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Jane Farrell April 12, 2022

An Investigation into the Prosody of Camouflaged Forms in African American English: Past-Tense *Ain't*

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Abstract

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African American English (AAE) is an extraordinarily rich language that is the subject of many works of sociolinguistic research. One variable of AAE that lacks extensive research is the grammatically camouflaged variable past-tense *ain't*. This study approaches the variable from a prosodic perspective-an angle less frequently used in AAE research. Previously, it has been found that in the AAE aspect system, stressed BIN and unstressed *been* have different grammatical restrictions (DeBose, 2015), showing us that prosody is partially defining the feature's semantics and grammar. Clauses that include tokens of *ain't* in the DCA, DCB, and PRV corpora from the Corpus of Regional African American Language (CORAAL) were extracted and measured at the word level for duration and pitch using Praat (Boersma and Weenink 2016) and a script developed by Dr. Tyler Kendall. Tokens of *ain't* were coded as either past and present tense and effects of maximum pitch, duration, gender (male or female) and location of speaker were examined, as well as interactions between gender and word duration, maximum pitch, and location. Maximum pitch was found to have a meaningful effect in predicting that an instance of *ain't* would be past tense, while word duration had a marginally meaningful effect. Women used pitch at a meaningful level while men did not, and the feature is more likely to appear in Washington, D.C. speakers versus those in Princeville, North Carolina--providing evidence to claims that this is a northern urban innovation (Wolfram, 2004; Howe, 2005; Fisher, 2018). A pilot study was conducted with 20–22-year-old African American and

non-African American males and females to investigate whether these cues are being used in perception. Participants were presented with audio of utterances containing past and present forms of *ain't* from two male and female speakers from the DCB corpus and asked to indicate whether the utterance they heard was in the past or present tense. Preliminary data shows trends of higher rates of accuracy from African American listeners overall and in responding to past tense utterances. The pilot study presents interesting trends that prompt further study and hint at the use of prosodic cues in the perception of the past-tense *ain't* feature.

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INTRODUCTION

Literature Review

African American English is an extraordinarily rich and highly studied language that shares features of mainstream English dialects and non-standard varieties but has many of its own unique and distinctive features (Fisher, 2018a). Many of these features are marked as "non-standard" and stigmatized by more mainstream English speakers—such as habitual be, copula absence, and -s absence. Over time, sociolinguistic research has built up a greater understanding of AAE grammar and has worked to destigmatize the language as well as combat misunderstanding, misrepresentation, and racist beliefs surrounding language use in African American communities. Though AAE has many distinctive, overt features, some are more covert—hidden in "grammatical camouflage."

Grammatical camouflage is a pattern in what we can refer to as African American Standard English (AASE) (Spears, 2015). A grammatically camouflaged feature has been defined as a form that is either phonologically identical or similar to forms in the standard language variety, but that may carry a different semantic-pragmatic function or be constructed in a subtlety different way (Spears, 1982; Wolfram, 2004; Collins et. al, 2008; Jones, 2016). These features can thus go under the radar of more mainstream English speakers, maintaining a sense of "standard" white English. Yet, these camouflaged features are distinctly Black grammatical features that have no counterpart in any other language or dialect. This characteristic is referred to as grammatical incommensurability (Spears, 2009).

One such feature that has been studied is stressed and unstressed *been*. Previous work has found there to differences in semantic function and syntactic co-occurrence restrictions with the variable depending on when it is stressed, denoted BÍN, or unstressed, bĭn (Rickford,

1995; Dillard, 1972; Steward, 1965). The unstressed form, bĭn, experiences restrictions such as occurring only with [−verb/+stative] predicates (DeBose, 2015), while time-adverbials cannot co-occur with BÍN (Rickford, 1995). See the following examples from Rickford (1995):

(1) I BÍN know you, you know. I bĭn knowing you for years.

Example (1) shows the grammatical restriction of the co-occurrence of stressed BÍN and time-adverbials.

Evidence of their differing semantics is shown in the following example:

(2) He bĭn doing it ever since we were teenagers, and he still doing it.

If the stressed construction was used in (2) rather than the unstressed form, this sentence would be considered redundant with the qualification "and he still doing it." Stress, a prosodic feature, is thus partially defining this feature's semantics and contributing to the grammar of this camouflaged form.

Another common language feature with a grammatically camouflaged form in AAE is *ain't*. Though widely and commonly used by white English varieties in the place of present tense verbs be and have, the use of *ain't* to signify past tense (i.e. *ain't* for *didn't*) is a distinctly AAE feature (Wolfram and Schilling, 2016; Labov et. al, 1968; Howe, 2005) which may be considered a recent innovation in the language (Wolfram, 2004; Howe, 2005; Fisher, 2018).

One foundational piece of research on this variable is Sabriya Fisher's work on Philadelphia African American English speakers' use of past-tense *ain't* (Fisher, 2018b). Drawing from production data recorded in Philadelphia in the early 1980s as part of the Influence of Urban Minorities on Linguistic Change Project [UMLC], Fisher finds an increase of past-tense *ain't* in both a real time and apparent time analysis. Furthermore, she discovers that

the intensification of this feature is stronger in speakers born and raised in Philadelphia in comparison to AAE speakers who migrated to the city from the South. This evidence supports previous arguments that link innovation in AAE to the linguistic segregation occurring in the urban North during the period of the Great Migration (Labov and Harris, 1986; Bailey and Maynor, 1987, 1989).

Fisher's dissertation (2018a) provides a more in-depth analysis of the variable, showing a preference for verbal morphology as past+base versus past-preterit (used only 25% of the time) in the younger generation. The older generation of Philadelphia AAE speakers use a higher proportion of the latter construction, which may be evidence that past-preterit forms are an older construction (Fisher, 2018b). Fisher establishes criteria for defining the feature's semantic category by finding patterns in the main verb morphology, found in Table 1.

Table 1. Criteria for determining semantic category based on main verb morphology

Semantic Category	Token Count	Auxiliary Variants	Main Verb Morphology
Copula	380	*ain't, isn't, aren't, 's not, 're not*	Non-verbal predicate
Pres. Prog.	172	*ain't, isn't, aren't, 's not, 're not*	V-*ing*
Periph. Future	143	*ain't, isn't, aren't, 's not, 're not*	*gon*(*na*)
Pres. Perfect	98	*ain't, hasn't, haven't*	V-*ed* or V-*en*
Pres. (before *got*)	113	*ain't, don't*	*got*
Past	888	*ain't, didn't*	V-Ø or V-*ed*

Note. From "Change Over Time in the Grammar of African American English," by Sabriya Fisher, 2018, p. 32. Scholarly Commons.

Since the verb morphology of the main verb following past-tense *ain't* can be like the verb morphology of standard present tense forms of English verbs (no morpheme attached), this causes us to question if there are any other cues that AAE speakers use to signal this feature.

Given the sheer amount of interest and research on morphosyntactic features in AAE features distinct to European varieties of English, it is unsurprising that very little investigation

has been done on this camouflaged variable. Furthermore, there is virtually none conducted from a prosodic standpoint--an angle less commonly explored in AAE research. However, it is an important avenue to venture upon with this variable as it seems that neither conversational context nor verbal morphology are always 100% reliable for determining the tense of the utterance. Consider the following example:

"Some mornings we ain't leave is [six.]" (CORAAL, PRV_se0_ag2_m_01_1.txt)

In this context, the speaker is discussing a job with the interviewer, and switches tense throughout the conversation. This sentence has conflicting information for the listener to understand. While following verbal morphology may point us in the direction of calling this utterance past tense, some more broad conversational context as well as the speaker's use of present tense makes its tense murkier. It is important to consider that not all utterances fit into criteria outlined in (Fisher, 2018), but simply follow a general trend. Therefore, we must investigate whether other cues may be present in this variable to help in the perception of ambiguous tense cases. Based on semantic and syntactic differences between past and present forms of *ain't* and the existence of past-tense *ain't* as a grammatically camouflaged form, there may be prosodic cues factoring into the production of this variable—just as is found with stressed BÍN.

This project combines both production and perception to better understand the use of prosody in conveying meaning in camouflaged forms. Previously, understanding perception of AAE prosody by European American English (EAE) speakers has been of great focus to help understand ethnic identification (e.g. Thomas and Reaser 2004; Thomas, Lass, and Carpenter 2010), however, AAE prosodic perception by AAE speakers has been grossly understudied (McLarty, 2020). The perception side of this research studies how African Americans may use

prosodic cues in the perception of the past-tense ain't, as these cues may be too subtle for non-native or naïve listeners to use in the perception of this distinct, grammatically camouflaged feature.

For this study, pitch and word duration have been chosen as the prosodic features of analysis. Previous literature has described AAE speakers using a wider range of pitch (Tarone 1973; Hudson and Holbrook 1981, 1982, Jun and Foreman 1996, Cole et al. 2005). This wider pitch range appears to be used more commonly in informal styles (Hudson and Holbrook 1981, 1982; Thomas, 2015) and thus may be a resource for AAE speakers in these contexts. This applies to the production data used for this study which will be discussed further in the methods section, and so this acoustic property is included in analysis as a potential tool for signifying tense. Duration also comes into play as a factor as it is a reliable cue for signaling prosodic prominence; for example, stressed vowels are longer than unstressed ones (e.g., Fry, 1958; Beckman & Edwards, 1994). Thus, *ain't* token durations will also be analyzed. Additionally, Cole et al. (2010) found that duration and fundamental frequency (F0) correlate with prosodic prominence, so these prosodic features are important to measure in case these acoustic cues are used in production by AAE speakers, as well as perception.

This work also investigates whether past-tense *ain't* can be considered a northern urban innovation--as has been previously claimed (Wolfram, 2004; Howe, 2005, Fisher, 2018)--by comparing Washington D.C. AAE speakers to AAE speakers in Princeville, North Carolina. Furthermore, it examines past-tense *ain't* usage and prosody generationally in Washington, D.C. These investigations will not only reveal telling information about how prosody may be used to signal grammatically camouflaged forms but also allows us to make predictions about which speakers use this feature and how it may be used in other varieties of AAE around the United

States. Results from gendered usage of prosodic variables provoke interesting questions and discussion for further work about how AAE-speaking females may be using pitch in comparison to AAE-speaking males generally. This work is also important for contributing to more recent literature (e.g., Wolfram, 2007) that highlights regional differences between AAE speakers—providing further evidence to debunk the false belief that AAE language use is homogeneous across regions.

Corpus of Regional African American Language (CORAAL)

The production portion of this study pulls data from the Corpus of Regional African American Language (CORAAL) (Kendall and Farrington, 2021). CORAAL is a standalone, contributing component to the Online Resources for African American Language (ORAAL)—a website devoted to providing information about African American language use for educators, researchers, students, and the public. These long-term efforts are important for combating racist beliefs, misunderstandings, and misrepresentations of African American Language use. CORAAL is an ever-growing database of audio recordings and transcripts of speakers from Washington, D.C., Princeville, North Carolina, Rochester, New York, Atlanta, Georgia, Lower East Side of Manhattan, New York, and Valdosta, Georgia. Supplemental materials such as Montreal Forced Aligner-aligned Textgrids are also provided for datasets as they are created and uploaded (Farrington and Kendall, 2019). In total, the corpus includes speech data from over 150 sociolinguistic interviews gathered from speakers born between 1891 and 2005, allowing for extensive research on language use across dialects and generations. For the purpose of this study, speech data from the Washington, D.C. and Princeville, North Carolina corpora were analyzed.

METHODS

The Chosen Datasets and their Speakers

Three of the available corpora from CORAAL were examined: DCA (Kendall et.al, 2018a), DCB (Kendall et. al, 2018b) and PRV (Rowe et. al, 2018). DCA contains 74 audio recordings and transcriptions across 68 speakers. These sociolinguistic interviews were conducted as a part of Ralph Fasold's 1972 study on AAE in Washington, D.C., a foundational study on African American language use in that city. Though more data was collected for Fasold (1972) than was included in the DCA corpus, the speakers chosen for DCA were selectively chosen to best represent four age groups: below 19, 20 to 29, 30 to 50, and 51 years or older, and three social classes: working class, lower middle class, and upper middle class. Recorded between March 1968 and August 1969, the speech data comes from AAE speakers with dates of birth ranging from 1891 to 1958.

The DCB corpus contains 63 audio files from 48 primary speakers in Washington D.C. recorded between July 2015 and December 2017. Also gathered in the form of sociolinguistic interviews, the data was obtained specifically for CORAAL. Speakers were recruited through a mutual friend network to fulfill the same demographic format as was established for the DCA corpus.

