Wallen, S. & Fox, R. A. (2011). Vowel spaces in bilingual Haitian American kindergartners. In. J. Levis & K. LeVelle (Eds.). *Proceedings of the 2nd Pronunciation in Second Language Learning and Teaching Conference*, Sept. 2010. (pp. 153-168), Ames, IA: Iowa State University.

VOWEL SPACES IN BILINGUAL HAITIAN AMERICAN KINDERGARTNERS

Stacey Wallen, Georgia State University

Robert A. Fox, The Ohio State University

With the number of English Language Learners (ELL) in the United States, it has become important for communication professionals to understand how speech and language skills develop in this population in order to correctly differentiate a "communication disorder" from a "communication difference." In an effort to provide information on young ELLs, this study provides an acoustic description of Kreyol and English vowels spoken by monolingual and bilingual Haitian American kindergartners. Ten kindergarteners of Haitian descent produced words containing Kreyol and English vowels in either CV, CVC or CVCV contexts. Their productions were compared to eight non-Haitian children from the same region. The frequencies of the first two formants were extracted at the vowels' midpoint and compared between three groups: Haitian American monolingual English speakers (HAM), Haitian American bilingual (English/Kreyol) speakers (HAB), and Non-Haitian speakers (NH). Results for Kreyol vowels provide a first-time acoustic description of the Kreyol vowel space. Results for English vowels reveal significant differences in the production of one vowel, /o/, between HAM and HAB speakers. No significant differences in the English vowel spaces of bilingual Haitian American children were observed when compared to vowel spaces of their non-Haitian native counterparts.

INTRODUCTION

Children of Haitian descent living in the United States are part of the population that Portes and Rumbout (2001) call "children of the second generation"--first generation Americans either born in the United States to immigrant parents or brought to this country before turning 18. These children have connections to both the American and Haitian culture and can communicate fluently in either English or Haitian Kreyol. This fluency in English can have an effect on how professionals, especially teachers and speech-language pathologists, in the United States view speech and language data in this population. In order to effectively diagnose and treat communication disorders in people from different groups, speech language pathologists must know about what's "typical" in the language groups that they serve. They must also understand how that process of development changes when applied to a bilingual learner.

The National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs (NCELA) reports that Haitian Kreyol is one of the most common languages spoken by school-aged English language learners in the United States; it is ranked sixth in language backgrounds of English Language Learners (ELL) (Kindler, 2002). Because young school-aged children make up a large percentage of the children referred for articulation services, knowing how bilingual speakers (Kreyol/English speakers in this case) produce phonemes is important in determining which child will need articulation services. Although speech-language pathologists are trained to take the child‘s native language into consideration when assessing speech and language skills, the lack of objective developmental data on bilingual speakers too often causes the speech-language specialist to treat children that are bilingual as monolingual speakers of their native or second language. Therapists either treat the bilingual child using the data available in their native language (not considering the fact that they know/speak English), or they treat the child as a native English speaker of the mainstream dialect (not taking into consideration the child‘s use of their native language). This can lead to possible over-diagnosis or under-diagnosis of a communication disorder.

When we investigate phonological development in adult second language learners, we find that the sounds in the L2 that are the most salient perceptually will be produced first (Gorman & Kester, 2003). This is applicable for different languages or different dialects. The Perceptual Assimilation Model (Best, 1995) provides an explanation of how and why this occurs. This model relates perceptual saliency to perceived vocal tract constrictions. A listener perceives the constrictions of the vocal tract that relate to their native language, judging similarities between the sound structures of L2 and L1. The listener then associates the non-native sound to the native sound that most closely resembles it.

Flege (1995) defined the "production" side of this phenomenon via the Speech Learning Model. The Speech Learning Model (SLM) also explains the changes that occur in L1 and L2 phonological systems when the two languages interact. It asserts that as L1 and L2 interact, performance in both languages is affected. Different factors, including age of acquisition, length of exposure, access to, and use of the L2 determine how the L1 and L2 will interact. Flege, MacKay and Meador (1999), examined age of arrival (AOA) and use of L1 as factors in native-like perception and production in bilingual (Italian/English) speakers. They determined that the earlier bilingual subjects began speaking L2 (English), the more likely it was that their L2 productions were like that of a native English speaker. Subjects learning English at a later age were more heavily influenced by their L1 (Italian) and had a tendency of producing English phonemes more consistent with phonemes in Italian. Continued use of the L1 was not found to be significant in native-like production or perception in this particular study. However, other studies have found that increased use of the L1 lead to more "accented" productions of the L2 (Flege, 1999).

Haitian Kreyol is a member of the "Atlantic French-based Creoles". Approximately 90% of its lexicon is derived from 16^{th}-18^{th} century French, but its morphology, semantics and syntax are more closely related to West African languages (Savain, 1999; St. Fort, 2000). Kreyol, the primary language spoken by about 90-95% of Haitians, was an oral language until 1980, when an official orthographic system was developed. Table 1 provides the 30 symbols that make up the Haitian Kreyol alphabet. Kreyol became an official language of Haiti in 1987; however, the use of Kreyol for official business and as the standard written medium has not been prevalent (Reagan, 2005; St. Fort, 2000). There are ten vowels in Kreyol's phonemic inventory (/i, ɛ, e, ɑ, u, o, ɔ, ɑ̃, õ, ɛ̃/), including three nasal vowels and seven non-nasal vowels (Savain, 1999; St. Fort, 2000; Muysken & Veenstra, 1995; Tinelli, 1981). Few studies written in English (Tinelli, 1981) have done an in-depth analysis of Kreyol phonology.

