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The Low Back Merger in Miami

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Abstract

The last major study of the low-back merger in Miami, Florida, was Labov, Ash, and Boberg's (2006) work for the Atlas of North American English (ANAE). In that influential work, Labov et al. found the low-back merger to be in transition in Miami. However, the ANAE was based on Telsur data, the most recent of which was collected nearly 10 years ago. Presumably, since that time, the low-back merger has progressed in Miami towards a full merger.

This study focuses on the progress of the low back merger in a Miami speech community. Eighteen participants were interviewed. Interviews consisted of a word list with 8 words containing vowels of the /o/ word-class, and 8 others containing vowels of the /oh/ word-class, as well a short reading passage and a commutation test. Acoustic analysis focused on the words in the word list, and a cursory examination of the passage data was in agreement with the findings from the word list pronunciations. The data from the word lists was analyzed and the F1 and F2 of /o/ and /oh/ vowels were averaged for comparison. Vowels preceding [r] and [+nasal] obstruents were excluded from analysis, due to their significant effect on formants. This exclusion should also serve to make any results suggesting movement towards a merger more compelling, because ANAE data found that 2 of 5 Miami residents interviewed had a merger only before nasals.

Keeping analysis within the listed restraints, it appears that the low-back merger has continued towards fruition in Miami. To determine the presence of a merger, techniques were replicated from an earlier study on near-mergers (Bowie 2001), using t-tests to compare the averages of the first two formants of the /o/ and /oh/ vowels for each speaker. Initial analysis suggests that 13 of 18 interviewees have a low-back merger in perception, and 11 of 18 have a merger in both production and perception. This pattern follows predictable patterns of merger proliferation, suggesting that merger is continuing to spread among Miami residents and that the city and surrounding areas continue to diverge from traditional Southern dialect characteristics.

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1 Introduction

One of the most significant sound changes occurring the United States is the merging of the vowel phonemes /o/ (defined by words such as *cot*, *shod*, and *tot*) and /oh/ (defined by words such as *caught*, *ought*, and *taught*). This sound change, commonly referred to as the low back merger (or '*cot* / *caught* merger'), is prevalent in the West, the Midland, and Eastern New England. In these places and others where the merger is not blocked by conflicting dialectal features (e.g., the Northern Cities Shift, the Southern Shift, etc.), it is generally either in progress or completed. Historically, the two different phonemes have been pronounced as two distinct vowels, with /oh/ having an F1 of around 600 Hz and an F2 of around 1,000 Hz, and /o/ having formants around 750 Hz and 1400 Hz.

The most recent major linguistic survey of the United States was *The Atlas of North American English* (Labov, Ash, and Boberg 2006), henceforth ANAE, which classified southern Florida as part of the Southeastern Super Region (SESR). This area is defined, in part, by a distinction between /o/ and /oh/ in production and perception (Labov, Ash, and Boberg 2006:137). However, ANAE only provide data for one speaker from south Florida, a 43-year-old woman from Miami, and she did not maintain a distinction between the two phonemes in all phonetic environments.

The sparseness of data from the region, and the potential signs of a merger in progress for the one speaker from Miami make south Florida an interesting area for further research. Furthermore, the data from ANAE are now nearly 10 years old, and it is possible that the merger could have progressed significantly towards a full merger since the data for ANAE were collected. The goal of the present study is to document the status of the low back merger in southern Florida. Our results support the conclusion that the low back merger is no longer in transition but rather appears to have gone to completion. Given that ANAE defines the SESR in part by the absence of the low back merger, south Florida's inclusion in this region is thus in question.

2 Methodology

There were two data collection sessions for this project. The first session took place in March, 2007. Ten speakers, all part of the extended social network of the interviewer, were recorded while they read a word list consisting of 40 words, including eight tokens of the phoneme /o/ and eight tokens of /oh/ placed randomly within the list. Table 1 presents the list of 40 words, along with the 8 that were ultimately selected for analysis.