Finally, the PRV corpus contains 32 audio files across 16 primary speakers in Princeville, North Carolina, collected for the North Carolina Language and Life Project. The speakers were recorded between August 2003 and June 2004. Unlike the Washington, D.C. corpora, these speakers fulfill a less comprehensive demographic matrix. Instead, the focus is on distribution across three age groups: under 29, 30 to 50, and over 51 years of age, and two genders: male and female.

The choice to analyze speakers from Washington D.C. and Princeville, North Carolina are based on a few principled reasons. Firstly, these two field sites are especially important in representing different historical and geographical contexts. Farrington (2019) describes the significance of the migration of African Americans out of the South to more northern areas between 1915 and 1970--a period known as the Great Migration (Tolney, 2003) --on shaping AAE language varieties across the widespread areas in which they settled. Washington D.C. is one of the most northern cities of the South, positioned at the border of the South and the South Atlanta regions. A key city in the Great Migration on the East Coast, D.C. had a stable African American population even before the migration. Due to the combination of an increase of the African American population between 1940 and 1970 and portions of the white population moving out to suburbs in a period of "white flight" beginning around 1950 (McQuirter, 2000), in 1957, D.C. became one of the first cities in the United States to have a majority African American population. By the end of the Great Migration in 1970, there were two and a half times as many African Americans living in Washington, D.C. as there were white residents (Farrington, 2019).

Princeville, North Carolina also poses an interesting and important AAE language environment and speech community for study. Firstly, it represents AAE in a more rural community. Furthermore, as the first Black incorporated town in the United States, much of the community can trace their lineage back to the town's original founders. Based on the 2000 census, African Americans composed 97% of the population (Rowe, 2005; Kendall, 2007; Kendall and Wolfram 2009).

Great Migration patterns not only occurred between the rural South and the urban North and West, but also between the rural South and the urban South, and then potentially even further

to the urban North (Farrington, 2019; Long 1988; Gregory 2005). African American residents of coastal states such as Georgia, Virginia, and the Carolinas showed patterns of interregional migration to more northern cities such as Washington, D.C., Baltimore, Philadelphia, and New York (Wolfram, 2004). This context is the impetus for the chosen corpora. Washington, D.C. can be considered a 'mid-point' between the North and South. With long-standing population relationships between rural North Carolina and more northern cities such as Philadelphia and New York established during the Great Migration, analyzing this unique AAE feature in speakers from D.C. and Princeville carries historical weight in the linguistic practices of each community. The context also allows for a more meaningful comparison to the use of past-tense *ain't* by Philadelphia AAE speakers discussed in Fisher (2018a and b).

Considering both the DCA and DCB corpora allows this project to take a real time approach to the data when analyzing how prosody may be used to signal past-tense *ain't* from generation to generation. The more modern corpus, DCB, also places our data in an ideal position to be compared to Fisher's Philadelphia speakers. Collected between 1981-1984--after the Great Migration--the linguistic data used in Fisher's study are recordings from 20 speakers below the age of 30 and 22 speakers above 30 years of age. This parallels the DCB data, which though recorded between 2015 and 2017, contains recordings from 20 speakers below 30 years old and 28 above 30 years old--making the data comparable on the basis of age. The sociolinguistic interviews conducted for the DCB dataset and in Philadelphia were both led by members of the city's own Black community, so the recorded conversations may be representative of a more vernacular variety of AAE (Baugh 1983, Ash and Myhill 1986, Labov 2014).

Coding

Using the audio recordings and MFA-aligned Textgrids that are available on CORAAL for the DCA, DCB, and PRV corpora (Farrington and Kendall, 2019), independent clauses containing tokens of *ain't* were identified and extracted using Praat (Boersma and Weenink 2016), a free online software designed for speech analysis in phonetics. Referencing criteria established by Sabriya Fisher for determining verb type and semantic category from main verb morphology (See Table 1), all tokens were coded for verb type: be, have, or do, and semantic category: copula, present progressive, periphrastic future, present perfect, present, or past.

All acoustic measurements were made using Praat with a script developed by Dr. Tyler Kendall (McLarty, 2018) that extracted word duration and maximum pitch for each word in the clause. Through the script, pitch was converted to Equivalent Rectangular Bandwidth (ERB) to facilitate comparison between values. The following picture illustrates a token of *ain't* and its acoustic measures that were extracted:

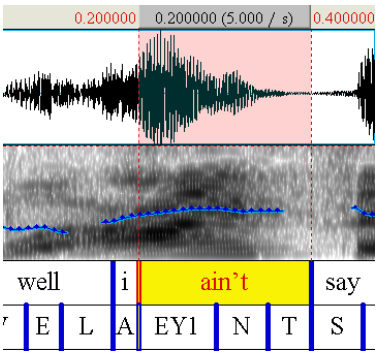

Figure 1. An example of an *ain't* token

Clauses with speech disfluencies and those that did not meet syntactic criteria were omitted. This included incomplete clauses with tokens of *ain't* that were not followed by a word or verb, or were followed by an unknown or unintelligible utterance, as there was not enough information to code the semantic meaning of the variable. A clause was also omitted if the token of *ain't* had a false start. Finally, clauses were not included in the analysis if *ain't* was

surrounded by pauses over the length of 250 ms (Robb et. al 2004; Thomas 2011) so that stress did not skew the pitch and duration data. If the semantic category was ambiguous to lack of context, these clauses were discarded to avoid incorrect coding. After coding, individual tokens of *ain't* were drawn out into a separate data frame with their maximum pitch, duration, and semantic information. The final dataset for analysis included 380 tokens of *ain't* across 58 speakers from the DCA, DCB, and PRV corpora.

Statistical Analysis

Tokens of *ain't* coded as copula, present progressive, periphrastic future, present perfect, and present, were re-coded as "non-past" forms of *ain't* for a simpler and more clear comparison between past and non-past forms of *ain't.* As past-tense *ain't* is the grammatically camouflaged form, it is expected that any difference in the production of *ain't* in AAE speakers would exist between past and non-past forms, while there would be no differences between specific non-past semantic categories as they are not camouflaged forms and function similarly in the syntax. Therefore, it was natural to simplify the coding to compare binary dependent variables: past and non-past.

Statistical analysis follows a similar set of procedures described in McLarty (2018, 2020). Using statistical procedures explained in Sonderegger et al. (2018), a mixed-effect logistic regression was run using the lme4 package (Bates, Maechler, Bolker and Walker 2015) in R (R Core Development Team 2018). All the models use the 'bobyqa' optimizer, which facilitates model convergence (Bates et al. 2015). The stimuli are 380 isolated instances of *ain't* to compare prosody in the tokens at the word-level. Tense was treated as the dependent variable, whether the stimuli was coded as past (1) or present (0).

The main effects included for fixed effects are gender (male or female), maximum pitch, word duration, and location (speakers from either the DCA, DCB or PRV corpora). The model also tests for interactions between gender and maximum pitch, word duration and location. The model includes random intercepts for speaker.

It is important to recognize the binary categorization of gender in both the corpora used and this study. While sociolinguists are beginning to become more cognizant of the habit of using the terminology of gender and sex interchangeably (Cheshire, 2008), due to the lack of information about self-identified gender of speakers in these datasets, what is referred to gender in the corpus and in this study is biological sex. Therefore, I am using sex information to assess potential gender effects, however, plenty of literature describes vocal gender performance separate from biological sex because of social expectations surrounding voice and gender (e.g., Delph-Janiurek, 1999). The binary categorization of gender historically was not only shaped by beliefs surrounding gender and sex, but also to simplify the data. Creators of CORAAL have kept this categorization of gender to be consistent with the limited information provided in older datasets—such as speaker data from Fasold (1972), who described gender as male and female. Because of physiological differences in the vocal tract between biological males and females that impacts vocal pitch, this is still valuable information for purpose of this study. However, it is important to consider that not all speakers who have indicted gender as female or male for the purpose of data collection, given only those two choices, necessary identify with those genders.

Maximum pitch and word duration values were centered around their mean, but not scaled. As the pitch and duration values already rested on a perceptually meaningful scale, it was unnecessary to scale these values. However, centering the values from our acoustic measures allows us to interpret findings based on the grand mean (such as in McLarty, 2018).

Since the purpose of the mixed-effects logistic regression models is to test relevant factors and their effects to understand which factors matter, all independent variables of interest are included for all models as well as their two-way interactions--regardless of whether effects are found meaningful or not meaningful. Effects are considered meaningful at or above an absolute t-value of 1.96. While I could report p-values here, these values are less informative about our results, illustrating only if our findings are simply due to chance or above chance. As these values are not entirely meaningful, and to avoid 'p-hacking,' I choose to report t-values instead.

As the goal is to discover trends over time and compare across locations, the full models will be presented rather than trimmed to best-fitting predictors. The figures presented in the next section show predicted probabilities that an instance of *ain't* is considered past tense, and were created using the sjPlot package in R (Lüdecke 2018). These plots illustrate the model predictions for main effects and interaction effects.

PRODUCTION RESULTS

The following two figures illustrate the main effects of word duration and maximum pitch on predicted probabilities of an instance of *ain't* being past tense.

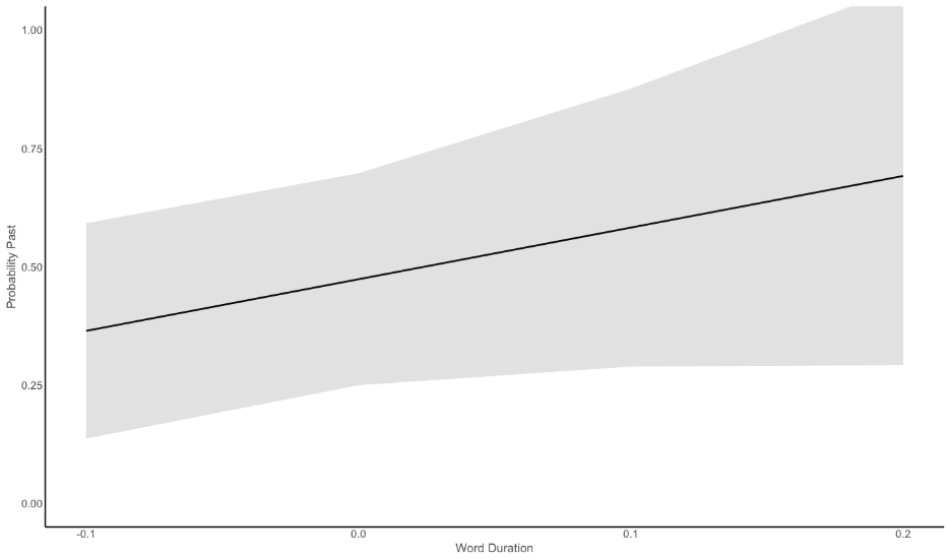

Figure 2. Predicted probabilities of past-tense *ain't* based on word duration: All speakers.

Measuring tokens of *ain't* from all speakers (DCA, DCB, and PRV speakers), the overall effect of word duration on the probability that an instance of *ain't* is considered past tense was determined to be marginally meaningful with a t-value of 1.56.

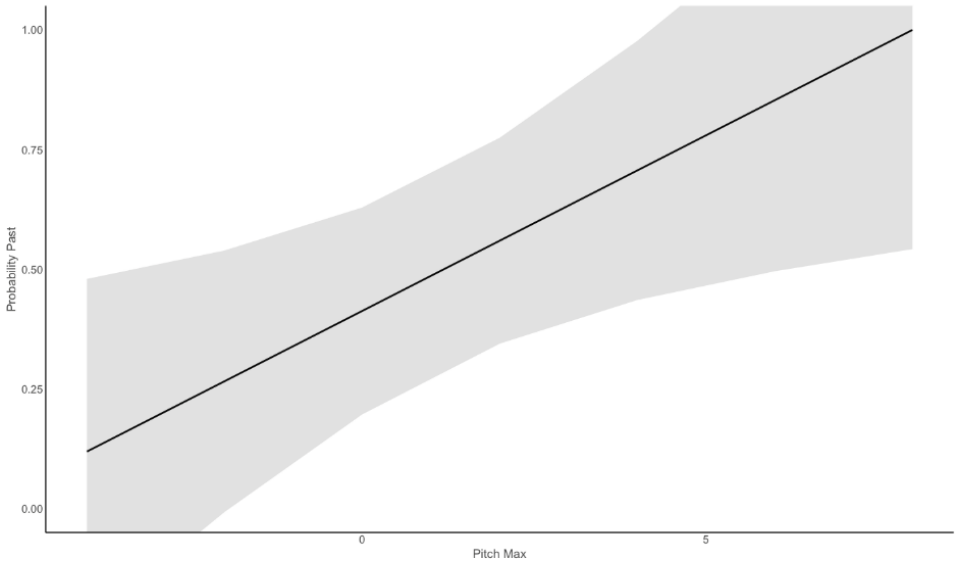

Figure 3. Predicted probabilities of past-tense *ain't* based on maximum pitch: All speakers.

