2012-03-14

Vowel Quality and Language Contact in Miami-Cuban Spanish

Brandon M. Rogers
Brigham Young University - Provo

Vowel Quality and Language Contact in Miami-Cuban Spanish

Brandon Michael Apffel Rogers

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Arts

Scott M. Alvord, Chair
Willis C. Fails
Robert N. Smead

Department of Spanish and Portuguese

Brigham Young University

April 2012

ABSTRACT

Vowel Quality and Language Contact in Miami-Cuban Spanish

Brandon Michael Apffel Rogers
Department of Spanish and Portuguese, BYU
Master of Arts

The current study investigated vowel quality in Miami Cuban Spanish, looking specifically at the influence of English on the Spanish vowel system. The vowel production of eleven Miami Cubans from three generations is investigated. Subjects include six males and five females. Three different elicitation instruments were used. The first was a brief sociolinguistic interview, the second was a story that the participants were asked to read aloud. Carrier words were embedded into the story in order to obtain multiple samples of both stressed and unstressed vowels. For the third instrument, subjects were asked to read a list of words with careful attention to their pronunciation. The reading list contained the same words that were embedded in the story of the first task. These three instruments were repeated in both Spanish and in English in order to investigate possible English influence in the Spanish vowel system of these bilinguals.

Keywords: Vowels, vowel reduction, centralization, formants, generation, Miami-Cuban, task type, contextual formality, stress, context, mixed model.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank Carmen and Nicolás who have had to constantly share me and the rest of their lives with this thesis and my other studies. Thank you for your love and patience; especially during the times when I was wound especially tight. I am forever grateful to my thesis chair, Scott M. Alvord, for entrusting me with this project and for all of the countless time he has set aside to guide me and to help me not only put this current project together, but also to navigate the landscape of academia. I would also like to express my gratitude to the other members of my thesis committee, Willis C. Fails and Robert N. Smead, for their time and their invaluable feedback. Finally, thank you to the countless faculty in the numerous departments who have in their own ways helped shape me during my time at BYU.

List of Tables

List of Figures

Contents

Introduction

Spanish has had a presence in the United States for many years and has become more and more common and prominent in the US. According to Lipski (2008) "On a worldwide scale, the United States is home to the fifth largest Spanish-speaking population and well on its way to fourth place" (p.1). According to the 2010 US Census, the overall Hispanic population in the United States grew by 10 percent, from 35,305,818 to 50,477,594, between 2000 and 2010. Every country that makes up the Spanish-speaking world is represented in the United States with the three largest groups being Hispanics from Mexico, Puerto Rico, and Cuba respectively (Lipski 2008 pp.8-9). According to Alvord (2006), of these major groups of Hispanics residing in the US, Cuban Spanish, spoken mainly in Miami, is the variety that has been the least studied (p.1). Cubans make up 3.5 percent of the total Hispanic population in the United States. According to the 2010 Census the Hispanic demographic makes up close to 23 percent of the total state population of Florida. The Cuban demographic is the largest Hispanic group in Florida, with a total statewide population of 1.2 million, which translates to approximately 9 percent of the entire state population (United States Census 2010).

The studies that have been done regarding Miami-Cuban Spanish have mostly been sociolinguistic studies dealing with the maintenance and loss of Spanish in favor of English within the Miami-Cuban community (Alvord, 2006, p.1). Very few phonological studies regarding the Miami-Cuban variety of Spanish have been done when compared to the number of similar studies done regarding other varieties of Spanish in the United States, such as Mexican Spanish. The phonological studies on Cuban and Miami-Cuban Spanish have almost all focused on the consonants of these varieties of Spanish and not the vowels. The focus of this study was

on vowels and vowel quality in Miami-Cuban Spanish. The following research questions guided the present study.

1. Is there evidence of unstressed vowel centralization in Miami-Cuban Spanish?
2. Do Miami Cubans produce English-like vowels (e.g. /æ/ for /o/) in their Spanish?
3. Does Miami-Cuban Spanish vowel production vary by task type?

Chapter 1: Review of the Literature

A History of Cubans in Miami

In 1958 there were fewer than 250,000 Cubans living in all of the United States (López Morales, 2003). Up until 1958 the relationship between Cuba and Miami was almost entirely based on tourism and commercial factors (Lynch, 1999). Most of the immigrants who have arrived in the United States from Cuba have come in waves. The first major wave of Cuban immigrants came at the onset of the Cuban Revolution headed by Fidel Castro. From 1959-1962 the Cuban population in the United States nearly doubled as almost 250,000 political refugees fled the Communist regime of Castro. The second major wave began in 1965 and lasted until 1973. Unlike the first wave, which was characterized by a swift and sudden influx of Cuban immigrants, the second wave was maintained over a longer period of time bringing a steady flow of new immigrants to the United States from Cuba. During the second wave 297,000 more immigrants entered the United States on the "Freedom Flights" or "Vuelos de libertad" (Alvord, 2006). During the third wave, which lasted from 1973 until 1979, another 179,000 Cubans arrived in the United States from other countries, such as Spain, in which they had sought refuge during the Revolution (Alvord, 2006). In 1980 during the Mariel boat lift, thousands more refugees from Cuba arrived on US soil in a period of only five months and were allowed asylum in the United States (López Morales, 2003). Since the arrival of the *marielitos*, there has been a steady flow of *balseros*, or Cuban refugees who flee to the US on rafts, and other Cuban immigrants who have sought refuge in other countries, to the United States (Alvord, 2006).

As a result of this relative sudden influx of Cubans to the United States over the last 60 years, Miami is the first city of more than 2,000,000 people to have a Hispanic majority. For this

reason, Miami is known by many as the “Gateway to Latin America” and is a true bilingual city (Alvord, 2006). One of the principle causes of Miami's ascension to the status of a bilingual city is that Spanish has achieved a status that has given it almost as much prestige as English. Fernández (1983) states that during the earlier years of Cuban immigration to the US, Cuban Spanish seemed destined to fade out like the many other languages of previous immigrant groups. What has saved it in part, and led towards its maintenance, according to Fernández (1983), is the economic success of the Cubans in the US. As a result Spanish is a thriving language in Miami (Fernández, 1983). In Miami, Spanish enjoys a much higher level of prestige than it does in other Spanish-speaking communities in the United States (Boswell 2000). With regards to the status of Spanish in Miami compared to its status within other Spanish-speaking communities in the United States, Boswell (2000) says “especially in Miami, Hispanics are empowered both economically and politically. Thus speaking Spanish is not associated with the stigma of poverty and social disaffection in Miami to the same degree that it is in many other large American cities” (p. 423). Boswell also observed that in Miami there is a preference in the workplace for bilinguals with monolingual English-speakers being the next preference followed by monolingual Spanish-speakers. Lynch (1999) also observed the elevated status of bilinguals in the Miami working world. Miami-Cubans also enjoy a higher economic status than Spanish-speakers have traditionally enjoyed in the US (Boswell, 2000).

Despite this prestige that Spanish enjoys in Miami, Alfaráz (2002) notes that Miami-Cubans draw a sociolinguistic line down the middle of their variety of Spanish effectively dividing the Spanish they speak into two distinct varieties. According to Alfaráz, Miami-Cubans consider that their dialect can be divided into a “Cuba-Pre” variety and a “Cuba-Post” variety. “Cuba-Pre” refers to the Spanish that was spoken in Cuba before the Revolution and

consequently the Spanish that the immigrants in the first three waves spoke. “Cuba-Post” refers to the Spanish that emerged in Cuba in the years following the Revolution and is associated with those immigrants who have come in the more recent waves. According to Alfaráz, Miami-Cubans who speak both the “Pre” and “Post” dialects consider the “Cuba-Pre” dialect to be the more prestigious of the two. Alfaráz's conclusions show that the “Cuba-Post” dialect was not only given low prestige when compared with “Cuba-Pre”, but also in comparison to other dialects of Spanish spoken in both Latin America and Spain. She concludes that the main factor that contributes to the division of Miami-Cuban Spanish into “Cuba-Pre” and “Cuba-Post” is primarily political. Those who speak “Cuba-Pre” consider that “Cuba-Pre” disassociates them with the politics of the Revolution and the Castro Regime thus creating a certain level of solidarity amongst those speakers of “Cuba-Pre”. Those who speak “Cuba-Post” tend to be associated and grouped with the current politics and regime in Cuba (Alfaráz 2002). She also notes that race is a factor contributing to this division. The first Cuban immigrants were overall from the more affluent socioeconomic classes and tended to be lighter skinned. Those who stayed on the island and consequently came in the later waves were stereotyped as being those poorer Cubans who had more African ancestry. Alfaráz states that the “Cuba Post” variety is also considered to be more “anegrado” or black because the Spanish currently spoken in Cuba is more associated with those of African descent. Therefore, even though Spanish does in fact enjoy higher prestige in Miami than in other areas of the country, it still suffers a certain degree of stigmatism from its speakers.

As a bilingual city, in Miami Spanish and English are in contact on a daily basis. Because of this constant contact between the two languages, Cuban Spanish has and is continuing to undergo “heavy linguistic borrowing” (Fernández 1983). Much of the Spanish spoken by Cubans

in Miami now is not the same as the Spanish spoken by Cubans in the US before the Revolution. As stated previously by Alfaráz (2006), there are even sub-varieties spoken within the Miami-Cuban dialect. This change in the language cannot be attributed to one single factor, and a study of all of the possible contributing factors is beyond the scope of this paper. The focus of this paper is the extent to which variability of vowel quality is inherent in Miami-Cuban Spanish and how much is the result of contact with English.

Vowels and Human Language

Within human language, sounds can be divided up into consonants and vowels. Phonetically, consonants differ from vowels as sounds that are produced by some sort of obstruction of airflow as the air comes up from the lungs and out either the mouth or the nose. Vowels are produced with no obstruction in the vocal tract. According to Quilis and Fernández (1982) “Desde el punto de vista fonético, las vocales son los sonidos que presentan la mayor abertura de los órganos articulatorios” (p.47). Phonologically, vowels are differentiated from consonants, especially in Spanish, by the fact that they always form the nucleus of a syllable, while consonants, when present, are normally to the left or the right of the nuclear vowel of a syllable in either the onset or the coda (Quilis & Fernández, 1982 p. 47). Some languages like English can have syllabic nasals and liquids, while in Spanish, consonants traditionally are only located in either the onset or the coda of a syllable. With regards to the overall stability and quality of vowels, many different factors have been found to contribute to the production and variation of vowels in human language. Many times a reduction or a change in vowel quality is the result of the interaction of more than one factor.

English Vowels and Vowel Quality.

The vowel system of English has 11 vowels /i ɪ e ɛ æ ɑ u ʊ o ɔ ʌ/ three diphthongs /aɪ̯, æu, oɪ̯/, one triphthong /juɪ̯/, and is much more complex than its Spanish counterpart. Although not completely the same, English has vowels that share similarities with the five traditional Spanish vowels (/i/, /e/, /u/, /o/, /a/) as well as lax counterparts (/ɪ ɛ æ ʊ ɔ/) for each of the five. The lax vowels are more centralized than their tense counterparts, which can be seen by the fact that acoustically they have lower F2 values than their respective tense partners. The symbols [ɨ] and [ʉ] are used to represent centralized high vowels that lie between the high vowels /i/ and /u/ while [ə] and [ʌ] are used to represent mid central vowels sometimes referred to as schwa (Ladefoged, 2006, p. 216). According to Miller (1981), centralization and vowel reduction are, when the normal formant frequencies of a vowel produced in isolation are not achieved thus resulting in an overall reduction of the vowel space. In languages, such as English, that have schwa in their vocalic inventory, some or all other vowels may or may not be subject to reduction. This creates situations in these languages in which their vowels can be in complementary distribution. It is important to note that the term “reduction” is not implicative of always reducing to schwa. Vowel reduction is better defined as a directional change in the quality (height, frontness, backness, rounding etc.) of a vowel that causes the vowel to follow a trajectory to a more centralized point within the respective vowel space.

Delattre (1969) experimented with vowel reduction in French, English, Spanish, and German. His data are also based on recorded laboratory speech of informants who read one set of words in which the target vowels were stressed and another set in which the same target vowels were unstressed. After recording the data, Delattre made spectrograms of each recording and

measured the first two formants of each target value in each of the four languages. Delattre found in his comparison of vowel reduction in the four languages that English had the highest rate of vowel reduction at 17.78% of all tokens. He gives several possible motives for vowel reduction. First, he attributes reduction to the assimilation of vowels to surrounding consonants and also indicates that stress is one of the factors that can lead to vowel maintenance or reduction: The weaker a vowel, or the less stress a vowel receives, the greater the likelihood that it will be reduced–especially in languages such as English (Delattre, 1969, p.297). Delattre also states that a correlation exists between duration and vowel reduction. According to Delattre vowel reduction is also a possible result of English being a language with polysyllabic rhythm consequently making it more prone to vowel reduction. The stressed syllables in a polysyllabic language have a longer duration than unstressed syllables, as opposed to monosyllabic or syllable-timed languages in which stressed and unstressed syllables have more or less the same duration. Miller (1981), like Delattre, also finds that surrounding consonants can contribute to vowel reduction, "Due to coarticulation, vowels embedded between consonants often fail to reach their targets, and are often assimilated toward the vowels of the surrounding consonants" (Miller, 1981, p.42).

Magen (1997) sought to see if it was possible to describe and predict the effects of coarticulation between phonemes and across phonemic boundaries. According to Magen, coarticulation is defined as "the articulatory or acoustic influence of one segment or phoneme on another". She talks about two different types of coarticulation: carry-over and anticipatory. Carry-over is when one or more of the qualities of one phoneme affect the qualities of a following phoneme in a speech segment. Anticipatory effects are when a previous phoneme anticipates the articulation of a following phoneme and actually alters some of its qualities so

that they are more similar to those of the following phoneme. For example, /i/ has a high F2 and a low F1 while /a/ has a low F2 and a high F1. So if /i/ affects /a/ then the expected result would be a lowering of the /a/ F1 and a raising of the /a/ F2, while the opposite is expected if /a/ affects /i/. Magen's study showed a wide variety of results, probably due to the fact that her informants were from different parts of the United States. All were native speakers of United States English: two were from Detroit, one from Philadelphia, and another was from western Massachusetts. Each subject was asked to pronounce nonce words structured as/ bV1əbV3b/, with V1 and V3 being either /i/ or /a/. The purpose of this was to see if coarticulatory effects could carry over multiple intervening elements such as vowels and consonants. What she found is that the coarticulatory effects extended from V1 to V3 and from V3 to V1, in other words, she found both anticipatory coarticulation and carry-over coarticulation. She observed that the effects that she found lasted longer and began sooner than previous literature has indicated. In one case she found that anticipatory effects of /a/ when /a/ was V1 were found as soon as the onset of /a/. As far as the frequencies of carry-over and anticipatory effects in the speech of her informants, she found that carry-over coarticulation manifests itself much more than anticipatory coarticulation in some speakers, while the opposite was true for other speakers and concludes that this variation was mediated by stress. The most important result of her study was that coarticulation occurs much more than previously believed.

Miller (1981) also cites that rate of speech is also a possible factor in English vowel reduction, “There is little doubt that changes in speech tempo alter the temporal characteristics of the vowel nucleus of a syllable in predictable ways” (Miller, 1981, p.51). This, in part, agrees with the assertion of Quilis and Fernández (1982) that the intensity of English vowels weakens throughout the course of their production, sometimes leading to changes in the places of

articulation of the lips and tongue thus altering the quality of the original vowel.

Fourakis (1991) analyzed the role of tempo, stress, and context in English vowel reduction. He concluded that on a phonological level reduction occurs with no regard to tempo or context and is based on stress. According to Fourakis, on a phonetic level, reduction seems to be largely due to context. He found that tempo and stress, while they do play a role in English vowel reduction, aren't as prominent in the overall reduction process. He also states that in English, while some vowels on a phonological level may be exempt from vowel reduction, on the phonetic level no vowel is completely immune from the possibility of reduction.

Vowel quality varies greatly in English. As the previously cited studies suggest, many different factors cause a speaker or a speech community to alter their individual and overall vowel quality. However, it has been known for a long time that English reduces and centralizes its vowels. On the other hand, Spanish has traditionally been considered to show little if any variation it its vowel space.

Spanish Vowels and Vowel Quality.

Traditionally, Spanish has five contrastive vowels /i/, /u/, /e/, /o/, /a/: two high, two mid, and one low. According to Navarro Tomás (1957) roughly 50% of all phonetic material in Spanish is made up of vowels, even though there is a much larger inventory of consonants in Spanish (Navarro Tomás, 1957). Regarding the stability of the Spanish vowel system, Navarro Tomás asserts,

> El timbre de las vocales españolas es ordinariamente invariable desde el principio al fin de cada sonido. Las vocales cerradas francesas suelen citarse en este sentido como ejemplo de fijeza y uniformidad. Las vocales españolas, cerradas o abiertas, se hallan

muy cerca de ese mismo carácter. (p.43)

However, Navarro Tomás also affirms that Spanish has “vocals reducidas” or “reduced vowels” when stress is absent. This affirmation is also an acknowledgement that stressed vowels differ in quality from unstressed vowels.

Quilis and Esgueva (1983) performed a spectrographic study on the vowel quality and formants of native, male, speakers of Spanish who spoke both Latin American and Peninsular varieties of Spanish. Bradlow (1994) examined the vowels of five speakers of Peninsular Spanish. Based on the data from both studies the Spanish vowel system is shown to have a high level of stability. The one exception between the two data sets is the distribution of /u/. Quilis and Esgueva report /u/ being more posterior, while Bradlow's data indicates that /u/ is slightly more fronted. Nevertheless, the differences are slight as both data sets produce the traditional inverted triangle model for Spanish vowel distribution. Despite Navarro Tomás’ previous assertion that stressed and unstressed vowels differ in quality, neither Quilis and Esgueva nor Bradlow took stress into account when calculating the means of their vowels tokens. Instead, they included stressed and unstressed tokens into the averages of each vowel. This reflects the overall general acceptance on more or less a universal level that Spanish vowels are stable and that their variability, if there is any at all, is negligible at best.

To illustrate the high level stability of Spanish vowels and further support Navarro Tomás’ assertion, Quilis and Fernández (1982) compare the vowel system of Spanish with that of English, which traditionally has much more variation amongst its vowels than Spanish. The example of variation they use is diphthongization. When English speakers try to pronounce /e/ and /o/ they have to make a considerable effort to avoid diphthongization and many times /e/ and /o/ are rendered as [e̯i̯] and [o̯u̯]. On the other hand, according to Quilis and Fernández “en

español el timbre [de estas vocales] se mantiene fijo desde el comienzo hasta el final (Quilis & Fernández, 1982, p.59). Diphthongization is a form of vocalic variability because the initial vowels, in this case /e/ and /o/, phonetically, do not finish the way they started. In other words, their quality is altered as they are being produced. This phenomenon is also known as "off gliding". Quilis and Fernández attribute this to the fact that in English the intensity of the vowel weakens as it is produced and English speakers close their mouth more towards the end. On the other hand, according to Quilis and Fernández, the intensity of Spanish vowels increases as they are produced thus maintaining their quality from beginning to end. According to Whitley (2002), /e/ and /o/, along with /i/ and /u/ are pure vowels or monophthongs in Spanish. In other words, similar to what Quilis and Fernández assert, /i e o u/ are articulated with steady and relatively unwavering tongue and lip positions, while in English diphthongization can occur because the tongue and lip positions of an English speaker are prone to change position during the articulation of /i e o u/. Delattre (1969) and Skelton (1969) confirm this assertion. They found that the high back vowel /u/ was among the most stable in Spanish. In their separate studies they found that /u/ generally maintained its high back position. Such is not the case with English /u/. As previously noted, English /u/ can vary in stability and quality. It also has a different vowel space than Spanish /u/. Labov (2006) notes that in over 90% of the United States /u/ has undergone a forward shift. This means that the Spanish vowel, while represented by the same symbol, has lower F2 values than the English /u/. Consequently, the higher F2 values of the English /u/ cause its vowel space to overlap with the high front vowels resulting in tokens of the English /u/ that have a certain degree of I-coloring. Thus a /u/ pronounced with I-coloring in Spanish might not sound like a traditional Spanish /u/, and might contribute to some degree of foreign accent.

Delattre (1969) classifies Spanish as an intermediary language on the scale of polysyllabic and monosyllabic languages, inferring that Spanish is less prone to vowel centralization and/or reduction because it's stressed and unstressed syllables share more or less the same duration. Quilis (1999) with respect to centralization and reduction in Spanish states,

> Muchos trabajos, relativamente recientes, han puesto y siguen poniendo de relieve que, aunque lógicamente, en español, se producen realizaciones más o menos abiertas de cada fonema vocálica, el número de estas realizaciones para cada fonema es más bien reducido, con grados de abertura o cierre no muy grandes, y, sobre todo, que, *en condiciones normales, las realizaciones de los fonemas vocálicos españoles no se producen en distribución complementaria.* (p. 145).

In other words, variability such as centralization or reduction to schwa, don't exist in Spanish as they do in English.

> En el sistema vocálico español apenas si es posible hablar de *vocales relajadas*. Se realiza de este modo la que se encuentra en posición final del grupo fónico, cuando precede a una pausa, y aún así, suele conservarse netamente su timbre característico. (Quilis, 1999, p. 151).

Hualde (2005) reiterates that the vowel quality of Spanish vowels is highly stable and therefore the variation that exists in English vowels is virtually absent in Spanish. He attributes this stability to the simplicity of the Spanish vowel system when compared to the more complex and diverse vowel systems of other languages.

With the acoustic studies of Quilis and Esgueva (1983) and Bradlow (1994), and the studies examining Spanish vowel quality and pronunciation (e.g. Navarro Tomás 1957, Quilis & Fernández 1982, Quilis 1999, Whitley 2002, Hualde 2008) it would appear that the stability of

Spanish vowels is unquestionably strong, leaving little or no room for variation. In fact, invariably when native and non-native speakers of Spanish are taught about Spanish vowel quality, the overwhelming majority of students are taught that Spanish is limited to just five contrastive vowels that do not vary. Despite this, there are several studies that show that, on different levels, variability does in fact exist in the Spanish vowel system.

Skelton (1969) analyzed the laboratory-recorded speech of 20 native speakers of Spanish from both Spain and Latin America. He asked each informant to pronounce 12 instances of each of the five Spanish vowels. The environments and conditions of stress on all of the vowels in his experiment conformed to the same environments and conditions in the studies of Navarro Tomás (1957). Skelton's results show that the majority of utterances of each vowel gravitate around the mean values for each value. His results also show a small number of utterances that move away from the central point. Some of these utterances that are moving away from the central (mean) point show a movement towards the center of the vowel space, suggesting slight centralization.

According to Delattre's (1969) study on vowel reduction in English, French, German, and Spanish, he found that Spanish had a slight (3.65% of all tokens analyzed) rate of vowel reduction. Based on the charts that Delattre provides, the reduction that he found in Spanish appears to be slight centralization of all unstressed vowels, with the mid vowels /e o/ and the low vowel /a/ showing the greatest propensity to centralize. The centralization that Delattre's data shows is very slight and it is questionable whether the centralization he observed would have been perceptible.

Lope Blanch (1972) observed the reduction in duration of unstressed vowels in Mexican Spanish. He states that sometimes the reduction of unstressed vowels in Mexican Spanish leads to their complete deletion from an utterance. He rates the reduction of Mexican unstressed

vowels on a four-point scale, with one being a complete elision of the vowel and four being a slight reduction. The results of Blanch's study are intriguing because they show a greater amount of reduction and variability than Skelton (1969) and Delattre (1969). What is problematic with Blanch's study is his methodology because he used no laboratory equipment to evaluate the data he collected, rather he opted to analyze his data using solely his perception of the quality of the vowels he rated. What is needed to further strengthen Blanch's claims are acoustic studies that produce empirical evidence of vowel variation and deletion in Mexican Spanish.

Hundley (1983) did research regarding vowel weakening and complete vowel deletion in Andean Spanish of a Peruvian speech community. He targeted vowels in both slow and fast speech and found that in fast speech both vowel reduction and deletion occurred. He concludes that vowel reduction and deletion are due to both linguistic and extralinguistic factors. In his conclusions he says in both cases of weakening and deletion the main linguistic factor that causes both phenomena in Andean Spanish is the consonantal environment surrounding the vowel. He lists geographic region, social class, and rate of speech as his nonlinguistic factors that contribute to vowel reduction and weakening in the dialect he studied.

A breakthrough study on Spanish vowel quality is that of Harmegnies and Poch-Olivé (1992). They observe that many of the studies on Spanish vowel quality (Delattre 1969, Skelton 1969, Quilis and Esgueva 1983, Bradlow 1994) “have been based upon laboratory speech samples” (Harmegnies & Poch-Olivé, 1992, p.430). “Our aim is clearly to determine whether certain speech sounds – Spanish vowels – are influenced by a specific independent variable: speech style” (Harmegnies and Poch-Olivé, 1992, p. 430). They compared spontaneous and laboratory speech samples of two native Spanish speakers using lists of target words from previous recorded spontaneous conversations. What they found was significant variation between

vowel productions in the context of spontaneous speech when compared to laboratory speech.

The results agreed with the results of Skelton (1969) with the majority of the vowel formants of the laboratory data gathering around a central focal point, with a decreasing number fanning out from the focal point. Like Skelton's results indicate, some of the vowels that fan away from the central points are centralized. The laboratory data also agrees with Delattre's (1969) results. The high vowels underwent the least amount of centralization, while the mid and low vowels underwent centralization to a greater degree. The spontaneous speech data was what was most intriguing. High levels of variation occurred in the form of extensive mid and low vowel centralization. Once again, in agreement with Delattre's results, the spontaneous high vowels suffered the least amount of centralization, even in spontaneous speech. However, it must be noted that variability occurred in the productions of all of the vowels in the study. The results show a clear difference between vowel quality in laboratory and spontaneous speech samples, which contradicts the assumptions made by Navarro Tomás (1957) and later supported by Quilis and Fernández (1981), Quilis and Esgueva (1983), Quilis (1999), Whitley (2002) and Hualde (2008), that the Spanish vowel system is highly stable and undergoes little if any variation. It would appear that in the context of spontaneous speech, the Spanish vowel system has a degree of inherent propensity to reduction. Willis (2005) in part basing his study on Harmegnies and Poch Olivé's results, also found centralized vowels in the spontaneous speech of speakers of Southwest U.S. Spanish, further confirming the variability of Spanish vowel quality in spontaneous versus laboratory speech. What is not known at the end of Willis' study is the extent of the influence of English on the centralization of Southwest Spanish vowels.