Dawn	**tot**	**taught**	stable	front
hit	hook	bat	star	**caught**
skier	huddle	enter	**ought**	**shod**
core	fasten	skip	about	happen
fizzle	ache	head	con	**father**
fought	flute	**cot**	car	flute
freckle	pray	pea	good	scoop
shore	fleece	Donald	hit	store

Table 1: The word list presented to participants (bold words indicate words used for analysis)

The speakers ranged in age from 15 to 55, and included five women and five men. Each speaker recited their name into an Olympus digital voice recorder and then read the complete word list. Following the recording, the speakers were administered a perception test in which they were asked the following questions (expected answers are given in parentheses):

(1) What is the past tense of the word *catch*? (*caught*)
(2) What is the name of a small portable bed? (*cot*)
(3) Do these words sound similar or different? (the same / different)
(4) What is the time of the day called when the sun comes up? (*dawn*)
(5) What is the shortened name of the famous cartoon duck? (*Don*)
(6) Do these words sound similar or different? (the same / different)

Eight additional speakers were interviewed in August 2007. All eight speakers were part-time employees of the City of North Miami Beach Parks and Recreation. They ranged in age from 15 to 39, included four men and four women, and lived as far south as Liberty City (downtown Miami) and as far north as Ft. Lauderdale (1/2 hour north of Miami). The same protocol was used for the eight additional speakers.

The subject pool, though not randomly selected, was diverse in age, gender, ethnicity, and occupation. In the study, there were nine males and nine females, whose occupations included student, teacher, firefighter, and UPS driver, among others. While a majority of the speakers fell into an age range of 15 to 22, there were four speakers above this range (38, 39, 47, and 55). The subject pool was also very diverse in ethnicity, being composed of seven African Americans, four Latinas/os, and seven Caucasians.

3 Analysis

After the data collection phase, the recordings were then edited and analyzed. The original word list contained eight tokens each of /o/ and /oh/. Ultimately, however, only four tokens of each were included in the analysis in order to avoid environments that might have affected the formants of the vowels (e.g., before /r/ or nasal consonants). Formants were measured for 5 ms intervals of the four preserved tokens' vowels, as close to the middle of the voicing interval as possible.

Formants were compared in two different ways. Firstly, individual speakers' formants were compared against one another to determine if that individual speaker had a merger. Secondly, in an attempt to neutralize the natural variation between speakers of such a diverse community, all individual formants were normalized using the normalization methodology from ANAE and compared to obtain the status of the merger. Each of the two methods (individual and normalized comparison) used multivariate analyses of variance (MANOVA) at a 95% confidence interval.

To normalize vowels for the comparison of the group as a whole, log means were used. First, the log mean for the group (G) was computed by adding the natural log of each formant recorded, and dividing this by the number of total formants recorded, resulting in the log mean for a formant across the group. Then individual speakers' log means (S) were calculated, by using the same process for each of the individual's formants. A scaling factor (F) was computed as follows: $F = e^{(G-S)}$. F, a different factor for each speaker, was multiplied with each of its speaker's formants to calculate normalized formants for each of their utterances.

4 Results

The perception test administered at the time of the interview showed that every speaker was merged in perception. Each speaker responded with 'the same' in answer to questions (3) and (6). With regard to production, the MANOVA results for individual speakers are shown in Table 2.

For every speaker it was shown that they did not have distinct vowels for /o/ and /oh/ word classes, with the closest case of $p=0.066$. The largest difference between average F1s for any speaker was 38.25 Hz (Speaker 2), and the smallest was 3.5 Hz (Speaker 6). For F2, the largest difference for any speaker was 113.5 Hz (Speaker 10), and the smallest was 1 Hz (Speaker 8).

Speaker 1	$F(2, 4) = 1.55$	$p = 0.318$
Speaker 2	$F(2, 5) = 0.78$	$p = 0.238$
Speaker 3	$F(2, 5) = 1.33$	$p = 0.348$
Speaker 4	$F(2, 5) = 2.16$	$p = 0.464$
Speaker 5	$F(2, 5) = 0.26$	$p = 0.095$
Speaker 6	$F(2, 5) = 0.72$	$p = 0.223$
Speaker 7	$F(2, 5) = 1.93$	$p = 0.435$
Speaker 8	$F(2, 5) = 0.28$	$p = 0.100$
Speaker 9	$F(2, 5) = 0.78$	$p = 0.238$
Speaker 10	$F(2, 5) = 1.51$	$p = 0.502$
Speaker 11	$F(2, 5) = 0.45$	$p = 0.153$
Speaker 12	$F(2, 5) = 0.18$	$p = 0.066$
Speaker 13	$F(2, 5) = 4.03$	$p = 0.617$
Speaker 14	$F(2, 5) = 1.01$	$p = 0.287$
Speaker 15	$F(2, 5) = 6.07$	$p = 0.708$
Speaker 16	$F(2, 5) = 0.31$	$p = 0.111$
Speaker 17	$F(2, 5) = 0.27$	$p = 0.097$
Speaker 18	$F(2,5) = 0.27$	$p = 0.099$