Figure 3 depicts the predicted probabilities of an instance of *ain't* being past tense based on maximum pitch of the *ain't* tokens from all speakers. Maximum pitch is a very meaningful effect in predicting past tense *ain't*, with a t-value of 2.46.

The following figure breaks down the data to determine the likelihood of speakers from each location in using past-tense *ain't*.

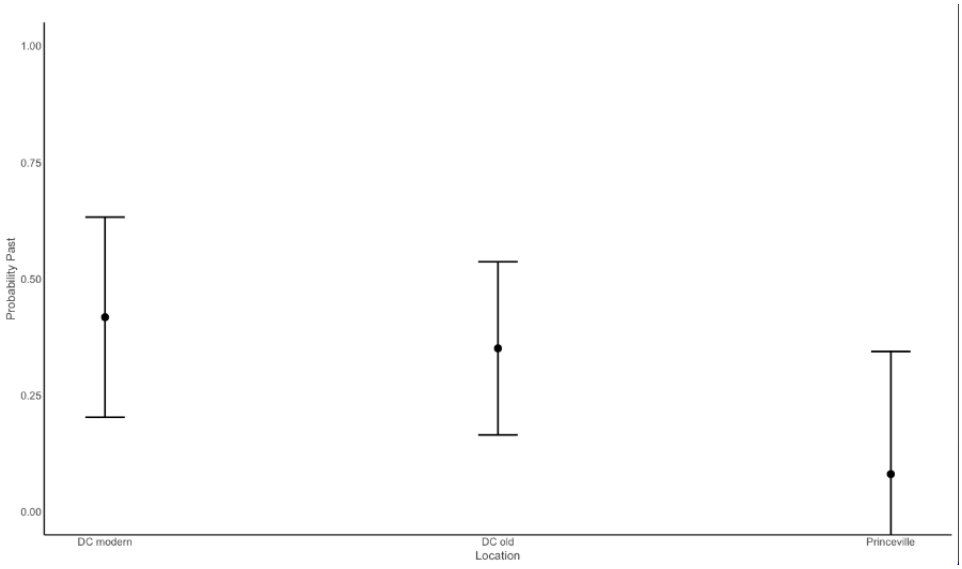

Figure 4. Predicted probabilities of past-tense *ain't* usage by Location of speakers.

"DC modern" describes speakers in the DCB corpus while "DC old" describes speakers in the DCA corpus, and "Princeville" does those in the PRV corpus. Each set of speakers is compared to the D.C. modern probabilities, and thus the t-values reflect that relationship. Though the plot shows the highest likelihood of past-tense *ain't* usage by speakers in the modern D.C. corpus, the difference between "D.C. modern" and "D.C. old" predicted probabilities is not meaningful (t=-0.48). However, "D.C. modern" (and visually Washington, D.C. speakers in general) are more likely to use past-tense *ain't*. When comparing probabilities between "DC

modern" and "Princeville" speakers, Princeville speakers are much less likely to use past-tense *ain't*, with a t-value of -1.97.

Figures 5 and 6 narrow the focus to the predicted probabilities of past-tense *ain't* based on the word duration and pitch used by speakers in each location.

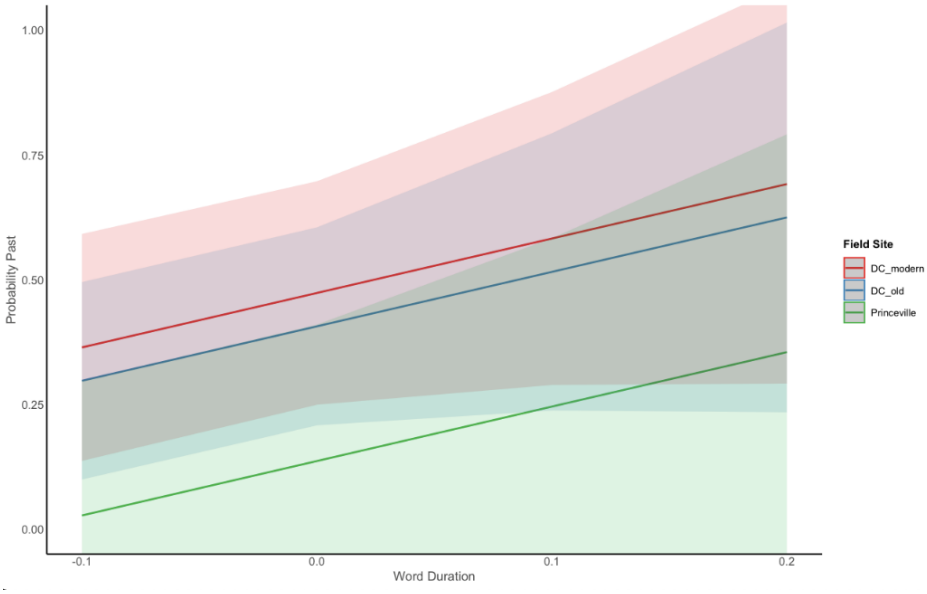

Figure 5. Predicted probabilities of past-tense *ain't* based on word duration by location

For all locations, an increase in word duration corresponds with an increase in probability that the *ain't* token is in the past tense. D.C. modern shows the greatest effect of word duration, however, the differences between D.C. modern and D.C. old may not be meaningful. As illustrated by the plot, there is a meaningful difference between Princeville speakers and Washington, D.C. speakers in how word duration is predicting past-tense *ain't.* It is important to remember that the main effect of word duration is only a marginally meaningful effect, shown with a more level slope.

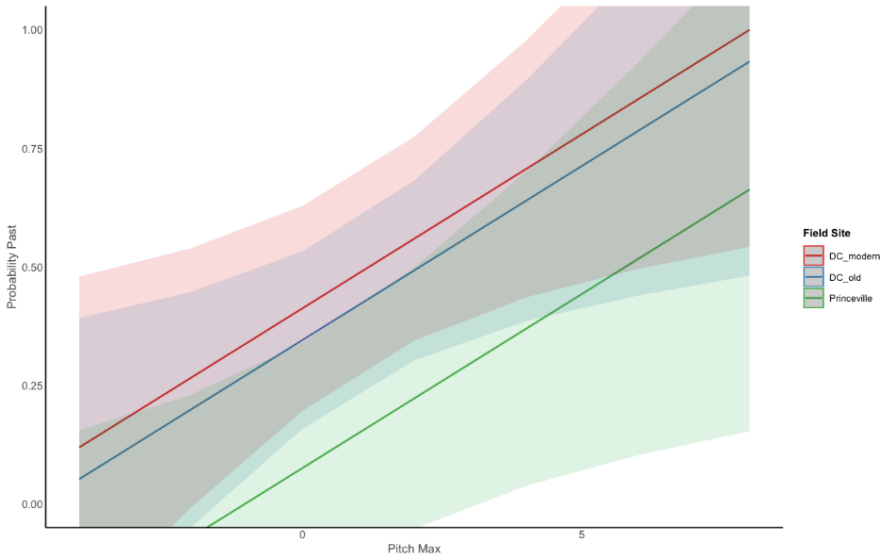

Figure 6. Predicted probabilities of past-tense *ain't* based on maximum pitch by location

Figure 6 shows steeper slopes for all locations in how maximum pitch predicts past-tense *ain't*, illustrating a greater effect of pitch over word duration in predicting this variable. While D.C. modern speakers do appear to have a stronger pitch effect in the plot, there may not be any meaningful difference in the trend for DC old and modern speakers, just like in Figure 5. However, there may be a meaningful difference between D.C. and Princeville speakers, shown by less overlap, and certainly between D.C. modern and Princeville speakers.

Figures 7 and 8 illustrate gender differences in word duration and pitch, and the predicted probabilities of an instance of *ain't* being in the past tense based on these acoustical measures. In these figures, men's production data is being compared to women's, and the t-values reflect this relationship--which is also well-illustrated in the plots.

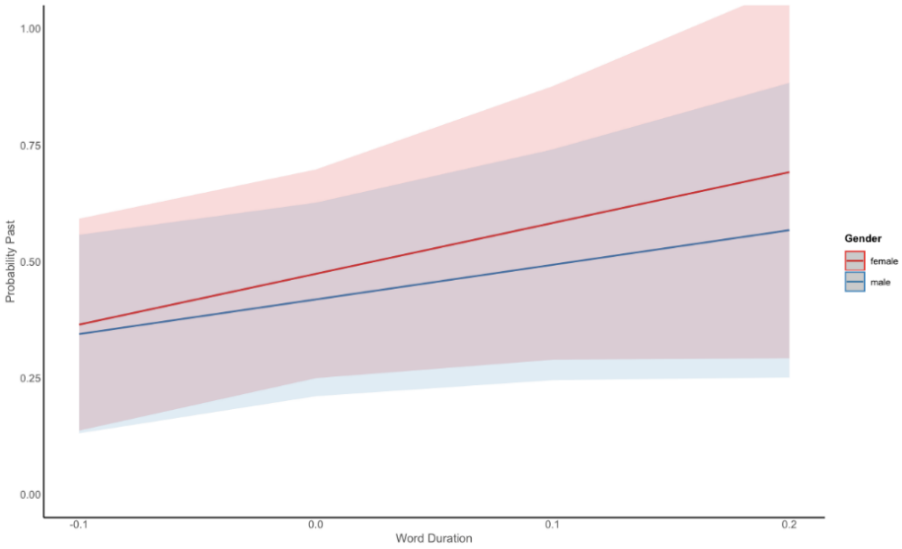

Figure 7. Predicted probabilities of past-tense *ain't* based on word duration by gender: All speakers

When the data is compared by gender, we do not find that one gender is more likely to use past-tense *ain't* over the other (t=-0.32). There is also no meaningful difference between men and women's use of word duration and how that may predict an instance of *ain't* being past tense (t=-0.40). However, the plot illustrates a trend of an increase in word duration corresponding to a higher probability of an instance of *ain't* being in the past tense.

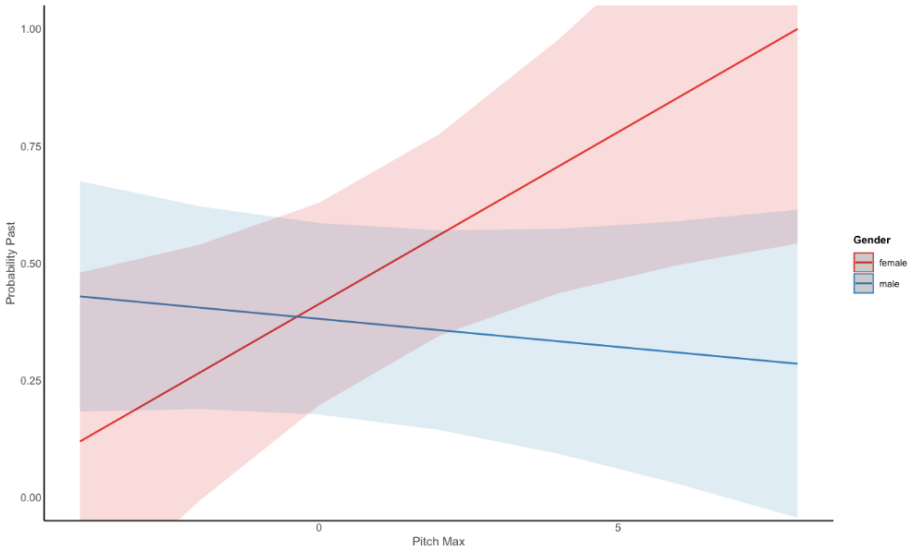

Figure 8. Predicted probabilities of past-tense *ain't* based on maximum pitch by gender: All speakers

In contrast to Figure 7, we find a meaningful difference in the trend of pitch predicting past-tense *ain't* between men and women (t=-2.49). There appears to be an inverse relationship between males' pitch and predicted probability of past-tense *ain't*, while females maintain a positive relationship. This will be discussed further in the next section.

The last two figures break down the data even further to illustrate interactions between gender and location of speakers based on the acoustic measures.