Phonological Studies on Cuban Spanish

Compared to other dialects of Spanish, there have not been as many phonological studies

or research done on Cuban and Cuban-American Spanish. Those that have been done have focused mainly on phonological phenomena having to do with the consonants. Varela (1974) studies and explores the lexical and syntactic influences of English on Cuban-American Spanish and (1983**)** further explores the influence of English on Cuban American Spanish. One such feature Varela (1983) mentions is the apparent Cuban-American tendency to distinguish between English *w*- [gw] and *wh*- [hw] (i.e, welfare > güélfer, What's the matter? >¿Guasimara?) (p.63). Ramírez (1992) states that there are four main phonological characteristics of Cuban-American Spanish that distinguish it from other varieties: word final aspiration of /s/, deletion of /r/ and gemination of the following consonant (i.e /vedde/ in place of /verde/, {verde}), epenthesis of /s/ *fuistes* instead of *fuiste*), and metathesis in segments like *delen* instead of *denle*. Lipski (2008) lists the following as characterizing features of Cuban-American Spanish phonology: a weak [h] pronunciation of [x], velarization of [n] in word final position, neutralization of word and syllable final /l/ and /r/ (i.e. rhotacism and lambdacism), aspiration and elision of [s], and rhotacism and lambdacism in preconsonantal position. Lipski also states that in Cuban speech there is devoicing of the trilled r and even preaspiration [hr] of the trill "[giving rise to] a sound that is trilled throughout its entire duration, but in which voicing is delayed or totally suppressed" (Lipski, 2008, p.111). He never specifies if this preaspiration applies categorically to both the trill and the tap, or if it is strictly limited to the trill. Hammond (1979) observed that in Cuban Spanish /n/ could appear as [ŋ] in any phonological context, especially in "absolute final" position. Terrell (1979) and Hammond (1980a) examine the processes of aspiration and elision of /s/ in Cuban Spanish. Fails (1984) analyzed the phonetic and phonological properties of the consonants of educated speakers in Havana, Cuba. He found voicing of the intervocalic voiceless obstruents /p/, /k/, /s/, and /x/, phrase final devoicing of /d/, /l/, /R/, and /N/, aspiration of word

final /R/ and /s/ with aspiration of /s/ be substantially greater than that of /R/, progressive gemination of /l/ and /R/ when preceding /p b t d m n l/, deletion of consonantal phonemes, voicing of /s/ before voiced consonants, and nasalization of vowels to the point where the nasal causing the nasalization is deleted. Alvord (2010) examines the effect of English contact on the intonation of Miami-Cuban bilinguals. He specifically investigated the two different absolute interrogative intonation patterns that were found to be in contact: the pattern which known to exist in Cuban Spanish in which the final contour falls, and the pattern in American English where the final contour rises. He found that there was an intonational change from generation to generation and theat the two most significant factors influencing this change were that of immigrant group and the social networks of the individual speakers.

Varela's (1992) study on the phonology and vowels of Cuban-American Spanish is one of the better known phonological studies on Cuban-American speech and is unique because it analyzes vowels as well as consonants. In her study she recorded both spontaneous and laboratory speech of 25 Cuban-American informants ranging from 14 to 80 years of age. The group consisted of members of a varied number of socioeconomic and backgrounds with varied levels of formal education and who were born either in Cuba or the United States. She states that she observed several phonological phenomena regarding the vowel quality of the Spanish vowels of her informants and she attributes these phenomena to the influence of English. One of the most outstanding of her findings is that of vowel reduction of unstressed vowels in native Spanish words to /ʌ/ or /ə/ (e.g [vʌ.vir] [*sic*] for *vivir*, [sʌ.gien.tə] [*sic*] for *siguiente*, and [məl.tʌ.plʌ.kár] [*sic*] for *multiplicar*). According to Varela, for *vivir* only eight of her informants reduced the unstressed Spanish /i/, but 15 of her informants reduced the unstressed vowels in *multiplicar,* and 20 of the informants reduced the unstressed vowels in *siguiente.* She states that

vowel reduction to schwa occurred 80% of the time in the speech of those she interviewed. Another phenomenon that Varela claims to have observed in the speech of her informants is the diphthongization of stressed vowels. As examples, she gives /nów/ for *no* and /ta.búw/ for *tabú.* The most curious of Varela's assertions is what I will refer to from this point on as extreme fronting. She claims that as many as 14 of her informants pronounced the mid, back, rounded vowel /o/ as the low, front lax vowel /æ/. In her data she gives as examples of extreme fronting [præn.to] for /prón.to/ and [æk.tú.bre] for /ok.tú.bre/. She asserts that this highly unusual case of extreme fronting is a frequent phonological process in the speech of the Cuban-Americans that she interviewed, even though it does not occur as often as the previously mentioned process of vowel reduction. All of these findings are intriguing but several problems in her study stand out.

One issue with her study is that she states that the 14 of her informants that were most prone to vowel instability and variation were transitional bilinguals and therefore the phenomena exhibited in their vowel system are due solely to the interference of English. However, the term *transitional bilingual* is problematic, Lipski (2008) defines a transitional bilingual with regards to Spanish speakers as "individuals who consider themselves Latino and whose passive competence in Spanish is considerable, but whose productive competence may fall short when compared to that of fluent native speakers" (p. 56). Lipski continues,

> [T]here is usually a shift away from the minority language and toward the national/majority language within a single generation or two at most. The shift is signaled by a transitional generation of vestigial speakers who spoke the language in question during their childhood, but who have subsequently lost much of their native ability (p. 56).

Nevertheless, this traditional model and definition of *transitional bilinguals* has been questioned

and contradicted by others. Fishman (1991) observed,

> The *where* and *why* of language shift are necessarily intimately related, particularly so at the earlier stages of the shift process. The location of shift in the total sociocultural spaces of a speech community is an indication of just where the stresses and strains of cross-cultural contact have eroded the ability of the smaller and weaker to withstand the stronger and larger. However, social processes transpire along a time continuum, and both historical time and current time must be of concern to those who wish to fully understand language shift. (p.55)

Villa and Mills (2009) observed that the traditional linear model of language maintenance and shift is not the same in Spanish-speaking communities of the Southwestern United States where language can be maintained to the third and fourth generations. Villa and Mills observed that in these communities one of the main factors contributing to longer maintenance of Spanish was the constant influx of monolingual immigrants, which created a more circular model of language maintenance and shift. With regards to Spanish, Beaudrie (2009), basing her conclusions on Fishman's (1991) assertions says,

> [I]n the case of Spanish the rate of the downward patterns of language shift cannot be seen as a single descending line; rather, it should be conceived of as a variant path with ups and downs, largely dependent on the specific contextual, cultural, and socio-political reality of each community. (p.86)

The situation in the Miami-Cuban community is both similar to the situation observed in the Southwestern United States by Villa and Mills (2009) and unique. Since the Cuban Revolution, there have been influxes of Cuban immigrants into Florida, at times in large waves and at others in smaller but longer maintained waves (López Moráles 2003). In Miami, as

previously discussed, Spanish is a constant presence and has acquired a level of prestige that it doesn't enjoy in other Spanish-speaking communities within the US (Boswell 2000). This, along with the more or less steady addition of monolingual immigrants, is a contributing factor in language maintenance. With specific regards to Miami-Cubans, Lynch (2000, 2009) states that among second and third generation-speakers, bilingualism is the norm. He says that while for first-generation speakers, Spanish is a link back to Cuba, but for second and third-generation speakers it has "immense everyday social value". With regards to the continuum of bilingualism Lynch (2000) states "Recontact with the heritage language through Spanish-dominant social networks encourages young Miami-born bilinguals to maintain their Spanish skills." (p.273). In other words, in Miami Spanish doesn't proportionally diminish as the specific generation of a given speaker increases. While Lynch acknowledges that the clear dominant language of Miami-born Cubans is English, the social value of Spanish encourages these speakers to maintain the language of their parents and grandparents. Lynch (2009) elaborates

> "Spanish-English bilingualism is incontestably the social norm among US-born Miami Cubans, as they are often placed in situations of having or needing to use the language not only with family members and friends, but also in the broader social en economic context of Miami." (p.2)

Thus, labeling the language situation between English and Spanish in Miami as a linear progression toward an eventual shift to English is erroneous. A number of interactions between a gamut of social factors foster the coexistence of both languages.

In light of this more recent data regarding language maintenance and shift the term *transitional bilingual* in terms of Miami-Cubans becomes a bit nebulous. This brings into question Varela's (1992) assertion that those informants that she recorded as having been prone to

vowel reduction were transitional bilinguals and therefore the reason they were prone the recorded phonological processes was almost entirely due to the influence of English on their Spanish. Because Varela essentially places all of the 14 informants in question at the same point between language shift and maintenance, there is no way to know how dominant each of them was and how they compared to one another in terms of their individual capacities in Spanish. The relative steady stream of monolingual immigrants into Miami, along with the prestige that Spanish enjoys in Miami suggests that in Miami language maintenance and shift seem to follow the model proposed by Fishman (1991) and later by Beaudrie (2009) and Villa and Mills (2009), rather than a linear model. Thus, the role that English plays in influencing reduction of vowels among Miami Cubans may be more prevalent for some than it is for others. Interestingly enough, Flege and Bohn (1989) studied native Spanish-speakers' ability to acquire English stress placement and vowel reduction when learning English as a second language. What Flege and Bohn found was that the native Spanish-speakers learned English stress placement first. The ability of native Spanish-speakers to reduce English vowels was acquired much later. Also according to Flege and Bohn, removing the stress from vowels wasn’t enough for them to be able to reduce English vowels. This suggests that reduction of Spanish vowels in situations of Spanish-English contact is not entirely a result of phonological interference from English. What is not known is to what extent the variability Varela observed was because of inherent tendencies of Spanish to centralize in spontaneous speech as shown by Harmegnies and Poch Olivé (1992) and Willis (2005), and how much was due to contact with English.

Another problem that arises in her study is that, like Lope Blanch (1964), she reports no empirical data with her findings. Her classifications of her phonological data were done purely based on her own auditory perception of what she heard in her recordings. While her findings are

in fact interesting, in order to confirm them, empirical data is needed. In order to determine the phonological influence of English on Miami-Cuban Spanish, I intend to find out to what degree vowel reduction and extreme fronting may or may not inherently exist within Miami-Cuban Spanish. Once I have an idea about the influences of Spanish on the variability of the quality of its own vowel system, then I will be able to determine the extent of English's role in influencing Miami-Cuban Spanish phonology. The purpose of this study is to explore the Miami-Cuban vowels and their quality on a phonetic and phonological level and to determine how much Spanish and English both influence vowel variability in Miami-Cuban Spanish. As previously mentioned, the current study was governed by the following research questions:

1. Is there evidence of unstressed vowel centralization in Miami-Cuban Spanish?
2. Do Miami Cubans produce English-like vowels (e.g. /æ/ for /o/) in their Spanish?
3. Does Miami-Cuban Spanish vowel production vary by task type?

Chapter 2: Methodology

The current study gathered data from 11 Miami-Cubans. Of the 11 informants 10 were Spanish-English bilinguals, and one was a monolingual Spanish-speaker. Six were male and five were female. The speakers were from three generations based on Silvia Corvalan's (1996) categorization of generations of Spanish speakers in the United States. In other words, those that made up the first generation were born in Cuba and immigrated to the US after the age of 11; those that were born in Cuba and immigrated to the US before the age of 6 or were born to at least one parent from the first generation made up the second generation; and those born to at least one parent of the second generation belonged to the third generation.

The first generation was comprised of two males and one female. A second first generation female had to be excluded because she had a cold and was congested, consequently altering her acoustic data. The second generation was made up of two males and three females and the third generation consisted of one male and two females. Each speaker, with the exception of the monolingual first generation speaker, was recorded doing 3 tasks in both Spanish and English, for a total of 6 tasks per speaker. The monolingual first generation speaker performed only the Spanish tasks. Each task varied in its formality. The most formal of the tasks in both languages was the word list. Each speaker was told to read the word list, paying special attention to pronunciation. The second task was less formal than the first. Each speaker had to read a story aloud, in both languages, and afterwards had to answer comprehension questions regarding the nature of each of the stories. The purpose of the comprehension questions was to get the participants to focus on the content and consequently make the task less formal than the reading list. The final task was a sociolinguistic interview eliciting spontaneous speech and was the least formal of all the tasks. This specific methodology follows specific methodology as discussed by

Labov (1997) in an effort to compare the differences between more and less formal speech.

The tasks were recorded digitally with a Marantz PMD 671 digital recorder at a recording rate of 44.1 Khz. The F1 and F2 values were taken from the mid-point of each vowel using PRAAT. In total 9130 Spanish vowels and 4634 English vowels were analyzed for an overall total of 13,764 vowels. To account for speaker differences all vowels were normalized using Thomas and Kendall's (2007) NORM vowel normalization and plotting suite. The method chosen was the Nearey 1 method of normalization:F*n[V] = anti-log(log(Fn[V]) – mean(log(Fn))), where F*n[V] is the normalized value for Fn[V], formant n of vowel V, and mean(log(Fn)) is the log-mean of all Fns for the speaker in question. After normalization, a mixed model analysis comparing the effects of stress, generation, and context was individually run on each formant for each vowel. Individual plots were made for each speaker's overall Spanish and English vowel space. Spanish vowel plots were made for stressed and unstressed vowel spaces, and contextually based vowel spaces. Plots were also made for the combined vowel space of all the speakers in the study, and the combined vowel spaces of each generation. Finally an overall plot was generated to show the varying vowel space of all speakers based on task type.

Additionally each participant filled out a background questionnaire that elicited several things. First they were asked to indicate not only information needed to determine what generation they belonged to, such as place of birth and if necessary, age of immigration to the United States. Also, they gave information regarding places of birth of parents and grandparents. In addition to this they indicated the age when they began acquiring both Spanish and English and if they used Spanish in different everyday situations. Finally, at the end of each questionnaire there was a language use survey, which was used to determine how much they used Spanish in

different contexts and environments. For the usage survey participants had to answer using a numbered scale from 1-5. An answer of 1 meant that they always did the task in question and 5 meant that they almost never, or never did that task. There was also an option labeled “na” for “not applicable”. Such tasks included speaking to family members, coworkers, and superiors in Spanish, along with praying, reading, and watching movies in Spanish.

Generation 1

Speaker 1006

Speaker 1006, a male born in Cuba, immigrated to the United States at 32 years of age. He reported that Spanish was his native language and that he started learning English when he was six. However, he reported that he didn’t start using English until he was around 23 years old. He also reported that the main language he used during his daily interactions was Spanish.

The usage survey confirms what he reported regarding his daily usage of Spanish. For most of the questions that he had to answer, his answers indicated that he almost always used Spanish for the tasks in question. However, the elicitation tasks showed him to be mostly monolingual with very limited English skills.

Speaker 1012

Speaker 1012, a male born in Cuba, immigrated to the United States when he was 18 years old. Spanish was his native language and he began learning English when he arrived in the United States. He reported that he spoke mainly Spanish in the work place, at weekly church services, and amongst his friends.

The usage survey reported that he used mainly Spanish for interactions within and outside of the home. He did indicate that he read, listened to the radio and watched movies and television

more in English.

Speaker 1013

Speaker 1013, a female born in Cuba, came to the US when she was 27. Out of the three first generation participants, she was the most fluent in English. She reported that Spanish was her native language, but that at the age of five she began to learn English in school. She indicated that she spoke mainly Spanish at work and amongst friends. However, she also stated that she was part of an organization that rescued abandoned cats and that the majority of those making up the membership of that organization were Americans.

Although her answers for the usage survey indicate that the language she used the most was Spanish, unlike the other two first generation participants, she reports greater usage of English. For example, she indicated that she preferred most of her media to be in English. She indicated that she spoke mostly Spanish with her grandparents, but that she spoke a good balance of both Spanish and English with her children in the home. However, outside of the home, she stated that she spoke almost exclusively Spanish with her children. She also indicated that she spoke a good balance of Spanish and English when she prayed, dreamed, and thought out loud.

Generation 2

Speaker 1005

Speaker 1005, a male, was born in the US to first generation parents. His dad came to the United States when he was 19 and his mom when she was 10. He reported that he began acquiring both English and Spanish at the same time and therefore would be categorized as a simultaneous bilingual. However, from what he reported, it can be concluded that for him the use of Spanish and English is a diglossic relationship. He reported that he exclusively spoke English

at work and among friends and that he sometimes spoke Spanish to his neighbors. He also reported that he was involved with a Spanish speaking church congregation three to four times a week. However, it was not clear from the data how much he used Spanish each time he associated with the congregation.

The data he reported for the usage survey further confirms the diglossic relationship that his English and Spanish shared. He reported that he almost exclusively preferred English language media. Also, he reported that he spoke almost all English with his younger sibling and his mother, while always speaking Spanish with his grandfather his father. He reported that for almost all of his activities outside of the home he used English. However, he reported that he frequently attended church services in Spanish and that he prayed almost exclusively in Spanish. What his reported data indicates is that even though he reported himself as a simultaneous bilingual, he heavily preferred English for most of his daily activities in and out of the home. However, on the other end of the spectrum, he reported a heavy preference for Spanish when speaking to his father both in and out of the home, when speaking with his grandfather, and when involved in religious activities.

Speaker 1010

Speaker 1010, a female, was born to a first-generation father and a borderline second-generation mother. She reported that she started acquiring Spanish slightly before she began to acquire English. However, she began acquiring both at a very early stage of her young childhood. In the general background information she reported that she spoke Spanish at work and with her friends. She also indicated that she was involved with a religious organization twice a week.

The data she provided for the usage survey is very similar to Speaker 1005, in that it indicates that her Spanish and her English had a diglossic relationship. She had a heavy preference for English media, but almost exclusively preferred Spanish when talking to her grandparents and her father. However, she did indicate that heavily preferred talking with her mother in English when in public and that she spoke almost exclusively in English to her younger sister. Also, like Speaker 1005, she indicated that she attended worship services exclusively in Spanish, and always prayed in Spanish.

Speaker 1015

Speaker 1015, a male, was also born to a first-generation father and a borderline second-generation mother. He indicated that he began to learn both languages at the same time. He reported that he spoke Spanish both at work and with friends.

Speaker 1015 was unique when compared to the other speakers of the latter generations because he reported in both the usage survey and the interview that he made a concerted effort to use Spanish as much as possible on a daily basis. For almost all of the questions in the usage survey he reported an exclusive preference for Spanish. In the interview he talked about how he was the head of a student-run political club that was working for a “free Cuba”. Although he had never been to Cuba, he exhibited a great amount of national pride and patriotism for Cuba and talked about how he listened exclusively to Cuban-run and Cuban-themed radio transmissions. To him, speaking Spanish was more of a source of pride than it appeared to be for the other second-generation speakers.

Speaker 1016

Speaker 1016, a male, was born in the United States to a first-generation father and a second-generation mother. He reported having begun his acquisition of Spanish before he began acquiring English. However, both ages of acquisition were during at very early stages of his childhood. He indicated that he did not speak Spanish at work and that most of the people he interacted with at work were Americans. However, he also reported that he Hispanic friends with whom he spoke Spanish.

The data he provided in the usage survey reflects many of the same tendencies exhibited by Speakers 1005 and 1010. He reported a strong preference for English language media and siblings. In fact, he indicated that he spoke mostly English with his parents as well, which in part strays from what Speakers 1005, 1010, and 1015 reported. Despite his reported tendency to speak English with family members, he reported that he frequently spoke Spanish to friends. Also, he stated that he almost exclusively spoke Spanish with his grandparents.

Speaker 1020

Speaker 1020, a female, was born to a first-generation mother. Based on the data provided in the background questionnaire, it wasn't apparent whether her father belonged to the second or the third generation. The only thing she reported was that he was born in the United States. She indicated that she began acquiring English and Spanish at the same time. She reported that she spoke Spanish at work and with friends. It merits mentioning that in the interview and the questionnaire she revealed that she worked with monolingual Spanish speaking students in an ESL class.

Based on the reported data in the usage survey, she showed a strong preference for

Spanish, although not as strong as Speaker 1015. For almost all of the questions she reported that she usually opted for Spanish in place of English. However, she did report an almost exclusive preference for Spanish when discussing politics, dreaming, and talking to her father in public places.

Generation 3

Speaker 1001

Speaker 1001, a female, was born in the United States to two second-generation parents. She reported that she began acquiring both English and Spanish at a very young age. She reported speaking Spanish at work but indicated that she didn't speak Spanish with her friends since they were American.

Based on the answers she provided on the usage survey, she had a strong overall preference for English. She indicated that she preferred to speak Spanish more with her mother than with her father. She also indicated that she preferred English-language media, even though she answered that she listened to the radio in Spanish to a greater extent than in English. Also, much like the second-generation speakers, she indicated that she spoke almost exclusively in Spanish to her grandmother. She also reported an exclusive use of English when she attended church, dreamed, prayed, and thought out loud. It merits mentioning that she reported speaking to her sisters almost exclusively in Spanish when in the home, but then indicated that when she spoke to them in public she usually did so with a more or less equal balance of both languages.

Speaker 1014

Speaker 1014, a female, was born in the United States to a second-generation father. The information she provided did not make clear whether her mother was first or second generation.

She indicated that she had acquired both Spanish and English simultaneously. She also reported that she spoke Spanish both at work and with friends.

According to the data that Speaker 1014 reported in the usage survey, she showed the most balance with her daily usage of both languages of all of the third-generation speakers. She reported that she mostly spoke Spanish with her mother and her grandmother while reporting that she spoke a good balance of both languages with her sisters. She also reported that she spent much of her free time with other Spanish-speakers while stating that she spoke a good balance of both languages with her friends. Finally, she reported that she watched, read, and listened to a good balance of both Spanish and English-language media.

Speaker 1021

Speaker 1021, a male, was born to two second-generation parents. He indicated that he began learning both languages between ages one and three. He reported that he spoke Spanish both at work and with friends.

Based on the data he reported in the usage survey his Spanish and English appeared to have a diglossic relationship. He indicated that he used Spanish the most when he spoke to his grandparents and that at work he used both to more or less the same extent at work. When speaking to his parents, he reported that he used mainly English. His media preferences were mainly for English-language media. He also reported that he rarely spent time with other Spanish-speakers, but that when he did he frequently mixed Spanish and English.

Chapter 3: Results

As previously mentioned, both the F1 and F2 values for each vowel were analyzed individually for each vowel. F1 values reflect the height of a vowel while F2 values reflect the frontness or backness of a vowel. In other words F1 variation moves vowels along a vertical trajectory while F2 variation moves vowels along a horizontal trajectory. Higher F1 values are the result of the tongue occupying a lower position in the oral cavity during production and consequently yield lower vowels. When the tongue elevates, F1 values decrease, and vowels are raised. Higher F2 values are the result of the tongue moving forward within the oral cavity during production and result in more fronted vowels. As the tongue makes its way backward in the oral cavity, F2 values decrease and vowels become more backed.

Stress, generation, and context were analyzed to determine their effects on the F1 and F2 values of the Miami-Cuban participants of the current study. As a result, this section analyzes each vowel individually, breaking it down into two separate analyses of each formant. Due to the normalization of the vowels using the Nearey 1 method, the units of measurement used in the current study are referred to as “normalized height” and “normalized advancement”. A greater value for “normalized height” results in a lower overall production of the vowel in question. Lower values for “normalized height” result in higher productions of a specific vowel. Higher values for “normalized advancement” result in more fronted vowel productions. Conversely, lower values for “normalized advancement” result in more backed vowels. With relation to overall tongue position, higher normalized height values indicate lower overall tongue position, and higher normalized advancement values are indicative of a more fronted overall tongue position.

Values for the first formant of the Spanish high front vowel /i/

The overall values for the first formant of the high, front vowel /i/, are initially shown divided up according to generation without separating averages by stress and task type. Table 1 shows the overall means.

Generation	Mean
1	.775
2	.796
3	.789

Table 1: Overall normalized generational height means for vowel /i/

According to the averages on Table 1, Generation 2 had the overall highest F1 mean for /i/ while Generation 1 had the lowest. These specific averages indicate that overall the second generation produced higher /i/'s, while the first generation speakers had the overall lowest tokens of the high front vowel. The averages for the third generation fell in between the second and first generation averages. Nevertheless, no real dependable conclusions can be drawn from the overall averages because these means include all instances, regardless of context or stress. To better understand the role that each factor played on the height of /i/, the results are broken down according to stress, generation, and context. Table 2 illustrates the results of the mixed model analysis for the first formant of /i/.

Factor	Sig.
Stress	.367
Generation	.001
Context	.000
Stress*Generation	.008
Stress*Context	.597

Table 2: Mixed effects for F1 of /i/

*Stress F(1,1316)=.814, p<.05 , Generation F(1, 1316)=7.080, p<.05 ,Context F(1,1316)=20.576, p<.05, Stress*Generation F(2, 1316)=4.487, p<5, and Stress*Context F(2, 1316)=.516, p<.05.*

According to the results of the mixed effects analysis for the height of /i/ the overall influence of stress on the F1 of /i/ was not significant. Yet, a significant main effect was found for the interaction between stress and generation within the parameters of each specific generation. Also, a significant main effect was found for both generation and context in relation to the overall height of /i/. Despite stress not achieving overall significance, the overall means for stressed and unstressed /i/ were in fact different. Also, it is worth noting that the stressed mean was higher at .785. The unstressed F1 for /i/ was slightly lower at .778.

When looking at stress within each generation ($F(2, 1316)=4.487$, $p<5$) in the mixed model analysis, the difference between stressed and unstressed tokens then achieved levels of statistical significance. Table 3 shows the stressed and unstressed means of each generation.

Generation	Stressed Mean	Unstressed Mean
1	.758	.778
2	.801	.788
3	.797	.769

Table 3: Overall stressed and unstressed F1 means for /i/ by generation

The results in Table 3 show that Generation 1 was the only generation of the three generations analyzed to have an unstressed F1 mean greater than its stressed F1 mean. In other

words, the first-generation participants were the only speakers to lower unstressed /i/ in their overall vowel space. Generations 2 and 3 both produced higher unstressed tokens of /i/ than the first generation.

Generation also played a significant role in the overall F1 values of /i/. Table 4 shows the overall mean F1 values by generation after normalization and Table 5 shows the post-hoc pairings and their significance or lack of significance.

Generation	Mean	Standard Deviation
1	.768	.005
2	.794	.006
3	.783	.007

Table 4:Generational F1 means for /i/, F(1, 1316)=7.080, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.026	.007	.001	1<2
1 and 3	-.015	.008	.212	n.s
2 and 3	.011	.009	.632	n.s

Table 5:Pairwise generational comparisons for /i/ F1, F(1, 1316)=7.080, p<.05

Table 4 indicates the first generation had the lowest F1 mean for /i/. On the opposite end of the spectrum, the second-generation speakers had the highest F1 mean. The mean for the third generation fell between the means of the first and the second generations. However, the post-hoc results indicate that the only significant height difference between generations was the difference between the first and the second generations. There was no significant difference between the average height of /i/ of the third generation and the average F1 heights of the other two generations.

