Stylistic variation in the production of /ai/ by North Carolina girls

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ABSTRACT

Southern American English is well known for the variation in the production of the diphthong /ai/ which, in everyday speech, shows considerable reduction and monophthongization. The present study seeks to characterize the variation in the production of /ai/ by ten girls aged 9-13 years who were born and raised in Western North Carolina. Three types of productions were examined: read isolated words, read sentences, and unconstrained spontaneous talks. The results show that the reduction and monophthongization of the diphthong /ai/ varies systematically as a function of discourse complexity, production type (speaking as opposed to reading) and word emphasis. In all production tasks, the diphthong was pronounced most often as fully diphthongal /ai/ in emphasized words whether in sentences, spontaneous talks or single words in citation form. Conversely, the production as a full /ai/ decreased in non-emphatic positions and in spontaneous talks. This trend indicates that the North Carolina girls are aware of the distinctions among the variants of /ai/ and use them in a systematic way, depending on the formality of the register.

INTRODUCTION

Variation in the production of the diphthong /ai/ (including monophthongization) is a well-documented feature of Southern American English (e.g., Evans 1935; Kurath & McDavid 1961; Wolfram & Christian 1976; Bernstein 2006; Labov et al. 2006). While immediate phonetic context explains some of this variation (Thomas 2000), relatively little is known about how the pronunciation of /ai/ by the same individuals may vary in the course of a discourse as a function of situational code switching or a shift in formality register.

The effects of code switching on pronunciation of /ai/ were found in the speakers of African American English (AAE) who were able to spontaneously switch between the AAE and Standard American English based on the formality of the situation, demonstrating high levels of metalinguistic awareness (Garner & Rubin 1986). A study of sorority girls from Alabama and Texas showed variation with regard to a reading style: the monophthongization of /ai/ increased when reading a passage compared to reading a word list (Bernstein 2006).

This study looks for systematic stylistic differences in the production of the diphthong /ai/ in Appalachian English in the speech of girls in Western North Carolina.

There is a widely-held belief that, given easy access to "Standard American English" in the media (including the internet), speakers of Appalachian English—especially younger generations—may be losing their regional "accent." If so, then we would expect variability in the production of /ai/. Recent findings in our lab from a large corpus of data from Western North Carolina suggests that children do produce more monophthongal versions of /ai/ in spontaneous talks than when reading sentences. The present work investigates this issue in greater detail; of particular interest is whether this variation is systematic and what the conditioning factors might be.

METHODS

Speakers: 10 girls from Western North Carolina (the Sylva, Cullowhee, and Waynesville areas), ranging in age from 9-13 years. All were speakers of Appalachian English (AE).

Stimuli: Exemplars of the diphthong /ai/ were recorded in three distinct contexts: (1) in a [h_d] context produced as isolated words, (2) in sentences in which the diphthong /ai/ occurred in the phonetic contexts [b_dz] and [b_ts] and in five different levels of emphasis (produced by changing the main sentence stress—see the examples below) and (3) in unconstrained spontaneous talks.

BIDES	BITES
SUE thinks the small bides are cute.	JANE thinks the small bites are deep.
No! JANE thinks the small **bides** are cute.	No! SUE thinks the small **bites** are deep.
Jane KNOWS the small bides are cute.	Sue KNOWS the small bites are deep.
No! Jane THINKS the small **bides** are cute.	No! Sue THINKS the small **bites** are deep.
Jane thinks the SHORT bides are cute.	Sue thinks the LARGE bites are deep.
No! Jane thinks the TALL **bides** are cute.	No! Sue thinks the SMALL **bites** are deep.
Jane thinks the small CATS are cute.	Sue thinks the small CUTS are deep.
No! Jane thinks the small **BIDES** are cute.	No! Sue thinks the small **BITES** are deep.
Jane thinks the small bides are GROSS.	Sue thinks the small bites are WIDE.
No! Jane thinks the small **bides** are CUTE.	No! Sue thinks the small **bites** are DEEP.