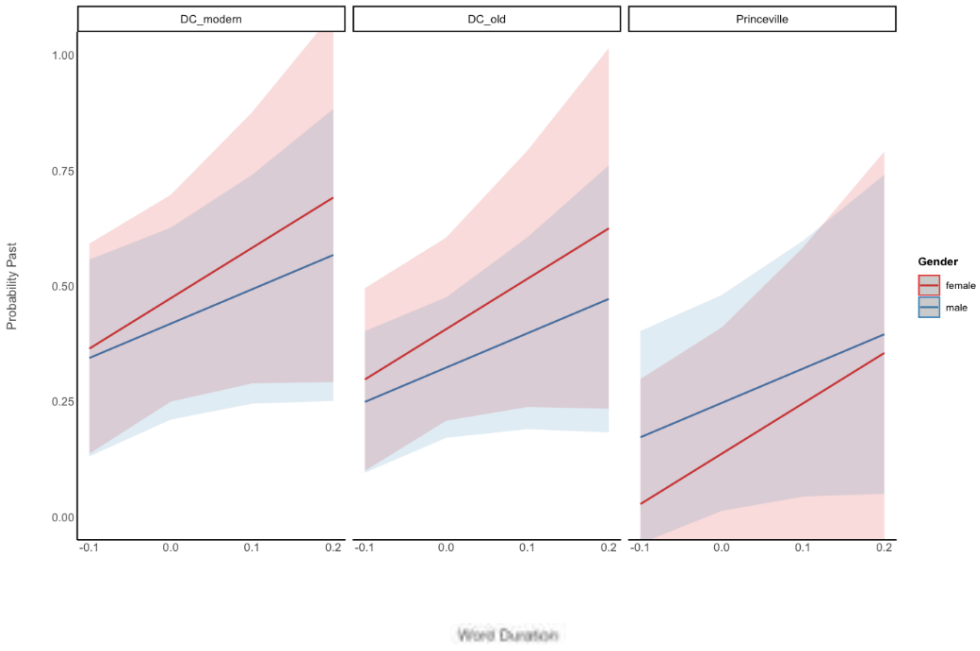

Figure 9. Predicted probabilities of past-tense *ain't* based on word duration with interactions between gender and location of speakers

Just as in Figure 7, we see that both genders in all locations have a positive relationship between word duration and probability. Interestingly, Princeville males show a higher probability with the use of word duration than Princeville women, however, Princeville women show a steeper incline in probability that an instance of *ain't* will be past tense as their word duration increases in comparison to Princeville men.

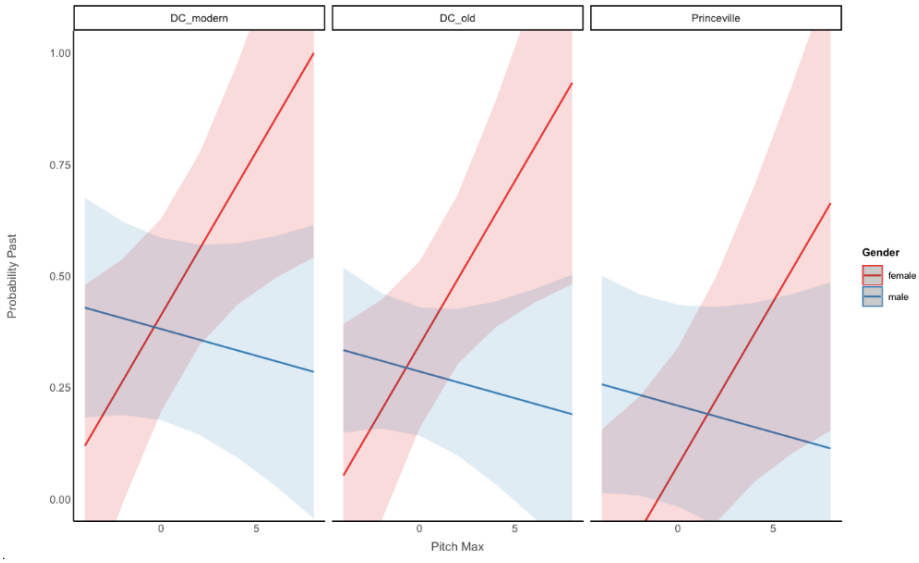

Figure 10. Predicted probabilities of past-tense *ain't* based on maximum pitch with interactions between gender and location of speakers

When the data is compared based on gender and location, we see the same patterns as in Figure 8. Women continue to show a steep increase of predicted probability as their pitch increases, while men show an inverse relationship. In all locations, the men's slope is not entirely flat, but not necessarily significant either.

DISCUSSION

The main takeaway from these results is that pitch is a large factor in predicting whether an instance of *ain't* is past tense or not, while word duration is marginally meaningful. The use of pitch is particularly prominent in female AAE speakers and appears to increase over time when we examine Figure 9, which includes comparisons between D.C. modern and D.C. old. These results fit with previous conclusions that AAE-speaking females have generally increased their pitch over time (McLarty, 2018). To fully investigate whether this trend holds, an extensive intonation study must be done, which would be an interesting direction for future work.

While the women maintain a positive relationship between maximum pitch and likelihood of past-tense *ain't*, Figures 8 and 10 both illustrate an inverse relationship between these variables for male speakers. Though men and women clearly show a difference in trend, the men's negative slope is not necessarily significantly negative. It is a relatively flat slope; thus, the men may be more stagnant in their pitch use that what is being visually represented in the figures. This would fit with previous findings, also from McLarty (2018), that men are relatively stable in their use of pitch over time. Though AAE-speaking men may not be using pitch to signal past tense, it does not mean that they will not do so in the future. Since this feature has only emerged recently in the 20th century (Wolfram, 2004; Howe, 2005, Fisher, 2018), it is possible that this is a language change that women have started to drive, and men have yet to begin using pitch to signal this feature. This would be following Labov's Principle II: "In the majority of linguistic changes, women use a higher frequency of the incoming forms than men" (Labov, 1990). Again, further study would need to be conducted to determine whether AAE-speaking women truly are driving a change in pitch, and to examine how men may be changing their pitch would require revisiting this project in the future.

The consistent differences between modern Washington D.C. speakers and those in Princeville provide evidence to claims that past-tense *ain't* is a northern urban innovation. This allows us to make predictions about the use of this feature across dialects. These findings also highlight regional differentiation in AAE, further debunking the supraregional myth: the false belief that AAE has a uniformity insusceptible to regionality. This racist assumption was upheld by early linguistic descriptions of AAE, such as the observed shared core structures of AAE in contrasting and dissimilar urban environments. However, our results show that just like white

varieties, AAE also has subdomains of language use (see Wolfram, 2007 for further discussion), invalidating this sociolinguistic folklore.

Though the differences between D.C. modern and D.C. old may not be meaningful given the considerable overlap shown in the plots, D.C. modern consistently shows a greater likelihood of using the past-tense variable as well as use of word duration and pitch in signifying past-tense *ain't*. This illustrates the same pattern of intensification of the variable as was found in Fisher (2018). Perhaps in the future we will see a more meaningful difference between the generations in the likelihood of using past-tense *ain't*, as well as using pitch and word duration to signal this form.

These results also set up another major question: do these acoustic measures signaling past-tense *ain't* aid in the perception of tense by African American listeners?

EXPERIMENT INTRODUCTION

To better understand the prosodic measures being used to signal past-tense *ain't*, it is important to investigate whether these acoustic cues are used in perception. Previously, it has been found that duration and F0 (fundamental frequency) values, as well as intensity, are meaningful acoustic correlates of prosodic perception (Pitt et al., 2007; Cole et al., 2010). Considering word duration is a marginally meaningful effect in predicting past-tense *ain't*, while pitch—how F0 values are perceived, is very meaningful, these cues could potentially be used by native speakers to understand tense. Given that prosodic perception of AAE by African American listeners is vastly understudied, this pilot study is important to grow the understanding of acoustic cues that native AAE speakers may be attending to in the perception of their own camouflaged forms.

EXPERIMENT METHODS

The experiment was created using Psychopy (Pierce et al., 2019), an online software using Python, and included audio of extracted clauses from two female speakers and two male speakers from the DCB corpus. Stimuli was drawn from the DCB corpus not only because of the existence and intensification of this feature and its prosodic cues found in the first half of this study, but also because DCB speakers and participants in the perception study are closest in generation. The experiment included a 1:2 ratio of critical to filter items (Arunachalam, 2013). Critical items were clauses including instances of *ain't*—half of which were past tense, and the other half present. Clauses did not include any temporal lexical items. Filter items were clauses extracted from the same speakers that did not include any distinct AAE features nor temporal lexical items. A feedback trial was included that had one example of a simple past tense sentence and a simple present tense sentence recorded by the researcher: a white native speaker of English. All recordings were set to an average intensity of 70 dB SPL using Praat. The experiment was administered on a computer. Participants were asked to respond whether the clause they heard was either "past" or "present tense" by pressing either response keys '1' for past, or '0' for present. While the audio played, "past" and "present" labels were displayed on the screen; "past" shown on the left to correspond with the '1' response key, and "present" on the right to correspond with response key '0.' Below is the Psychpy flow of the experiment:

Participant responses and response time were recorded. After a participant completed the experiment, a linguistic background survey was administered to them through the Qualtrics

online survey platform. The survey included questions about sex, self-identified ethnicity, languages spoken, country and state of birth (if born in the United States), experience with AAE, and information about the environment in which they were raised (urban, suburban, rural).

Participants

Participants were recruited by word-of-mouth and flyers sent out of various academic departments across Emory University, such as the Linguistics, African American Studies, and Music Departments--the sole requirement being that all participants were native speakers of English. All research subjects were Emory University students between 20-22 years of age. Given choices on the linguistic background survey, participants indicated the ethnicity to which they most closely identified. To stay consistent which how the production data was collected, participants were asked about their sex rather than gender. In total, there were four female African American and two male African American participants, one male and two female European-Americans, and one male and two female Asian-American participants (one female identified as both Asian-American and European-American). All African American participants reported a lot of experience with AAE, while the European-American participants reported little experience, and Asian-American and Asian-American/European-American participants reported some experience—generally through media (television, music). Participants also indicated where they were born, as well as the type of environment (urban, suburban, or rural). Six out of the ten participants shared that they were born in a Southern area of the United States, one born in an African country, and the another born outside the country but has lived in a Southern region for an extended period. The other two participants are from Northern areas of the United States. Most participants expressed that they lived in a suburban area, while one male Asian-American indicated a mix of urban and suburban. However, one African American participant indicated

living in a rural area, as did two European-American participants. The Asian-American/European-American female participant indicted growing up in an urban environment, as did one male African American participant.

PERCEPTION RESULTS

The data reported here is reaction time and response to the critical items: utterances including *ain't*. Stimuli was organized into two ethnic categories on Excel (African American, Non-African American), and the proportion correct was determined by dividing the number of correct responses over the total number of responses to those utterances. By categorizing the participants into two ethnic groups, African American and non-African American, we can examine the data based on some of our predictions. Given that *ain't* is a feature common in most every American English dialect, some accuracy from both groups is expected. However, it is expected that African American participants will have more accuracy in responding to utterances with the past tense form of *ain't* as this is a grammatically camouflaged form unique to AAE. The data was also broken down into responses to a male or female speaker. Considering the data from this angle is important as production differences were found between the sexes in the production portion of this research.

Due to a large variance that comes with most small datasets, standard error bars are used rather than standard deviation bars. The standard error bars also paint a better picture of uncertainty in the data over standard deviation. Using standard error bars better illustrates how the data fits in our confidence interval and stays consistent with how data was reported in the production data (using t-values).

Differences in Performance based on Ethnicity

No differences were found in response time between ethnic groups, which shows that each participant is responding similarly in this sense.

Figures 11-13 show differences between ethnic groups in proportion of correct responses.

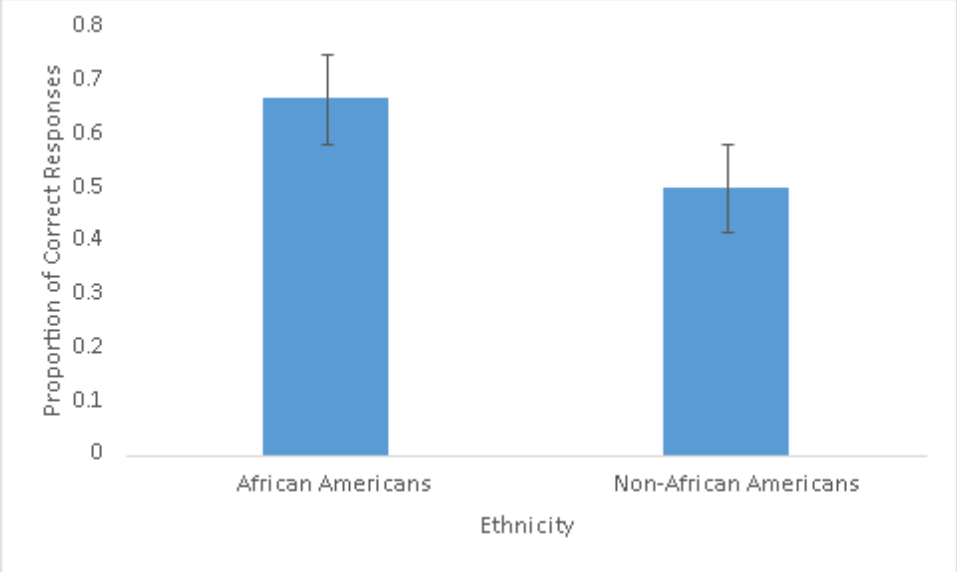

Figure 11. Proportion of correct responses by Ethnicity: All utterances containing *ain't*

Figure 11 depicts the proportion of correct answers for each ethnicity group in response to all utterances that contain past or present semantic categories of *ain't*. This graph shows an overall higher performance by African American listeners.