The post-hoc analysis also indicated that context played a significant role in the height of

/i/. Table 6 displays the F1 means for each of the three contexts and Table 7 gives the results of the post-hoc pairwise comparisons run between all three contexts.

Context	Mean	Standard Deviation
Word List	.745	.008
Story	.787	.004
Spontaneous	.813	.006

Table 6 :Contextual F1 means for /i/, F(1,1316)=20.576, p<.05.

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	-.042	.009	.000	Word List<Story
Word List and Spontaneous	-.067	.010	.000	Word List<Spontaneous
Story and Spontaneous	-.025	.008	.000	Story<Spontaneous

Table 7: Pairwise contextual comparisons for the height of /i/, F(1,1316)=20.576, p<.05

The data on Table 6 show that as the task formality increased, the height of /i/ decreased. Knowing that generation and context played significant roles with relation to the height of /i/, it is necessary to break down the results by generation to see the effects of context on the height on /i/ within each generation. As a result of stress not being a significant factor, Table 8 displays the results for the three generations by task type.

Task Type	Gen 1	Gen 2	Gen 3
	Mean	Mean	Mean
Word List	.714	.751	.775
Story	.769	.805	.790
Spontaneous	.811	.817	.795
Overall	.775	.796	.789

Table 8: Generational normalized height means for /i/ by task type

The third generation had the highest F1 mean for /i/ in the word list while the lowest mean for /i/ was that of the first generation. The second generation had the highest mean in the story while the third generation had the lowest mean. Finally, in the context of the sociolinguistic interview the second generation again had the highest F1 mean for /i/, while the third generation had the lowest. Due to the post-hoc pairwise comparisons of generation only finding a significant difference between the F1 productions for /i/ of the first and second generations, a more in depth look at the contextual means of the two generations merits mention.

For all three contexts, the second-generation speakers had higher means and produced lower tokens of /i/ than the first generation. The lower means for /i/ of the first generation point to higher productions of /i/ than those of the second generation. Even though this difference was consistent, it must be noted that it was contextually relative. In other words, the data indicate that task by task, the overall production of /i/ was higher in the first generation. The second generation F1 mean for the word list was lower than the first generation F1 mean for the story, indicating that the notion that Generation 1 F1 means for /i/ are lower than those of Generation 2 only holds up when means are compared in the same context.

As previously mentioned, the post-hoc results indicated that the differences between all three contexts were statistically significant with relation to the F1 of /i/. It was found that F1 values for /i/ rose as contextual formality decreased. Table 8 further confirms that this pattern held up across all three generations. In other words, the F1 means for /i/ increased within each generation as task formality decreased.

Values for the second formant of the Spanish high front vowel /i/

The overall normalized advancement values of the high, front vowel /i/ are first divided

up according to generation without separating averages by stress and task type. Table 9 shows the overall means for each generation.

Generation	Mean
1	1.559
2	1.539
3	1.380

Table 9: Overall generational normalized advancement means for /i/

Based on the means from the mixed model analysis in Table 11, the first generation tokens of /i/ were overall more fronted than those of the other two generations. In fact, /i/ gradually centralized from one generation to the next, with the most centralized tokens being those of the third generation. However, it is necessary to paint a more detailed picture of the factors that interacted with the participants' production of /i/. The mixed effects analysis that was run on the F2 values of /i/ found a significant main effect for generation and context that correlated with the overall frontness of /i/. Table 10 shows the results.

Factor	Sig.
Stress	.971
Generation	.000
Context	.000
Stress*Generation	.032
Stress*Context	.911

Table 10: Mixed effects for F2 of /i/

*Stress $F(1,1316)=.971$, $p<.05$, Generation $F(1, 1316)=22.846$, $p<.05$, Context $F(1,1316)=12.220$, $p<.05$, Stress*Generation $F(2,1316)=3.439$, $p<.05$, and Stress*Context $F(2,1316)=.093$, $p<.05$.*

Even though unstressed /i/ was slightly more centralized than stressed /i/, these values did not attain statistical significance. That being said, as can be seen in Table 10, only within the

context of its interaction with generation was a significant main effect found for stress with relation the second formant of /i/. Table 11 shows the stressed and unstressed F2 means of /i/ for each generation.

Generation	Stressed Mean	Unstressed Mean
1	1.591	1.503
2	1.523	1.515
3	1.365	1.395

Table 11: Overall stressed and unstressed normalized advancement means for /i/ by generation

The first and second generations both had overall F2 means that were greater in stressed contexts. This means that the overall productions of /i/ within the first two generations were on average more fronted than their corresponding unstressed tokens. The exact opposite was true for the third generations. The overall unstressed F2 mean of /i/ for the third generation was higher than the stressed mean. It is also important to note that while the unstressed tokens for the third generation were further forward than their stressed tokens, the overall averages for the third generation were lower than the averages of both of the preceding generations. Therefore, while relative to their vowel space the third generation fronted their unstressed /i/ tokens more than Generations 1 and 2, overall they were still further back than the stressed and unstressed means of the first and second generations.

The differences between the first two generations and the third were shown to be significant by the Bonferroni post-hoc test run on the F2 values of /i/. Table 12 shows the means for each generation and Table 13 shows the generational pairwise comparisons for the second formant of /i/ and which ones were significant.

Generation	Mean	Standard Deviation
1	1.547	.015
2	1.519	.017
3	1.380	.021

Table 12: Generational F2 means for /i/, F(1, 1316)=22.846, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	.028	.021	.522	n.s.
1 and 3	.167	.025	.000	n.s.
2 and 3	.138	.026	.000	3<2

Table 13: Pairwise generational comparisons for /i/ F2, F(1, 1316)=22.846, p<.05

The data in Table 12 further support what was seen with the stressed and unstressed generational means: Generation 1 had the highest F2 mean and Generation 3 had the lowest. The first generation tokens of /i/ were overall the most fronted of all the generations. On the opposite end of the continuum, Generation 3 had the overall lowest F2 mean. According to the pairwise comparisons in Table 13, the F2 differences between the first two generations were not significant. However, the differences between Generations 1 and 3 and Generations 2 and 3 achieved statistically significant levels. At first glance, it would appear that these significant differences between the first two generations and the third generation indicate that the third generation participants centralized /i/ more. However, the overall F2 mean for the third generation includes both stressed and unstressed tokens. Based on the data in Table 11, the absence of stress didn't correlate with any trend of centralization. In fact, as previously mentioned, the unstressed tokens for the third generation speakers were slightly more fronted than their stressed tokens. Therefore, the data are indicative of significant variation between the overall third generation productions of /i/ and the overall productions of the first two generations.

As with the F1 analysis, context also came out as having a significant effect on the F2 of /i/. Table 14 shows the overall F2 means by task and Table 15 shows the post-hoc pairwise comparisons and their overall significance or lack of significance.

Context	Mean	Standard Deviation
Word List	1.519	.019
Story	1.518	.013
Spontaneous	1.409	.019

Table 14: Contextual F2 means for /i/, F(1,1316)=12.220, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	.001	.027	1.000	n.s
Word List and Spontaneous	.109	.031	.001	Spontaneous<Word List
Story and Spontaneous	.108	.023	.000	Spontaneous<Story

Table 15: Pairwise contextual comparisons for /i/ F2, F(1,1316)=12.220, p<.05

Table 15 shows a gradual decrease of F2 as the contextual formality decreased, with the highest F2 mean for /i/ having occurred with the tokens taken from the word list. The lowest F2 mean for /i/ was from the tokens extracted from the sociolinguistic interview. The pairwise comparisons show that the difference between the F2 means of /i/ of the word list tokens and the story tokens was not significant. In fact, the two means only differ by .001. The differences between the word list and the sociolinguistic interview and the differences between the story and the sociolinguistic interview were significant. These findings go along with the notion that vowel space constricts as contextual formality decreases previously discussed in the section on the F1 results for /i/. As the formality decreased from the word list to the interview and from the story to

the interview, it appears that the speakers' tokens began to move back/

To further understand the interactions that generation and context had with regards to the F2 values of /i/ Table 16 breaks the results down by generation and context.

Task Type	Gen 1	Gen 2	Gen 3
	Mean	Mean	Mean
Word List	1.610	1.514	1.464
Story	1.595	1.542	1.433
Spontaneous	1.455	1.560	1.254
Overall	1.559	1.539	1.380

Table 16: Generational normalized advancement means for /i/ by task type

.

Generation 1 had the highest F2 means for /i/ in the word list and the story while Generation 3 had the lowest word list and story means. The Generation 2 means fell between the means of the other two generations.

For the sociolinguistic interview the second-generation speakers had the highest mean and the third generation speakers had the lowest. This is further indication that the third generation backed /i/ more than the other two generations. Generations 1 and 2 tended to produce /i/ in a more consistent fronted position.

As contextual formality decreased Generations 1 and 3 followed the previously noted pattern of vowel space constriction. The first and third generation means consistently decreased as the formality of the task type decreased. When these results are taken into account with the contextual results for the F1 of /i/, it becomes clear that as contextual formality decreased, the tokens of /i/ produced by the first and third generation participants began to lower and move toward the center of their vowel spaces. In other words, as speech became less and less formal, the first and the third-generation participants, produced lower and more centralized tokens of /i/.

While Generation 2 followed the same pattern with task type as Generations 1 and 3 with the first formant of /i/, they did the exact opposite with the second formant. Thus, while Generations 1 and 3 shifted /i/ down and back as contextual formality decreased, Generation 2 shifted /i/ down and forward.

Values for the first formant of the Spanish high back vowel /u/

Values for the first formant of the Spanish high back vowel /u/. The overall means for the first formant of the high back vowel /u/ for each generation are given in Table 17. Once again, as with /i/, these values do not take any individual factors into account.

Generation	Mean
1	.763
2	.754
3	.736

Table 17: Overall normalized height means for /u/ of all three generations

The F1 means for /u/ gradually decreased with each generation. The first generation had the highest F1 mean for /u/ and as a result had the lowest overall productions of /u/. The third generation had the lowest F1 mean for /u/, which indicates that the highest overall productions of /u/ belonged to the third generation. The mixed model analysis of the first formant of /u/ found that to varying degrees stress, generation, and context all played significant roles on the height of /u/. Table 18 shows the results of the fixed effects.

Factor	Sig.
Stress	.000
Generation	.003
Context	.001
Stress*Generation	.784
Stress*Context	.439

Table 18: Mixed effects for F1

*Stress F(1,886)=14.70, p<.05 , Generation F(2, 886)=5.711, p<.05, Context F(2,886)=7.529, p<.05, Stress*Generation F(2,886)=.244, p<.05, and Stress*Context F(2,886)=.823, p<.05*

The mixed effects indicate that fairly significant main effects were found for stress, generation, and context. The Bonferroni post-hoc analysis breaks each of these factors down in more detail. Table 19 shows the results of stress. It is important to note that stress played an overall significant role for all tokens in general. However, the interaction between generation and context did not achieve statistically significant levels.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	.763	.007	Unstressed<Stressed
Unstressed	.728	.006	Unstressed<Stressed

Table 19: Stressed and unstressed F1 means for /u/, F(1,886)=14.70, p<.05

The differences between the stressed and unstressed means for the first formant of /u/ were determined in a pairwise comparison to be significant. The F1 values for /u/ were highest when /u/ was stressed. This is indicative of lower productions of /u/ when the vowel was in a stressed position and consequently higher productions when the vowel was unstressed. As previously mentioned, stress played an overall significant role and there were no significant

differences between stressed and unstressed means between contexts or generations. Therefore, the overall indication of the data in Table 19 is that stress was had a general influence on the first formant of the tokens produced by all the participants of the current study.

Even though the interaction between stress and generation wasn't significant, generation by itself came out as significant. Table 20 gives the overall F1 means for /u/ by generation and Table 21 shows the pairwise comparisons and gives a clearer picture of the height differences between each generation's productions of /u/.

Generation	Mean	Standard Deviation
1	.760	.007
2	.748	.006
3	.728	.008

Table 20: Generational F1 means for /u/, F(2, 886)=5.711, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	.012	.008	.462	n.s
1 and 3	.032	.009	.002	3<1
2 and 3	.020	.009	.077	n.s

Table 21: Pairwise generational comparisons for /u/ F1, F(2, 886)=5.711, p<.05

The generational means in Table 20 show that Generation 1 had the highest F1 means and the lowest overall productions of /u/. Afterwards, with each progressive generation the F1 values increase yielding progressively higher productions of /u/./. Generation 3 had the lowest F1 mean, which means that their overall tokens for /u/ were the highest or most raised of the three generations. The pairwise comparisons in Table 21 indicate that the height differences for /u/ between generations only reached significant levels when Generation 1 was compared to Generation 3. This shows that the more raised /u/ tokens of the third generation were

significantly higher than those of the first generation. From the perspective of the first generation, this also means that the first generation produced significantly lower overall tokens of /u/. The differences between the first and the second generation were not significant, and the differences between the second and the third generations weren't significant either. However, it could be argued that the pairwise comparison of the second and third generations did in fact approach levels of significance. Therefore, the difference, while not quite significant, still merits noting.

Context was also a significant player in the height of /u/. Table 22 shows the overall F1 means for /u/ by context and Table 23 shows the post-hoc pairwise comparisons of each of the three contexts.

Context	Mean	Standard Deviation
Word List	.761	.008
Story	.759	.004
Spontaneous	.716	.010

Table 22: Contextual F1 means for /u/, F(2,886)=7.529, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	-.042	.011	.001	Story<Word List
Word List and Spontaneous	-.045	.013	.002	Spontaneous<Word List
Story and Spontaneous	-.003	.009	1.000	n.s

Table 23: Pairwise contextual comparisons for /u/ F1, F(2,886)=7.529, p<.05

The overall contextual means in Table 22 show progressively higher productions of /u/ as contextual formality decreased. The word list had the highest means and consequently the lowest productions. The lowest mean was that of the sociolinguistic interview resulting in the highest

productions of /u/. This trend with /u/ and context is the exact opposite trend seen with the F1 means for the other high vowel /i/. Therefore, while F1 values of /i/ lowered as contextual formality decreased, /u/ shifted upwards.

The pairwise comparisons in Table 23 that the height differences between the word list and the two other contexts were significant. The height differences between the story and the spontaneous tokens were not significant. These comparisons indicate that the less formal tokens were significantly higher than the more formal tokens of the word list. What this says about the trend of raising as contextual formality decreases is that the pattern was only significant when formality was at its greatest in the word list.

Task Type	Gen 1		Gen 2		Gen 3	
	Stressed	Unstressed	Stressed	Unstressed	Stressed	Unstressed
Word List	.776	.734	.711	.697	.717	.683
Story	.798	.745	.781	.736	.772	.725
Spontaneous	.790	.753	.825	.774	.723	.718
Overall	.792	.746	.777	.736	.754	.718

Table 24: Generational normalized height means by task type and stress for /u/

Table 24 shows the stressed and unstressed means by generation and context. The first generation speakers came out with the highest stressed F1 mean for /u/ in the word list, while the second generation's stressed F1 mean was slightly lower than that of the third generation. This is indicative of lower productions of stressed /u/ by the first generation participants and higher productions of /u/ by the second and third generation participants in the context of the word list. The same general pattern held true for the unstressed F1 means of /u/ in the word list. The third generation mean was the highest which is indicative of the lowest overall productions of

unstressed /u/. Generation 3's unstressed F1 mean for the word list was slightly lower than that of Generation 2. Therefore, overall productions of /u/ were lowest in the third generation's production of the word list.

Stressed and unstressed /u/ in the story were both produced the highest by the third generation who had the overall lowest F1 mean for both stressed and unstressed contexts. As the case was with the word list, the lowest overall productions of stressed and unstressed /u/ were those of the first generation speakers who had the highest stressed and unstressed means of the first formant of /u/ in the story.

For the sociolinguistic interview the second generation had the highest F1 means for stressed and unstressed /u/. Generation 3 had the lowest means and the first-generation F1 means for /u/ fell in the middle. Overall, for stressed /u/ in all three of the contexts analyzed, the first and third generations produced their highest F1 means for /u/ in the story, while the highest stressed mean for the second generation was that of their spontaneous tokens. For the unstressed means both the first and second generations progressively lowered /u/ as contextual formality decreased, reflecting in part the same type of trend that was seen with /i/. However, the third generation lowered the most in the story. Consequently, the pattern of lowering the high vowels as contextual formality decreased wasn't as apparent with /u/ as with /i/, because /u/ showed less variation than /i/. That being said, all three generations produced /u/ the highest in the word list, which was the most formal of the tasks.

Values for the second formant of the Spanish high back value /u/

The overall means for the second formant of the high back vowel /u/ are shown in Table 25. The means are the overall averages for each generation and do not take context or stress into

account.

Generation	Mean
1	.620
2	.661
3	.616

Table 25: Overall normalized advancement means for /u/ of all three generations

Based on the above means, Generation 2 came out with the highest F2 mean for /u/. The data also suggest that the English-dominant speakers of the third generation fronted /u/ the least. The post-hoc analysis found that stress and generation were significant determiners of the overall frontness of /u/. Table 26 shows the fixed effect results and the significance of stress, generation, and context.

Factor	Sig.
Stress	.015
Generation	.001
Context	.259
Stress*Generation	.530
Stress*Context	.097

Table 26: Mixed effects of normalized advancement of /u

*Stress $F(1,886)=5.890$, $p<.05$, Generation $F(2, 886)=7.264$, $p<.05$,Context $F(2,886)=1.352$, $p<.05$, Stress*Generation $F(2,886)=.636$, $p<.05$, and Stress*Context $F(2,886)=..097$, $p<.05$.*

The mixed effects analysis showed that significant main effects were found for both stress and generation with relation to the overall horizontal positioning of /u/. No significant main effect was found for context nor the interaction between stress and either of the two other factors. Table 27 shows the results for stress from the Bonferroni post-hoc test.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	.610	.010	Unstressed<Stressed
Unstressed	.645	.010	Unstressed<Stressed

Table 27: Stressed and unstressed F2 means for /u/,F(1,886)=5.890, p<.05

The post-hoc results suggest that overall the instances of /u/ were more backed when they were stressed. This supports previous evidence that unstressed vowel space is inherently different, and frequently more constricted, than stressed vowel space. Table 28 shows the overall post-hoc means for each generation and Table 29 shows the pairwise comparisons run for each generation.

Generation	Mean	Standard Deviation
1	.614	.010
2	.656	.010
3	.612	.012

Table 28: Generational F2 means for /u/, F(2, 886)=7.264, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.042	.013	.003	1<2
1 and 3	.001	.015	1.000	n.s
2 and 3	.044	.014	.006	3<2

Table 29: Pairwise generational comparisons for /u/ F2, F(2, 886)=7.264, p<.05

The post-hoc results reflect the overall results in Table 25. Generation 2 had the highest mean indicating the most fronted productions of /u/. Generation's 1 and 3 had the lowest means for the second formant of /u/ indicating more backed productions. However, the difference between the two wasn't significant. The difference in frontness/backness for /u/ was found to be

significant when Generation 2 was paired with both the first and the second generations. Thus it can be said that the second generation significantly fronted /u/ more than either of the other generations.

As a result of context was not being found to be significant, it would appear that the main factor affecting fronting in all three generations was stress. Table 30 shows the overall stressed and unstressed means for each generation

Generation	Stressed Mean	Unstressed Mean
1	.604	.624
2	.632	.681
3	.594	.631

Table 30: Post-hoc stressed and unstressed F2 means for /u/ by generation. $F(1,886)=5.890$, $p<.05$

For both stressed and unstressed contexts the second generation fronted the most of all three generations. For the stressed tokens the third generation produced the most backed tokens of /u/, while the first generation backed /u/ the most of all three generations in unstressed cases. There was also tendency to front /u/ more when it was unstressed. Across all three generations the unstressed F2 means were consistently higher than the stressed F2 means for /u/. This shows that for all three generations /u/ was produced further back when it was stressed, and that unstressed /u/ was more fronted. When this data is taken into account with the overall stress means for the first formant of /u/, it shows that overall all the participants lowered and backed /u/ when the vowel was stressed and then in the absence of stress /u/ was raised and fronted.

Values for the first formant of the Spanish mid front vowel /e/

The overall means s for the first formant of the mid, front vowel /e/ are shown in Table 31 by generations. Stress and task type are initially not taken into account.

Generation	Mean
1	.987
2	1.025
3	.993

Table 31: Overall normalized height means for /e of all three generations

The initial F1 means for /e/ show that Generation 2 had the highest mean while Generation 1 had the lowest mean, suggesting that Generation 2 produced a lower /e/ more often than the other generations. This is an initial indication of the same type of downward shift that was also present in the second generation productions of the high front vowel /i/. The mixed-effects analysis determined that generation and context played significant roles relative to the height of /e/, while stress, although not significant, approached levels of statistical significance. The interaction between stress and generation was not significant, but it was determined that the interaction between stress and context was significant. Table 32 shows the fixed effects results.

Factor	Sig.
Stress	.058
Generation	.000
Context	.000
Stress*Generation	.083
Stress*Context	.025

Table 32: Mixed effects of /e/ normalized advancement

*Stress F(1,2310)=3.609, p<.05 , Generation F(2, 2310)=13.421, p<.05 ,Context F(2,2310)=12.802, p<.05, Stress*Generation F(2,2310)=2.488, p<.05, and Stress*Context F(2,2310)3.676=, p<.05.*

Firstly, even though no significant main effect was found for stress with relation to the height of /e/, as indicated in Table 32, overall stress neared levels of statistical significance with a p-value of .058. The overall stressed F1 mean for /e/ was 1.011 while the overall unstressed mean was .997. This is indicative of overall lower productions for stressed /e/. The post-hoc analysis breaks the significant main effects down in more detail starting with generation. Table 33 shows the overall means by generation and Table 34 shows the pairwise comparisons.

Generation	Mean	Standard Deviation
1	.985	.005
2	1.023	.006
3	1.004	.007

Table 33: Generational normalized advancement means for /e/, F(2, 2310)=13.421, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.038	.007	.000	1<2
1 and 3	-.019	.008	.054	n.s.
2 and 3	.019	.009	.115	n.s.

Table 34: Pairwise generational comparisons for /e/ F1/, F(2, 2310)=13.421, p<.05

The post-hoc generational means show that the highest mean for the first formant of /e/ was that of the second generation. This parallels the overall F1 means for /e/ in Table 31, further suggesting that Generation 2 shifted /e/ down like it did with /i/. Generation 1 had the lowest F1 mean for /e/. The pairwise comparisons indicate that the only significant difference was the height difference between the productions of the first and the second generations. However, the height difference between the F1 mean for /e/ of the first and the third generations approaches significant levels with a p value of .054. This suggests that the first generation produced significantly higher mid front vowels than the other two generations. Context was also a

significant factor with regards to the overall height of /e/. Table 35 shows the overall means by context for the first formant of /e/ and Table 36 shows the post-hoc pairwise comparisons of all three contexts.

Context	Mean	Standard Deviation
Word List	1.005	.006
Story	1.021	.004
Spontaneous	.986	.009

Table 35: Contextual F1 means for /e/, F(2,2310)=12.802, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	-.015	.010	.365	n.s.
Word List and Spontaneous	.020	.011	.184	n.s.
Story and Spontaneous	.035	.007	.000	Spontaneous<Story

Table 36: Pairwise contextual comparisons for /e/ F1, F(2,2310)=12.802, p<.05

The overall means indicate that /e/ was pronounced the lowest in the story and the highest in the sociolinguistic interview. The mean for the word list fell between the means of the story and the interview. However, the only significant difference in height was between the story and the word list. As a result, /e/ was articulated significantly lower in the story than in the interview.

The interaction between context and stress was also a significant factor. Table 37 shows the results of the F1 means of stressed and unstressed /u/ in each of the three contexts.

Environment	Word List	Story	Spontaneous
Stressed	.997	1.039	.997
Unstressed	1.014	1.002	.994

Table 37: F1 means for /e/ for the pairing of stress with context, F(2,2310)3.676=, p<.05.

According to the post-hoc results, /e/ had the highest average when it was stressed in the story and the lowest when it was unstressed in the interview, meaning on average the story had the lowest productions of stressed /e/, while the interview yielded the overall highest productions of unstressed /e/. Also, when /e/ was unstressed there was a gradual decrease in the overall means as contextual formality decreased, leading to a progressive overall raising of /e/. For all contexts /e/ was higher when it was stressed and lower when it was unstressed.

Stress was not found to be significant by itself; therefore table 38 illustrates the overall F1 means for /e/ by just generation and context.

Generation	Word List	Story	Spontaneous
1	1.027	.988	.977
2	.989	1.040	1.014
3	1.037	1.052	.950

Table 38: Normalized height means for /e/ by generation and context

The first generation had the highest mean for the word list and as contextual formality decreased, the first generation means decreased. This pattern of progressively higher productions of /e/ according to contextual formality was only present in the first generation. The second generation produced /e/ the highest most frequently in the word list and produced the overall lowest tokens of /e/ in the story. The third Generation lowered /e/ the most in the story and raised it the most during the interview.

Of the three generations, the third generation had the highest mean for the word list and

the story and the overall lowest F1 mean for /e/ in the interview. Generation 1 had the lowest mean for the story and Generation 2 had the lowest mean for the word list.

Values for the second formant of the Spanish mid front vowel /e/

The overall values for the second formant of /e/ are given in Table 39 according to generation. Stress and task type are initially not taken into account.

Generation	Mean
1	.987
2	1.025
3	.993

Table 39: Overall normalized advancement means for /e/ of all three generations

The initial means indicate that the second generation produced overall higher tokens of /e/ than the first and the third generations. This continued to show the same pattern for the second-generation tokens of /e/ as was seen with the second generation F2 means for /i/. In fact, when the previous second generation F1 data for /i/ and /e/ is considered together it shows that both /i/ and /e/ were produced lower and further forward in the second generation. The fixed effects of the mixed model analysis concluded that stress, generation, and context were all significant with respect to the F2 productions of /e/. Also, the interaction between stress and context was also determined to be a significant factor for the frontness/backness of /e/. Table 40 illustrates the results.

High significant main effects were found for stress, generation, context, and the interaction between stress and context, indicating that these various factors all played varying roles with regards to the overall frontness/backness of /e/. Table 41 shows the post-hoc results for

stress as an overall influence on frontness/backness of /e/.

Factor	Sig.
Stress	.000
Generation	.005
Context	.000
Stress*Generation	.966
Stress*Context	.002

Table 40: Fixed effects of normalized advancement of /e/

*Stress F(1,2310)=40.477, p<.05 , Generation F(2, 2310)=5.364, p<.05 ,Context F(2,2310)=30.905, p<.05, Stress*Generation F(2,2310)=.035, p<.05, and Stress*Context F(2,2310)6.117=, p<.05*

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	1.381	.012	Unstressed<Stressed
Unstressed	1.291	.008	Unstressed<Stressed

Table 41: Stressed and unstressed F2 means for /e/, F(1,2310)=40.477, p<.05

The results in Table 41 point to an overall more fronted production of /e/ when /e/ was stressed. When /e/ was unstressed the data show that it was backed. In other words, unstressed /e/ was more centralized than stressed /e/.