Data Analysis: An aural classification task was used. Each production of /ai/ in each of these three stimulus types was categorized as either a full diphthong (unreduced /ai/), a reduced diphthong (i.e., reduced offglide) or the monophthong /a/. Each token was classified twice (in two different listening sessions) over a three week period by the first author. Any discrepancies between these two classifications were resolved by one of the other authors. In spontaneous talks, the tokens were also aurally classified as emphasized and not-emphasized. In read sentences, the two levels of emphasis (emphatic and non-emphatic) were selected on the basis of the acoustic measurements of vowel duration.

1 /ai/ in isolated words

Data elicitation

Each participant read single words with a [hVd] structure, one at a time, as they appeared in random order on a computer monitor. There were three repetitions of the target word *hide* in the set of 42 words containing 14 different vowels and diphthongs of American English. The recordings were controlled by a custom MATLAB program. A high-quality head-mounted microphone was used, positioned 1 inch from the lips.

Results for isolated words

Of 10 girls who participated, only one produced a monophthongal variety of the diphthong, which was classified as an /a/ on each of the three recorded renditions of the word *hide*. The remaining 9 girls produced a fully diphthongal /ai/. There were no notable reductions of the diphthong for any of the participants.

These results show no variation in the production of the diphthong /ai/ in a careful pronunciation in a citation form.

Although all the subjects were classified as speakers of AE, and had been born and raised in the same region in Western North Carolina, only one of them produced the monophthongal version of /ai/ commonly produced by local speakers of this dialect. The presence of the monophthongal variety of /ai/ in everyday speech is prevalent in this core area of the Southern Vowel Shift. It is clear that these girls can code-switch under formal speaking conditions to produce a version of /ai/ found in so-called "Standard American English" (SAE).

Will the same code-shifting pattern be found when these same speakers are reading longer passages such as sentences in mini-dialogs?

More importantly, will this code-shifting be present in spontaneous talks?

2 /ai/ in read sentences

Data elicitation

The sentence pairs were read in random order. The participant could repeat each pair as many times as needed to ensure fluent production and proper emphasis. The recordings were controlled by a different custom MATLAB program. The experimental procedure was the same as in eliciting isolated words.

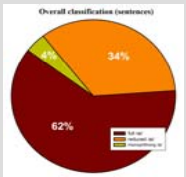

Figure 1

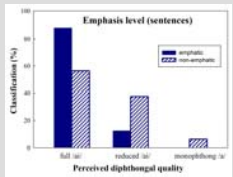

Figure 2

Figure 1: We show here the overall classification of /ai/ in read sentences in which the words *bides* and *bites* occurred in both emphatic and non-emphatic positions. The variant classified as an unreduced /ai/ occurred most often across all sentences, followed by a reduced /ai/ and the monophthong /a/.

Figure 2: In this figure we see significant variation in the production of /ai/ as a function of word emphasis. The diphthong was classified as a full /ai/ more often when the target word carried the main sentence stress than when it occurred in a non-emphatic position. Pearson chi-square test showed a significant association between vowel classification and stressed position (p=0.003).

Consonantal context effects 3

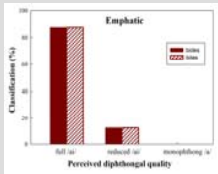

Figure 3

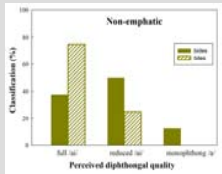

Figure 4

Figure 3: As can be seen in this figure, there was no difference in the proportion of unreduced vs. reduced versions of /ai/ as a function of final consonant voicing when the word was produced in an emphatic context.

There were no consonantal context effects on the classification of the diphthong as a full /ai/ and reduced /ai/ when the target word occurred in the emphatic position.

Figure 4: However, a different pattern of variation in the production of /ai/ was obtained for the non-emphatic position. The diphthong was produced in a reduced form more often before a voiced consonant than a voiceless consonant.

Consonantal context made a difference in classification of /ai/ when the target word occurred in a non-emphatic position in a sentence.