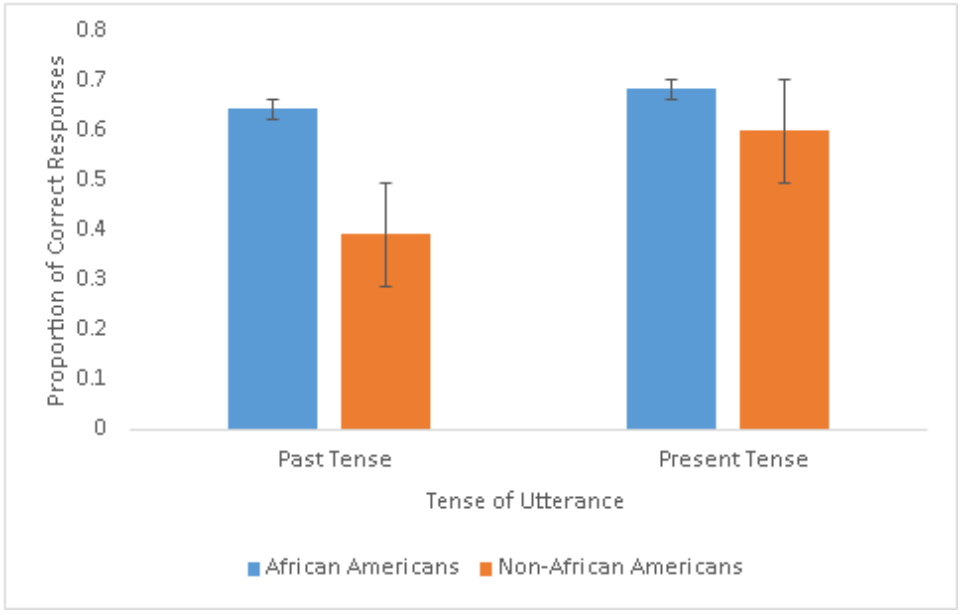

Figure 12. Proportion of correct responses by Ethnicity: Tense of utterance containing *ain't*

Figure 12 illustrates the proportion of correct answers in response to utterances with past tense *ain't* or present tense forms of *ain't*. This figure breaks down the data shown in Figure 11 to examine how the two groups may response differently to the stimuli, and how each group may respond with differing levels of accuracy to past and present utterances. African American listeners continue to respond with greater accuracy over non-African American listeners to both past and present utterances. Both groups have a higher proportion of correct answers to present tense utterances, and the error bars show that the difference in performance between the two categorized ethnicity groups could be insignificant. However, the differences in performance in response to past tense utterances appears to be larger between African American and non-African American listeners. For non-African American listeners, they perform around or below a 50% proportion of correct responses while African American listeners have about a 60% proportion of correct responses to past tense utterances.

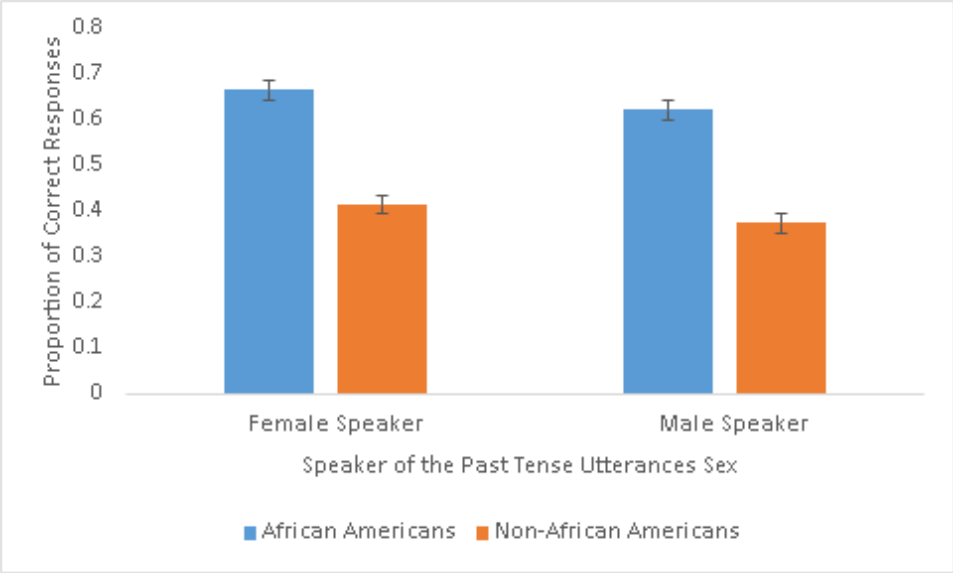

Figure 13. Proportion of correct responses by Ethnicity when responding to past tense utterances spoken by either a female or a male

Figure 13 illustrates the proportion of correct responses per ethnic group in response to past tense utterances containing *ain't* and whether the audio they heard was from a female or a male speaker. This was done to see if participants were more sensitive to pitch cues from female speakers, who were found to use pitch meaningfully to signal this feature (see Figure 8). African American listeners appear to have a higher proportion of correct responses to female speakers of past tense utterances, and less so for male speakers, however, these differences may not be meaningful. The same trend is shown for non-African American participants.

Figures 11-13 show a general trend that African American listeners perform more accurately than non-African American listeners. Due to the limited number of participants, it is important to consider that any participant could affect this data. Differences between the two groups in any area—performance when listening to past tense utterances, performance when hearing a male speaker, etc.--could be driven by a single participant. However, the general trend

of higher accuracy from African American participants warrants further research to see if this trend holds.

Differences in performance based on Sex and Ethnicity

Comparing participant responses within ethnicity groups by sex was not very feasible given an unequal number of tokens for comparison (four females versus two males in each both ethnic groups). However, it was possible to compare participant responses by sex across ethnicity groups. The data was broken down in the same way as in Figures 11-13-- showing proportions of accuracy overall, when responding to past or present tense utterances, or responding to past tense utterances spoken by either a male or female speaker. The following three figures depict the female listeners' performance, also organized by ethnicity as was done in the previous figures.

Females

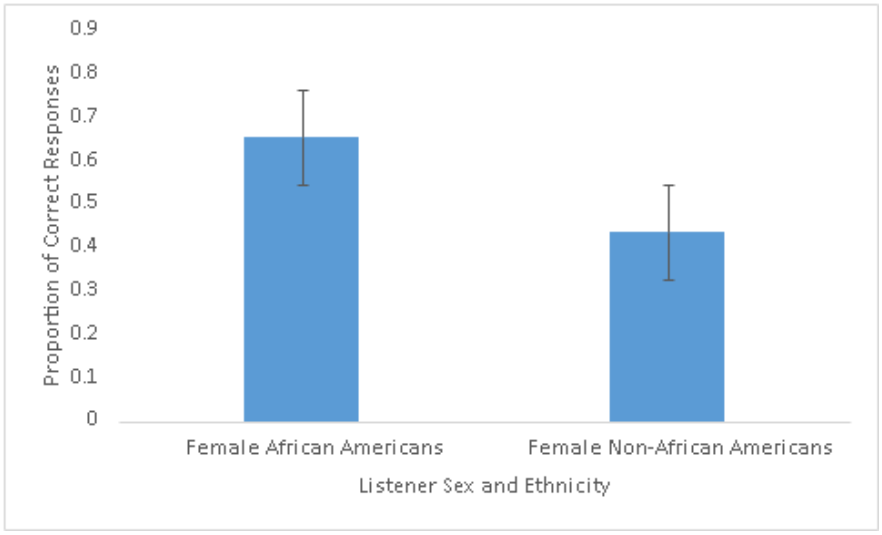

Figure 14. Overall performance of participants by Sex and Ethnicity: Females

Figure 14 depicts a greater accuracy of female African Americans overall.

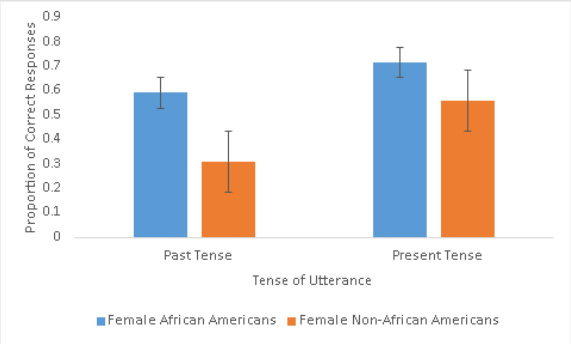

Figure 15. Proportion of correct responses: Females responding to past and present tense utterances

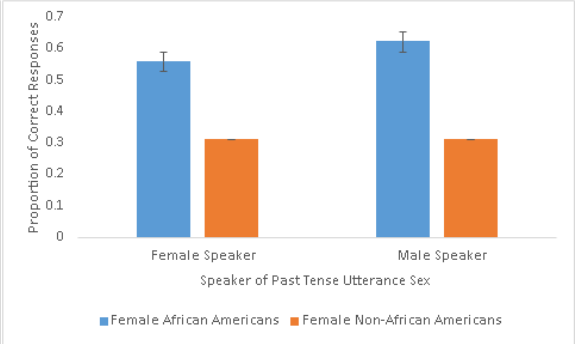

Figure 16. Proportion of correct responses: Females responding to past tense utterances spoken by either a Female or a Male

Figure 15 narrows the focus to show accuracy in responding to past or present tense utterances, and even further in Figure 16 to show how female participants responded to past tense utterances when spoken by either a male or a female. In both figures, we continue to see a trend of a higher level of performance from African American listeners. Seen before in the general results, Figure 15 illustrates a greater accuracy in responding to present tense utterances containing *ain't* over past tense utterances containing *ain't*. Differences between female African American listeners and female non-African American listeners when responding to present tense utterances could be insignificant when enough data is collected to run statistics, however, there does appear to be a more substantial difference between the two groups in performance on past tense utterances—for now. Interestingly, Figure 16 shows female African American listeners responding with greater accuracy to past tense utterances spoken by a male speaker. This difference could be insignificant given a slight overlap of the error bars between female African American listeners responding to a female or male speaker. Figure 16 illustrates female non-African American listeners as performing similarly regardless of the sex of the speaker.

Males

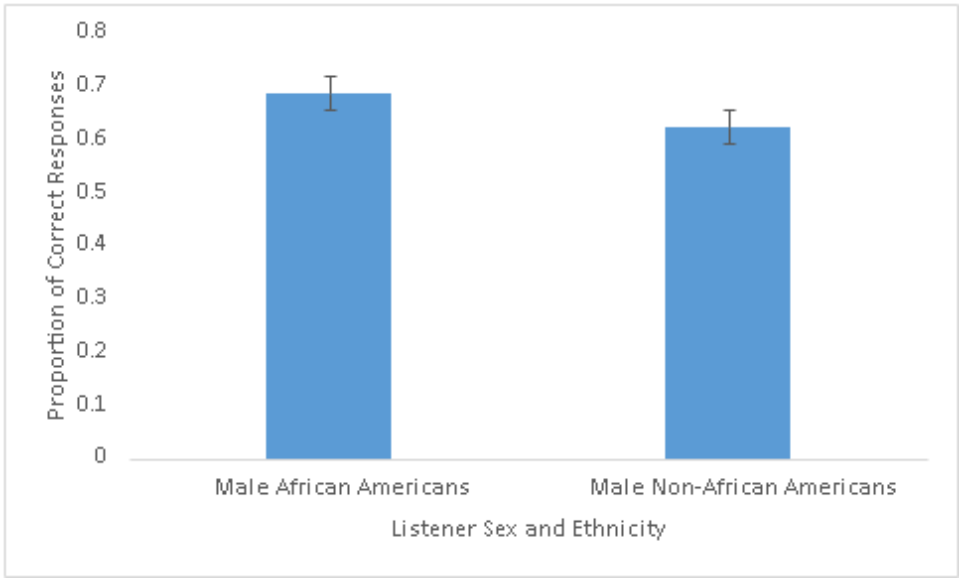

Figure 17. Overall performance of participants by Sex and Ethnicity: Males

Figure 17 illustrates differences between males of the two groups' overall performance when responding to all utterances containing *ain't*. Male African Americans show a greater proportion of correct responses.