Table 1: *Kreyol Alphabet*

Consonants	Vowels	Semi-vowels
[b, ch, d, f, g, h, j, k, l, m, p, r, s, t, v, z]	[a, an, e, é, en, i, o, ó, on, ou]	[ui, w, y]

If we consider the fact that an older speaker learning a second language is less likely to sound like a native speaker of the L2, what happens when a younger speaker learns a second language simultaneously with her native language? Goldstein (2001) notes that the phonological system of a child that speaks Spanish can influence that child‘s production of English. However, to date, there are no known studies that look at this possibility for Haitian American children that are fluent in or influenced by English and Haitian Kreyol.

To provide developmental information on ELLs , the goal of this study is to provide a description of the speech patterns of Haitian American children born in the United States (to Haitian parents) that are influenced not only by Kreyol, but by English as well. This study will specifically look at the production of vowels. Vowels were chosen, in part, because their relative "steady-state" quality holds valuable information that listeners use to help interpret the speech signal (Pickett, 1999). Another reason vowels were chosen is because they are early developing sounds that aren't typically misarticulated in children (McLeod & Bleile, 2004; Bernthal & Bankson, 1993).

Vowels are described acoustically by their location in the vowel space, which is guided by the position/shape of the articulators during production. The first formant (F1) and the second formant (F2) provide information regarding vowel quality. F1 corresponds to tongue height (Ladefoged, 1996). As the tongue rises, F1 decreases; as the tongue lowers, F1increases. F2 corresponds to tongue advancement. As the tongue moves forward, F2 increases; as the tongue moves backward, F2 decreases (Mosser, 1999; Pickett, 1999; Rosner & Pickering, 1994; Klatt, 1976).

This study will use the acoustic parameters of F1 and F2 to provide an objective description of speakers‘ vowel spaces as they produce words containing American English and Haitian Kreyol vowels. The following questions will be addressed:

1. What is the acoustic representation of the Haitian Kreyol vowel space when spoken by 4- and 5-year olds of Haitian descent?

2. What is the acoustic vowel space of American English vowels spoken by 4- and 5-year olds of Haitian descent?

3. How does this English acoustic space produced by Haitian speakers compare to that of native speakers of American English that live in the same region and are of similar ages?

METHODS

Subjects

Ten speakers of Haitian descent (6 male, 4 female) and eight non-Haitian speakers (4 male, 4 female), ages 5-6 years participated in the study (Table 2). Participants were recruited from kindergarten classes at 2 private church schools in Fort Lauderdale (Broward County), Florida. The schools were located on the border of Lauderhill and Plantation, Florida, which is an area with a large concentration of Haitian Americans.

Table 2: *Participant Description*

Group	**Male**	**Female**	**Total (N)**
Haitian American Monolingual (HAM)	3	2	5
Haitian American Bilingual (HAB)	2	3	5
Non-Haitian (NH)	4	4	8

Of the Haitian American children, five were monolingual English speakers and five were bilingual. Three of the five bilingual subjects were reported to have learned Kreyol first. Four of the five were reported to be in a home where Kreyol was spoken (Table 3). All non-Haitian children in the study were monolingual English speakers.

Table 3. *Information from language use questionnaire: Language input for each Haitian American participant*

Subject	**Language Status**	**Language Spoken in the Home**	**Language Learned First**	**Exposed to Kreyol Daily**
3	Bilingual	Unknown	Unknown	Unknown
4	Bilingual	Kreyol	Kreyol	Yes
5	Monolingual	English	English	Yes
6	Bilingual	Kreyol/English	Kreyol	Yes
7	Monolingual	English	English	No
8	Monolingual	English/Kreyol	Kreyol	Yes
10	Monolingual	Unknown	Unknown	Unknown
17	Monolingual	English	English	Yes
18	Bilingual	Kreyol/English	Kreyol/English	Yes
19	Bilingual	Kreyol	Kreyol	Yes

Stimuli

Two sets of picture stimuli were presented to elicit word productions in both English and Kreyol. Table 4 provides a list of stimulus items. The English stimulus set contained 18 pictures, whereas the Kreyol stimulus set contained 20 pictures. Both sets of picture stimuli were flashcards of everyday household/play items gathered from Baby Bumblebee (http://www.babybumblebee.com).