Generation also achieved relatively high levels of significance. Table 42 illustrates the post-hoc F2 averages for /e/ by generation and Table 43 shows the pairwise comparisons that were run comparing each generation against the other two.

Generation	Mean	Standard Deviation
1	1.311	.010
2	1.345	.011
3	1.353	.013

Table 42: Generational F2 means for /e/, F(2, 2310)=5.364, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.034	.014	.040	1<2
1 and 3	-.043	.015	.014	1<3
2 and 3	-.009	.017	1.000	n.s.

Table 43: Pairwise generational comparisons for /e/ F2, F(2, 2310)=5.364, p<.05

The generational means show that there was a pattern of progressive fronting with each increase in generation. The first generation had the lowest F2 mean for /e/ and as a result produced the least fronted tokens of /e/. Generation 3 had the highest mean which resulted in the overall most fronted production of /e/. Generation 2 fell in between the first and third generations with regards to relative frontness of /e/. The pairwise comparisons found that the differences between the first generation when compared to the subsequent two generations were significant.

Context was another significant factor with relation to the height of /e/. Table 44 lists the post-hoc means for the second formant of /e/ by context and Table 45 shows the contextual pairwise post-hoc comparisons.

Context	Mean	Standard Deviation
Word List	1.415	.010
Story	1.329	.008
Spontaneous	1.265	.017

Table 44: Contextual F2 means for /e/, F(2,2310)=30.905, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word List and Story	.086	.018	.000	Story<Word List
Word List and Spontaneous	.150	.020	.000	Spontaneous<Word List
Story and Spontaneous	.064	.013	.000	Spontaneous<Story

Table 45: Pairwise contextual comparisons for /e/ F2, F(2,2310)=30.905, p<.05

The post-hoc contextual means show a gradual backing of /e/ as contextual formality decreased. F2 values were lowest in the interview. The pairwise comparisons found that at each stage of contextual formality the differences between context were significant, implying that the overall pattern of progressive backing of /e/ was significant. This is evidence of an even greater overall tendency that has already been mentioned with previous vowels also: as contextual formality decreases, overall vowel space is altered.

The interaction between context and stress attained levels of statistical significance as well. Table 46 shows the stressed and unstressed means by context.

Environment	Word List	Story	Spontaneous
Stressed	1.482	1.383	1.278
Unstressed	1.348	1.275	1.251

Table 46: F2 means for /e/ for the pairing of stress with context, F(2,2310)6.117=, p<.05.

Table 46 shows a two-way constriction of vowel space. Firstly, all unstressed means for the first formant of /e/ in all contexts were lower and more backed than the means of the stressed tokens of /e/. This indicates that the presence of stress correlated with more fronted tokens of /e/. This suggests that for this study's participants unstressed mid front vowel space was more constricted than stressed mid front vowel space. Secondly, for both stress and unstressed /e/ there

was a progressive backing of /e/ as contextual formality decreased. As a result overall the data in Table 46 suggest that unstressed informal speech correlated with the increased backing of /e/.

Considering that stress, generation, and context all were significant factors related to the F2 values for /e/, Table 47 breaks down the F2 means of each generation by stress and context. This allows for an even more detailed look at how each factor interacted with /e/.

Task Type	Gen 1		Gen 2		Gen 3	
	Stressed	Unstressed	Stressed	Unstressed	Stressed	Unstressed
Word List	1.579	1.347	1.479	1.324	1.408	1.392
Story	1.350	1.246	1.373	1.268	1.448	1.401
Spontaneous	1.236	1.234	1.358	1.333	1.281	1.222
Overall	1.326	1.248	1.392	1.292	1.375	1.288

Table 47: Generational normalized advancement means for /e/ by task type and stress

The first generation was the only individual generation to adhere to the previously discussed patterns of backing. All stressed means were greater than all unstressed means in all three contexts and overall. This shows that the first generation speakers followed the previously mentioned pattern of centralizing unstressed /e/ more than stressed /e/. Also, the first generation centralized /e/ progressively more as contextual formality decreased from the word list to the interview. With respect to stress Generations 2 and 3 also showed lower means for all unstressed tokens compared to their corresponding stressed tokens. The fact that all three generations produced more centralized tokens when /e/ was unstressed lends even further support to the notion that vowel space constricts when stress is absent.

With regards to contextual formality, Generations 2 and 3 broke away from the patterns followed by the first generation. In all three contexts, Generation 2 progressively centralized /e/ as contextual formality decreased among stressed tokens. However, the second-generation

participants actually centralized unstressed spontaneous /e/ the least while centralizing unstressed /e/ in the story the most. For the stressed tokens, Generation 3 centralized the tokens in the story the least, while centralizing the spontaneous stressed tokens of /e/ the most. This same pattern in the third generation held up for unstressed /e/ as well: the third generation speakers centralized unstressed /e/ the least in the story and the most in the interview.

Overall, Generation 1 had the highest means for both stressed and unstressed /e/ in the word list, indicating out of all three generations the first generation fronted /e/ the most in the word list. For stressed /e/ in the word list Generation 3 had the lowest mean, while Generation 2 centralized unstressed /e/ the most in the word list. Generation 3 had the highest F2 means for stressed and unstressed /e/ in the story while Generation 1 had the lowest stressed and unstressed F2 means for /e/ overall. In the interview, Generation 2 had the least centralized stressed and unstressed tokens, while Generation 1 centralized spontaneous stressed /e/ the most and Generation 3 centralized spontaneous unstressed /e/ the most.

Values for the first formant of the Spanish mid back vowel /o/

The overall F1 means for /o/ are shown in Table 48 by generation. Stress and context are initially not considered as separate factors.

Generation	Mean
1	.950
2	.982
3	1.028

Table 48: Overall normalized height means for /o/ of all three generations

The initial means indicate that there was a progressive lowering of /o/ with each

subsequent generation. Generation 1 had the lowest F1 mean for /o/ of all three generations. Generation 3 had highest F1 means resulting in the lowest overall productions of /o. A more detailed picture of what happened with the F1 of /o/ is shown in Table 49.

Factor	Sig.
Stress	.000
Generation	.000
Context	.098
Stress*Generation	.765
Stress*Context	.227

Table 49: Fixed effects for normalized height of /o/

*Stress F(1,2239)=24.766, p<.05 , Generation F(2, 2239)=36.229, p<.05 ,Context F(2,2239)=2.330, p<.05, Stress*Generation F(2,2239)=.267, p<.05, and Stress*Context F(2,2239)=1.485, p<.05*

The only two factors that were determined to have a significant main effect were be stress and generation. It is important to note that the overall effect of stress on the means from all generations was significant. The interactions between stress and generation and stress and context were not significant. Table 50 shows the post-hoc results for stress.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	1.014	.007	Unstressed<Stressed
Unstressed	.974	.004	Unstressed<Stressed

Table 50: Stressed and unstressed F1 means for /o/, F(1,2239)=, p<.05

The post-hoc pairwise test run on stress concluded that the difference between the stressed and unstressed tokens of /o/ was significant and shows that the presence of stress shared a positive correlation with F1 values of /o/. As a result, the stressed tokens were produced lower than the unstressed ones.

Generation also played a significant role related to the overall height of /o/. Table 51 shows the post-hoc means of /o/ for each generation and Table 52 shows the results of the post-hoc pairwise comparisons of all three generations.

Generation	Mean	Standard Deviation
1	.957	.006
2	.993	.006
3	1.033	.007

Table 51:Generational F1 means for /o/, F(2, 2239)=36.229, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.036	.008	.000	1<2
1 and 3	-.076	.009	.000	1<3
2 and 3	-.040	.009	.000	2<3

Table 52: Pairwise generational comparisons for /o/ F1/, F(2, 2239)=36.229, p<.05

The post hoc means show that the third generation had the highest F1 mean and the while the first generation had the lowest F1 mean. The pairwise comparisons confirmed that the progressive lowering of /o/ as generation increased was significant. In other words all three pairings were significant making the drop from Generation 1 to Generation 2 significant and then subsequent drop from Generation 2 to Generation 3 significant.

Values for the second formant of the Spanish mid back vowel /o/

The overall values for the second formant of the mid back vowel /o/ are given in Table 53 and are divided by generation. Stress and context are not initially considered as separate factors

.

Generation	Mean
1	.729
2	.787
3	.854

Table 53: Overall normalized advancement means for /o/ of all three generations

The initial means indicate that there was a pattern of progressive fronting for /o/ due to the F2 mean increasing with each subsequent generation. The first generation tokens maintained a more backed position while the tokens of the second and third generations gradually moved forward. The mixed effects analysis run on the F2 values of /o/ determined that there were significant main effects for stress, generation, with respect to the overall horizontal movement of /o/. Table 54 shows the results of the mixed model analysis.

Factor	Sig.
Stress	.000
Generation	.000
Context	.000
Stress*Generation	.677
Stress*Context	.073

Table 54: Fixed effects for normalized advancement of /o/

*Stress $F(1,2239)=47.401$, $p<.05$, Generation $F(2, 2239)=116.184$, $p<.05$,Context $F(2,2239)=20.564$, $p<.05$, Stress*Generation $F(2,2239)=.391$, $p<.05$, and Stress*Context $F(2,2239)=2.625$, $p<.05$*

However, the interactions were not determined to be significant. Table 55 shows the post-hoc stressed and unstressed means of the second formant of /o/.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	.744	.007	Unstressed<Stressed
Unstressed	.799	.004	Unstressed<Stressed

Table 55: Stressed and unstressed F2 means for /o/ F(1,2239)=47.401, p<.05

The post-hoc pairwise test run for the stressed and unstressed instances of /o/ found that the differences between the stressed and unstressed F2 means were significant. The means in Table 55 show that the stressed tokens were more backed than the unstressed tokens. This indicates that in unstressed environments, /o/ was more centralized than in stressed environments. Also, the data are in agreement with previously discussed results that point to constriction of the mid vowel space in unstressed contexts.

Generation was the next significant factor that played a role in the F2 productions of /o/. Table 56 shows the post-hoc F2 means for /o/ by generation and Table 57 shows the results of the post-hoc pairwise comparisons by generation.

Generation	Mean	Standard Deviation
1	.704	.006
2	.771	.006
3	.804	.007

Table 56: Generational F2 means for /o/, F(2, 2239)=116.184, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.068	.008	.000	1<2
1 and 3	-.136	.009	.000	1<3
2 and 3	-.068	.009	.000	2<3

Table: Pairwise generational comparisons for /o/ F2, F(2, 2239)=116.184, p<.05

The generational means in table 56 show a pattern of progressive fronting or

centralization of /o/ with each subsequent generation. The pairwise comparisons determined this pattern to be significant between each generation. Generation 1 centralized the least and consequently had the lowest F2 mean for /o/. From Generation 1 to Generation 2, the productions of /o/ were more fronted. From Generation 2 to Generation 3 /o/ centralized even more. When these results are taken into account with the generational results for the first formant of /o/, not only did /o/ progressively move further forward with each generation, it also lowered.

The third factor that played a significant role with regard to the overall F2 means for /o/ was context. Table 57 shows the post-hoc F2 means by context and Table 58 shows the results of the contextual pairwise comparison.

Context	Mean	Standard Deviation
Word List	.736	.009
Story	.771	.005
Spontaneous	.808	.007

Table 57: Contextual F2 means for /o/, F(2,2239)=20.564, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	-.035	.010	.001	Story<Word List
Word List and Spontaneous	-.071	.011	.000	Spontaneous<Word List
Story and Spontaneous	-.036	.009	.000	Spontaneous<Story

Table 58: Pairwise contextual comparisons for /o/ F2,F(2,2239)=20.564, p<.05

The contextual means show that /o/ was progressively centralized as the formality of each task decreased. The pairwise tests confirmed that the F2 differences for /o/ between each subsequent generation were significant. This means that from the first to the second generation

productions of /o/ began to move forward significantly and from the second to the third generation /o/ significantly centralized even more. In the previous section on the F1 means of /o/, context was not significant as it was for the F2 means. This suggests that as contextual formality decreased, the overall height of /o/ was more or less stable while it gradually moved forward with as the speech task became less and less formal.

In order to get an even more detailed picture of how the significant factors interacted. Table 59 shows the stressed and unstressed F2 means for each generation by context.

Task Type	Gen 1		Gen 2		Gen 3	
	Stressed	Unstressed	Stressed	Unstressed	Stressed	Unstressed
Word List	.667	.722	.695	.775	.762	.809
Story	.675	.744	.737	.804	.782	.870
Spontaneous	.692	.740	.762	.848	.903	.898
Overall	.679	.741	.730	.805	.824	.869

Table 59: Generational normalized advancement means for /o/ by task type and stress

Generation 3 had the highest stressed and unstressed means for all three tasks. All of stressed and unstressed F2 means for Generation 2 were lower than the corresponding third generation means, but were all higher than the corresponding first generation means. Generation 1 had the lowest F2 means in all three contexts, for both stressed and unstressed tokens. This further supports the previously discussed notion that there was progressive centralization of /o/ as generation increased.

Generations 1 and 2 both had higher unstressed means for all three contexts while Generation 3 followed the same pattern for the word list and the story only. The stressed spontaneous F2 mean for the third generation was slightly higher than the corresponding unstressed mean. Overall though, these results confirm the previous affirmation that /o/ was

centralized more when it was unstressed than when it was stressed.

Finally, Generations 2 and 3 produced progressively higher tokens of /o/ as task formality decreased. In other words, all of the F2 means for /o/ in the second and third generations were higher when contextual formality was lower. Generation 1 followed this same pattern for the word list, the story, and for stressed /o/ in the interview. The first generation unstressed mean for the story was slightly higher than the unstressed F2 mean for the interview. However, this difference was slight and overall the data also further support the notion that /o/ was centralized more as contextual formality decreased.

The overall indications for the F2 data of /o/ suggest that /o/ was most centralized by the third generation when it was unstressed in spontaneous speech, and most backed when it was produced in a stressed environment by the first generation. This is an indication of a constriction of the mid back area of the speakers' vowel space.

Values for the first formant of the Spanish low vowel /a/.

The overall means for the first formant of the low, central vowel /a/ are first divided up according to generation without separating averages by stress and task type. Table 60 shows the overall means for each generation

Generation	Mean
1	1.351
2	1.397
3	1.363

Table 60: Overall generational normalized height means for /a/

The results indicate that overall the first generation produced the highest /a/, while the

second generation produced the overall lowest /a/. However, these are overall averages that include all instances, stressed and unstressed, in all contexts. To get a better picture of what happened with the first formant of /a/ for each generation it is necessary to break down the results by stressed and unstressed instances of /a/ and by task type. The mixed effects analysis showed that stress, generation, and context were all significant factors with respect to the height of /a/. Table 61 illustrates the results of the fixed effects regarding the significance of stress, generation, and context on F1 values of /a/.

Factor	Sig.
Stress	.000
Generation	.040
Context	.000
Stress*Generation	.696
Stress*Context	.730

Table 61: Mixed effects for normalized height of /a/

*Stress F(1,2324)=154.063, p<.05 , Generation F(1, 2324)=3.231, p<.05 , Context F(1,2324)=78.109, p<.05, Stress*Generation F(2, 2324)=.363, p<.05, and Stress*Context F(2, 2324)=.314, p<.05.*

It is apparent from the results of the mixed effects analysis that there were significant main effects for each of the three factors analyzed with respect to relative height of /a/. However, there were no significant main effects found for the interactions between stress and generation and stress and with relation to the overall height of /a/. The Bonferroni post-hoc pairwise comparison shows the results for overall stress in more detail. Table 62 shows the results of the analysis.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	1.464	.008	Unstressed<Stressed
Unstressed	1.344	.006	Unstressed<Stressed

Table 62: Stressed and unstressed F1 means for /a/, F(1,2324)=154.063, p<.05

Firstly, stress was a significant factor with unstressed /a/ having a lower mean than stressed /a/. This indicates that unstressed /a/ is higher than stressed /a/, consequently causing the unstressed vowel space of the speakers to be more constricted than their stressed vowel space. In other words, /a/ rose to a greater extent when it was in a position that did not receive stress. Generation proved to be a significant factor only when the first and the second generations were compared to one another. No statistically significant difference was found for the height of /a/ between the first and the third generations, nor between the second and the third generations. The second-generation speakers had the highest mean for F1 while the first generation had a slightly lower average than the third generation. As previously stated, the only comparison that attained statistically significant levels was the pairwise comparison between the first and second generations. The first generation raised /a/ more than the second generation. Table 63 illustrates the mean F1 values by generation after normalization through post-hoc analysis and Table 64 shows the pairings and which ones attained levels of significance.

Generation	Mean	Standard Deviation
1	1.396	.007
2	1.419	.008
3	1.398	.009

Table 63: Generational F1 means for /a/, F(1, 2324)=3.231, p<.05

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.024	.010	.041	1<2
1 and 3	-.003	.011	1.000	n.s.
2 and 3	.021	.012	.245	n.s.

Table 64: Pairwise generational comparisons for /a/ F1, F(1, 2324)=3.231, p<.05

The pairwise comparisons indicate that there was a significant height difference between production of /a/ in the first generation and production of /a/ in the second generation, with /a/ being higher in the first generation. The differences between the first and the third generations and the second and the third generations did not attain statistical significance.

Finally, the post-hoc test also concluded that context had a significant influence on the overall height of /a/. Table 65 shows the overall post-hoc F1 means of /a/ in relation to context and table 66 shows the results of the pairwise comparisons of context.

Context	Mean	Standard Deviation
Word List	1.498	.011
Story	1.384	.006
Spontaneous	1.331	.008

Table 65: Contextual F1 means for /a/, F(1,2324)=78.109, p<.05

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	.114	.012	.000	Story<Word List
Word List and Spontaneous	.167	.013	.000	Spontaneous<Word List
Story and Spontaneous	.053	.010	.000	Spontaneous<Story

Table 66: Pairwise contextual comparisons for /a/ F1, F(1,2324)=78.109, p<.05

The results of the contextual pairwise comparisons confirm that context, or the formality

of the task type, influenced vowel quality and production. In this specific case it is evident that with increased formality, the speakers of current study produced higher F1values resulting in lower overall productions of /a/. The opposite is true also. In other words, as contextual formality decreases, the speakers' overall F1 means for /a/ decreased, resulting in higher overall productions of /a/. This showed centralization of /a/ in less formal contexts and shows an overall constriction of vowel space in less formal contexts..

Knowing that stress, generation and context played significant roles with relation to height of /a/ among the speakers of the current study, it is necessary to break down the results by generation. Table 67displays the results for the all three generations by task type and divides /a/ into stressed and unstressed instances.

Task Type	Gen 1		Gen 2		Gen 3	
	Stressed	Unstressed	Stressed	Unstressed	Stressed	Unstressed
Word List	1.574	1.484	1.590	1.414	1.522	1.425
Story	1.440	1.308	1.438	1.349	1.463	1.336
Spontaneous	1.373	1.254	1.464	1.315	1.522	1.269
Overall	1.433	1.307	1.476	1.359	1.432	1.323

Table 67: Generational normalized height means for /a/ by task type and stress

For the word list, which was the most formal of the tasks, Generation 2 had the highest stressed mean, while Generation 3 had the lowest stressed mean for the first formant of /a/. On the opposite end, the third generation had the lowest F1 averages for /a/ for the word list. Generation 3 had a slightly lower F1 average for stressed /a/ in the word list than Generation 2.

For unstressed /a/ in the word list task, Generation 1 had the highest average while Generation 2, who had the highest F1 average for stressed /a/ in the word list, had the lowest average. Generation 3 had a slightly higher F1 average for unstressed /a/ in the word list than

Generation 2. Generation 3's average was slightly higher than that of Generation 2.For the story, Generation 3 had the highest mean for stressed /a/, while Generation 2 had a slightly lower mean than Generation 1, indicating that on average the third generation yielded lower productions of stressed /a/ while on average Generations 1 and 2 raised stressed /a/ more. For unstressed /a/ in the story Generation 2 had the highest mean and consequently on average raised unstressed /a/ the least in the story. The first generation had the lowest F1 average for unstressed /a/, overall producing more raised tokens of unstressed /a/ in the story.

For spontaneous speech, Generation 3 had the highest stressed F1 for /a/, while Generation 1 had the lowest. Generation 2 fell close to right in the middle of the means of Generations 1 and 3. For unstressed /a/ in spontaneous speech Generation 2 had the highest F1 means while Generation 1 had the lowest mean, with the third generation means being slightly higher than those of Generation 1.

Overall, the values for all three generations decreased as contextual formality decreased. This shows that even though all three generations produced /a/ at varying heights, all unstressed productions of /a/ in all three contexts were higher than the corresponding stressed productions. As a result, even when task type formality was greatest, all unstressed F1 means of /a/ were lower than the corresponding stressed F1 means. Also of interest is the fact that of all F1 means for stressed and unstressed /a/ the first generation had the lowest means. This resulted in the first generation having the overall highest productions of /a/ out of all of the participants. As a result of all of the first generation speakers were very Spanish dominant, these results would seem to imply that centralization of /a/ was an inherent feature in the Spanish of the L1 Spanish speakers used in this study. In fact, as seen in the Bonferroni post-hoc comparisons between generations, the first generation speakers produced significantly higher F1 values for /a/ than the second

generation speakers who were much more fluent in English than the first generation. Furthermore, although not found to be statistically significant, the raw and post-hoc means showed that the first generation's F1 means were even slightly lower than those of the third generation speakers, who were very English-dominant. This suggests that within the Spanish vowel system, there exists an inherent tendency toward partial reduction of the vowel space of /a/ along a vertical trajectory. Furthermore, this is evidence of little to no English transfer to the Spanish low central vowel space.

Values for the second formant of the Spanish low vowel /a/

The overall values for the second formant of the low, central vowel /a/ are first divided up according to generation without taking into account task type and task type. Table 68 shows the overall means for each generation for F2 of /a/.

Generation	Mean
1	1.003
2	1.038
3	1.080

Table 68: Overall generational normalized advancement means for /a/

Table 68 shows, without taking into account stress, context, or generation, that there was a gradual fronting of /a/ from the first to the third generations. While Generation 1 was shown in the previous section to produce a higher /a/ than the other two generations, the raw F2 means indicate that Generation 1 fronted /a/ the least when compared to the other two generations. Generation 2 fronted more than Generation 1, and Generation 3, the English-dominant

generation, fronted /a/ more than either Generations 1 or 2. Therefore, while the vowel height for /a/ of the second and third generations didn't vary as much as that of the first generation, the frontness of the /a/ productions of the second and third generation speakers varied more than that of the first generation.

Once again though, these are averages that include all instances, stressed and unstressed, in all contexts. To get a better picture of what happened with the second formant of /a/ for each generation it is necessary, as was in the previous section, to break down the results by stressed and unstressed instances of /a/ and by task type. The mixed effects analysis also showed that stress, generation, and context were all significant factors with respect to the frontness and/or backness of /a/. Table 69 illustrates the results of the fixed effects regarding the significance of stress, generation, and context on F2 values of /a/.

Factor	Sig.
Stress	.002
Generation	.000
Context	.030
Stress*Generation	.775
Stress*Context	1.239

Table 69: Mixed effects for normalized advancement of /a/

*Stress $F(1,2324)=9.920$, $p<.05$, Generation $F(1, 2324)=28.354$, $p<.05$, Context $F(1,2324)=3.512$, $p<.05$, Stress*Generation $F(2,2324)=.255$, $p<.05$, and Stress*Context $F(2, 2324)=1.239$, $p<.05$.*

These results confirm that there were significant main effects found for stress, generation, and context in relation to the frontness of the productions of /a/ of the speakers of the current study. The Bonferroni post-hoc analysis paints a more detailed picture of the individual relationship that the analyzed factors have with the F2 values of /a/. Table 70 illustrates these results.

Vowel	Mean	Standard Deviation	Post-hoc
Stressed	1.014	.007	Stressed<Unstressed
Unstressed	1.040	.005	Stressed<Unstressed

Table 70: Stressed and unstressed F2 means for /a/, F(1,2324)=9.920, p<.05

, Regarding stress, in the case of vowel frontness, the unstressed instances of /a/ had a higher mean than the stressed instances. This resulted in more fronted unstressed productions of /a/ and more backed productions of stressed /a/.

As with the F1 values of /a/, generation was also shown to play a significant role in relation to the F2 values of /a/. Table 71 illustrates the mean F2 values by generation after normalization through the Bonferroni post-hoc analysis and Table 72 shows the generational pairings.

Generation	Mean	Standard Deviation
1	0.993	.006
2	1.026	.007
3	1.063	.008

Table 71: Generational F2 means for /a/, F(1, 2324)=28.354

Generation Pair	Mean Difference	Standard Deviation	Sig.	Post-hoc
1 and 2	-.033	.008	.000	1<2
1 and 3	-.070	.010	.000	1<3
2 and 3	-.037	.010	.001	3<2

Table 72: Pairwise generational comparisons for /a/ F2, F(1, 2324)=28.354

Just as the mixed effects means showed, the post-hoc means showed that as generation increased, F2 values for /a/ increased. In other words, /a/ was produced in a more fronted

position in the overall vowel space as generation increased. The pairwise comparisons showed that all generational pairings were significantly different with regards to fronting, while only the difference between the first and second generation was shown to be significant in the analysis of the F1 values of /a/.

The pairwise comparisons indicate that there was a significant difference in frontness between all three generations. Like the means in Table 71 indicate, the least amount of fronting occurred in the first generation production of /a/, while the most fronting occurred with the third generation production of /a/. As illustrated in Table 72, the differences between the F2 mean of the third generation and the F2 mean of the first and the second generation were statistically significant.

Finally, the Bonferroni post-hoc test also concluded that context had a significant influence on the overall frontness/backness of /a/. Table 73 shows the overall post-hoc F2 means of /a/ in relation to context and table 74 shows the results of the pairwise comparisons of context.

Context	Mean	Standard Deviation
Word List	1.027	.009
Story	1.016	.005
Spontaneous	1.038	.007

Table 73: Contextual F2 means for /a/, F(1,2324)=3.512, p<.05.

Context Pairing	Mean Difference	Standard Deviation	Sig.	Post-hoc
Word list and Story	.011	.010	.914	n.s.
Word List and Spontaneous	-.012	.011	.934	n.s.
Story and Spontaneous	-.022	.008	.026	Story<Spontaneous

Table 74: Pairwise contextual comparisons for /a/ F2, /, F(1,2324)=3.512, p<.05.

The means show that the most fronting occurred in the sociolinguistic interview while the least degree of fronting occurred during the story. However, the pairwise comparisons indicate that the only contextual pairing to achieve significance was that of the story and the sociolinguistic interview. Therefore, according to the results, the greater amount of fronting that occurred during the spontaneous speech was significantly more than that which occurred in the story. These findings point to a trend of fronting related to decreased contextual formality. However, this trend did not play out when formality decreased from the word list to the story.