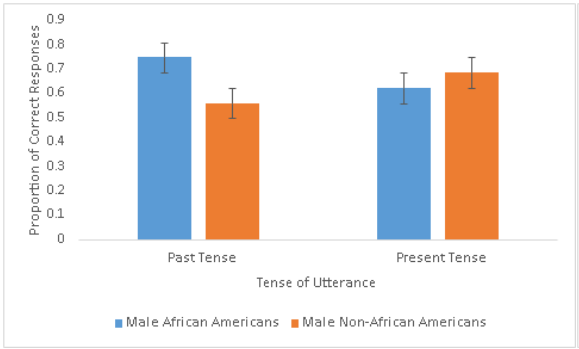

Figure 18. Proportion of correct responses: Males responding to past and present tense utterances

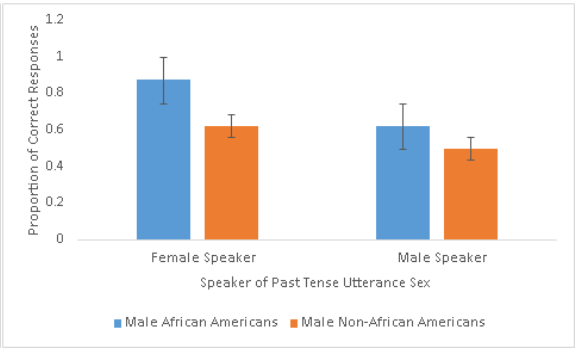

Figure 19. Proportion of correct responses: Males responding to past tense utterances spoken by either a female or a male

These two figures break down the data to observe differences in accuracy when responding to utterances with past and present tense forms of *ain't*. Again, we observe a higher

accuracy from male African Americans over male non-African Americans. The higher proportion of correct responses from non-African American participants in the present tense category shown in Figure 18 may be driven by one or two participants. Figure 19 shows both male African American and non-African American listeners responding more accurately to female speakers of utterances with past-tense *ain't.* African American listeners continue to respond more accurately than non-African American listeners in Figure 19.

Performance in the Perception of Specific Past Tense Utterances

Participants in each ethnicity group generally stayed consistent in how they responded to each ambiguous past-tense utterance. The following figures show data from some of the utterances to which they responded.

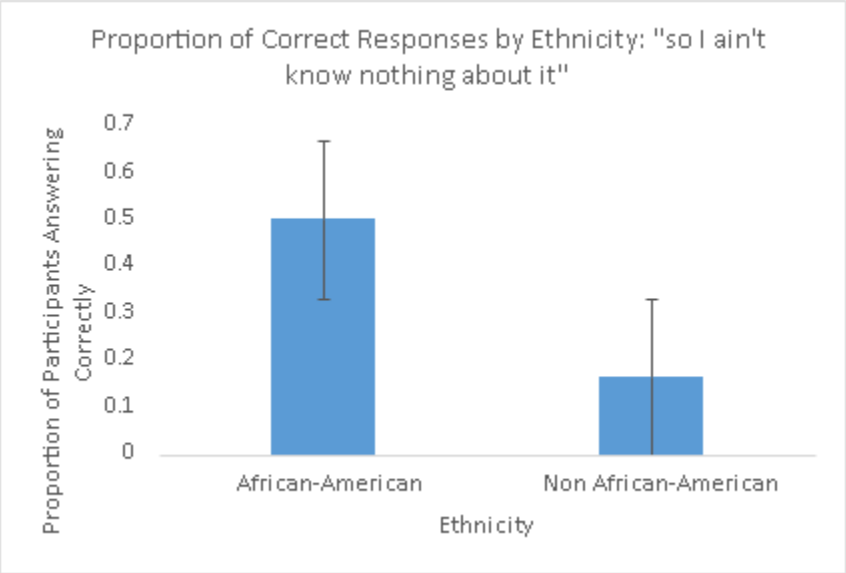

Figure 20. Proportion of participants answering correctly by Ethnicity: "so I ain't know nothing about it."

This ambiguous past tense utterance was answered correctly by three out of six African American listeners, whereas only one of six non-African American listeners answered correctly.

Spoken by a female, the pitch of *ain't* was 5.93, which, if we refer "DC modern" in Figure 10, rests on a high probability level that the instance of *ain't* is past tense (greater than or equal to a 75% probability). Given the lack of morphological information from the main verb, *know*, this sentence is ambiguous regarding tense given a lack of context and semantic cues—just like the other past tense *ain't* utterances included in the previous graphs.

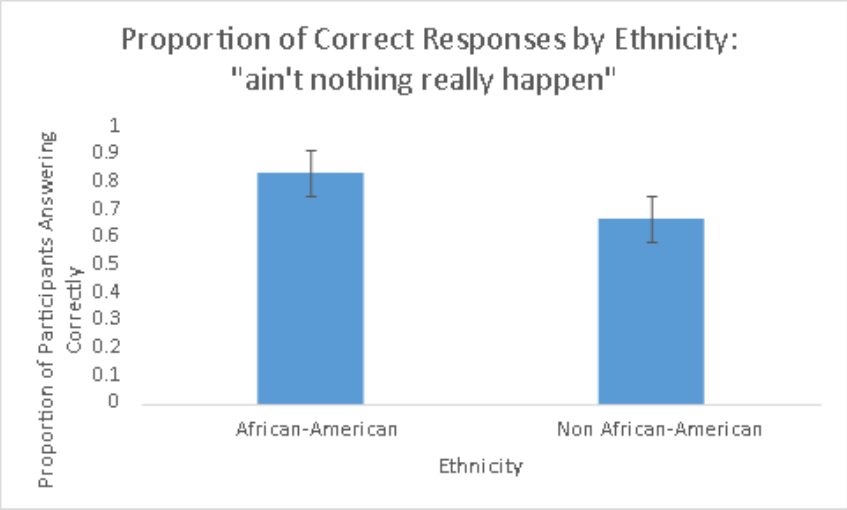

Figure 21. Proportion of participants answering correctly by Ethnicity: "ain't nothing really happen"

This past tense utterance represents a methodological flaw; the main verb, *happen*, provides some morphological cue of past versus present tense. The participants could potentially have expected *happens* if they believed the utterance was present tense, and this may have impacted their decision to answer, 'past tense.' This utterance was spoken by a female speaker, who produced *ain't* with a maximum pitch of 6.49 ERB (a probability of over 75% given results shown in Figure 10). The trend of higher accuracy from African American listeners continues, though the difference between the two groups may be insignificant.

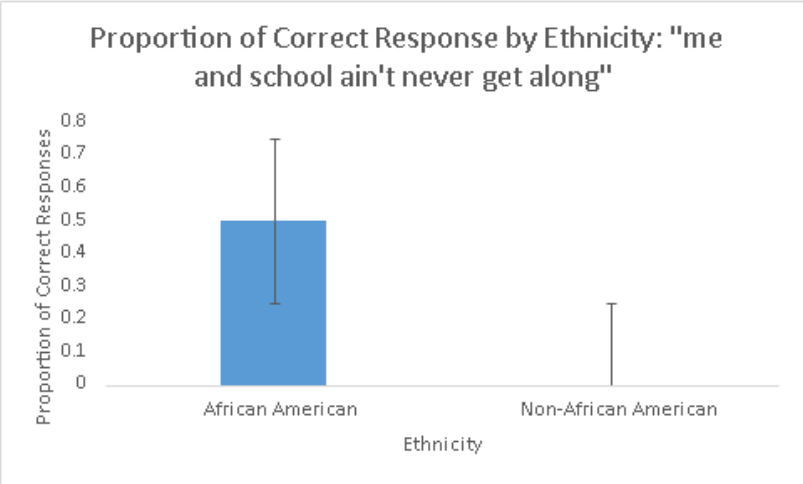

Figure 22. Proportion of participants answering correctly by Ethnicity: “me and school ain’t never get along”

This utterance received the lowest number of correct responses. Spoken by a male, the past tense *ain’t* had a maximum pitch value of 2.88 ERB—the lowest of all past tense *ain’t* utterances used in this study. No non-African American listeners responded correctly, while only three out of the six African American listeners did.

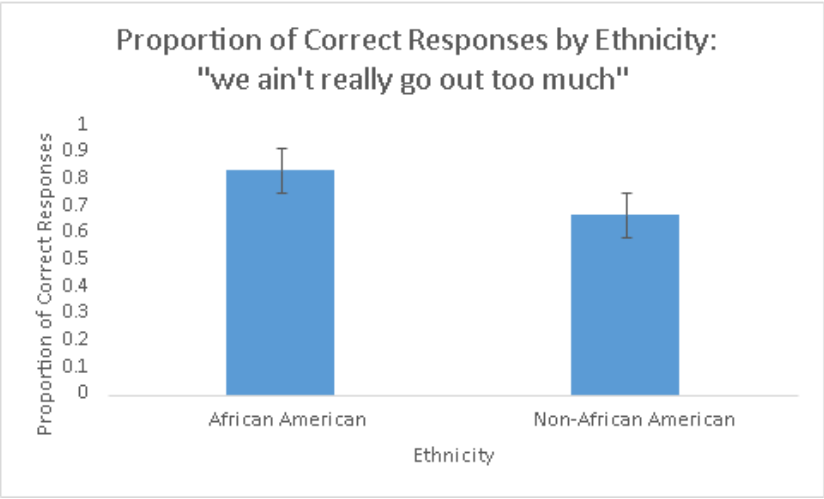

Figure 23. Proportion of participants answering correctly by Ethnicity: “we ain’t really go out too much”

Figure 23 illustrates responses to another past tense utterance by a male speaker, who produced *ain't* with a maximum pitch value of 3.85 ERB. This has a low predicted probability that *ain't* will be past tense, at a value of below 50%, as seen in Figure 10. Participants from both groups responded well to this utterance; five out of six African American listeners responded correctly while four out of six non-African American listeners responded correctly.

DISCUSSION

This pilot study was run to frame findings about the production of this feature and does not contain sufficient data to make claims about its perception. Because of the sparse number of participants, even as much as one response incorrect can make a relatively substantial impact on the data. For example, female African American listeners responded to past tense utterances spoken by a female at a 9/16 proportion of correct responses, which led to a 56.2% rate of accuracy. They responded similarly to past tense utterances by a male speaker at a 10/16 proportion of correct responses, however, this shows a 62.5% rate of accuracy. Therefore, these results must be taken with a grain of salt. With more data, these results will become more accurate, and this gap could be closed, or the divide spread even further. Regardless, these results allow us to begin seeing trends in the perception of this feature that provide great stepping off points for this research to be continued and developed further in the future.

The main trend shown in all figures is the higher rate of accuracy by African American listeners. However, non-African American listeners were able to respond accurately as well, though at a rate potentially too low to be considered more than guesswork. At an individual level, most non-African American listeners had an overall accuracy rate at about 50% or slightly above, while a few showed as little as around 31%. This highlights the broad range of performance that may come with a small dataset. However, it more importantly emphasizes the

crucial role of language contact and environment. Non-African American participants who performed better than other non-African American listeners generally self-reported a higher level of experience with African American language—mostly through media such as television and music.

The prosodic cues present, namely maximum pitch, may be used in the perception of past- tense *ain't* given that both female and male African American listeners perform more accurately than their non-African American counterparts—as would be expected for a grammatically camouflaged feature. Figure 21 may also show some evidence towards this claim. Even though the inclusion of this utterance was a flaw in the methodology due to some morphological cues in the main verb, *happen*, this utterance exemplifies how participants respond similarly given the morphological cues. All listeners' performance on this utterance can be compared to that toward the ambiguous past tense utterances. The female speaker spoke *ain't* at a maximum pitch of 6.49 ERB (a probability of over 75% given results shown in Figure 10). Combined with the morphological cues, tense should be more perceptible to both ethnicity groups. Indeed, this utterance was reacted to most accurately of all utterances with past-tense *ain't*. African American participants did answer more accurately than non-African American listeners, so they potentially could have received a stronger cue: morphology and prosody. Further data collection could solidify this claim. Given that African American listeners are consistently performing better without morphological cues on past tense *ain't* utterances may also hint that the prosodic cues are helping African American listeners in the perception of this feature.

Though African American listeners performed with more accuracy responding to most past and present tense utterances containing *ain't*, both ethnicity groups performed better

responding to present tense utterances over past tense utterances. This fits with expectations. Utterances that include present tense forms of *ain't* have main verb morphology that contains more semantic information to guide perception of tense. These cues are stronger than prosodic cues, so a higher accuracy in responding to these utterances is expected.