Table 4. *Stimulus items* (www.babybumblebee.com; www.kreyol.com; Savain, 1999)

English	**IPA**	**Kreyol**	**IPA**
Boot	but	Bouch (Mouth)	buʃ
Spoon	**spũn**	Boul (Ball)	bul
Baby	bebi	Zye (Eye)	zye
Train	**trẽn**	Pye (Foot)	pye
Boat	bot	Chapo (Hat)	ʃɑpo
Comb	**kõm**	Dlo (Water)	dlo
Tree	tri	Liv (Book)	liv
Key	ki	Bis (Bus)	bis
Pig	pɪg	Flé (Flower)	flɛ
Fish	fɪʃ	Chez (Chair)	ʃɛz
Dress	drɛs	Mato(Hammer)	mɑto
Leg	lɛg	Tab (Table)	tɑb
Hand	**hæ̃nd**	Ból (Bowl)	bɔl
Cat	kɑt	Póm (Apple)	pɔm
Clock	klɑk	**Chen (Dog)**	**ʃɛ̃**
Car	kɑr	**Nen (Nose)**	**nɛ̃**
Cup	kʌp	**Elefan (Elephant)**	**ɛlɛfɑ̃**
Duck	dʌk	**Zoranj (Orange)**	**zorɑ̃ʒ**
		Lion (Lion)	**liõ**
		Avyon (Plane)	**ɑvyõ**

*Stimuli in **bold** indicate nasal vowels in Kreyol or nasalized vowels in English

Elicited words contained the following vowel sounds: / i, ɪ, e, ɛ, æ, ʌ, u, o, ɑ, ɔ, ẽ, ɑ̃, õ/. Oral vowels, in general, exist in the vowel inventory of both English and Kreyol. Although nasal vowels occur in English, they are allophones of oral vowels and do not represent separate and distinct phonemes. However, in order to maintain balance in the stimuli, English words that have features of nasal assimilation were included in the stimulus set. Stimuli were presented in three syllabic formats. In English, stimulus items were in "Consonant Vowel Consonant" (CVC) or CCVC format only since English lax vowels cannot occur in open syllables. However, in Kreyol, the labels for the target vowels can occur in CV, CVC, or CVCV syllables.

Procedures

Subjects were tested in a quiet room. Stimuli were presented to subjects using flash cards. Each child was asked to provide a label for each given stimulus item in English and/or Kreyol (see the Appendix for elicitation script). When a child was unable to provide a label, a model was provided and the child was asked to repeat the label. Each subject participated in a practice session in order to become familiar with the procedures.

Subjects wore a head-mounted Platronics DSP-400 headset with a noise-canceling microphone. Subjects' productions were recorded directly onto a computer hard drive as a Quick Time audio file (.mov file) using a sampling rate of 44.1 kHz with 16-bit quantization. Tokens were then exported as a .wav file using the same sampling/quantization rate and saved on disk.

Acoustic Analysis

Before segmentation, samples underwent a noise reduction process to reduce ambient noise in the signal. A portion of each sample (which contained ambient noise only) was taken out to create a noise profile. This profile was then applied to the subject's entire signal. This "noise reduction" process was implemented for each subject. Once each sample went through the process, it was saved to a disk and down-sampled to 11.025 kHz for spectrographic analysis.

Vowel onsets and offsets were located manually (using the waveform and spectrogram as a reference). Determination of vowel onset location was made as follows:

1. For vowels preceded by stop consonants: Vowel onsets were marked just after the release of the consonant (and at the beginning of voicing for a particular vowel). Vowel offsets were marked at the beginning of the closure for the final consonant following the target vowel.
2. For vowels preceded by the liquid /l/: The vowel onset was marked following elimination of the spectral zero (produced by alveolar contact) and increased energy in the F2-F3 frequency range.
3. For vowels preceded by the liquid /r/: Vowel onsets were marked at the point where F3 was raised and separated from F2 (i.e., the point at which the sound was no longer rhotacized).
4. For vowels followed by the liquid /r/: Vowel offsets were marked at the point where F3 was lowered to a frequency close to F2 (i.e., onset of rhotacticization).
5. For vowels followed by nasals /m, n/ with the exception of Kreyol nasal vowels: Vowel offsets were marked at the drop in amplitude energy at the third formant.

The onsets and offsets were used to calculate the overall vowel duration. Formant frequency values were then extracted manually with 98% pre-emphasis using LPC with a 450 Hz bandwidth and a Hamming window. F1 and F2 frequencies were measured at three temporal points within the duration of the vowel:

1. 20 ms from vowel onset
2. at vowel midpoint
3. 20 ms from vowel offset

A two-way ANOVA (with group and gender as the between-subject factors) was performed on midpoint F1 and F2 values to determine if significant differences existed between Haitian American monolingual (English) and bilingual (Kreyol/English) speakers during the production of Kreyol and English vowels. Only group differences will be discussed here.

RESULTS

In order to describe the vowel production skills of bilingual Haitian American children, the following questions were addressed:

1. *What is the acoustic representation of the Haitian Kreyol vowel space when spoken by 4 and 5 year olds of Haitian descent?*

Mean F1 and F2 values (and standard deviations) are provided in Table 5. When plotted, formant frequency values indicated that the basic Kreyol vowel space is triangular with three ”point” vowels, /i, u, ɑ/ (Figure 1). When these values were compared across the two Haitian American groups (Haitian American monolingual and Haitian American bilingual speakers), differences were not statistically significant.