/ai/ in spontaneous talks 4

Data elicitation

Each participant was asked to talk about family, hobbies, school, favorite activities, etc. The choice of the topic and the length of the talk varied among the girls although most of them talked freely for about 10-15 minutes. The recordings were done using Adobe Audition program. The same head mounted microphone was used.

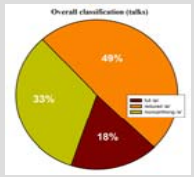

Figure 5

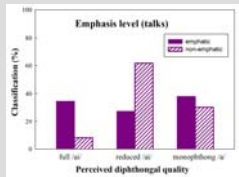

Figure 6

Figure 5: Overall, the proportion of unreduced versions of /ai/ drastically decreased in spontaneous talks (18%) compared to read sentences (62%). The speakers produced higher proportions of both the reduced /ai/ and monophthongs in spontaneous talks (49% and 33%, respectively) compared to read sentences (34% and 4%, respectively).

Figure 6: Emphasis was again a significant factor. Pearson chi-square test showed a strong association between vowel classification and emphasis level (p<0.001). When the diphthong occurred in emphatic position, its classification as a full /ai/ was 35% whereas it was much smaller in non-emphasized words (8%). The classification as a reduced /ai/ increased in non-emphatic positions compared to the emphatic positions.

DISCUSSION

The results of this study support the existence of stylistic variation and variable code-switching in the production of the diphthong /ai/ by Western North Carolina girls. While reading single words, all but one speaker produced a fully diphthongal /ai/—this demonstrated that in formal situations, these speakers code-switched to produce versions of /ai/ consistent with SAE. However, there was less code-switching when they were producing sentences (especially when the /ai/ was in a non-emphasized position) and the least in spontaneous talks. These results indicate that these younger female AE speakers are aware of the distinctions among the variants of /ai/ and use them in a systematic way. The more formal the register, the more careful pronunciation of /ai/.

Stylistic variation

The findings of the current study support the work of Bernstein (2006) who, in her study of sorority girls from Alabama and Texas, found variation with regard to reading style. Bernstein's results showed the increased monophthongization of /ai/ in read passages compared to a read word list. The current study found a significant increase in the monophthongization of /ai/ from 4% in sentences to 33% in spontaneous talks.

Variation as a function of word emphasis

The present variation in the pronunciation of /ai/ was also related to the degree of emphasis of the target word. Although the girls seemed to be aware of the change in the formality register, some of the variation found here can be explained by speech mechanics, such as those summarized in Lindblom's target undershoot model (Lindblom, 1990). Accordingly, speakers reach the articulatory target for vowels produced in a citation form (or stressed positions) but fail to achieve this target when the articulatory system is forced to speak more rapidly. Articulatory reduction in fast speech produces the "articulatory undershoot" effect which occurs mainly in non-emphatic positions of the target. In the present read sentences, we find that there is a significant variation based on the emphatic position of the word. Full /ai/ is produced more often in the emphatic position, reduced /ai/ is produced more in the non-emphatic position, and monophthong /a/ is produced mostly in non-emphatic position. This variation is in accord with Lindbloom's target undershoot model.

Variation as a function of consonantal context

The present study indicates that consonantal context (in terms of voicing) may play a role in production of /ai/ although this was found only when the target word occurred in non-emphatic position in a sentence. In this position, we found more instances of full /ai/ when the diphthong occurred before voiceless consonants in the coda (in the word *bites*) compared to voiced consonants (in *bides*). These results do not concur with Wolfram & Christian (1976) who found that the diphthong /ai/ had a reduced glide offset when followed by a voiceless consonant. Because we did not analyze our data acoustically, we do not know whether the aural classification of the full /ai/ in the present study is in any way related to the reduction of its glide offset. This issue needs to be resolved in future research.

Future research

The current findings should be explored in future research. More work is currently under way which examines the production of /ai/ by ten boys coming from the same region of Western North Carolina. The preliminary findings point toward a difference in the production of the diphthong as a function of speaker gender. As a general trend, girls seem to produce more of the full /ai/-variants than boys, whose diphthongs tend to be more reduced and monophthongized. The two sets of data will also be analyzed acoustically.

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