Differences in accuracy when responding to male versus female speakers could potentially be due to the speaker's voice depth. A few participants described difficulty in hearing one of the male speakers as his voice was very low. This is exemplified by the performance illustrated in Figure 22. The participants did perform better on other utterances by this speaker, so this individual utterance may have skewed the data. The difference in performance to two different male speakers with differing pitch levels of past-tense *ain't* shown in Figures 22 and 23 may also provide some evidence that incorrect responses could be due to simple human error in hearing the speaker. Another factor that may have led to error could be the length of the clause. Some participants expressed that they wished some of the clauses could be re-played, as the length of the clause was short and caught them more by surprise. Despite some of these difficulties, which could be playing into any inaccuracy that exists, participants within their ethnicity groups generally stayed consistent in how they responded to each ambiguous past-tense utterance. The ability to still perform accurately despite these difficulties in understanding the semantics of the utterance could show some evidence for participants subconsciously using acoustic cues to help guide their response, though there is also a good chance that participants simply guessed correctly in these situations. Again, more data would need to be collected to understand this.

Though there were only two males in each ethnicity group, we can make a few predictions on their performance based on some trends when comparing female participants (n=4

in each ethnicity group). Given the greater divide between female African American participants and their non-African American counterparts, a similar division between male African American participants and non-African American participants is also expected with the collection of more data. The difference, if any, in performance between the two sexes within ethnicity groups would be interesting to observe, especially when observing how each sex responds to male or female speakers. If this research direction is followed in the future, we might discover whether female African Americans are more sensitive to pitch in the perception of this feature, given AAE-speaking females' significant use of pitch to signal past-tense *ain't.*

Given that past-tense *ain't* is a grammatically camouflaged feature, one would expect that non-African American participants would not exhibit any differences in how they respond to a male or female speaker—as the use of pitch by AAE-speaking women would not be perceptible. This hypothesis is supported by the results depicted in Figure 16. We observe no difference in how female non-African Americans respond to a male versus a female speaker. We might also hypothesize that females may be attending to pitch cues at a higher rate than males given their use of such prosodic cues. However, it is possible that the use of pitch at a meaningful rate by females does not impact the perception of this feature by African American females, as the link between the perception and production of this feature may be weaker than we believe. Differences in response accuracy shown in Figures 16 and 19 show an inconsistency in how African American males and females are responding to female and male speakers. With the same hypothesis, we should expect that African American males would not exhibit much difference in performance when responding to a male or female, as they might not be as sensitive to the pitch cue. However, our results show the contrary. Males show a difference in their response accuracy to males versus females--responding with a higher rate of accuracy to female speakers--while

female African American listeners responded with greater accuracy to males. Again, any differences may be deemed insignificant with further data collection, and it is important to recognize that data illustrated in Figures 17-19 are from only four total male participants--two African American and two non-African American--while their female counterparts are twice as many. Should further data show there to be no difference in the perception of this feature whether spoken by a male or a female, it could provide evidence that all African American listeners are sensitive to these cues even if male African Americans may not be producing them yet. This would align nicely with how the production results fit into the Labovian Principles, and how we understand that some sound changes in the perceptual system may precede those in the production system (Pinget et. al, 2020). In this case, it would provide further evidence that past-tense *ain't* is an emerging feature undergoing language change, developing prosodic cues that have yet to be acquired by all members of the community but that have been able to be perceived by the community.

Since the perception of these acoustic measures may be occurring before production, we might be able to continue making predictions about production regionally at this point--especially as past-tense *ain't* is a recent language feature emerging in the 20th century. Six out of the ten participants shared that they were born in a Southern area of the United States, one born in an African country, and the another born outside the country but has lived in a Southern region for an extended period. Given the findings from the production portion of this research, it is expected that these participants would be less likely to use this feature and not exhibit a use of pitch or word duration to signal this form. However, the ability of the participants, particularly African American, urban/suburban raised participants, to perform at an accuracy rate above 50% highlights a few important points:

1) There may be an emergence of prosodic signaling of this feature in other AAE dialects in the future considering that prosodic cues may be perceived even if not yet used. This stresses the importance of continuing this research over time to better understand this feature generationally and regionally.

2) The importance of language contact. Particularly with the rise in modern technology, language and dialect features can be spread rapidly. This has great implications for the use and production of prosodic cues in this feature to grow and spread across regions. It also could make prosodic dominance a bit more perceptible to naive listeners, such as our non-African American participants, as their language contact grows. However, the subtleties of the intersection between prosody, semantics, and pragmatics in this feature could still be undetectable to non-African American listeners given that this is a grammatically camouflaged form.

3) Predictions about past-tense *ain't* production can be made based on geographical region given evidence from the corpus study. However, predictions about perception may be a little trickier, as perception may come before production, and modern means of communication--such as over the internet, has provided the potential for language contact unseen before.

There is still much investigation to be done, and with the collection of more data to make this a fully-fledged perception study, we may uncover some answers about trends in the data or understand individual puzzles.

CONCLUSIONS

This study has produced important findings surrounding prosody and signaling in the use of past-tense *ain't* in AAE and has sparked many questions about sex differences in pitch production for this feature. Future work on the perception half of this study may include more urban, northern African American participants to see if they outperform more Southern African

American participants. This could show interesting results about the use and perception of this feature by region, further debunk the supraregional myth, and provide even more stepping off points for research in the future. This direction would also help us understand if any lower rate of performance could be attributed to regionality, as most of the participants in this study were either born and/or raised in a Southern area. From the production standpoint, another fascinating direction would be to investigate individual differences, such as age. How are young women using pitch compared to older women? Are younger women increasing their pitch more than older women? Are young men starting to participate in using pitch to signal this feature? Exploring these questions could solidify the theory that the use of pitch to signal this feature is a language change being led by women. This project has opened many doors for future work and continues to push us further into understanding language change and dialect differences in AAE.

REFERENCES

Arunachalam, Sudha. 2013. Experimental Methods for Linguists: Experimental Methods for Linguists. *Language and Linguistics Compass* 7(4). 221–232. https://doi.org/10.1111/lnc3.12021

Ash, Sharon, and John Myhill. 1986. Linguistic correlates of inter-ethnic contact. In David Sankoff (ed.), *Diversity and Diachrony.* 33–44. Philadelphia: John Benjamins.

Bailey, Guy, and Maynor, Natalie. 1987. Decreolization? *Language in Society* 16(4). 449–473. https://www.jstor.org/stable/4167877

Bailey, Guy, and Maynor, Natalie. 1989. The Divergence Controversy. *American Speech* 64(1). 12–39. https://doi.org/10.2307/455110

Bates, Douglas, Martin Mächler, Ben Bolker, and Steve Walker. 2015. Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software* 67(1). 1-48.

Baugh, John. 1983. *Black Street Speech: Its History, Structure, and Survival*. Austin: University of Texas Press.

Beckman, Mary E., and Jan Edwards. 1994. Articulatory evidence for differentiating stress categories. In Patricia A. Keating (ed.), *Phonological Structure and Phonetic Form.* 7–33. Cambridge University Press. https://doi.org/10.1017/CBO9780511659461.002

Boersma, Paul, and David Weenink. 2016. PRAAT: Doing Phonetics by Computer. Version 6.0.21. http://www.fon.hum.uva.nl/praat/.

Cole, Jennifer, Erik R. Thomas, Erica Britt, and Elizabeth L. Coggshall. 2005. Intonational Distinctiveness of African American English. Paper presented at *New Ways of Analyzing Variation* 34, New York, NY, October.

Cole, Jennifer, Yoonsook Mo, and Mark Hasegawa-Johnson. 2010. Signal-Based and Expectation-Based Factors in the Perception of Prosodic Prominence. *Laboratory Phonology* 1(1). 425–452.

Collins, Chris, Simanique Moody, & Paul M. Postal. 2008. An AAE camouflage construction. *Language* 84(1). 29–68. https://doi.org/10.1353/lan.2008.0059

Debose, Charles. 2015. The Systematic Marking of Tense, Modality, and Aspect in African American Language. In Sonja Lanehart (ed.), *The Oxford Handbook of African American Language* 371-386. Oxford University Press.

Delph-Janiurek, Tom. 1999. Sounding Gender(ed): Vocal performances in English university teaching spaces. *Gender, Place & Culture* 6(2), 137-153. doi: 10.1080/09663699925079

Dillard, Joe. 1972. *Black English: Its History and Usage in the United States*. New York: Random House.

Farrington, Charles. 2019. Language Variation and the Great Migration: Regionality and African American Language. Doctoral dissertation, University of Oregon. https://scholarsbank.uoregon.edu/xmlui/handle/1794/24866

Farrington, Charlie and Tyler Kendall. 2019. The Corpus of Regional African American Language: MFA-Aligned. Version 2019.06. Eugene, OR: The Online Resources for African American Language Project. [http://lingtools.uoregon.edu/coraal/aligned/]

Fasold, Ralph W. 1972. Tense Marking in Black English: A Linguistic and Social Analysis. Washington, DC: Center for Applied Linguistics.

Fisher, Sabriya. 2018a. Variation and Change in Past Tense Negation in African American English. Doctoral dissertation, University of Pennsylvania. https://repository.upenn.edu/edissertations/2925

Fisher, Sabriya. 2018b. Change over Time in the Grammar of African American English. University of Pennsylvania Working Papers in Linguistics 24(2). https://repository.upenn.edu/pwpl/vol24/iss2/5

Fry, Dennis B. 1958. Experiments in the perception of stress. *Language and Speech* 1(2). 126–152. https://doi.org/10.1177/002383095800100207

Gregory, James N. 2005. *The Southern Diaspora: How the Great Migrations of Black and White Southerners Transformed America*. Chapel Hill: The University of North Carolina Press.

Howe, Darin. 2005. Negation in African American Vernacular English. In Yoko Iyeiri (ed.), *Aspects of English Negation.* 173–203. John Benjamins Publishing Company. https://doi.org/10.1075/z.132.16how

Hudson, Amelia I., and Anthony Holbrook. 1981. A Study of the Reading Fundamental Vocal Frequency of Young Black Adults. *Journal of Speech and Hearing Research* 24(2). 197–201.

Hudson, Amelia I., and Anthony Holbrook. 1982. Fundamental Frequency Characteristics of Young Black Adults: Spontaneous Speaking and Oral Reading. *Journal of Speech and Hearing Research* 25(1). 25–28.

Jones, Taylor. 2016. AAE Talmbout: An Overlooked Verb of Quotation. *University of Pennsylvania Working Papers in Linguistics*, 22(2). https://repository.upenn.edu/pwpl/vol22/iss2/11

Jun, Sun-Ah, and Christina Foreman. 1996. Boundary Tones and Focus Realization in African American Intonation. Paper presented at the 3rd Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, Honolulu, Hawaii, Dec. 2–6.

Kendall, Tyler. 2007. The people what makes the town: The semiotics of home and town spaces in Princeville, NC. *The North Carolina Folklore Journal* 54(1): 33-53.

Kendall, Tyler and Charlie Farrington. 2021. The Corpus of Regional African American Language. Version 2021.07. Eugene, OR: The Online Resources for African American Language Project. http://oraal.uoregon.edu/coraal.

Kendall, Tyler, Ralph Fasold, Charlie Farrington, Jason McLarty, Shelby Arnson, and Brooke Josler. 2018a. The Corpus of Regional African American Language: DCA (Washington DC 1968). Version 2018.10.06. Eugene, OR: The Online Resources for African American Language Project.

Kendall, Tyler, Minnie Quartey, Charlie Farrington, Jason McLarty, Shelby Arnson, and Brooke Josler. 2018b. The Corpus of Regional African American Language: DCB (Washington DC 2016). Version 2018.10.06. Eugene, OR: The Online Resources for African American Language Project.

Kendall, Tyler, and Walt Wolfram. 2009. Local and external language standards in African American English. *Journal of English Linguistics* 37(4). 305-330.

Labov, William. 1990. The intersection of sex and social class in the course of linguistic change. *Language Variation and Change* 2(2). 205–254. https://doi.org/10.1017/S0954394500000338

Labov, William. 2014. The role of African Americans in Philadelphia sound change. *Language Variation and Change* 26. 1–19.

Labov, William, Paul Cohen, Clarence Robbins, and John Lewis. 1968. *A Study of the Non-Standard English of Negro and Puerto Rican Speakers in New York City*. Philadelphia: U.S. Regional Survey.

Labov, William, and Wendell A. Harris. 1986. De facto segregation of Black and White vernaculars. In Daniel Sankoff (ed.), *Diversity and Diachrony* 1–24. Amsterdam: John Benjamins.