Table 5. *Mean F1 and F2 measures (in Hz) for Kreyol vowels produced by all Haitian subjects*

Vowel Type	F1	F2
õ	547 (186.0)	1519 (271.0)
ε̃	783 (121.6)	2513 (234.1)
ɑ̃	955 (172.3)	1860 (201.8)
i	406 (66.3)	2928 (270.1)
u	481 (49.6)	1191 (113.9)
e	662 (32.3)	2508 (157.3)
ɑ	1091 (154.1)	1760 (125.8)
o	623 (84.9)	1241 (113.0)
ε	731 (65.9)	2403 (83.9)

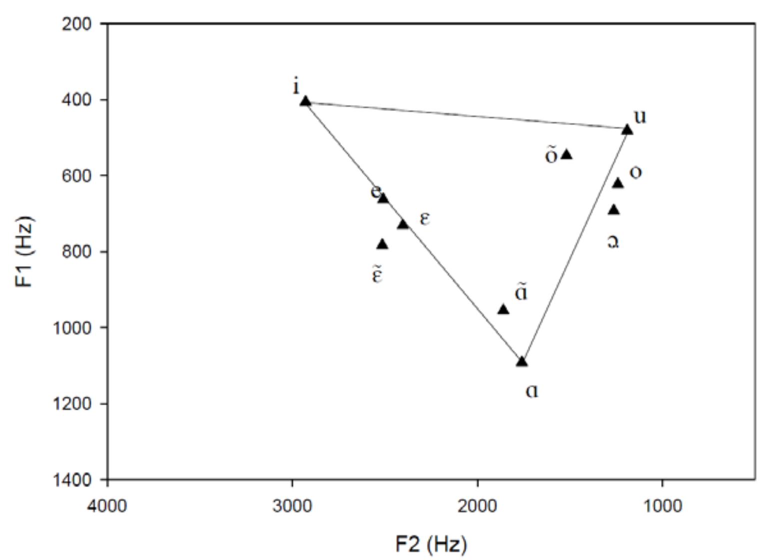

Figure 1. Kreyol vowel space for Haitian American subjects

ɔ	692 (141.1)	1263 (206.3)

2. *What is the acoustic vowel space of American English vowels spoken by 4-and 5-year olds of Haitian descent?*

Mean group F1 and F2 values for English vowels produced by Haitian American subject are provided in Table 6. The corresponding vowel space (in Hz) for Haitian American subjects can be found in Figure 2. The overall shape of the vowel space is consistent with previous studies that describe the English vowel space (Peterson and Barney, 1952; Hillenbrand, Getty, Clark & Wheeler, 1995; Lee, Potiamianos, & Narayanan, 1999). The vowel space of Haitian American subjects contains four "point" vowels (i, u, ɑ, ae), three mid front vowels (ɛ, ɪ, e), one middle vowel (ʌ), and one mid back vowel, (o).

Table 6. *English F1 and F2 values (in Hz) for all Haitian American subjects*

Vowel	F1	F2
æ	1036 (99.2)	2295 (148.7)
e	543 (83.4)	2832 (170.4)
ɛ	790 (69.6)	2330 (132.4)
i	406 (42.8)	3297 (188.4)
ɪ	592 (59.6)	2677 (163.0)
o	670 (76.0)	1237 (194.8)
u	441 (64.3)	1117 (245.5)
ɑ	1037 (83.3)	1529 (112.5)
ʌ	855 (50.9)	1694 (236.6)

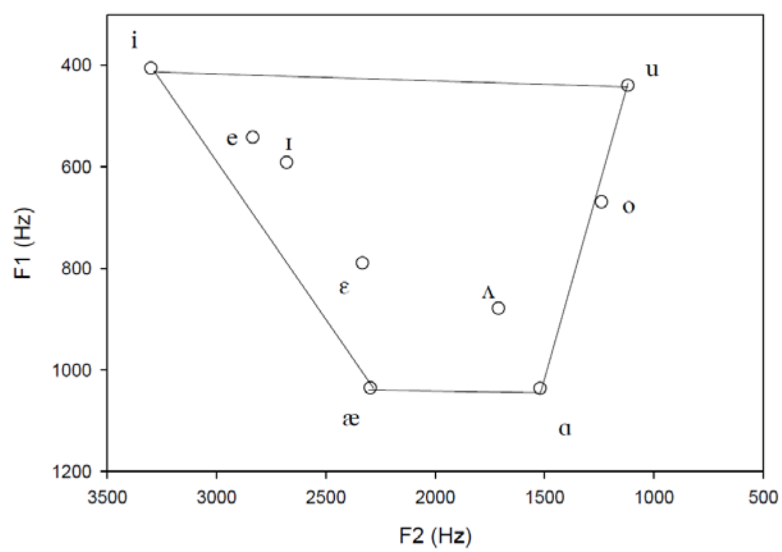

Figure 2. English vowel space (in Hz) for all *Haitian American subjects*

When F1 and F2 values for HAM and HAB were compared, results indicated significant main effects of group on F1 values for /o/ [F(1, 6)=9.9, p<.05, η^2=.623]. HAM speakers produced /o/ lower in the vowel space (closer toward /ʌ/), whereas HAB speakers produced /o/ higher in the space, closer toward /u/ (Figure 3). This difference in production could be attributed to possible diphthongization on the part of bilingual speakers. Or it could have been an effect of consonant co-articulation and differences in production of the final consonants. It should be noted that HAM and HAB speakers produced all other English vowels with similar F1 and F2 values (Table 7).