Table 2: Statistical results from *t*-tests for individual speakers

The results of the normalized averages for the group are similarly convincing. The F1 of the average /o/ vowel (756.8 Hz) was within 2 Hz of the F1 of the average /oh/ vowel (755.9 Hz). The F2 of each were within 11 Hz of each other as well (1,548.1 Hz for /o/ and 1,549.8 Hz for /oh/, shown in Figure 1). When these are compared using a MANOVA, the result is $F(2,138)=0.92$, $p=0.401$, which means that. like for each individual speaker, the vowels are not distinct.
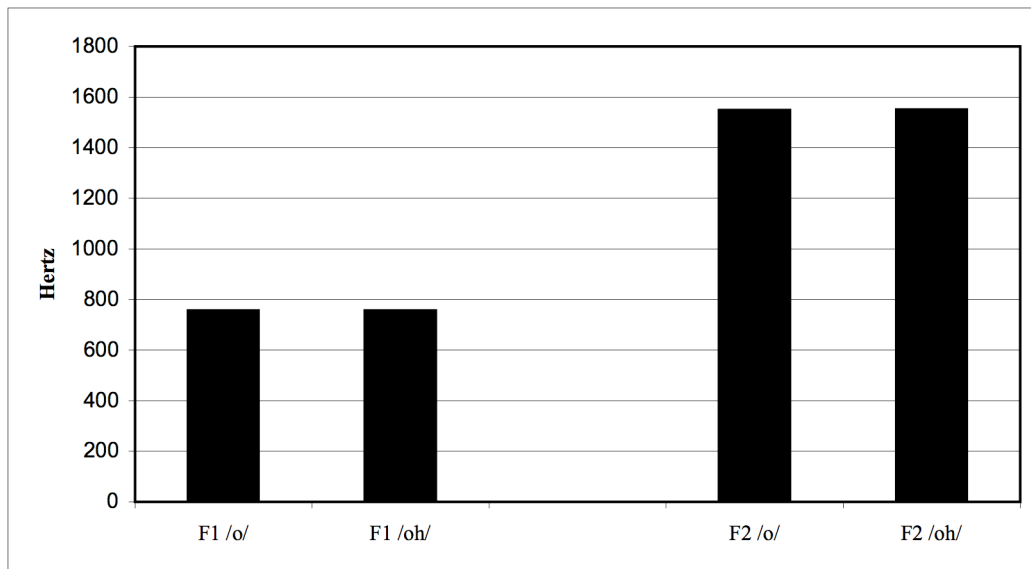

Figure 1: Normalized formant averages across all speakers

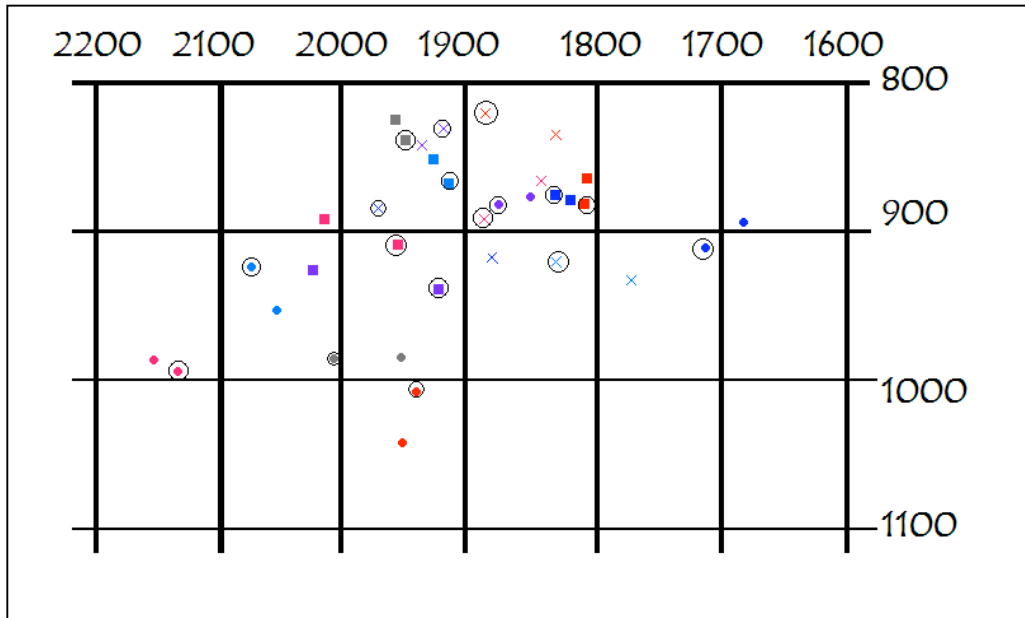Finally, Figures 2 and 3 present the individual vowel tokens from each speaker analyzed.