Knowing that stress, generation and context played significant roles with relation to the frontness/backness of /a/, it is necessary to break down the results by generation. Table 75 displays the results for the all three generations by task type and divides /a/ into stressed and unstressed instances.

Task Type	Gen 1		Gen 2		Gen 3	
	Stressed	Unstressed	Stressed	Unstressed	Stressed	Unstressed
Word List	.989	.996	1.037	1.031	1.066	1.101
Story	.966	.999	.990	1.034	1.050	1.051
Spontaneous	.991	1.013	1.373	1.068	1.039	1.254
Overall	.975	1.003	1.003	1.038	1.049	1.029

Table 75: Generational normalized advancement means for /a/ by task type and stress.

In the word list, the third generation speakers had the highest F2 stressed mean for /a/ and the first generation had the lowest mean. The second generation speakers' stressed F2 mean for /a/ in the word list fell right in the middle of the first and third generation means. This reflects the previously mentioned trend of an increase in the degree of fronting with each subsequent generation. The first generation speakers had the lowest mean and as a result their overall

stressed productions of /a/ in the word list were the least fronted. Generation 2 had a higher F2 mean than Generation 1 for stressed /a/ in the word list, but lower than Generation 3. This indicates that fronting of stressed /a/ increased in the word list in the progression from the first to the second generations. This progressive fronting of stressed /a/ in the word list continued from the second to the third generations with the speakers of the third generation fronting stressed /a/ in the given context overall more than the speakers of the other two preceding generations. This trend was the same for unstressed /a/ in the word list. Like with stressed /a/, the third generation had the highest F2 mean for unstressed /a/ in the given context, while the first generation had the lowest. Once again, the F2 mean for the second generation fell in the middle of the first and third generation means. As a result, like with the stressed /a/ F2 means, in unstressed position, /a/ was progressively fronted, with the least amount of overall fronting occurring in the tokens of the first generation and the greatest amount of overall fronting occurring with the tokens of the third generation. Generation 3 also had the highest F2 mean for stressed /a/ in the story. Once again, as with the word list, Generation 1 had the lowest stressed F2 mean and the second generation mean fell in the middle. Consequently in stressed position in the story, the progressive fronting trend for /a/ was also present. In other words, overall Generation 1 fronted stressed /a/ the least in the story, while Generation 2 fronted /a/ slightly more and Generation 3 exhibited the greatest amount of fronting. This progressive fronting played out for unstressed /a/ in the story as well, with the first generation having the lowest F2 mean and overall fronting unstressed /a/ the least, and the third generation having the highest F2 mean and fronting unstressed /a/ the most.

As expected from the results of the word list and story, the trend of progressive fronting of /a/ also played out in the sociolinguistic interview. When /a/ was stressed Generation 3 had the highest F2 mean and fronted overall produced the most fronted tokens, while Generation 1 had

the lowest F2 mean for stressed spontaneous /a/ and consequently produced the overall least fronted tokens. As in the previous two tasks, the tokens and the F2 mean for stressed /a/ with respect to the second generation fell between the first and the third generations. It was the same story for the unstressed spontaneous tokens of /a/. Generation 3 had the highest F2 mean and consequently fronted unstressed /a/ the most in the sociolinguistic interview, while Generation 1 had the lowest F2 mean, and the overall least fronted tokens of unstressed spontaneous /a/.

The aforementioned trend of progressive generational fronting of stressed and unstressed /a/ further supports the previously mentioned post-hoc results that showed significant fronting differences between all three generations. Those results showed that the first generation fronted the least, with more fronting of /a/ seen in the tokens of the second generation, and the most fronted tokens being those of the third generation. In the previous section the more Spanish-dominant speakers of the first generation raised /a/ more, suggesting a possible inherent tendency for centralizing /a/ in the Spanish vowel system. With regards to the horizontal positioning of /a/ within the Spanish vowel space, it would appear that the inherent trend in the Spanish vowel system is to maintain /a/ in a more central position. However, the post-hoc analysis did find a significant difference in fronting between the tokens in the story and the tokens in the sociolinguistic interview, with the least formal task rendering more fronted tokens. In fact, in the means, the first generation speakers had the highest F2 means for their spontaneous tokens.. The same trend was seen in the second and third generations as well.

Overall English Vowel Spaces

With the acoustical measurement made of the more than 4,000 English vowel tokens, it was also possible to establish the overall English vowel spaces for each generation. Due to the

larger number of vowels in the English vowel system, in order to more clearly distinguish between tense and lax, rounded and unrounded, and stressed and unstressed vowels, slightly modified symbols from the TIMIT Acoustic-Phonetic Continuous Speech corpus were used. Table 76 shows the symbols for each vowel, stressed and unstressed.

Vowel	Stressed Symbol	Unstressed Symbol
/i/	IY	iy
/ɪ/	IH	ih
/e/	EH	eh
/æ/	AE	ae
/ɑ/	AA	aa
/u/	UW	uw
/ʊ/	UH	uh
/oʊ/	OW	ow
/ʌ/	AH	ax

Table 76: TIMIT symbols for stressed and unstressed English vowels

Generation 1

Figure 1 is a normalized plot of the overall English vowel space for the first generation participants.

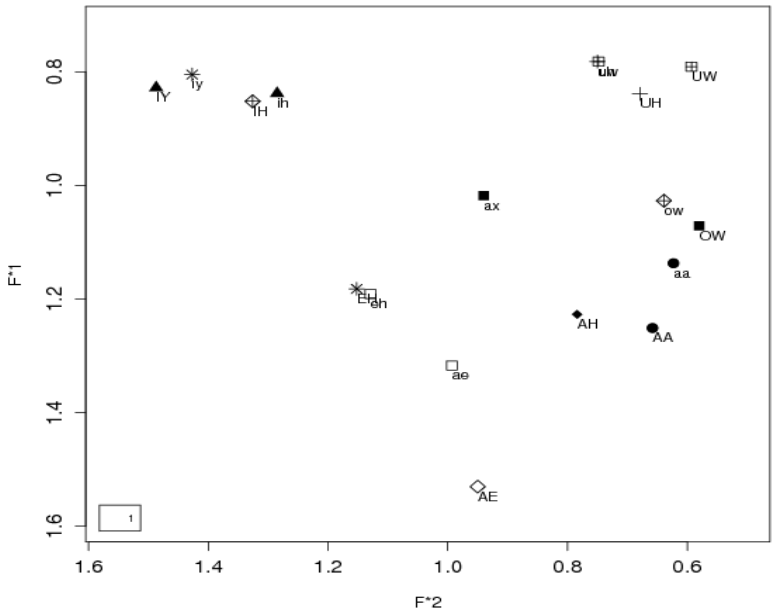

Figure 1: Overall Gen. 1 English vowel space

The Generation 1 English vowel space shows very tight grouping of the high vowels. The high, front tense vowel /i/ and the high front lax vowel /ɪ/ were very tightly grouped with /ɪ/ being raised to almost the height of /i/. The high front tense vowel maintained a more fronted position than /ɪ/. For both tense and lax variants, the unstressed tokens were slightly higher and more centralized than the stressed tokens.

The tense and lax high back vowels were also tightly grouped with the lax, /ʊ/, being raised like the front lax vowel /ɪ/. Stressed /u/ was more backed than stressed /ʊ/, but both unstressed /u/ and /ʊ/ occupied virtually the same space and were more fronted than their stressed counterparts.

The mid front vowel /ɛ/ was much lower than the high front vowels. The stressed and unstressed tokens for /ɛ/ overlapped a lot and shared much of the same vowel space. The mid back vowel /oʊ/ was very backed, with the unstressed tokens being slightly more raised and centralized than the stressed tokens. The mid central vowel /ʌ/ was lower and more backed when

stressed and raised and centralized when stress was absent. This shows that despite the first generation being highly Spanish dominant, they were capable of producing schwa in both stressed and unstressed environments.

The low front lax vowel /æ/ shifted back into the low central spot occupied by Spanish /a/. The stressed and unstressed tokens of /æ/ parallel the behavior of the stressed and unstressed tokens the first generation produced for the Spanish low vowel /a/ in that unstressed /æ/ is notably raised compared to unstressed /æ/. This backward shift consequently pushed the low back English vowel /ɑ/ backwards and up and into the mid back vowel's vowel space. In fact, tokens taken from the acoustical analysis suggested a merge of the /ɑ/ and /oʊ/ with words such as "basketball" being rendered as /bɑ.skɛt.boʊl/. These results show a clear influence of the Generation 1 Spanish vowel space on their English vowel space.

Generation 2

Figure 2 shows the normalized English vowel space of the second generation participants.

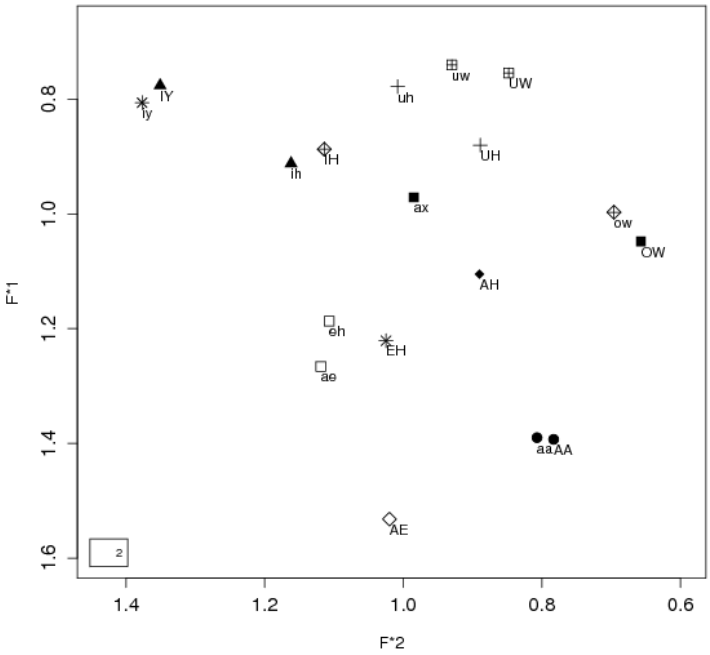

Figure 2: Overall Gen. 2 English vowel space

The high front tense and lax vowels for the second generation show much more separation than the corresponding tokens of the first generation. The high front tense vowel /i/ was much more fronted than /ɪ/ and was also more raised. Stressed /i/ was more raised but slightly less fronted than unstressed /i/. The high front lax vowel /ɪ/ was lower and more centralized than /i/. Stressed /ɪ/ was overall higher and more centralized than unstressed /ɪ/. The high back tense and lax vowels also showed more separation than those of the first generation. Also, both /u/ and /ʊ/ were more fronted than in the first generation. With respect to /u/, these results reflect the previously cited literature regarding English fronting of /u/ (i.e. Labov 2006). Both /u/ and /ʊ/ were more fronted when they were unstressed. Stressed /u/ and /ʊ/ were also lower than their unstressed counterparts

The second generation centralized the front mid vowel /ɛ/ more than the first generation. The stressed tokens were lower and less fronted than the unstressed tokens. The mid back vowel

/oʊ/ was the most backed of all of the vowels of the second generation. It was most backed when it was stressed. Stressed /oʊ/ was also slightly lower than unstressed /oʊ/. The mid central vowel was lower and more backed when it was stressed and higher and more centralized when it was unstressed.

The low front lax vowel /æ/ shifted back in much the same way it did in the first generation. Generation 2 also raised unstressed /æ/ more than stressed /æ/. The low back vowel was unaffected by the backward shift of /æ/ unlike what happened to the low back English vowel in the first generation. The second-generation tokens of the low back vowel were backed to much the same degree as the first generation's tokens but the second generation productions were much lower than those of the first generation. This indicates that the merge of /ɑ/ and /oʊ/ was unique to the first generation. It is also an implication that the Generation 2 English vowel space shows influence from their Spanish vowel system, specifically on the low front lax vowel /æ/.

Generation 3

The high front tense vowel was higher and more fronted than the high front lax vowel. For both high front vowels, stressed and unstressed means were almost identical which can be seen in the plot by the virtual complete overlap of stressed and unstressed tokens for both high front vowels. There was much more space between the stressed and unstressed tokens of the high front back tense and lax vowels. The high front tense vowel /u/ was notably fronted when stressed, moving it closer to the vowel spaces of the two high front vowels than the same tokens of the previous two generations. When /u/ was unstressed, it was much more backed and slightly raised. The high back lax vowel /ʊ/ was notably fronted for both stressed and unstressed tokens, but stressed /ʊ/ was lower than unstressed /ʊ/, overlapping with the unstressed schwa in the center of the vowel space.

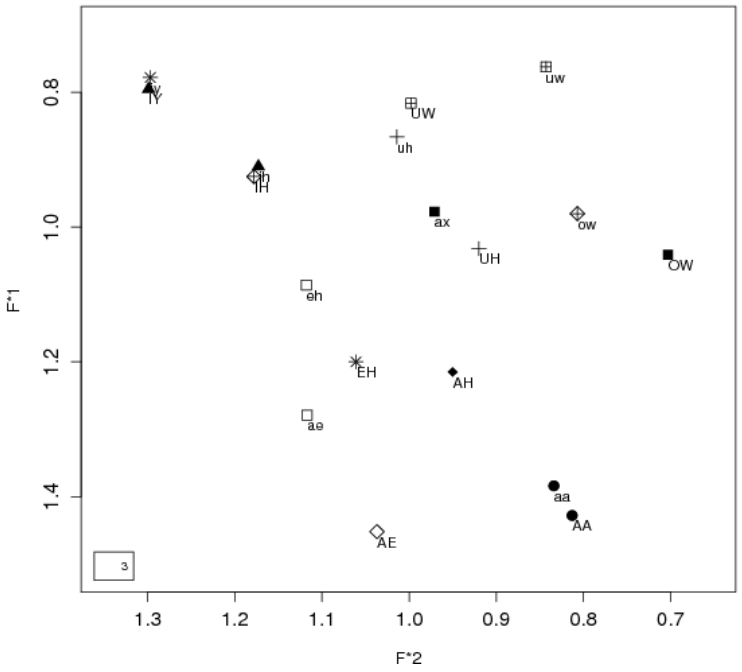

Figure 3 Overall Gen 3 English vowel space

The high front mid vowel /ɛ/ was lower and slightly more centralized when it was stressed and higher and slightly more fronted when it wasn't stressed. The mid back vowel /oʊ/ was lower and more backed when stressed and more raised and centralized when unstressed. The mid central vowel was lower and slightly more backed when it was unstressed, while raising and overlapping somewhat with stressed /ʊ/ when it was unstressed.

The low front lax vowel /æ/ appeared to have undergone the same backward shift at least when it was stressed. When it was unstressed it rose considerably and fronted. As was the case with Generation 2, the effects of the shift were only seen with the low front lax vowel, because the low back vowel was low and back with no evidence of any merge with /oʊ/. It rose slightly when it was unstressed, but moved forward. The backward shift however of the third generation's stressed tokens of /æ/ echoes what happened with /æ/ in the previous two

generations and is further evidence of Spanish transfer into the English vowel system. In the case of the third Generation, this transfer isn't as evident as it is in first two generations, but the fact that /æ/ still shifted backward into the low central region shows that the Spanish influenced the English vowel systems of all three generations, while there was no conclusive evidence of English transfer to any of the overall Spanish systems of the any of the participants in any of the three generations.

Chapter 4: Discussion

Each generation had its own unique vowel spaces and not every vowel was affected the same way by every factor in each generation. In order to get a clear picture of what happened with each generation's respective vowel space, this section first discusses each generation's individual vowel space and how stress and context affected each generation. Afterwards the role that generation played in the overall production of each vowel is analyzed and all three generation are compared to the others. As discussed in the previous section, different factors interacted differently with each vowel in each generation, sometimes achieving levels of significance with some vowels, while not being significant with others.

The first formant of the Spanish high front vowel /i/ was significantly affected by generation, context, and the pairing of stress with generation. The second formant had significant relationships with the same factors as the first formant.

The first formant of the Spanish mid front vowel /e/ had significant interactions with generation and context. The second formant was significantly affected by stress, generation and context. The interaction between stress and context affected both F1 and F2 significantly.

The first formant for the Spanish high back vowel /u/ had significant relationships with overall stress, generation, and context. The F2 means were only significantly affected by overall stress and generation.

The first formant of the Spanish mid back vowel /o/ interacted significantly with overall stress and generation. The second formant of /o/ was significantly influenced by overall stress, generation, and context.

Finally, the first formant of the Spanish low vowel /a/ had significant interactions with overall stress, generation and context. The second formant of /a/ was also significantly affected

by the same three factors as the first formant.

Generation 1

Figure 4 is the overall normalized Spanish stressed and unstressed vowel spaces for Generation 1 and Figure 5 shows the first generation vowel space by stress and by task type (context) respectively.

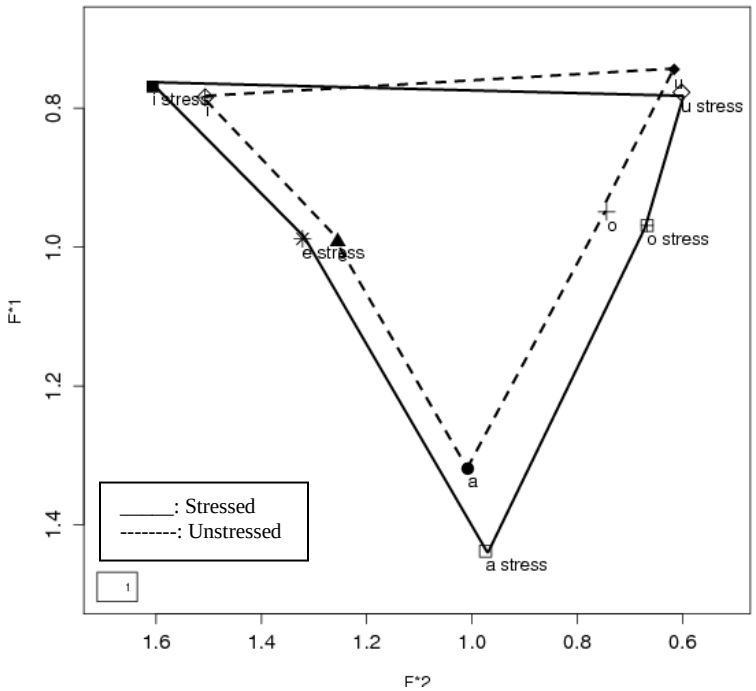

Figure 4: Overall normalized Generation 1 stressed and unstressed Spanish vowel space

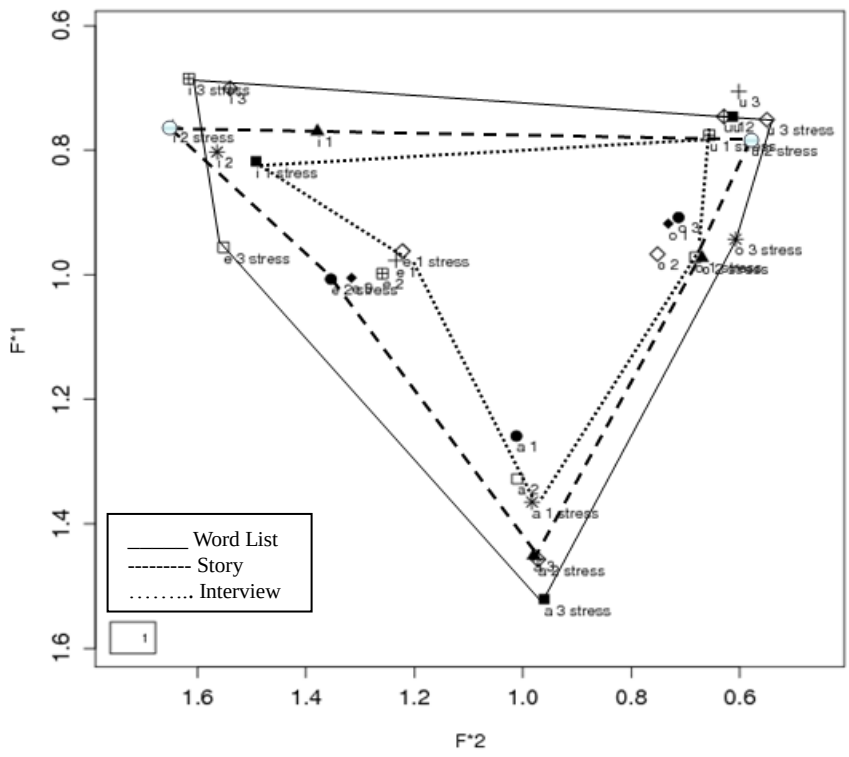

Figure 5: Overall normalized Generation 1 stressed Spanish vowel spaces by context

Spanish high front vowel: /i/

The first generation had the lowest overall F1 mean for /i/ while having the highest overall F2 mean. In other words, the first generation participants produced the overall highest and most fronted tokens of /i/.

As previously cited, Harmegnies & Poch-Olivé (1992) found that as contextual formality decreased vowel tokens had an overall tendency to centralize. Although they found that the mid and low vowels centralized the most, the high vowels still showed the same behavior to a lesser extent. The first generation productions of /i/ followed this pattern. In the most formal task, the word list, the first generation produced the highest and most fronted tokens of /i/. As the tasks decreased in formality, the F1 and F2 values increased resulting in lower and more backed productions of /i/. These overall differences were found to all be significant. This begins to show

the shortcomings of previous studies that have used more controlled lab speech (word lists, carrier sentences) to make overall conclusions with regards to the overall properties of the Spanish vowel system. It could also be argued that because /i/ varied consistently across all three tasks that using the measurements of one task to generalize /i/ for all tasks is inaccurate and that contextual formality should always be taken into account when considering acoustical data of /i/.

Cross-linguistically, it would appear that the first generation's Spanish /i/ strongly influenced their production of the English high front lax vowel /ɪ/. The Generation 1 normalized English vowel plot in Figure 5 shows that even though the Generation 1 speakers centralized /ɪ/ more than /i/, they raised it to virtually the same height as /i/. This was most likely due to the fact that Generation 1 was made up of Spanish-dominant speakers and the absence of a tense-lax contrast not only in the high front region, but the entire Spanish vowel space for that matter, caused the first generation speakers to map English /ɪ/ onto /i/. In fact, of all three generations, the first generation had the most fronted overall /i/ for the recorded English speech. This can in part be explained physiologically. Part of the difference between tense and lax vowel production in English is overall tongue position. The tense /i/ is higher and more fronted than the lax /ɪ/; therefore, this means that /i/ is produced with a higher more advanced tongue position. For the vowel to be lax, the tongue must slightly retract and relax. This retraction in turn not only contributes to productions of the token in question, but it moves it more toward the center of the overall vowel space as well. This difference in height and frontness, as well as relative tenseness of the tongue, is a distinction that is absent in Spanish. Liu (2004) speculates that because this contrast does not exist in Spanish, Spanish-speakers may lack the proper sensitivity on a phonetic level to make the tense-lax distinction. The fact that Generation 1 raised /ɪ/ to the same height as /i/, suggests that the most important factor in perceiving high front vowels for the first

generation participants of this study was height. However, this notion would seem to be refuted by the fact that the first generation not only raised /ɪ/ more than the other two generations but fronted it more than the other generations as well. Consequently, while height played a role in the perception of English high front vowels for the first generation, frontness also had an influence. The results point to a mapping of the high front lax vowel onto the high front tense vowel by the first generation for height and frontness. This tight grouping of the high front tense vowel with the high front lax vowel appears to be cross-linguistic influence from Spanish. There was no apparent influence from English on the productions of Spanish /i/ in the first generation data.

Spanish high back vowel: /u/

On average the first generation tokens for /u/ were the lowest of all three generations. Stress and context were all determined to play significant roles in the overall height of /i/, while only stress played a significant role with regards to the backness of /u/.

Overall, the first generation's stressed tokens for /u/ were lower and more backed than the unstressed tokens. This is confirmed in Figure 4 as unstressed /u/ was the only unstressed vowel not to fall inside the stressed vowel space. As a consequence of unstressed /u/, the first generation's unstressed vowel space rose in its high back region. However, this still indicates that the first generation speakers articulated stressed and unstressed instances of /u/ differently.

The influence of context did not have a significant effect on the overall vowel space of the first generation's tokens of the high back vowel. This is apparent in Figure 9 where the various contextual means for /u/ are the most tightly grouped of all vowels throughout all three contexts. This confirms part of Skelton (1969) and Delattre (1969)'s findings that /u/ was one of the most stable vowels. It also falls in line with Harmegnies & Poch-Olivé (1992) who found that even when Spanish vowels varied and centralized more as contextual formality decreased, /u/,

along with /i/, were the most stable vowels.

The overall stability of the first generation productions of /u/ also shows that there was no English transfer to their Spanish productions of /u/ due to the American English tendency to front /u/. In fact, the first generation English tokens of /u/ did not undergo a great degree of fronting either. Unstressed English /u/ was slightly more fronted than stressed /u/, but its mean was still the lowest for all three generations for unstressed English /u/. With this information, it could be hypothesized that the first generation English production of /u/ was influenced by transfer from the Spanish /u/. However, while Labov (2006) affirms that 90% of American English speakers in the United States front /u/, he excludes most of Florida from his map that he uses to show where /u/ undergoes fronting. The only part of Florida that Labov shows as fronting /u/ is the most western section of the Panhandle. It could be that the English of Miami has been hispanized as a result of the sheer number of Spanish speakers that reside in the region and the favorable status that Spanish enjoys there. This notion falls outside of the scope of the current study though. What the current study can affirm is that the first generation speakers did not front their English /u/ as is typical in the vast majority of American English. With the current data set, this would seem to be the result of Spanish transfer into the English vowel system of the first generation.

Spanish mid front vowel: /e/

Generation 1 had the lowest means for both formants of all three generations meaning that the overall production of /e/ by the first generation was the lowest and least fronted when compared to the productions of the other two generations. Context and the interaction between stress and context were all determined to significantly influence the height of the first generation productions of /e/. Stress as an overall factor approached significant levels. For frontness, stress, context, and the interaction between stress and context were all significant.

The effect that context had on /e/ for the first generation tokens was much the same as the effect it had on /i/. F1 means were the highest for the first generation in the story and slightly lower for the word list. This difference however, was not found to be significant. Neither was the height difference between the word list and the interview. However, the height difference between the story and the interview for the first generation tokens of /e/ was found to be significant. Although this doesn't show a clear progressive pattern of raising caused by gradual decrease in contextual formality, it does show a raising of /e/ as contextual formality decreased from the story to the interview. The F2 means were highest for /e/ when context was the most formal and progressively decreased as formality decreased. In other words, the most fronted and lowest productions of /e/ were the tokens from the word list while the most centralized and high productions of /e/ were tokens from the interview. Figure 5 shows how /e/ was considerably more centralized in the interview than in the word list. The same phenomenon happened with the high front vowel /i/ as previously discussed. This indicates contextual formality affected the overall vowel space of the front vowels in two differing ways. First, as formality decreased the overall space occupied by the front vowels was significantly reduced on a statistical level and gravitated toward a more central point. As the formality of a speech task increased, the front vowel space increased and tokens started to distance themselves from the central point they gravitated towards in the more informal contexts.