Table 7. *Mean English F1 and F2 values (in Hz) broken down by language status: Haitian American monolingual (HAM) and Haitian American bilingual (HAB) subjects*

Vowel	HAM		HAB	
	F1	F2	F1	F2
æ	1018 (117.0)	2320 (125.0)	1055 (67.9)	2269 (180.2)
e	497 (83.8)	2807 (158.1)	588 (58.9)	2857 (196.8)
ɛ	780 (81.0)	2317 (173.9)	800 (63.9)	2343 (93.8)
i	422 (43.1)	3217 (227.0)	391 (40.9)	3378 (110.4)
ɪ	590 (86.1)	2679 (207.7)	594 (23.9)	2675 (129.0)
o	726 (45.6)	1352 (201.1)	614 (55.0)	1122 (108.1)
u	451 (77.0)	1190 (286.5)	431 (55.9)	1043 (200.1)
ɑ	1023 (92.2)	1519 (110.0)	1052 (81.3)	1539 (127.0)
ʌ	833 (62.2)	1571 (155.8)	877 (27.8)	1818 (252.2)

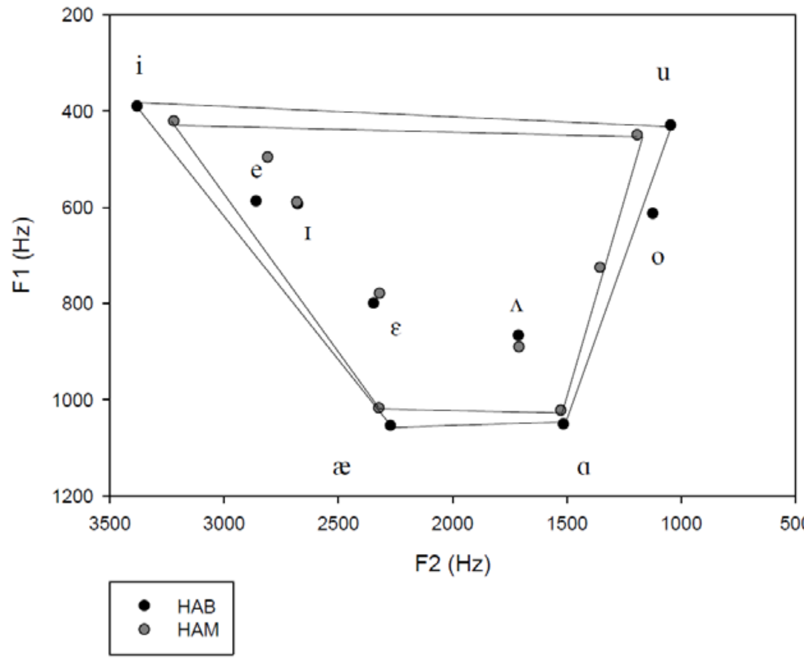

Figure 3: English vowel space for Haitian American monolingual and bilingual speakers.

3. *How does this English acoustic space produced by Haitian speakers compare to that of native speakers of American English that live in the same region and are of similar ages?*

In order to determine if Haitian American speakers produced English vowels differently than a Non-Haitian speaker, their productions were compared with Non- Haitian (NH) peers from the same region. Formant values (in Hz) for English vowels as a function of group can be found in Table 8.

Table 8. *Mean English F1 and F2 Values (in Hz) for Haitian American and Non-Haitian Speakers.*

Vowel	**Haitian**		**Non-Haitian**	
	F1	F2	F1	F2
æ	1036 (92.2)	2295 (148.7)	1114 (176.8)	2382 (191.9)
e	543 (83.4)	2832 (170.4)	517 (71.5)	2859 (243.4)
ɛ	790 (69.6)	2330 (132.4)	772 (67.8)	2443 (100.2)
i	406 (42.8)	3297 (188.4)	428 (46.9)	3299 (211.7)
ɪ	592 (59.6)	2677 (163.0)	567 (34.8)	2759 (189.6)
o	670 (76.0)	1237 (194.8)	635 (90.0)	1201 (181.8)
u	441 (64.3)	1117 (245.5)	456 (111.3)	1281 (165.6)
ɑ	1037 (83.3)	1529 (112.5)	1025 (89.3)	1510 (171.2)
ʌ	855 (50.9)	1695 (236.6)	903 (94.8)	1683 (131.1)

At first glance, the F1 values for Haitian American speakers‘ /æ/ and /u/were observed to be higher than their Non-Haitian counterparts. However, ANOVA results indicated that differences in F1 between the groups were not significant. This could be attributed to high variability during production. ANOVA results also indicated no significant differences in F2 values between Haitian American and non-Haitian speakers. Overall, both Haitian American and non-Haitian speakers produced English vowels with similar tongue height and “forwardness” (Figure 4).