Figure 2: Vowel means arranged by speaker; /oh/ tokens are circled, and each speaker has an individual token shape
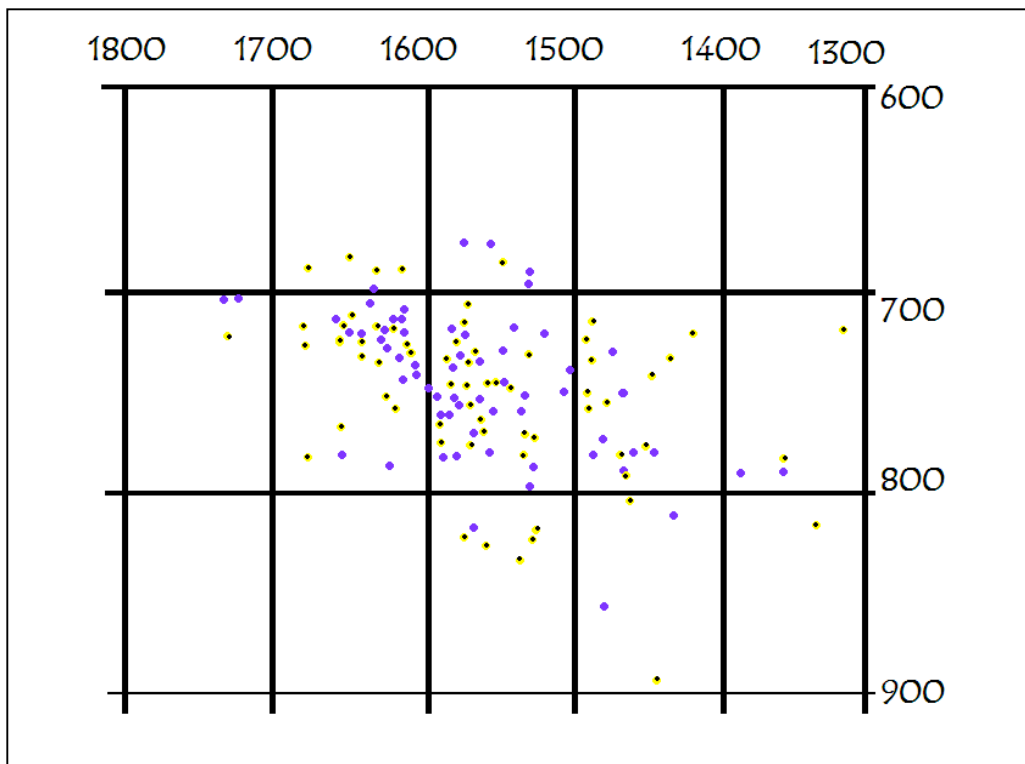

Figure 3: Normalized vowels for all speakers

5 Discussion

From the above results, we can now conclude that there is a full low back merger in Miami, and it is no longer in transition. Based on both the perception and production tests, all 18 speakers were fully merged.

The effects of this study invite discussion as to whether South Florida should continue to be classified as part of the SESR. This research would, however, only be the first step towards a full analysis of the phonetic features of the South Florida region. Further research into this geographical region should include a look at /ow/ fronting, another characteristic of the SESR, to determine if Southern Florida has moved away from the norm regarding this feature as well.

Though our results seem robust, there are several possible sources of error. In this study, there was considerable background noise for interviews, and the digital recorder used was selected more for convenience than for quality. Future study should take advantage of higher quality recording equipment and perform interviews in environments with minimal background noise. Furthermore, any additional subjects should ideally be drawn from different social networks; whereas the interviews for the current study were limited to a single social network. Extension of the corpus to cities of South Florida other than Miami and Ft. Lauderdale would also be useful to determine if all of South Florida is patterning differently from the SESR.

References

William Labov, Sharon Ash, and Charles Boberg. 2006. *Atlas of North American English*. Berlin: Mouton de Gruyter.

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