Although stress as an overall determining factor for the quality of /e/ wasn't determined to be significant, with a p value of .58 it neared levels of significance and thus merits mentioning. The first generation produced stressed /e/ in an overall more fronted position than unstressed /e/. The lack of stress correlated with the first generation backing /e/. These data further indicate that stressed and unstressed vowel spaces are inherently different. In the

particular case of /e/ the first generation exhibited the same pattern as they did with /i/, that is, vowel space for both /i/ and /e/ constricted when stress was absent. In the case of the first generation stress correlated with increased vowel space, while lack of stress correlated with a decrease in the vowel space occupied by /i/ and /e/.

The interaction between stress and context was determined to have a significant relationship to the height and frontness of the first generation productions of /e/. For /e/ the only contextual pairing that was significant for F1 was the story and the interview. All three pairings were significant for F2. The first generation stressed and unstressed F1 means for the story were higher than the stressed and unstressed means for the interview. This means that the tokens in the story were significantly lower than in the interview and that both the lack of stress and decreased contextual formality caused /e/ to be raised. Figure 5 confirms this with the productions of /e/ becoming higher from the story to the interview.

The first generation F2 means for /e/ decreased in all three contexts when /e/ was not stressed. Also, there was a progressive decrease in the F2 values for the first generation's production of /e/ as contextual formality decreased. Figure 5 confirms these results. Not only did /e/ gradually back as the formality of each task decreased, but within each task the vowel space for stressed /e/ was less backed than the vowel space of unstressed /e/. The data also show that in the first generation, stress and increased contextual formality correlated with more fronted tokens of /e//e/.. Overall, when the F1 and F2 data is combined, /e/ moved forward gradually and significantly as the formality of each task decreased and as stress was removed within each context. Between the story and the world list /e/ not only made a significant move back, but also upward in the overall vowel space.

The overall vowel space for the first generation productions of the front vowels was

affected by several factors. More fronting occurred when stress was present and the formality of the speech tasks increased. When stress was removed and contextual formality decreased, the overall first generation front vowel space became progressively more constricted. The high front vowel moved down and back and the mid front vowel moved up and back. These results confirm Harmegnies & Poch-Olivé (1992)'s findings for context and further add stress as a factor influencing vowel quality.

Spanish mid back vowel: /o/

Generation 1 had the lowest means for all three generations for both formants. Height was found to have a significant relationship with stress and backness had significant relationships with stress and context.

The stressed F1 mean for the first generation productions of /o/ was higher than the unstressed F1 mean. The stressed F2 mean was lower than the unstressed F2 mean. These numbers show that in the first generation stressed instances of /o/ were overall lower and more backed, while unstressed tokens were higher and fronted. These results are further evidence in favor of the notion that the lack of stress shrinks overall vowel space.

Context only had a significant relationship with the overall horizontal position of the first generation productions of /o/. The means decreased as contextual formality increased. In other words, /o/ gradually centralized as the formality of each task decreased. Figure 5 confirms this notion as the vowel spaces for /o/ in the story and the interview are notably more fronted than the word list productions of /o/. In the review of the literature Varela (1992)'s findings were cited. Among them was her claim that as many as 14 of her informants pronounced the mid, back, rounded vowel /o/ as the low, front unrounded English vowel /æ/. In her data she gives [præn.to] for /prón.to/ and [æk.tú.bre] for /ok.tú.bre/. She asserts that this highly unusual case of extreme

fronting was a frequent phonological process in the speech of the Cuban Americans that she interviewed. The first generation data gives no indication of any type of extreme fronting. The first generation did indeed front a number of their /o/ tokens, but in order for /o/ to have moved from a mid-back position to a low front position it would have had to lower considerably and cross the entire first generation vowel space. This would have been very difficult for the first generation seeing as how no downward trajectory was shown in any of the productions. Context did not significantly influence the F1 values for /o/ in any of the data sets for any of the generations. Therefore, if extreme fronting were to have occurred, stress could have been the only factor within each generation that could have caused it. The first generation productions of /o/ were lowest in stressed position but did not continue to lower when stress was absent. In fact, unstressed /o/ was actually articulated higher in the vowel space than stressed /o/. Also, Figure 1 shows that the first generation didn't even produce /æ/ in English. In fact, it appears that Spanish actually influenced the first generation's English vowel space more by moving /æ/ back into a low central. This shift and its implications will be discussed in more detail later on. However, Varela did say that her subjects were "transitional bilinguals", and although she didn't make any specifications regarding the overall Spanish fluency of her subjects, she implies that they were English-dominant and Generation 1 was Spanish-dominant. That being said, if extreme fronting is in fact a valid phenomenon within Cuban-American Spanish, then the data suggest that it is not a part of the Spanish of first generation speakers.

The findings for the back vowels of the first generation show variation occurred in the back area of the first generation vowel space much like with the front vowels. Overall, stress and context played differing roles with the first generation productions of both back vowels. While stress and context were shown to significantly affect the height of /u/, only stress significantly

affected the overall height of /o/. Stress and context significantly influenced the overall frontness/backness of /o/ while only stress had a significant effect on the backness of /u/. Both vowels had higher F1 means for stress bearing tokens. This indicates that the presence of stress correlated with the lower productions of both back vowels by the first generation. Decreased contextual formality resulted in more fronted productions of /u/. However, the only significant fronting occurred as formality decreased between the word list and the story and the word list and the interview. No significant front occurred between the story and the interview. Stressed F2 values for /o/ and /u/ were lower than unstressed F2 values, indicating that the presence of stress correlated with more backed productions of both vowels. Also, the F2 values for /o/ gradually increased and contextual formality decreased, resulting in more centralized tokens of /o/ as formality decreased.

Spanish low vowel: /a/

The low vowel /a/ was arguably the vowel that varied the most out of all of the vowels for the first generation. Stress and context were significant factors for both height and overall frontness or backness.

The stressed F1 mean for /a/ was higher than the unstressed F1 mean, while the stressed F2 mean was lower than the unstressed F2 mean. What this resulted in were lower more backed productions of stressed /a/, and raised fronted unstressed productions of /a/. Consequently /a/ is the only low vowel in Spanish; therefore, fronting isn't necessarily indicative vowel space reduction. However, if /a/ rises, this *is* indicative of a constriction of vowel space. A rise of /a/ is also a gravitation of the vowel toward a more central point in the overall vowel space of a given speaker. The first generation raised /a/ significantly when /a/ was unstressed thus offering further

evidence to the previously mentioned notion that unstressed vowel space is overall more constricted than stressed vowel space. Figure 4 confirms this idea even further as it is evident that the first generation had higher productions of unstressed /a/ than of stressed /a/.

The overall height of /a/ changed significantly with all three tasks, while the only significant difference in overall frontness/backness occurred between the story and the interview. F1 means decreased as contextual formality decreased and F2 means increased as formality decreased. This indicates that /a/ gradually centralized with the decrease in formality of each task. The only significant difference in frontness occurred between the story and the interview with the spontaneous /a/ tokens moving forward in the vowel space.

The overall indications of the results for /a/ is even further evidence to back up the assertions that vowel space varies based on stress and context. Also, the fact that /a/ varied the most is once again directly in line with the findings of Harmegnies and Poch-Olivé (1992). In their study of vowel reduction and variation, they found that the low vowel showed the most variation, frequently moving in an upward direction within the overall vowel space. Delattre (1969) and Skelton (1969) also noted that /a/ was the least stable of all of the Spanish vowels. In all three of these studies, /a/ varied the most in height. Variation for /a/ was also found by Willis (2005), but he found that the productions of /a/ in his study varied more along a horizontal trajectory.

Summary

As mentioned earlier, the first generation participants were the most Spanish dominant of all three generations studied. The overall vowel space of the first generation showed a good amount of variation for all five Spanish vowels. Overall, with the exception of /u/, unstressed

tokens tended to centralize. In the case of /u/, unstressed tokens were indeed fronted, but they were also raised, creating more distance between them and the center of the vowel space. Overall, the stressed vowel space of the first generation was larger than their unstressed vowel space. Contextual formality also increased or decreased overall vowel space for all vowels to varying degrees. The data indicate that decreased contextual formality resulted in decreased vowel space.

With respect to the influence of language contact on the English and Spanish vowel spaces, the first generation showed no evidence of English influence when producing Spanish vowels. For example, even though the first generation was able to produce both stressed and unstressed schwa in English, there was not any evidence of schwa in their Spanish vowel space. This serves as partial evidence that no transfer from English occurred in the first generation Spanish vowel space. In fact, the opposite was true. The first generation's English vowel system showed signs of transfer from Spanish. The low front lax vowel shifted back into the space that Spanish /a/ occupies. This in turn pushed the low back English vowel even further back and upwards, creating what at times seemed to be a merge with the mid back vowel. The high front tense and lax vowels were also produced at nearly the same height. Spanish has no tense or lax distinction between any vowels; therefore, it could be hypothesized that the tight grouping of the first generation's high front tense and lax vowels is further evidence of transfer from Spanish. Finally, the first generation also consistently produced very backed tokens of English /u/. This is indicative of Spanish transfer into the Generation 1 English vowel space. As mentioned earlier, 90% of the U.S. fronts /u/ yielding productions that have I-coloring (Labov 2006). This I-coloring is a result of overlap with the high front vowels, The fact that there was no I-coloring in the first generation's tokens of English /u/ may indicate transfer of the Spanish /u/ into the first

generation's English vowel space. Labov (2006) does indeed state that most of the US fronts /u/ to a certain degree, but he excluded Miami from all u-fronting regions. On a much larger scale this too could be considered as evidence of transfer of various features of Spanish into the English of Miami. It could be that the strong Spanish influence in Miami has prevented the forward shift of /u/ in the region. However, verifying this assertion is beyond the scope of the current investigation.

Generation 2

Figure 6 illustrates the stressed and unstressed vowel spaces of the second generation. Figure 7 demonstrates how the second generation vowel space varied as contextual formality varied. Also, the vowel spaces shown in Figure 7 are the contextually based stressed vowel spaces.

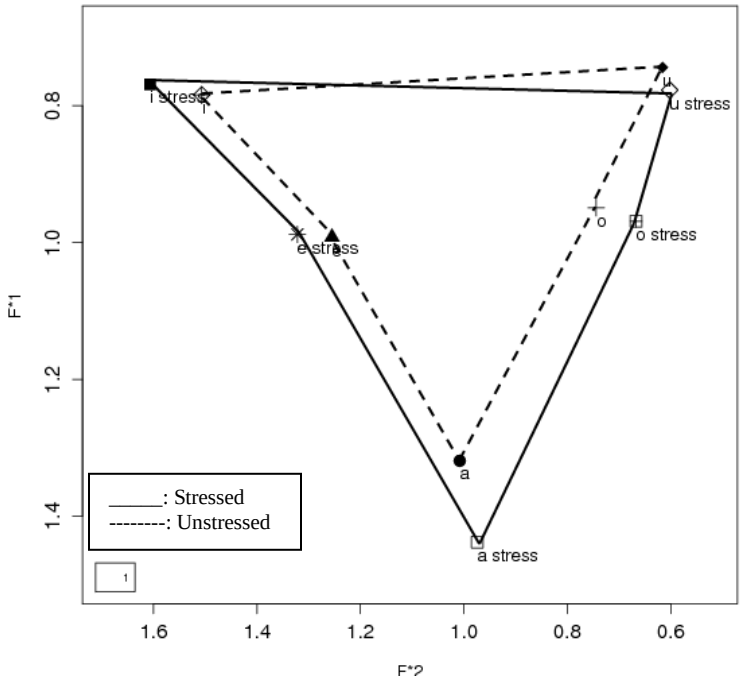

Figure 6: Overall stressed and unstressed Generation 2 Spanish vowel space

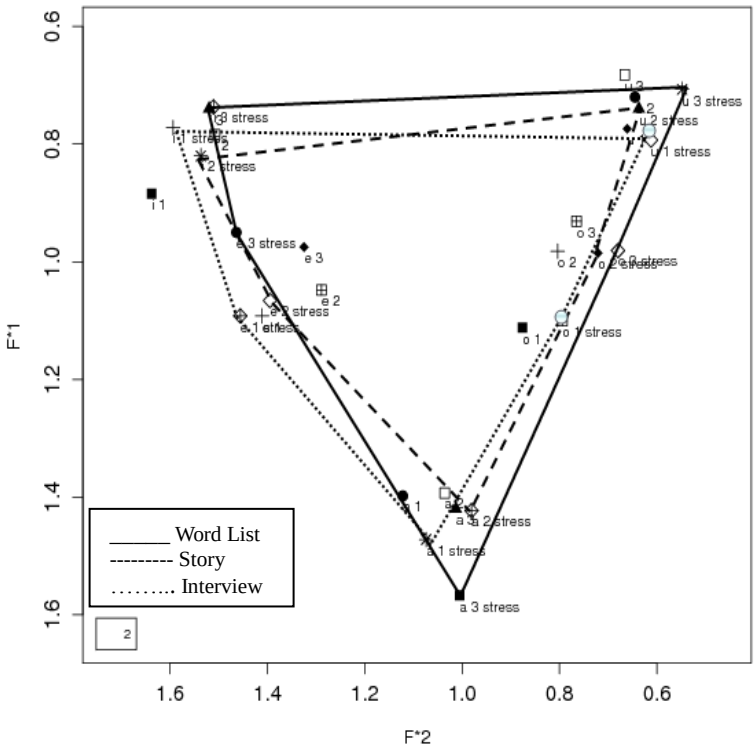

Figure 7: Overall normalized Generation 2 stressed Spanish vowel spaces by context

Spanish high front vowel: /i/

The second generation had the highest overall F1 mean for /i/ and the second highest overall F2 mean. As previously noted, the first generation had the highest overall F2 mean.

The second-generation speakers gradually increased F1 values and increased F2 values as contextual formality decreased. This resulted in progressively lower and more fronted tokens of /i/ as the formality of the speech task decreased. The overall differences between the F1 means for each task for all generations were found to be significant. However, as can be seen in Figure 7, stressed /i/ in the interview appeared to have had lower F1 values than stressed /i/ in the story. Statistical analyses were not run on contextual pairings with stress within each generation; therefore, the significance of this height difference is unknown. Only the F2 differences between the word list and the interview and the story and the interview were significant. Figure 7

confirms this as it shows that the most fronted high front vowel space was that of the interview. On the other hand, the most backed high front vowel space was that of the tokens taken from the word list task. With relation to English, Spanish /i/ does not appear to have affected the second generations' ability to distinguish between the high front tense and lax English vowels. The high front lax vowel was considerably more centralized than its tense counterpart. This suggests that because the second generation was more fluent in English than the first, they were able to maintain more autonomous vowel spaces for Spanish and English.

The overall second-generation vowel space for Spanish /i/ showed variation, but this variation did not reduce the vowel space. Rather, especially when unstressed spontaneous /i/ was considered, the entire vowel space for /i/ appears to have undergone an overall forward and downward shift as contextual formality decreased.

Spanish high back vowel: /u/

The second generation had the greatest F2 mean for the Spanish high back vowel. Overall stress and context significantly affected height while only overall stress affected the F2 values.

On average, stressed tokens had greater F1 values and smaller F2 values than unstressed tokens. This resulted in /u/ being produced in a lower, more backed position when it was stressed and then in a higher more fronted position when stress was absent. Figure 6 illustrates this forward and upward shift that second generation productions of /u/ made. In fact, unstressed /u/ was the only vowel that didn't fall within the stressed vowel space. Centralization did occur, but with the upward shift, there was no clear reduction in overall vowel space for /u/ when stress was absent.

The overall F1 values for /u/ gradually increased as contextual formality decreased. In

other words, as the formality of the speech type decreased, second generation tokens of /u/ gradually decreased in overall height relative to their vowel space. However, the overall data for all three generations indicate that only the difference between the word list and the other two tasks was significant. The height difference between the story and the interview was not found to be significant when the data from all three generations were considered. However, Figure 7 does show that the second-generation productions of /u/ did in fact vary in height across all three tasks within the context of just the second generation data. A second Bonferroni post-hoc analysis run after the initial analyses found that the interaction between generation and context was significant with regards to the height of /u/ within each generation. However, a generation-by-generation analysis of the variation of each vowel by task is beyond the scope of the current study.

With regards to language transfer, although the F2 means for Generation 2 were higher and increased when stress was absent, it doesn't appear that there was any transfer from English. It also appears that transfer from Spanish into the English high back vowel space was also absent in the second-generation data. The second generation stressed English tokens of /u/ were more fronted than the unstressed Spanish tokens indicating that on average even the most fronted Spanish tokens weren't as fronted as the most backed English tokens. What this means is that the second generation showed greater ability than the more Spanish-dominant first generation to distinguish between the subtle differences of the production of Spanish tokens of /u/ and the production of English tokens of /u/. It is interesting to note that even though Labov (2006) excluded Miami from his grouping of areas of the United States that front English /u/, the second generation fronted their productions of English /u/ and did so even more when /u/ was unstressed. In fact, Generation 2 fronted stressed and unstressed tokens of both the high back tense vowel and the high back lax vowel. Although not the focus of the current study, these data

could be indicative of English /u/ undergoing a frontward shift in Miami amongst speakers who speak English with equal or greater ability than Spanish.

In summary, although the second-generation productions of /u/ did vary in height and overall backness, in general /u/ was relatively stable compared to other productions of other vowels. In fact, the variation seen between stressed and unstressed tokens didn't reduce the overall high back Spanish vowel space of the second generation. Rather, it just moved it slightly forward and up. Context appeared to create overall height differences between productions, but the variation wasn't constant across contexts and it doesn't appear that there was a definitive decrease in the overall high front vowel space. With /u/ being the most stable vowel, followed by other high vowel /i/, the overall conclusion that can be drawn is that the high region of the overall Generation 2 Spanish vowel space was the most stable region, confirming the findings of previously cited studies (e.g Skelton 1969, Dellattre 1969, Harmegnies and Poch-Olivé 1992). However, stability does not imply categorical immunity to variation. The data confirm that although stable, there was still variation in the upper echelon of the Generation 2 Spanish vowel space that wasn't simply the result of transfer from English. This means that even in the most stable region of the Spanish vowel space, variation is present.

Spanish mid front vowel: /e/

The second-generation speakers had the highest mean for the first formant of the mid front vowel and the second highest mean for second formant.

Overall stress only had a significant interaction with the F2 means of the second-generation productions of /e/. When productions of /e/ were stressed, their F2 values tended to be higher than when stress was absent. This means that the absence of stress correlated with more

centralized productions of /e/.

Context significantly influenced both the F1 and the F2 values for /e/. This means that the first formant increased between the word list and the story and decreased between the story and the interview. As contextual formality decreased the F2 values decreased. The only significant overall difference in height was between the story and the interview, in which the tokens from the interview were produced significantly lower in the overall vowel space than those tokens taken from the story. It merits noting that the pairwise comparisons for task were run on the combined data of all three generations from each task. Therefore the significance of generation specific changes isn't entirely clear. What is known though is that changes and variations did indeed occur. With regards to overall frontness, the differences between all three tasks were significant. What this means is that the second generation gradually centralized /e/ as the tasks progressively became less formal. The overall second-generation tokens of /e/ consistently centralized as task formality decreased, but the height variations didn't follow a consistent pattern. From the word list to the story /e/ lowered and from the story to the interview, instead of continuing on a gradual downward trajectory, /e/ rose. When stress was looked at within each context for /e/, the relationship was significant for both formants. The stressed F1 means for /e/ were the same in the word list and the interview and highest in the story. The unstressed F1 means gradually decreased as the formality of the speech task decreased. The stressed and unstressed F2 means gradually decreased as formality decreased. This translates to overall higher and more centralized unstressed productions of /e/. The stressed productions of /e/ didn't follow a set pattern; they were the most fronted for the word list, but were the lowest in the story. Overall, the effects that stress and context had on the second formant of /e/ are the most interesting, because /e/ was centralized as both stress was removed and contextual formality

decreased. This overall decrease in the horizontal vowel space of the mid front vowel is further evidence that task type influences vowel quality and overall vowel production. It also agrees with the findings of Harmegnies and Poch-Olivé (1992) that decreased formality results in more reduced vowel tokens.

The overall front vowel space of the second generation showed the same tendencies as the front vowel space of the first generation. The F2 means for both vowels were what ultimately determined if the vowel space decreased or not. It cannot be definitively concluded that the differences in height reduced the overall front vowel space because at times they were inconsistent. But the differences in the second formant show that /e/ gravitated toward a central point within the overall second-generation vowel space. Stress was only significant for /e/ but contextual formality was significant for both front vowels. Greater formality correlated with more fronted productions of both vowels and consequently less constriction at the front of the overall vowel space of the second generation.

Spanish mid back vowel: /o/

F1 values of /o/ for the second generation were generally higher when stressed. F2 values increased when stress was absent. This yielded productions of the mid back vowel that were more backed and lower when stress was present. When stress was absent, production of /o/ moved forward and upward. Overall, the unstressed mid back vowel space of the second generation was more constricted than their corresponding stressed vowel space. Context only had significant effects on the overall F2 values of /o/. Within the second generation, F2 values increased as contextual formality decreased. The overall differences between each task were found to be significant. Figure 7 reflects this gradual forward movement of the second-

generation productions of /o/ as the task type became less formal. The end result might at first seem to be an increasingly more constricted mid back vowel space. However, the data for the second-generation front vowels indicated a gradual forward shift as contextual formality decreased. In other words, even though /o/ gradually fronted as speech formality decreased, the forward shift was not necessarily indicative of an overall reduction of the mid back vowel space because the front vowels moved forward also thus moving much of the entire vowel space forward. Therefore, at least in a horizontal direction, context didn't seem to reduce the second generation's mid back vowel space.

Extreme fronting was of /o/ was not indicated by the second-generation data either. Once again context only affected the overall values for the second formant of /o/. As previously discussed, in order for /o/ to move into the space of /æ/, speakers would have to lower /o/ from the middle of the overall vowel space to the bottom and then /o/ would have to cross the entire width of the vowel space before it got to the low front region. The second-generation stressed F1 tokens were lower within their overall vowel space than unstressed tokens. As a result, where a fronted downward trajectory would be needed for /o/ to end up in the vowel space of /æ/, the second-generation productions of /o/ had almost the opposite trajectory as they moved forward and up when not stressed. In fact, Figure 2 shows that the second generation also shifted /æ/ backward into a more low central position. Once again, it could be argued in light of previously discussed data that the second-generation speakers weren't transitional bilinguals because of their high fluency in both languages. However, the data show that if extreme fronting is a true phenomenon in Cuban-American Spanish, it integrates itself into the phonology later on in the bilingual continuum. This also indicates that if valid, the speaker must be much more English-dominant than Spanish-dominant.

In summary, the second generation back vowel space behaved similar to the front vowel space and at the same time slightly differently. The back vowels reacted differently to stress. The unstressed tokens of /o/ were more centralized than the stressed tokens, resulting in a more constricted mid back vowel space when stress was absent. On the other hand the high back vowel moved up more than it did forward when stress was absent, placing unstressed /u/ outside of the second generation's stressed vowel space, resulting in no definite reduction of the high back vowel space.

With regards to context, the back vowels behaved somewhat differently than the front vowels. While both front vowels gradually moved forward as contextual formality decreased, only /o/ made the same forward shift. It is not fully apparent what caused this forward shift, but it could be argued that as the front vowels moved forward, they "pulled" /o/ forward too. This doesn't explain why /u/ didn't undergo the same pattern of fronting though. An alternative explanation might be that /o/ "pushed" the front vowels forward. Once again though, this leaves /u/ unexplained. A third explanation might be that /o/ pushed the front mid vowel /e/ forward, and because /e/ is traditionally more centralized than /i/, the forward "momentum" of /e/ pulled /i/ forward in order to maintain the same overall positional relationship in the overall vowel space between the two front vowels. This final explanation makes even more sense when the second generation English and Spanish vowel spaces are compared. The second generation, like the first generation, did not reduce any vowel to schwa in Spanish. Thus, the mid central vowel was completely absent from the Generation 2 Spanish vowel space. If /o/ were to have continually moved forward without an expansion of the space in front of it, it would have eventually been reduced to schwa. By shifting /e/ forward, the vowel space occupied by schwa moved forward as well, preventing schwa from emerging in Spanish of the second generation.

Ladefoged and Broadbent (1957) state that vowel perception is based on the overall range of formant frequencies. In their experiment they found that vowels were perceived at higher formant ranges when the overall formant range of a carrier sentence was increased. When the overall formant range was decreased, vowels were heard at lower and more restricted ranges. This appears to be what happened with the second generation as /o/ pushed /e/ forward, /i/ moved forward also because the frequency range for /e/ increased, and the overall positional relationship between the two front vowels had to be conserved. However, this still doesn't explain /u/. The high back vowel was more stable although it did vary in height from task to task. It would appear that the high back vowel space was altered more vertically, while the mid back vowel space was altered more horizontally. The forward shifts of /i/, /e/, and /o/ didn't affect the overall horizontal position of /u/. This could be because there was not need to shift /u/ forward. The positional relationship between the two back vowels places /u/ higher and further back than /o/. If /o/ shifts forward, even if the shift is dramatic, /u/ remains further back than /o/ and the relationship between the two vowels is maintained.

Spanish low vowel: /a/

The stressed F1values for the second-generation productions of /a/ were higher than the unstressed F1 means. The stressed F2 values were lower than the unstressed F2 values. Consequently stressed tokens of /a/ were produced lower and further back than unstressed tokens. The low central vowel space is different than the vowel spaces of the other four Spanish vowels in that forward movement is not toward a more central point. If /a/ moves toward a central point, because of its positioning it has to move up. Consequently, while the high and mid vowel spaces constrict horizontally, the vowel space for /a/ constricts vertically. Figure 6

confirms this showing that the stressed /a/ was produced lower than unstressed /a/. The upward movement of unstressed /a/ consequently reduced the overall low central vowel space. It is important to note that even though /a/ shifted upward toward the mid central area of the overall vowel plot, it never reduced to schwa. The second-generation English vowel space in Figure 2 confirms that /a/ never reached the area occupied by stressed or unstressed schwa. Unstressed /a/ also moved forward, but that forward movement did not create any definitive reduction of vowel space. What it did do was move /a/ further away from the vowel spaces of stressed and unstressed schwa.