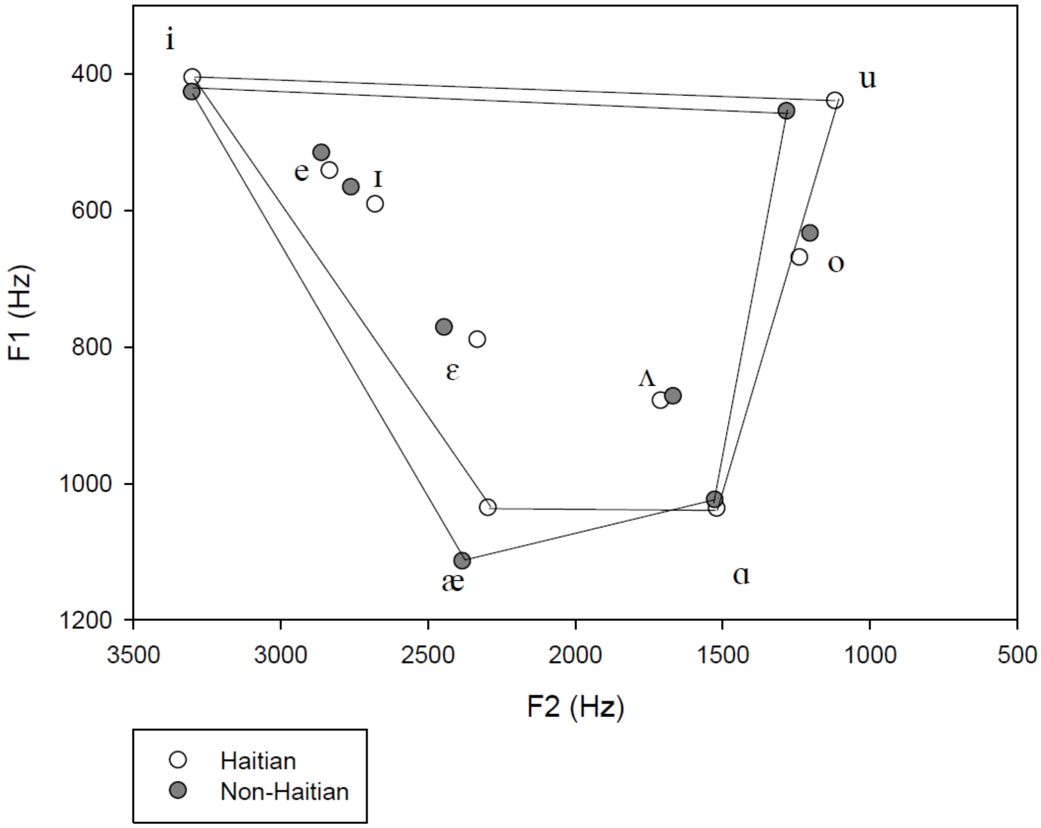

Figure 4. English vowel space for Haitian American and non-Haitian speakers

Because of their status as monolingual English speakers, HAM speakers were factored out and Haitian American bilingual speakers' productions were compared to their non-Haitian (NH) peers from the same region. Formant values (in Hz) for English vowels as a function of group can be found in Table 9. ANOVA results did not indicate significant F1 and F2 differences between groups. Overall, both Haitian American bilingual and Non-Haitian speakers produced English vowels with similar tongue height and "forward/backward" tongue movement (Figure 5).

Table 9. *Mean English F1 and F2 values (in Hz) for Haitian American bilingual and non-Haitian speakers.*

Vowel	Haitian American Bilingual		Non-Haitian	
	F1	F2	F1	F2
æ	1055 (67.9)	2269 (180.2)	1114 (176.8)	2382 (191.9)
e	588 (58.9)	2857 (196.8)	517 (71.5)	2859 (243.4)
ɛ	800 (63.9)	2343 (93.8)	772 (67.8)	2443 (100.2)
i	391 (40.9)	3378 (110.4)	428 (46.9)	3299 (211.7)
ɪ	594 (23.9)	2675 (129.0)	567 (34.8)	2759 (189.6)
o	614 (55.0)	1122 (108.1)	635 (89.9)	1201 (181.8)
u	431 (55.9)	1043 (200.1)	456 (111.3)	1281 (165.6)
ɑ	1052 (81.3)	1539 (127.0)	1025 (89.3)	1510 (171.2)
ʌ	877 (27.8)	1818 (252.2)	903 (94.8)	1683 (131.0)