Long, Larry. 1988. *Migration and Residential Mobility in the United States*. New York: Russell Sage Foundation.

Lüdecke, Daniel. 2018. sjPlot: Data Visualization for Statistics in Social Science. doi: 10.5281/zenodo.1308157, R package version 2.6.3, https://CRAN.Rproject.org/package=sjPlot.

McLarty, Jason. 2018. African American Language and European American English Intonation Variation over time in the American South. *American Speech*.

McLarty, Jason. 2019. Prosodic Prominence Perception, Regional Background, Ethnicity and Experience: Naive Perception of African American English and European American English. Doctoral dissertation, University of Oregon. https://scholarsbank.uoregon.edu/xmlui/handle/1794/25258

McQuirter, Marya Annette. 2000. Claiming the City: African Americans, Urbanization, and Leisure in Washington, DC, 1902-1957. Doctoral Dissertation, University of Michigan. Retrieved from https://deepblue.lib.umich.edu/handle/2027.42/132840.

Peirce, Jonathan, Jeremy R. Gray, Sol Simpson, Michael MacAskill, Richard Höchenberger, Hiroyuki Sogo, Erik Kastman, and Jonas K. Lindeløv. 2019. PsychoPy2: Experiments in behavior made easy. *Behavior Research Methods* 51(1). 195–203. https://doi.org/10.3758/s13428-018-01193-y

Pinget, Anne F., René Kager, and Hans Van de Velde. 2020. Linking variation in perception and production in sound change: Evidence from Dutch obstruent devoicing. *Language and speech* 63(3). 660–685. https://doi.org/10.1177/0023830919880206

Pitt M.A., Dilley, L., Johnson, K., Kiesling, S., Raymond, W., Hume, E. and FoslerLussier, E. 2007. Buckeye Corpus of Conversational Speech (2nd release) [www.buckeyecorpus.osu.edu] Columbus, OH: Department of Psychology, Ohio State University (Distributor).

Rickford, John. 1975. Carrying the new wave into syntax: The case of Black English BIN. In Ralph W. Fasold and Roger W. Shuy (eds.), *Analyzing variation in language: Papers from the second Colloquium on New Ways of Analyzing Variation* 162-183. Washington DC: Georgetown University Press.

Robb, Michael P., Margaret A. Maclagan and Yang Chen. 2004. Speaking rates of American and New Zealand varieties of English. *Clinical Linguistics & Phonetics*. 18. 1-15.

Rowe, Ryan. 2005. The Development of African American English in the Oldest Black Town in America: Plural –s Absence in Princeville, North Carolina. Master's Thesis, North Carolina State University.

Rowe, Ryan, Walt Wolfram, Tyler Kendall, Charlie Farrington, and Brooke Josler. 2018. The Corpus of Regional African American Language: PRV (Princeville, NC 2004). Version 2018.10.0

Sonderegger, Morgan, Michael Wagner, and Francisco Torreira. 2018. Quantitative Methods for Linguistic Data. Version 1.0. http://people.linguistics.mcgill.ca/~morgan/book/index.html

Spears, Arthur K. 1982. The Black English Semi-Auxiliary Come. *Language* 58(4). 850–872. https://doi.org/10.2307/413960

Spears, Arthur K. 2009. On Shallow Grammar: African American English and the Critique of Exceptionalism. In Jo Anne Kleifgen and George C. Bond (eds.) *The Languages of Africa and the Diaspora: Educating for Language Awareness* 231–48. Bristol, UK: Multilingual Matters.

Spears, Arthur K. 2015. African American Standard English. In Sonja Lanehart (ed). *The Oxford Handbook of African American Language* 786-799. Oxford University Press.

Stewart, William A. 1965. Urban Negro speech: Sociolinguistic factors affecting English teaching. In Roger Shuy (ed.), *Social dialects and language learning*. A Report of a Conference Sponsored by Illinois Institute of Technology and the National Council of Teachers of English. Champaign, Illinois: National Council of Teachers of English.

Tarone, Elaine E. 1973. Aspects of Intonation in Black English. *American Speech* 48. 29-36.

Thomas, Erik R. 2011. *Sociophonetics: An Introduction.* Basingstoke, UK: Palgrave Macmillan.

Thomas, Erik R. 2015. Prosodic Features of African American English. In Sonja Lanehart (ed.), *The Oxford Handbook of African American Language*. 420-435. Oxford University Press.

Thomas, Erik R., Norman J. Lass, and Jeannine Carpenter. 2010. Identification of African American Speech. In Dennis R. Preston and Nancy Niedzielski (eds.), *A Reader in Sociophonetics*. New York, NY: De Gruyter Mouton.

Thomas, Erik R. and Jeffery Reaser. 2004. Delimiting Perceptual Cues Used for the Ethnic Labeling of African American and European American Voices. *Journal of Sociolinguistics* 8(1). 54-87.

Tolnay, Stewart E. 2003. The African American "Great Migration" and Beyond. *Annual Review of Sociology* 29(1). 209-232.

Wolfram, Walt. 2004. The Grammar of Urban African American Vernacular English. *Handbook of Varieties of English* 2. 111-32.

Wolfram, Walt. 2007. Sociolinguistic Folklore in the Study of African American English: Sociolinguistic Folklore in the Study of African American English. *Language and Linguistics Compass* 1(4). 292–313.

Wolfram, Walt, and Natalie Schilling. 2016. American English: Dialects and Variation, 3rd Ed. Malden/Oxford: Wiley/Blackwell.

APPENDIX

Full Model of Production Data:

```
Linear mixed model fit by REML ['lmerMod']
Formula: past_nopast_num ~ gender * (cPitchMax + cWrd_Dur + loc) + (1 |      Speaker)
   Data: jane.dat1
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 1e+05))

REML criterion at convergence: 448

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.9993 -0.6440 -0.3313  0.8945  2.4032

Random effects:
 Groups   Name        Variance Std.Dev.
 Speaker  (Intercept) 0.04535  0.2130
 Residual             0.16091  0.4011
Number of obs: 380, groups:  Speaker, 58

Fixed effects:
                           Estimate Std. Error t value
(Intercept)                 0.46875    0.11469   4.087
gendermale                 -0.04966    0.15617  -0.318
cPitchMax                   0.07338    0.02988   2.456
cWrd_Dur                    1.09114    0.69935   1.560
locDC_old                  -0.06686    0.13969  -0.479
locPrinceville             -0.33680    0.17102  -1.969
gendermale:cPitchMax       -0.08536    0.03427  -2.491
gendermale:cWrd_Dur        -0.34741    0.86875  -0.400
gendermale:locDC_old       -0.02831    0.18919  -0.150
gendermale:locPrinceville   0.16502    0.23148   0.713

Correlation of Fixed Effects:
            (Intr) gndrml cPtchM cWrd_D lcDC_l lcPrnc gnd:PM gn:W_D gn:DC_
gendermale  -0.734
cPitchMax   -0.261  0.192
cWrd_Dur     0.279 -0.205  0.025
locDC_old   -0.697  0.512  0.023  0.024
locPrincvll -0.584  0.429  0.087  0.033  0.471
gndrml:cPtM  0.228 -0.193 -0.872 -0.022 -0.020 -0.076
gndrml:cW_D -0.225  0.242 -0.020 -0.805 -0.019 -0.027 -0.039
gndrml:lDC_  0.515 -0.742 -0.017 -0.018 -0.738 -0.348  0.042  0.029
gndrml:lcPr  0.431 -0.613 -0.064 -0.025 -0.348 -0.739  0.100  0.045  0.511
```

Pilot Study Stimuli:

Practice Trial:

Sentence	Correct Answer (present=0, past=1)	Gender of Speaker
I am going to the store	0	female
I went to the store	1	female

Experiment Stimuli:

Speaker (includes gender info)	Sentence	Correct Answer (present=0, past=1)
DCB_se1_ag1_f_01	So I ain't know nothing about it.	1
DCB_se1_ag1_f_01	I ain't go that long	1
DCB_se1_ag1_f_01	Like ain't nobody gonna doing nothing to me	0
DCB_se1_ag1_f_01	Cause how come you ain't put it in the drawer yet	0

DCB_se1_ag1_f_03	I ain't see it	1
DCB_se1_ag1_f_03	Ain´t my boo no more	0
DCB_se1_ag1_f_03	Ain´t nothing really happen	1
DCB_se1_ag1_f_03	I ain´t gonna see him for a reason	0
DCB_se1_ag2_m_01	Me and school ain't never get along	1
DCB_se1_ag2_m_01	I ain't seen her or talked to her since	0
DCB_se1_ag2_m_01	We ain't even get to eat	1
DCB_se1_ag2_m_01	I ain't got nothing wrong with that	0
DCB_se1_ag3_m_02	We ain't really go out too much	1
DCB_se1_ag3_m_02	You know it ain't no difference	0
DCB_se1_ag3_m_02	We ain't never fight	1
DCB_se1_ag3_m_02	And who the ones who really ain't	0
DCB_se1_ag1_f_01	I was born on October 10, 1997	1
DCB_se1_ag1_f_01	First I want to be a athletic trainer	0
DCB_se1_ag1_f_01	Um they do like different activities	0
DCB_se1_ag1_f_01	Well I used to go here	1
DCB_se1_ag1_f_01	And we started from the other campus	1
DCB_se1_ag1_f_01	Just in case I don’t get the job	0
DCB_se1_ag1_f_01	I was ready to go home	1
DCB_se1_ag1_f_01	Yeah like if I have something	0
DCB_se1_ag2_m_01	I grew up in kentland tho	1
DCB_se1_ag2_m_01	That was another elementary school	1
DCB_se1_ag2_m_01	That's how you build a championship team	0
DCB_se1_ag2_m_01	I don't know where my daddy was born*	0
DCB_se1_ag2_m_01	I still respect his game	0
DCB_se1_ag2_m_01	I had a job and all that.	1
DCB_se1_ag2_m_01	It's still to be seen	0
DCB_se1_ag2_m_01	So it was like always	1

	apartments	
DCB_se1_ag1_f_03	My mom works at a hotel	0
DCB_se1_ag1_f_03	A whole lot of tragedies happened	1
DCB_se1_ag1_f_03	My mom graduated from Roosevelt	1
DCB_se1_ag1_f_03	She likes to go out to eat sometimes	0
DCB_se1_ag1_f_03	I don't really talk to my dad	0
DCB_se1_ag1_f_03	I used to dance for the boys and girls club	1
DCB_se1_ag1_f_03	I was her first granddaughter	1
DCB_se1_ag1_f_03	I live in an apartment with my foster mom	0
DCB_se1_ag3_m_02	Well actually I was born and raised in dc	1
DCB_se1_ag3_m_02	Oh I have a very big family you know	0
DCB_se1_ag3_m_02	Like you say what's up dog	0
DCB_se1_ag3_m_02	But it was still family oriented	1
DCB_se1_ag3_m_02	Cause my aunts and uncles are basically like my brothers and sisters	0
DCB_se1_ag3_m_02	But that's how it's always gonna be	0
DCB_se1_ag3_m_02	She worked for the government	1
DCB_se1_ag3_m_02	We took trips here and there	1

* This clause confused participants, but as filler items were not included in analysis it did not impact the results.

Linguistic Background Questionnaire:

Participant ID Number:
Textbox

Sex:
Choice Male, Female

Ethnicity:
Choicebox African-American, European-American, Hispanic/Latino, Asian-American

Do you have any problems with your speech, hearing or vision?
Textbox

Country of birth:
Choice United States, Other
Textbox

If United States, list city/state:
Textbox

How much experience would you say you have had with African American English?
Choicebox No experience, Little experience, Some experience, A lot of experience

Of all the speech (not including music, television and film) you have heard in the last two weeks, what percentage of it would you say is African American English?
Choicebox Less than 2%, Less than 10%, Less than 20%, Less than 50%, More than 50%

Of all the music you listen to, what percentage of it would you say is Rap or Hip-Hop?
Choicebox Less than 2%, Less than 10%, Less than 20%, Less than 50%, More than 50%

How much experience would you say you have had with Southern American English?
Choicebox No experience, Little experience, Some experience, A lot of experience

Of all the speech (not including music, television and film) you have heard in the last two weeks, what percentage of it would you say is Southern American English?
Choicebox Less than 2%, Less than 10%, Less than 20%, Less than 50%, More than 50%

Of all the music you listen to, what percentage of it would you say is Country or Blue-Grass?
Choicebox Less than 2%, Less than 10%, Less than 20%, Less than 50%, More than 50%

Do you consider yourself to be a monolingual English speaker (a person who speaks only English)?
Choice Yes, No

If no, what language(s) do you speak natively?
Textbox

Did you grow up in an urban, suburban, or rural area?
Textbox