As contextual formality decreased F1 values generally decreased while F2 values generally increased. However, neither formant followed a set pattern. The overall cross-generational F1 differences were significant between all three tasks while only the difference between the story and the interview was significant for F2. Generation 2 moved /a/ up and forward as contextual formality decreased. Figure 7 shows a significant forward shift between the story and the interview. The effects of contextual formality on /a/ strongly resembled the effects of stress. When /a/ was in the most formal context it was lower and more backed, just like it was when stressed. As formality decreased /a/ moved up and forward, much like it did when it wasn't stressed. This shows that /a/ followed the same forward shift that the other vowels made when contextual formality decreased.

The Generation 2 vowel space had no evident transfer effect on Spanish /a/. In fact, there was evidence of transfer from Spanish in the second generation's English vowel space in much the same manner as was seen in the first generation. The same backward shift of /æ/ to the low central space occupied by Spanish /a/ occurred in the second generation English vowel space as well. However the shift did not continue as it did in the first generation and there was no merge

of /a/ with /oʊ/. Also, as previously mentioned, there was not reduction of /a/ to schwa either.

Summary

With the exception of /u/, the lack of stress centralized all other vowel spaces. This is further evidence of the notion that stress and unstressed vowel spaces are inherently different. Decreased contextual formality caused all vowels, except for /u/, to shift forward. Vowel space did in fact reduce from task to task, but more vertically than horizontally. This was especially evident with /a/.

The second generation participants overall had the best handle on both languages. It could be argued that they were English-dominant, but their overall Spanish skills were superior to those of the third generation and their overall English skills were superior to those of the first generation. The data back this notion up, suggesting that Generation 2 was the generation that was most able to draw clear lines between their English and Spanish vowel spaces. In English they were able to clearly distinguish between all tense and lax vowels, while maintaining the overall quality of the corresponding Spanish vowels without making them lax. Also, they showed a clear ability to distinguish between Spanish and English /u/. They fronted English /u/ while maintaining a very backed Spanish /u/. In fact, most of the variation seen with the second generation productions of /u/ was related to height and not frontness or backness. Also, there was no reduction of any vowel to schwa. Finally, there was no evidence at all for extreme fronting. In fact, /o/ followed the exact opposite trajectory necessary for extreme fronting to take place.

Generation 3

Figure 8 shows the stressed and unstressed vowel spaces of the third generation. The

solid line indicates the stressed vowel space while the dashed line outlines the unstressed vowel space. Figure 9 shows the contextual vowel spaces of the third generation. The solid line represents the vowels space of tokens taken from the word list, the dashed line is the vowel space of tokens taken from the story, and the dotted line outlines the vowel space of tokens taken from the interview. The vowel spaces represented in Figure 9 are the context-specific stressed vowel spaces.

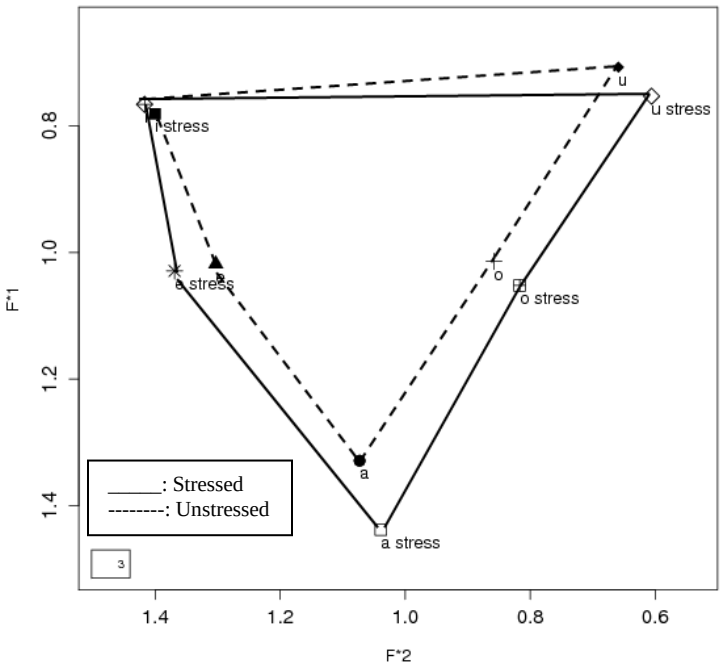

Figure 8: Overall stressed and unstressed Generation 3 Spanish vowel space

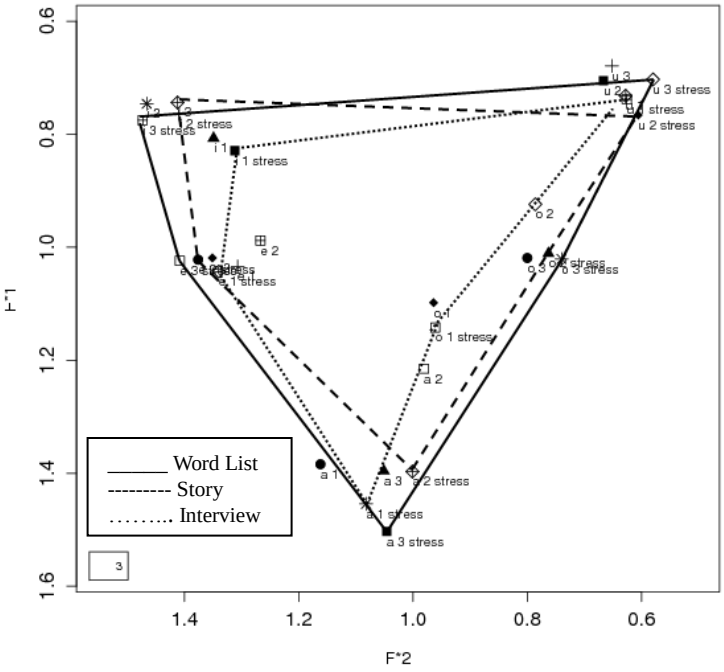

Figure 9: Overall normalized Generation 3 stressed Spanish vowel spaces by context

Spanish high front vowel: /i/

The F1 means for the third generation's productions of /i/ increased as contextual formality decreased while the F2 values decreased. The overall post-hoc analysis found that all F1 differences between each task were significant while the F2 differences were only significant between the word list and the interview and the story and the interview. The third generation contextual data for the first two formants of /i/ show that /i/ got progressively lower and more centralized as formality decreased. The overall results of this pattern created a more constricted high front vowel space from the most to the least formal tasks.

Even though /i/ gradually centralized from task to task, the most centralized token of Spanish /i/ was overall still more fronted than any English token of the high front lax vowel. In fact, Spanish /i/ was centralized by all three generations to one extent or another. The third

generation English vowel space indicates that Generation 3 was very good at distinguishing between the high front tense vowel and the high front lax vowel. Both stressed and unstressed tokens for each of these vowels were very tightly grouped in their respective vowel spaces. English /i/ was higher and notably more fronted than /ɪ/ creating a clear separation of the high front tense and lax vowels. In other words, even though the participants from the third generation were the most English-dominant of all of the participants, they still were able to draw a clear separation between the Spanish and English front high vowel spaces.

Spanish high back vowel: /u/

Stress had a significant overall impact in both formants of /u/. F1 values for the third generation were higher when /u/ was stressed while F2 values were highest when stress was absent. This resulted in lower more backed productions of /u/ when /u/ was stressed. When /u/ wasn't stressed the overall productions moved up and forward. Overall context only significantly affected the first formant of /u/. The only significant differences were the overall difference between the word list and the story and the word list and the interview. The third generation F1 values for the word list were lower than the means for both the story and the interview. The F1 values increased from the word list to the story, but then decreased from the story to the interview. Therefore, as contextual formality decreased from the word list to the story, /u/ lowered but then slightly rose from the story to the interview. Figure 9 shows that throughout all the contexts, /u/ stayed in the same area and was relatively stable like the /u/ tokens for the previous two generations.

This overall stability of /u/ shows that not even in the third generation was there transfer from the English high back vowel space to the Spanish high back vowel space. Further proof of

this is illustrated by the plot of the third generation English vowel space in Figure 3. Like Generation 2, Generation 3 fronted the English high back vowel, while maintaining the Spanish high back vowel in a much more backed position. This indicates that Generation 3, despite being English dominant, had established a clear division between their Spanish and English high back vowel spaces. When this is taken into account with the data for the second generation English /u/, it serves as even more evidence that the English /u/ shift is even more extensive than Labov (2006) claims.

Spanish mid front vowel: /e/

The overall impact of stress on the second formant of /e/ for all participants was significant and neared significance for the first formant. F1 and F2 values decreased when stress was absent. This resulted in stressed productions of /e/ being lower and more fronted than unstressed tokens. The centralization of unstressed /e/ created a horizontal constriction of the mid front vowel space when compared to the stressed mid front vowel space. As contextual formality decreased F1 values didn't follow a set pattern. The lowest F1 mean was that of the word list. The F1 values increased for the story, but instead of continuing to increase, they decreased for the interview. Overall, the only significant difference in F1 values was the difference between the story and the interview. The third generation produced lower F1 tokens for /e/ in the interview than in the story. F2 values on the other hand followed a consistent pattern relative to degree of formality. As contextual formality decreased, F2 means decreased. Overall, the differences between each context were significant. The third generation produced the most fronted tokens of /e/ in the word list and the most centralized tokens in the interview. Consequently, as formality decreased, overall mid front vowel space shrunk horizontally.

English had no apparent influence on the Spanish mid front vowel space. In fact, the English tokens of /ɛ/ were much more centralized than the productions of Spanish /e/. The main difference between Spanish /e/ and English /ɛ/ is tenseness, and the third generation data indicate that Generation 3 was able to maintain a certain degree of separation between the vowel spaces of Spanish /e/ and English /ɛ/.

In summary, the front vowel space of the third generation followed many of the same patterns of the first two generations. Stress only affected /e/, but the same patterns of unstressed centralization were seen in the productions of /e/. Context affected both vowels and constricted both the high and mid front vowel spaces as formality decreased. The high front vowel appeared to be less stable than the mid front vowel. The reverse was the case for the previous two generations. The high front vowel not only significantly centralized, but it significantly lowered as well. The mid front vowel showed the most variation in terms of overall frontness.

Spanish mid back vowel: /o/

The overall analysis for all /o/ values from all three generations found that stress had a significant relationship with both the F1 and F2 values of /a/ The stressed F1 values for the third generation tokens of /o/ were higher than the unstressed values. The stressed F2 values were also higher than their corresponding unstressed means. The results were lower more backed tokens of stressed /o/ and higher more centralized productions of unstressed /o. As a result vowel space was more constricted when stress was absent.

Overall context only had a significant relationship with the overall F2 values. In fact, the differences between all three contexts were found to be significant for the combined data of all three generations. Decreased contextual formality effected productions similar to the way the

absence of stress affected productions. The overall Generation 3 F2 values increased as contextual formality decreased. In other words, as the formality of the speech task decreased, /o/ was produced in a more centralized position in the overall vowel space. Figure 9 illustrates these results and shows that /o/ was progressively fronted as formality decreased. The difference between the story and the interview is especially evident in Figure 9, which shows that the tokens taken from the interview made a rather large shift forward when compared to the tokens from the story and the word list. When compared to the third generation English vowel space, the forward shift of /o/ could have created some slight overlap with the vowel space of /ʌ/. However, it must be noted too that although /o/ was significantly fronted in the least formal task, the vowel space for /ʌ/ was still more centralized than that of spontaneous Spanish /o/. Figure 9 also shows that /o/ centralized and lowered enough to cause potential overlap with some of the productions of /a/. There was no evidence in the third generation data to support the existence of extreme fronting. The third generation tokens did in fact front more than the other generations but they didn't front enough to even reduce to schwa. Tokens from less formal tasks did lower slightly, but unstressed tokens rose. In other words, in none of the contexts or environments did /o/ show any indication of the necessary trajectory to move it from its mid back position to the low front lax position. It can be therefore be concluded that extreme fronting does not exist in Miami-Cuban Spanish because none of the generations showed any significant shift from the mid back vowel space to the low front lax vowel space.

The data give no clear indication as to whether there was any other language transfer between the third generations mid back English and Spanish vowel spaces. The F1 values seem to indicate that there was no transfer from English to Spanish. Generation 3 had the highest F1 values for /o/ of all three generations. This resulted lower productions of /o/. The English mid

back vowel is considered by some to be a diphthong and thus is written as /oʊ/. If aspects of the English mid back vowel space were to have transferred to the third generation's Spanish mid back vowel space, F1 values would have been expected to be lower as intensity decreased and tongue position lowered. This is how Quilis and Fernández (1982) in part described the English mid back vowel saying that that the intensity of English vowel weakens throughout the course of its production, sometimes leading to changes in the places of articulation of the lips and tongue and altering the quality of the original vowel. Although there was significant horizontal variation of the third generation /o/, especially across task type, upward movement would have been more indicative of English transfer. Unstressed and less formal tokens of /o/ were centralized, but this cannot be definitively linked to English because the same pattern of centralization of /o/ was seen in the previous two generations.

In summary the third generation back vowel space behaved very similarly to the second-generation back vowel space. Stressed tokens of /u/ were lower than unstressed tokens. Unstressed tokens rose and much like the unstressed second generation tokens of /u/, unstressed third generation /u/ was produced outside the stressed vowel space. The mid back vowel was more centralized when it was unstressed and more centralized when it was produced in less formal tasks. The data point to a more definitive horizontal constriction of the mid back vowel space than for the high back vowel. However, as task type formality decreased, the mid back vowel space also underwent vertical reduction as /o/ progressively lowered from task to task. Overall, even though both vowels showed horizontal and vertical variation, /u/ was more stable than /o/, much like was seen in the previous two generations.

Spanish low vowel: /a/

Overall stress and context were determined to have significant relationships with both the F1 and F2 values of the combined data for all three generations. The third generation stressed F1 were higher for stressed tokens and the stressed F2 tokens were lower than their unstressed counterparts. As a result, stressed productions were lower and more backed than unstressed tokens.

From context to context the third generation productions of /a/ did not follow a set pattern. In fact their behavior seemed almost erratic. Figure 9 confirms this. Context affected both the F1 and the F2 values for /a/ in the combined data. The F1 differences between all contexts were significant, while only the F2 differences between the story and the interview were significant. The overall third generation F1 values gradually decreased as contextual formality decreased. The overall F2 values decreased from the word list to the story, but increased from the story to the interview. In terms of height /a/ gradually rose as contextual formality decreased. In fact, Figure 9 shows that the unstressed tokens in the story were the most raised of any of the contextual tokens of /a/ produced by the third generation. The general data indicated that the horizontal difference between the word list and the story was not significant. However, Figure 9 indicates that specifically within the third generation tokens, all horizontal differences between all tasks were significant.

There also was a significant difference between stressed and unstressed tokens between contexts. The lowest tokens were the stressed tokens from the word list. The unstressed word list productions of /a/ moved up, but made almost not forward movement. The stressed tokens for the story are raised to the same height as the unstressed word list tokens, but are further back. The unstressed tokens for the story were slightly more backed than the corresponding stressed tokens, but they were much more raised. In fact, Figure 9 shows that they rose so much that they

neared the vowel space for spontaneous /o/. Spontaneous tokens of /a/ were significantly lower and fronted than the stressed and unstressed tokens taken from the story. Stressed spontaneous /a/ was also slightly lower than the stressed /a/ tokens from the story. Unstressed spontaneous /a/ was at about the same height as stressed /a/ from the story. The data offer no explanation for the erratic contextual F1 behavior of the third generation /a/. The only thing that was apparent was that contextual formality had significant effects on the height of /a/.

A comparison of the third generation English and Spanish vowel spaces suggests that English transfer may have been present in the low central vowel space. The data indicate that /a/ was raised closer to the stressed schwa vowel space in the context of the story when stress was absent. However, the tokens did not rise all the way up into the unstressed schwa vowel space. As a result, the dramatic rise of unstressed /a/ in the story cannot be considered a full reduction to schwa because unstressed English tokens would have risen even more. Further comparison of both Generation 3 vowel plots shows that both stressed and unstressed spontaneous /a/ moved forward into the low front vowel space in which Generation 3 produced /æ/. However, it could also be argued that the /æ/ was influenced by Spanish and simply moved back into the low central vowel space occupied by Spanish /a/. If this overlap of low front and low central vowel spaces is in fact the same backward shift of /æ/ seen in the previous two generations, the shift only affected /a/ and /æ/ and didn't continue backward and upward as with the first generation.

The overall low central vowel space was reduced mostly in a general vertical direction across context and when stress was absent. Overall stressed and unstressed /a/ behaved much more regularly than the contextual tokens of /a/, which behaved rather erratically, especially with relation to height. Consequently, this indicated that /a/ was the least stable of all of the vowels produced by the third generation. This agrees with the previous findings of Skelton (1969),

Delattre (1969) and Harmegnies and Poch-Olivé (1992) regarding Spanish vowel space.

Summary

The overall third generation Spanish vowel space varied for every individual vowel and demonstrated the most stability in the high back region. The region that demonstrated the most variation was the low central region. The absence of stress correlated with an inward movement of all mid and high vowels, with the exception of /u/. The low vowel was constricted upward when stress was absent. Generally, decreased contextual formality had the same overall effects on the overall third generation vowel space as the absence of stress. Once again, the exception was /u/ which shifted more upward than forward when contextual formality decreased. Possible evidence of language transfer was seen in the low region of both the English and the Spanish vowel spaces of the third generation participants. However there was not enough information to definitively determine whether English transferred to Spanish, or whether Spanish transferred to English. The only thing that was clear was that English /æ/ appeared to be backed and Spanish /a/ appeared to be somewhat fronted. The data did not indicate what caused the two vowel spaces to overlap.

With the exception of one speaker, who struggled the most in Spanish of all the participants, Generation 3 showed no reductions of any vowel to schwa. There were vowels such as /o/ and /a/ that in less formal contexts neared the stressed schwa vowel space, but overall there were no definite reductions to /ə/. In part, this refutes the claims by Varela (1992) that reducing unstressed Spanish vowels to schwa was characteristic of English dominant Cuban-Americans. The one informant that did reduce to schwa and consequently supported Varela's claims, Speaker 1001, only reduced tokens of /e/ and /o/ to schwa. Figure 10 shows Speaker 1001's overall

normalized Spanish vowel space. The ellipses serve to show the overall extent of each vowel. Figure 11 shows Speaker 1001's overall normalized English vowel space and serves as a comparison to the Spanish vowel space.

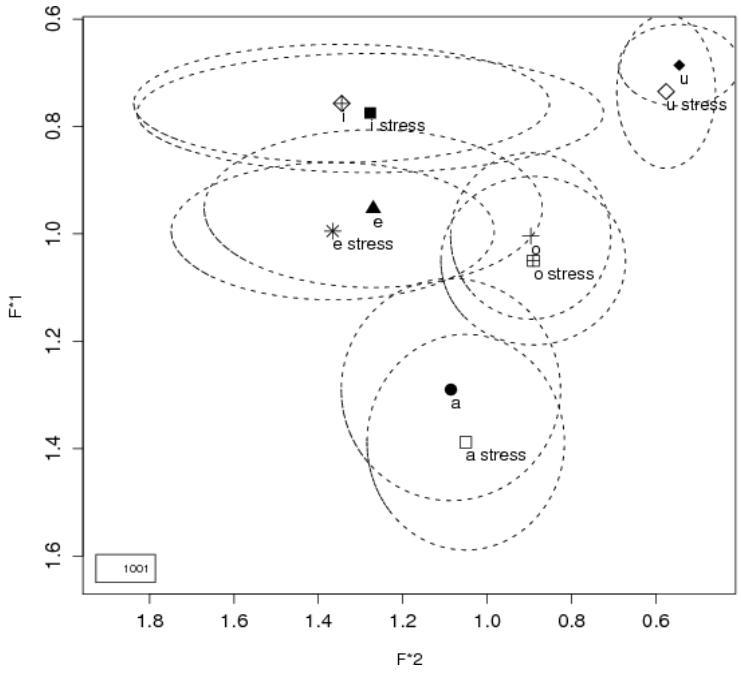

Figure 10: Overall normalized Spanish vowel space of Speaker 1001

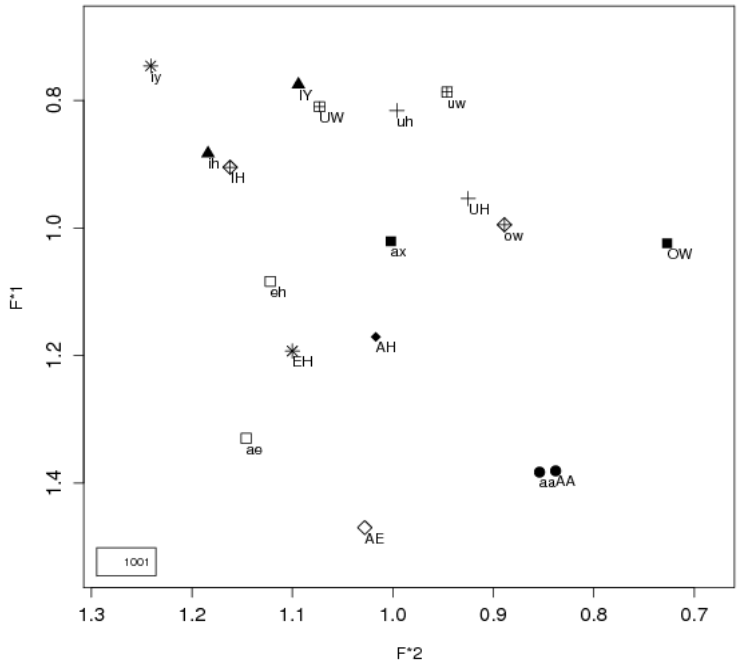

Figure 11: Overall normalized English vowel space of Speaker 1001

Figure 10 shows that Speaker 1001 produced stressed and unstressed tokens of both /e/ and /o/ that overlapped with the same area in which Speaker 1001 produced both /ʌ/ (AH) and /ə/ (ax). The low vowel /a/ also rose with unstressed tokens overlapping with /ʌ/ but not with /ə/. The high vowels varied, but did not come near the schwa vowel space. It is worth mentioning that even though it appears that English transfer caused Speaker 1001 to reduce several vowels to schwa, there was absolutely no English influence in Speaker 1001's high back vowel space. Speaker 1001 produced notably fronted tokens of /u/ in English, but maintained all productions of Spanish /u/ within a very stable and relatively limited space in the high back corner of the overall Spanish vowel space. This would seem to indicate that Speaker 1001 was able to maintain a clear separation of the English and Spanish back vowel spaces while blurring the lines between other vowel spaces.

Generational Comparisons

Spanish high front vowel: /i/

The overall F1 and F2 values for /i/ were affected significantly by the generation factor. The only significant pairing for the F1 values of /i/ was that of the first generation with the second generation. The first generation produced lower F1 values for /i/ while those of the second generation tended to be higher. This meant that there was a significant height difference between the first and the second generation's productions of /i/ with the first generation productions being higher than the second-generation productions.

There were significant F2 differences between the first and third generations and the second and third generations. When the first generation was compared to the third generation the first generation produced significantly greater F2 values than the third generation. Consequently the first generation tokens of /i/ were more fronted than the third generation tokens. When the second generation was paired with the third generation, the second generation produced /i/ with overall greater F2 values than the third generation causing the second generation productions of /i/ to be more fronted than those of the third generation. The interaction between stress and generation in the post-hoc analyses run for the first and second formants of /i/was significant. This confirmed that stress affected each generation's productions of /i/ in significantly different ways. Generation 2 had the highest overall stressed and unstressed productions of /i/, while stressed /i/ was lowest for the first generation and unstressed /i/ was lowest for the third generation. The most centralized stressed and unstressed productions of /i/ were those of the third generation while the first generation produced the most fronted stressed tokens of /i/ and the second generation fronted unstressed /i/ the most.

Spanish high back vowel: /u/

The only significant cross-generational height differences were those of the first generation and third generation productions of /u/. The first generation had higher overall F1 means for /u/ than the third generations. This indicated that the first generation tokens for /u/ were overall significantly lower than those of the third generation.

Significant F2 differences were found between the first and the second generations and between the second and the third generations. When the first and the second generations were paired together, the second generation had significantly higher F2 values than the first generation. This caused the second generation to produce /u/ in a significantly more forward position than the first generation. When the second generation was paired with the third generation, the results were similar. The second generation also had significantly higher F2 values than the third generation, which caused the second generation to front /u/ more than the third generation.

Spanish mid front vowel: /e/

The height differences between the first and second generations' productions of /e/ were significant, while the height differences between the first and third generations neared levels of significance with a p value of .054. The first generation had lower F1 values than both the second and the third generations. This means that the overall resulting productions of /e/ were higher than those of the second and the third generations.

The same two generational pairings had significant differences for the overall F2 values of their respective tokens of /e/. The first generation had the smallest F2 values for /e/. This

meant that the first generation produced the most backed productions of /e/ of all three generations. The second generation fronted /e/ the most of the three generations in the current study.

Spanish mid back vowel: /o/

All three generations had F1 values for /o/ that were significantly different from one another. When the first generation was compared with the second generation the second generation had greater overall F1 values than the first generation. This indicates that Generation 2 had lower overall productions of /o/ than the first generation. When the first generation was compared to the third generation, the results were similar, with the third generation having the highest F1 means for /o/. This means that both the second and the third generation had lower overall tokens for /o/ than the first generation. When the second and third generations were compared the third generation had the highest F1 means of the two, and consequently of all three generations. This not only means that the third generation had lower overall tokens of /o/ than the second generation, it means that /o/ progressively lowered as generation increased.

As was the case with the generational F1 differences, the F2 differences between each generation's productions of /o/ were all significant. When the first generation was paired with the second generation, the second generation had the highest overall F2 values for /o/ causing the second-generation productions of /o/ to be significantly more fronted than those of the first generation. When the first generation was compared to the third generation the results were similar. Generation 3 had the highest F2 values and fronted /o/ more than Generation 1. The comparison between the second and third generations showed that the third generation had significantly higher F2 values than the second generation, indicating that of all three generations,

the third generation fronted /o/ the most.

Spanish low vowel: /a/

The significant cross-generational difference for the first formant of /a/ was the difference between the first and the second generations. When these two generations were compared the second generation had significantly higher F1 values than the first generation. The resultant second generation productions of /a/ were more fronted. The cross-generational differences between the different F2 values of each generation were all found to be significant. When the first generation was compared to the second generation the second generation had the highest F2 values and the most fronted productions of /a/ between the two generations. The results of the comparison between the first and the third generations were similar; with the third generation have the highest F2 values for /a/, the more fronted tokens. When the second and third generations were compared, the second generation ended up having significantly higher F2 values than the third generation. This shows that overall the second generation fronted /a/ more than any of the other two generations.

Chapter 5: Conclusions

Research Questions

Research Question 1. Is there evidence of unstressed vowel centralization in Miami-Cuban Spanish?