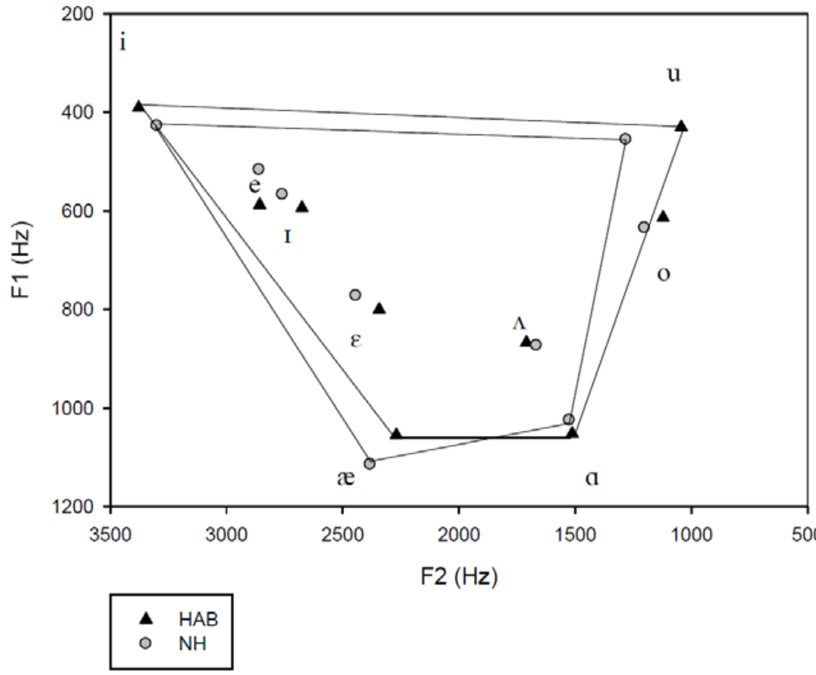

Figure 5. English vowel space for Haitian American bilingual and non-Haitian speakers

DISCUSSION

This study was designed to examine how Haitian (bilingual) speakers of Kreyol and English produce the sounds in the two languages. Specifically, this research provided an acoustic description of Kreyol and English vowels produced by monolingual (English) and bilingual (Kreyol/English) children of Haitian descent.

Results of this study revealed that the acoustic description of the Kreyol vowel space produced by this group of Haitian American speakers (e.g., residents of South Florida) is consistent with non-acoustic adult descriptions (Tinelli, 1981). With South Florida being one of the three states that report the largest Haitian American population, these results are to be expected. Similarities in phonemic repertoire could have also contributed to these results.

Another issue to consider is the fact that there were no monolingual Kreyol speakers in this study. It is not clear if these productions are true representations of Kreyol (not influenced by English). Having data on how monolingual Kreyol speakers produce Kreyol vowels would provide baseline measurements that would allow for a better monolingual/bilingual comparison.

When Haitian American speakers produced English vowels, acoustic analyses revealed that the English vowel space produced was no different than the vowel space of non-Haitian native English speakers. This was the case when both monolingual and bilingual Haitian speakers were compared to non-Haitian native English speakers from the same geographical area. This suggests that bilingual speakers as young as 5 years old can produce the vowel sounds of their second language as a native speaker. These overall results support the SLM, which indicates the influence of AOA on native- like production (Flege, 1999). The fact that the young bilingual speakers in this study appear to be able to differentiate between Kreyol and English vowels (their native and second language), leads one to wonder if these same results would exist during the production of consonant sounds. Examining consonant production differences between bilingual and monolingual speakers would be a useful follow-up to this research. If the same results are seen, it might be possible to test the articulation skills of a bilingual speaker of this particular age in the second language only.

With more recent descriptions of vowels looking at how the spectral features of the vowel change over the length of the vowel (Fox & McGory, 2007; Jacewicz, Fox, & Salmons, 2006; Fox, Jacewicz, & Salmons, 2006), future research should investigate dynamic spectral change to see if similarities in formant frequencies across groups continue to be evident.

Further research should also investigate if differences in production occur as a function of age. Conducting a cross-sectional study that investigates differences in vowel characteristics of Haitian American speakers of different ages and different ages of arrival (AOA) in the United States would help determine the critical age for bilingual speakers producing vowels as a native speaker.

ABOUT THE AUTHORS

Stacey Wallen is a speech-language pathologist and Assistant Clinical Professor at Georgia State University. Her current research interests include examining differences in the perception and production of phonemes as it relates to culturally/linguistically different groups. She has a Ph.D. in speech and hearing science from The Ohio State University.

Robert A. Fox is a Professor and Chair of the Department of Speech and Hearing Science at The Ohio State University. He is best known for his contributions to speech perception, especially for his work on the perceptual structure of vowels and diphthongs. He has also studied behavioral aspects of speech perception such as changes in listener response as a function of human aging and second language learning as well as dialectal variation.

Correspondence concerning this article should be addressed to Stacey Wallen, Department of Educational Psychology and Special Education, Georgia State University, Atlanta, GA 30303. Phone: (404) 413-8343. Email: swallen@gsu.edu

REFERENCES

http://www.babybumblebee.com

Bernthal, J. & Bankson, N. (1993). *Articulation and phonological disorders*. New Jersey: Prentice Hall.

Best, C. (1995). A direct realist view of cross-language speech. In W. Strange (Ed.), *Speech perception and linguistic experience: Theoretical and methodological issues* (pp. 171-204). Baltimore: York Press.

Flege, J. E. (1995). Second-language speech learning: Findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Theoretical and methodological issues* (pp. 233-273). Timonium, MD: York Press.