The data overwhelmingly indicated that stressed and unstressed vowel spaces are inherently different, with unstressed vowel space almost always being more constricted than stressed vowel space. The data also indicate that the reduction in the vowel spaces of the participants cannot be simply written off as transfer from English. First of all, the most Spanish-dominant generation showed almost categorical reduction of unstressed vowels. The only exception was /u/ which moved up and forward when it was unstressed. In fact this was the case across all three generations. All vowels, with the exception of /u/, moved toward a more central point in the overall vowel space. The high back vowel moved forward and up when it was unstressed in all three generations. The high front vowel and the mid vowels showed the most unstressed reduction on a horizontal trajectory with varying degrees of lowering occurring as well. The low vowel was centralized principally along a vertical trajectory as it too moved toward a more central point within a given vowel space.

The fact that all three generations reduced their overall vowel spaces between stressed and unstressed productions shows that Spanish does in fact have an inherent tendency to centralize its vowels. Spanish doesn't centralize vowels to the extent that has been documented in English, but nevertheless the data still indicate that Spanish vowel quality is not as constant and stable as the traditional literature has suggested (e.g. Quilis & Fernández, 1982, Quilis 1999, Hualde 2005).

Research Question 2. Do Miami Cubans produce English-like vowels (e.g. /æ/ for /o/) in their Spanish?

Overall all three generations demonstrated the ability to maintain clear distinctions between their overall English and Spanish vowel spaces. None of the generations showed any evidence of extreme fronting of /o/ to the low front vowel space. In fact, the first and the second generation productions were found to follow trajectories completely opposite to the necessary trajectory for /o/ to follow in order to end up in the space occupied by English /æ/. The third generation fronted /o/ considerably, even to the point of creating some overlap with the vowel spaces of /ʌ/ and /ə/. However, in order to have ended up in the low front vowels space, the third generation productions of /o/ would have and to cross the entire vowel space, which they didn't. Also, the third generation didn't lower /o/ enough to merge with /æ/.

In the first and third generation data there was no evidence of any type of reduction of Spanish vowels to schwa. With the exception of Speaker 1001, the third generation didn't show any evidence of reduction of Spanish vowels to schwa either. Speaker 1001 backed /e/ and fronted /o/ to the point where they partly overlapped with the unstressed schwa vowel space. Speaker 1001 also raised unstressed /a/ enough to overlap with the vowel space of English /ʌ/.

While Varela (1992) asserted that she found English transfer in the Spanish vowel spaces of her participants, the current study found the opposite trend, especially among the speakers of the first and second generations. The English vowel space of the first generation showed a backward shift of /æ/ into the low central region occupied by Spanish /a/. This shift pushed the first generation tokens of English /ɑ/ further back and up and created a merge between English /a/ and the English mid back vowel /oʊ/. This same shift in the lower region of the English vowel space manifested itself in the second generation data as well. However, in the second generation

the shift only affected /æ/ and didn't continue to force the English low back vowel up into the mid back vowel space. The third generation showed evidence of this same shift with /æ/ appearing to be more backed. However, the data could be interpreted as English transfer because Spanish /a/ also appeared to have been fronted. This could either indicate that the second generation Spanish /a/ was shifting forward into the vowel space of English /æ/ or that /æ/ was continuing the backward shift into the low central region that was seen in the data of the previous two generations.

The first generation showed clear Spanish influence in their high front English vowel space by raising the high front lax vowel virtually the same height as the high front tense vowel. Spanish lacks this tense/lax contrast in the high front area of its vowel space, and it was evident that the first generation speakers lacked the ability to make that distinction. The subsequent two generations, who were more proficient in English than the first generation, were able to make the distinction in English, without centralizing the high front Spanish vowel to the point that it became lax.

Further evidence of the lack of English transfer in the Spanish vowel systems of the participants of the current studies was the stability of /u/ across all three generations. As previously cited, over 90% of native English speakers in the United States front /u/ to one extent or another (Labov 2006). If there were to have been English influence in the Spanish vowel space, it would be expected for Spanish /u/ to be fronted to a certain extent. Generation 1, who was the most Spanish-dominant generation, showed clear Spanish influence in their productions of not only English /u/ but also English /ʊ/ by backing and almost merging the two vowels. Furthermore, they also showed a clear tendency to merge the English high front tense and lax vowels into just the tense. Generations 2 and 3, who were considered more dominant with

English than Generation 1, fronted their English tokens, but didn't front their Spanish tokens. Even the third generation, who was the least proficient with Spanish, did not front Spanish /u/. Both generations that spoke English natively showed the same overall ability to separate the vowel space occupied by English /u/ from that of Spanish /u/, thus suggesting that for the second and third generation speakers of the current study there was a feature or set of features that clearly distinguished English /u/ from Spanish /u/. The data point to backness as the feature used to distinguish between the two productions of the high back vowel. Both generations fronted English /u/ to the point that their English /u/ productions could be argued to have had I-coloring, while maintaining Spanish /u/ in the upper back corner of their Spanish vowel spaces. Even across task type and in stressed and unstressed environments, Spanish /u/ was overall maintained by all participants in a relatively restricted area in the upper back corner of their overall Spanish vowel spaces.

Research Question 3. Does Miami-Cuban Spanish vowel production vary by task type?

The data confirmed that vowel production for all three generations varied significantly by task type, confirming the findings of Harmegnies & Poch-Olivé, 1992. The advantage of these findings is that they lend even more credibility to Harmegnies & Poch-Olivé's results by studying a different dialect of Spanish and a greater number of participants performing more tasks. The overall trend was for vowel space to centralize as contextual formality decreased. This is most likely due to the fact that with decreased contextual formality, articulation becomes less and less the main focus of the speaker. The focus of less formal speech is more one of getting a message across to another interlocutor. As a result the speaker doesn't make the same effort as they would normally make in more formal tasks to make the articulatory organs hit all of their

traditional targets. It is important to note that some features of some vowels followed set patterns while others behaved one way in one context, and the opposite in another. This is indicative of the larger reality that language is spontaneous, and even though linguists like to group different linguistic phenomena into organized categories and make broad statements regarding the regularity of those categories, language never really fits into any mold because it is constantly changing. For example, the first generation vowel space, with the exception of /i/, progressively moved inward as contextual formality decreased. The high front vowel /i/ moved down but outward as formality decreased. The second generation vowel space, with the exception of /u/ which shifted forward and up, shifted forward gradually as formality decreased. Therefore, although the vowel spaces of all three generations varied across task type, the variation itself varied from generation to generation, and from speaker to speaker. The only thing that can be definitively concluded is that task type creates vowel variation and a general tendency is for vowel space to be smaller for less formal tasks.

Contributions of the Current Study

The current study is one of the first of its scope and kind. It has increased the overall knowledge on Spanish vowels and Spanish vowel quality through empirical results gathered from an acoustical study done across stress and varying task type. It has shown that traditional notions of Spanish vowels are not entirely accurate and has confirmed more recent findings that the Spanish vowel system has more inherent variation than previously thought. This variation was shown to be caused by a multitude of factors that affected some vowels more than others. The current study also suggests that stressed and unstressed vowel spaces are inherently different, confirming more recent findings regarding Spanish vowel quality (e.g. Harmegnies & Poch-Olivé, 1992, Willis 2005). This study also further confirms that the notion of bilingualism

and multi-lingual fluency is not binary, rather gradient.

Suggestions for Future Studies

Any study of Spanish vowels is different from any study on consonants due to the sheer number of tokens needed to make any definitive conclusions. The current study used close to 14,000 tokens taken from 11 speakers across three generations of proficiency. A study involving more speakers would be of great value to the overall understanding of Spanish vowels. However, the sheer size of the data sets would be the largest obstacle to such a study. Another possibility would be for future studies on Spanish vowels to have more word list tokens. Due to the inherent nature of what a word list task is, of all the tasks the current study had the fewest tokens from the word list task. Although a larger word list would lead to more tokens, informant fatigue would have to be considered.

A highly interesting study specifically on the region of Miami would be a study of the English of Miami. Anecdotally it has been said that the English spoken in Miami by monolingual English-speakers is hispanized. If this is true, this could potentially help explain some of the Spanish transfer to English observed in the current study (i.e. the backing of /æ/ into the low central area of the overall vowel space).

A limit of the current study is that all vowels were analyzed acoustically, so tongue position could only be deduced through the acoustical cues present in the spectrogram. A study involving MRI or ultrasound samples of the speech of the informants would be intriguing for two main reasons. Firstly, a phonetic study of this type would confirm the assertion regarding overall tongue position made in this study. Secondly, fMRI or ultrasound samples could show what role other articulatory organs (e.g. the larynx), whose influence is invisible in purely acoustical data,

play in the production of vowels

References

Alfaráz G. G. (2002). Miami-Cuban Perceptions of Varieties of Spanish. In Long Daniel & Preston Dennis R. (Eds.), *Handbook of Perceptual Dialectology* (Vol. 2) (pp. 1-11). Philadelphia, PA: John Benjamins North America.

Alvord S. M. (2006). Spanish intonation in contact: the case of Miami-Cuban bilinguals. PhD dissertation. University of Minnesota.

Alvord S. M. (2010). Variation in Miami Cuban Interrogative Intonation. *Hispania 93*(2), 235-255.

Boersma, Paul. 2001. Praat, a system for doing phonetics by computer. Glot International 5:9/10, 341-345.

Boswell T. D. (2000). Demographic changes in Florida and their importance for effective educational policies and practices. *Research on Spanish in the United States: linguistic issues and challenges*, ed. by Ana Roca, 406-431. Somerville, MA: Cascadilla Press.

Bradlow, A. R. (1994). A comparative acoustic study of English and Spanish vowels. *Journal of the Acoustical Society of America 97*(3), 1916-1924.

Beaudrie S. (2009). Spanish receptive bilinguals. *Spanish in context 6*(1), 85-104.

Delattre P. (1969). "An acoustic and articulatory study of vowel reduction in four languages". *International Review of Applied Linguistics, 7*, 295-325.

Fails, W. (1984). An analysis of the consonantal phonemes of the educated norm of Havana. PhD dissertation. University of Texas.

Fernández, R. G. (1983). English loan words in Maimi Cuban Spanish. *American Speech 58*(1), 13-19.

Fishman J. A. (1991). *Reversing Language Shift*. Great Britain: Longdunn Press LTD.

Fourakis, M. (1991). Tempo, stress, and vowel reduction in American English. *Journal of the Acoustical Society of America 90*(4), 1816-1827.

Hammond, R. M. (1979). The velar nasal in rapid Cuban Spanish. Colloquim on Spanish and Luso-Brazilian Linguistics, ed. by James P. Lantolf, Francine Wattman Frank, and Jorge M. Guitart, 19-36. Washington D.C.: Georgetown University Press.

Hammond, R. M. (1980a). Las realizaciones fonéticas del fonema /s/ en el español cubano rápido de Miami. *Dialectología hispanoamericana, estudios actuales*, ed. by Gary Scavnicky, 8-15. Washington D.C.: Georgetown University Press.

Harmegnies B. & Poch-Olivé D. (1992). A study of style-induced vowel variability: Laboratory versus spontaneous speech in Spanish. *Speech communication 11*(4-5), 429-437.

Hualde J. I. (2005). *The Sounds of Spanish*. Cambridge, UK: Cambridge University Press.

Hundley, James. 1983. Linguistic Variation in Peruvian Spanish: Unstressed Vowels and /s/. PhD dissertation, University of Minnesota.

Klee, C. & Lynch A (2009). *El español en contacto con otras lenguas*. Washington, D.C.: Washington, D.C. Georgetown University Press.

Labov W. (1997). Some further steps in narrative analysis. *Journal of Narrative and Life History,* 7:395-415

Labov W. (2008). Triggering events. In S. Fitzmaurice and D. Minkova (eds.), *Studies in the History of the English Language IV: Empirical and Analytical Advances in the Study of English Language Change*. Berlin/Mouton de Gruyter. Pp. 11-54.

Ladefoged P. & Broadbent D. E. (1957), Information conveyed by vowels. *The Journal of the Acoustical Society of America 29*(1), 98-104

Ladefoged, P. (2006). *A course in phonetics* (5th ed.). Boston MA:United States. Thomson Wadsworth.

Lipski, J. M. (2008). *Varieties of Sspanish in the United States*. Washington, D.C.: Washington, D.C.: Georgetown University Press.Liu, C.K. (2004). The movement of the vowel in American English. *Tamkang Studies of Foreign Languages and Literatures 3, 1-17.*

Lope Blanch J. M. (1964). En torno a las vocales caedizas del español mexicano. *Nueva revista de filología hispánica 17*(1/2), 1-19.

López Morales, H. (2003). *Los cubanos de miami : Lengua y sociedad*. Miami, FL : Ediciones Universal.

Lynch, A., 1999. The Subjunctive in Miami Cuban Spanish: Bilingualism, Contact, and Language Variability. PhD Dissertation, University of Minnesota, Minneapolis.

Lynch, A., (2000). Spanish-speaking Miami in sociolinguistic perspective: bilingualism, recontact, and language maintenance among the Cuban-origin population. In: Roca, A. (Ed.), *Research on Spanish in the United States: Linguistic Issues and Challenges*. Cascadilla Press, Somerville, MA, pp. 271–283.

Lynch A. (2009). A sociolinguistic analysis of final /s/ in Miami Cuban Spanish. *Language Sciences 31,* 767-790.

Magen, H. S. (1997). The extent of vowel-to-vowel coarticulation in English. *Journal of*

Phonetics 25, 187-205

Miller J. L. (1981). Effects of speaking rate on segmental distinctions. In *Perspectives on the study of speech,* ed, by P.D. Eimas and Joanne L. Miller. Hilldale, NJ: Lawrence Erlbaum Associates.

Navarro Tomás T. (1957). *Manual de pronunciación española*. (5th edition). New York: Hafner Publishing Company.

Quilis A. (1999). *Tratado de Fonología y Fonética Españolas*. Madrid: Gredos.

Quilis A, and Esgueva M. (1983). Fonemas vocálicos españoles. *Estudios de fonética*, ed. by Manual Esgueva and Margarita Cantarero, 159-252. Madrid: Consejo Superior de Investigaciones Científicas Instituto Miguel de Cervantes.

Ramírez, A. G. (1992). *El español de los Estados Unidos: el lenguaje de los hispanos.* Madrid: Editorial MAPFRE

Sadowsky, S. (2010). Los alófonos vocálicos como marcadores de identidad sociocultural en el discurso oral del castellano de Chile. Presented at 6th National Conference on Discourse Studies of the Latin American Association for Discourse Studies (ALED). Universidad de Chile, Santiago, Chile, 27-28 September 2010.

Skelton, R. B (1969). "The pattern of Spanish vowels". *International Review of Applied Linguistics, 6*, 231-237.

Silva-Corvalán, C. (1996) *Language contact and change;Spanish in Los Angeles.* New York:Oxford University Press.

Soto Barba, J. (2007). Variación del F1 y del F2 en las vocales del español urbano y rural de la provincia de Ñuble. *Revista de Lingüística Teórica y Aplicada, 45*(2), 143-165.

Terrell, T. D. (1979). Final /s/ in Cuban Spanish. *Hispania 62*, 599-612.

Thomas E. R. (2001). *An Acoustic Analysis of Vowel Variation in New World English 85.* United States: Duke University Press.

Varela, B. (1974). La influencia del inglés en los cubanos de Miami y Nueva Orleans. *Español actual 26* 16-25.

Varela, B. (1992). *El español cubano-americano*. New York: Senda Nueva.

Varela, B. (1983) Contact Phenomena in Miami, Florida. *Spanish and Portuguese in Social Context*. 61-66.

Villa D. J & Rivera-Mills S. V. (2009). An integrated multi-generational model for language

maintenance and shift: The case of the Spanish in the Southwest. *Spanish in Context 6*(1) [Special edition], 26-42.

Whitley M. S. (2002). *Spanish/English Contrasts: A Course in Spanish Linguistcs*. Washington D.C.: Georgetown University Press.

Willis, E. W. (2005). An initial examination of Southwest Spanish vowels. *Southwest Journal of Linguistics 24*(1), 1-14.

United States Census 2010. (2010). Retrieved March 6, 2012, from http://2010.census.gov/2010census/.

Appendix 1-Spanish Reading List and Story

Lee las siguientes palabras prestando atención a la pronunciación.

Please read the following words. Do your best to pronounce each one carefully.

1. mercado
2. mostrador
3. queso
4. Gumersindo
5. sobrino
6. americano
7. toda
8. Cuba
9. emigrado
10. pasado
11. pequeño
12. quejándose
13. favoritos
14. dinero
15. razón
16. encontrar
17. una
18. quería
19. cansado
20. otras
21. libras
22. aquella
23. víveres
24. jardines
25. institución
26. dócil
27. tocino
28. pregunta
29. muchacho
30. pasado
31. quedo
32. negocio
33. Galicia
34. retirarse
35. hora
36. queso
37. público
38. Usted
39. pregunta
40. contadora
41. comenzaron
42. Juliancito

El Sobrín

El “sobrín” era toda una institución en Cuba. Cuando el emigrado español (“el gallego,” aunque no fuera de Galicia) se sentía viejo y cansado después de haber pasado treinta años trabajando día y noche siete días a la semana, traía de España a uno de sus sobrinos favoritos para que continuara su labor. Los “sobrines” eran generalmente muchachos dóciles y humildes, dispuestos a continuar la tradición comercial de la familia, sin protestas ni rebeliones; con los años, ellos también pasarían de “sobrines” a “tíos.”

Gumersindo—propietario de "Los Jardines de Galicia", víveres finos y bebidas—no fue excepción. A los setenta y un años, soltero y con un buen capital en el banco, pensó que era el momento de encontrar sucesor. Y el sobrino afortunado resultó ser Juliancito, hijo de un hermano de Gumersindo que vivía en una pequeña aldea de Galicia. Juliancito, decían todos, era un joven inteligente, responsable y con una gran vocación para los negocios. Sin pensarlo más, Gumersindo le mandó al sobrino el dinero del pasaje en barco y pocas semanas más tarde el muchacho llegó a Cuba e iniciaba su aprendizaje en la tienda de víveres del tío.

— Juliancito, estas papas que me vendió ayer no están buenas.
— Está bien. Le daré otras.
— Juliancito, dos libras de queso blanco.
— Pero, Encarnita, usted todavía no ha pagado su cuenta este mes.
— Gumersindo, su sobrino no quiere fiarme dos miserables libras de queso.
— Está bien, sobrino. Encarnita es una antigua cliente.

Pronto Juliancito empezó a aburrirse de aquella clientela y de aquel modo de administrar el negocio. Un día llamó a su tío y le dijo que quería hablarle en serio.

— Tío, ¿cuánto tiempo hace que tiene usted esta tienda?
— Veintisiete años, sobrino. ¿Por qué me lo preguntas?
— Porque me parece que es hora de hacer algunas innovaciones.
— ¿Por ejemplo?
— Los tiempos cambian, tío. Cuando usted abrió la tienda éste era un barrio mediocre, un barrio de empleados públicos, obreros, dependientes…
— Sí, tienes razón. Ahora la aristocracia ha invadido el barrio. Y los americanos. Yo creo que todos los americanos de La Habana se han mudado para acá… Ah, pero yo aquí me quedo. Ya estoy muy viejo para empezar de nuevo.

— No se trata de empezar sino de cambiar. Dígame: ¿cuántos americanos entran a comprar aquí?
— Pues muy pocos, claro. Y cuando se dan cuenta de que yo no les entiendo una palabra…
— Exacto. Se van a comprar a otra parte, a uno de esos atractivos supermercados que han abierto en Miramar.
— Bueno, ¿y qué? Habla claro. ¿Qué idea tienes en la cabeza?

— Muy sencillo, tío: abrir nuestro propio supermercado: “Gumersindo’s Supermarket.”
— ¡Sobrino, tú estás loco! ¡Costaría una fortuna!
— No, tío. Podemos hacer el experimento con unos pocos pesos. Mire: quitamos el mostrador y pintamos las paredes de varios colores. Luego hacemos unos estantes nuevos y distribuimos la mercancía por todo el local: aquí los vegetales, allí los cereales, más allá las frutas… Además, podemos vender otros artículos que ahora no tenemos: carne, pescado, leche…
— Mira, yo no soy ni lechero ni carnicero.
— Y después, tío, ponemos cartelitos en inglés y español con los nombres de cada cosa, y con los precios. Así los americanos no tendrán que preguntar nada. Finalmente, compramos unos cuantos carritos…
— ¿Y nosotros qué hacemos?
— ¿Nosotros? Trabajar menos y ganar más. Sólo tendremos que pararnos detrás de la caja contadora y cobrar. Dinero efectivo, ¿comprende? Nada de crédito: todas las ventas serán al contado. Y si hay alguna dificultad, aquí estoy yo.
— Ah, ¿pero tú sabes inglés?
— Bueno…un poco. Estoy estudiando un curso por correspondencia en veinticinco lecciones. ¿Qué le parece?

A Gumersindo no le pareció nada bien y dijo que no cien veces. Pero tanto insistió el sobrino que acabó por convencerle. Tres meses después “Gumersindo's and Nephew's Grocery Store” abría sus puertas al público.

Muy pronto las predicciones del sobrino empezaron a cumplirse. Los vecinos americanos del barrio empezaron a entrar allí, al principio por curiosidad, luego por costumbre. La caja contadora sonaba ahora sin interrupción y en pocos meses fue necesario ampliar el negocio.

— ¿No le dije, tío? ¡Es un éxito!
— Sí, parece que vamos a hacernos ricos aquí.
— Pero, ¿qué tiene usted? Siempre lo veo triste, sin entusiasmo.
— Nada, sobrino. Son mis años.

Al final del segundo año, tío y sobrino comenzaron a construir un nuevo edificio para el supermercado.

— Tío—le dijo un día el sobrino—, veo que está cansado, sin energías. Con el dinero que ganamos ahora no es necesario que usted trabaje. ¿Por qué no piensa en retirarse?
— ¿Retirarme?—rió Gumersindo, que ese día estaba de muy buen humor—No, nada de eso. Al contrario. ¿Sabes una cosa? Acabo de comprar otra tienda.
— ¿Cómo? Sin decirme nada a mí?
— Es que no es la clase de tienda que a ti te gusta. Sabes, un amigo mío. Agustín Balseiro, va a retirarse y decidí…
— ¡Pero, tío! ¿Va a volver al viejo sistema? ¿A oír las protestas de los clientes, a regatear, a vender a crédito para que después no le paguen?
— Todo tiene su parte buena y su parte mala, muchacho. Pero no, tú no me entiendes.
— No, tío, la verdad es que no lo entiendo.

Gumersindo no tuvo dificultad en encontrar un nombre apropiado para su otra tienda: “Los Nuevos Jardines de Galicia.” Y allí estaba: en una esquina de la calle Dragones; sudando, discutiendo, quejándose de la temperatura y de los políticos detrás del mostrador, entre sus jamones y sus chorizos marca “Miño.”

— Gumersindo, ¿a cómo vende la libra de tocino?
— A cuarenta y cinco. Es legítimo tocino español.
— ¿A cuarenta y cinco? ¡Qué robo!
— Bueno, si me promete no decírselo a nadie, se lo doy a cuarenta…

Appendix 2- English Reading List and Story

Miami Cuban Vowel Study – List task

1. beat /i/
2. pale /ei/
3. bat /æ/
4. bet /ɛ/
5. bit /ɪ/
6. bait /ei/
7. boat /ou/
8. lick /ɪ/
9. feel /i/
10. boot /u/
11. dull /ʌ/
12. but /ʌ/
13. cot /ɑ/
14. chill /ɪ/
15. cat /æ/
16. caught /ɔ/ or /ɑ/
17. date /ei/
18. owl /æu/
19. dawn /ɑ/
20. done /ʌ/
21. dune /u/
22. fit /ɪ/
23. full /ʊ/
24. fought /ɔ/ or /ɑ/
25. fat /æ/
26. fate /ei/
27. goat /ou/
28. hell /ɛ/
29. late /ei/
30. loot /u/
31. bought /ɑ/ or /ɔ/
32. last /æ/
33. let /ɛ/
34. coat /ou/
35. lost /ɑ/
36. wool /ʌ/
37. lone /ou/
38. lust /ʌ/
39. look /ʊ/
40. loop /u/
41. lousy /æu/
42. loiter /ɔi/
43. meat /i/
44. met /ɛ/
45. pot /ɑ/
46. pull /ʊ/
47. pal /æ/
48. putt /ʌ/
49. rat /æ/
50. rot /ɑ/
51. sat /æ/
52. seat /i/
53. set /ɛ/
54. sit /ɪ/
55. sought /ɑ/ or /ɔ/
56. wait /ei/
57. wheat /i/
58. old /ou/
59. cool /u/
60. mile /ai/
61. oil /oi/
62. mule /ju/

Who Did Patrick's Homework?

By Carol Moore

Patrick never did homework. "Too boring," he said. He played baseball and basketball and Nintendo instead. His teachers told him, "Patrick! Do your homework or you won't learn a thing." And it's true, sometimes he did feel like a ding-a-ling.

But what could he do? This boy hated homework.

Then on St. Patrick's Day his cat was playing with a little toy and he grabbed it away. To his surprise it wasn't a doll at all, but a man of the tiniest size. He had a little wool shirt with old fashioned britches and a high tall hat much like a witch's. He yelled, "Save me! Don't give me back to that cat. I'll grant you a wish, I promise you that."

Patrick couldn't believe how lucky he was! Here was the answer to all of his problems. So he said, "Only if you do all my homework 'til the end of the semester, that's 35 days. If you do a good enough job, I could even get A's."

The little man's face wrinkled like a dishcloth thrown in the hamper. He kicked his legs and doubled his fists and he grimaced and scowled and pursed his lips, "Oh, am I cursed! But I'll do it."

And true to his word, that little elf began to do Patrick's homework. Except there was one glitch. The elf didn't always know what to do and he needed help. "Help me! Help me!" he'd say. And Patrick would have to help -- in whatever way.

"I don't know this word," the elf squeaked while reading Patrick's homework. "Get me a dictionary. No, what's even better. Look up the word and sound it out by each letter."

When it came to math, Patrick was out of luck. "What are times tables?" the elf shrieked. "We elves never need that. And addition and subtraction and division and fractions? Here, sit down beside me, you simply must guide me."

Elves know nothing of human history, to them it's a mystery. So the little elf, already a shouter, just got louder "Go to the library, I need books. More and more books. And you can help me read them too."

As a matter of fact every day in every way that little elf was a nag! Patrick was working harder than ever and was it a drag! He was staying up nights, had never felt so weary, was going to school with his eyes puffed and bleary.

Finally the last day of school arrived and the elf was free to go. As for homework, there was no more, so he quietly and slyly slipped out the back door.

Patrick got his A's; his classmates were amazed; his teachers smiled and were full of praise. And his parents? They wondered what had happened to Patrick. He was now the model kid. Cleaned his room, did his chores, was cheerful, never rude, like he had developed a whole new attitude.

You see, in the end Patrick still thought he'd made that tiny man do all his homework. But I'll share a secret, just between you and me. It wasn't the elf; Patrick had done it himself!