Flege, J. E. (1999). Age of learning and second language speech. In D. Birdsong (Ed.). *Second Language Acquisition and the Critical Period Hypothesis* (pp. 101- 131). Mahwah, NJ: Lawrence Erlbaum Associates.

Flege, J., MacKay, I, & Meador, D. (1999). Native Italian speakers‘ perception and production of English vowels. *Journal of the Acoustical Society of America, 106*, 2973-2987.

Fox, R., Jacewicz, E. & Salmons, J. (2006). Prosodically induced phonetic variations in vowels: A source of language change? In H. I. Aronson, F. L. Dyer, V. A. Friedman, D. S. Hristova, & J. M. Sadock (Eds.), *The Bill Question*, (pp.87-110). Bloomington, IN: Slavica.

Fox, R. A. & McGory, J. (2007). Second language acquisition of a regional dialect of American English by native Japanese speakers. In O.S. Bohn & M. J. Munro (Eds.), *Language experience in second language speech learning*, (pp. 117-134). Amsterdam: John Benjamins Press.

Goldstein, B. (2001). Transcription of Spanish and Spanish-influenced English. *Communication Disorders Quarterly, 23*, 54-66. Retrieved July 9, 2005, from Questia database, http://www.questia.com.

Gorman, B.K., & Kester, E.S. (2003). Spanish-influenced English: Typical phonological patterns in the English language learner. Online continuing education course. http://www.bilingusitics.com.

Hillenbrand, J., Getty, L., Clark, M., & Wheeler, K. (1995). Acoustic characteristics of American English vowels. *Journal of the Acoustical Society of America, 97*, 3099- 3111.

Jacewicz, E., Fox, R. A. & Salmons, J. (2006). Prosodic prominence effects on vowels in chain shifts. *Language Variation and Change 18*, 285-316.

Kindler, A. (2002). *Survey of the States' Limited English Proficient Students and Available Educational Programs and Services*. 2000-2001 Summary Report.

http://www.ncela.gwu.edu/files/rcd/BE021853/Survey_of_the_States.pdf

Klatt, D. (1976). Linguistic uses of segmental duration in English: Acoustic and perceptual evidence. *Journal of the Acoustical Society of America 59*, 1208-122l

Ladefoged, P. (1996). *Elements of Acoustic Phonetics*. Chicago: University of Chicago Press.

Lee, S., Potamianos, A., & Narayanan, S. (1999). Acoustics of children‘s speech: Developmental changes of temporal and spectral parameters. *Journal of the Acoustical Society of America, 105*, 1455-1468.

McLeod, S. & Bleile, K. (2004). Typical speech development summary. A resource summarizing research on typical speech development. Retrieved from http://athene.riv.csu.edu.au/~smcleod/ASHA03McLeod&Bleile.pdf

Mosser, G. (1999). Forming formants. In Scientific American: The Throat Singers of Tuva. Retrieved from http://www.sciam.com/1999/0999levinbox3.html.

Muysken, P. & Veenstra, T. (1995). Haitian. In Arends, J., Muysken, P., and Smith, N. (Eds). *Pidgins and creoles: An introduction*. Philadelphia, PA: John Benjamins Publishers.

Peterson, G. & Barney, H. (1952). Control methods used in a study of the vowels. *Journal of the Acoustical Society of America, 24*, 175-184.

Pickett, J. (1999). *The acoustics of speech communication*. Boston: Allyn and Bacon.

Portes, A. & Rumbaut, R. (2001). *Legacies: The story of the immigrant second generation*. New York: Russell Sage Foundation.

Regan, J. (2003). Haiti‘s first language still running second. Retrieved from http://www.hartfordhwp.com/archives/43a/538.html

Rosner, B. & Pickering, J. (1994). *Vowel perception and production*. New York: Oxford University Press.

Savain, R. (1999) *Haitian Creole in ten steps*. Rochester, VT: Schenkman Books.

St. Fort, H. (2000). *What is Haitian Creole?* Retrieved from http://www.ahadonline.org/eLibrary/creoleconnection/Number20/haitiancreole.htm

Tinelli, H. (1981). *Creole phonology*. New York: Mouton.

APPENDIX

Elicitation Script

I'm going to show you some pictures. Your job is to tell me what each picture is. Each time I show a picture I'm going to ask "What is this?" I want you to answer "It's a _______" and say the name of the picture. So if I show you a picture of a bird (hold up the picture of the bird) **and say "What is this?" I want you to say "It's a bird."**

Let's try some for practice.

(Hold up example #1—a picture of a shirt) What is this? *(Wait for response. If child answers "It's a shirt" then reply* ***"You're right it's a shirt, good job"*** and continue to stimulus items).

(If child answers "shirt", praise child for correct answer then model the desired response ***"You're right, it's a shirt. Can you say "It's a shirt.?"*** Wait for child to repeat the desired response then move to example #2—a picture of a cookie—and repeat process).

(If child appears unable to label the picture, provide a verbal cue (i.e. ***"It's a sh__".***) and wait for child to produce label. If the child is unable to name the picture after verbal cue, provide the label and ask child to repeat).