



Questioning Questions: The Illusion of Variation in African American English Polar Question Intonation

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Abstract

Polar questions (PQs) in African American English (AAE) have often been described as having three distinct final contours—rising, falling and level. In this paper, I test the claims that variation in PQ intonation for AAE speakers from the Mississippi Delta can be predicted by i) syntactic form: presence or absence of auxiliary inversion or ii) truncation effects related to post tonic syllable number. Semi-spontaneous questions were elicited from AAE speakers in the Mississippi Delta that varied in inversion status as well as the segmental material needed to evaluate truncation effects. Ultimately, the presence/absence of inversion did not constrain question intonation, while post nuclear segmental material was a statistical predictor of final contour. Thus, Similar to Armstrong (to appear), the study demonstrates that the illusion of variation in question contours in AAE may be most attributable to truncation effects. Namely, I will propose that PQs in AAE have a consistent final low boundary tone (L%), with a realization that varies based on number of post tonic syllables. Therefore, the greater the distance from pitch accent to final target for a given question, the more faithful an approximation of the boundary tone will be realized.

Index Terms: question intonation, variation, African American English, truncation, boundary tones, auxiliary inversion

1. Introduction

African American English (AAE) has been described as having variation in the intonation patterns available for polar questions (PQs). Specifically, previous work suggests that there are three distinct final contours: rising, falling, and level [1]. Some work has sought to explain this variation as it may be constrained by pragmatic factors like discourse type [2-3]; other work has used spontaneous speech and telephone corpora to evaluate the role syntactic form may play in contour type [4-5]. However, phonetic truncation has not yet been considered as a potential contributor to the variation in PQ intonation in AAE. The experiment investigates the role syntactic patterns like inversion and phonetic processes like truncation play in constraining the variation in final question contour in AAE.

1.1. Truncation in Questions

Truncation is a phonetic process caused by an inadequate amount of segmental material for realizing a tonal target that can result in an underlying tonal target having multiple surface realizations [6]. Some argue that the variant surface forms resulting from truncation are mere exponents—elements that do not affect the overarching inventory of possible contours [7]. For instance, in Puerto Rican Spanish, PQ intonation is typically described as having a falling contour, yet three final realizations have been identified, even some final shapes that

end high and appear to contain no boundary tone [8]. All of the variants identified could be described as having an $\uparrow H^* L\%$ final tune, but due to truncation effects, the extent to which the target tone is fully realized depends on the amount of segmental material available.

Question intonation tends to have a uniform shape and description in many varieties like Standardized American English (SAE), yet variable realizations are not uncommon in varieties outside of AAE, especially when little or no voiced segmental material is available for a given utterance. When a full tune must be realized with a short word or even within a syllable, a variety will either compress or truncate the tune [7]. Varieties that opt for compression will fully realize the prosodic tune on a short word, for example, by “speeding up” the realization of the particular accent shape. Varieties that choose truncation, however, will only realize as much of the accent shape as can be completed with the available voiced material (See Figure 1).

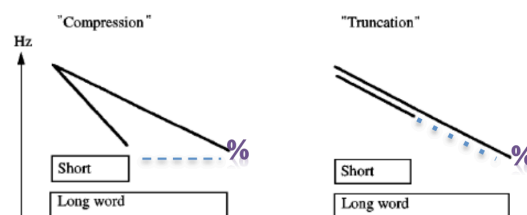


Figure 1: *Compression and truncation schemas* [7].

While some suggest that each language will either uniformly be truncating or compressing [6], one study used experimental methods to show that truncation or compression is more so dialect dependent [7]. In the study, declarative and PQ data were elicited from a total of 48 speakers; 12 each from 4 British dialects. The $L^* H-H\%$ pattern was typical for PQs though some differences related to the amount of final rise across dialect was identified. The most compelling findings across dialects came from the declarative data. In these data, F0 change from pitch accent to boundary was evaluated for words of varying syllable lengths. For Cambridge and Newcastle speakers, F0 change increased when words became shorter—a result consistent with compression. For speakers from Belfast, on the other hand, a significant decrease was found for F0 change for words with fewer syllables—evidence of truncation in that the shorter word allows for the realization of less of the final contour. These results suggest that varieties of one language will not uniformly choose the same phonetic process for realizing final contours with small amounts of post-nuclear segmental material.

Truncation also explains variation in PQ intonation in Puerto Rican Spanish [9]. Production of the boundary tone was found to be optional for questions when no material followed the nuclear pitch accent. These phonetic processes may be at play in the variation seen in AAE final contours for PQs, but it may not be the only contributor to final realization. Syntactic structure may also play a role, particularly in AAE where variation in auxiliary inversion occurs in PQs.

1.2. Auxiliary Inversion in AAE PQs

Questions in AAE can be formed both by inversion of the auxiliary, as well as with non-inversion where no auxiliary must appear in the surface structure. This can be seen in questions (1) and (2).

- (1) Is your name Sharon?
- (2) Your name (is) Sharon?

Both of the questions above are grammatical with no semantic difference between the two, though some views suggest that differences related to presuppositions may exist [10]. In addition to being semantically identical, both question types are appropriate PQs in AAE [4]. Following previous research [11], I define PQs to be information seeking questions that can be uttered in “out of the blue” contexts, and are used to elicit a yes or no response. The question in (2) is not to be confused with rising declarative questions in Standardized American English (SAE), which take the same syntactic form but cannot be uttered out of the blue, but require salient elements of the question be previously discussed or implied in the relevant discourse [11]. Despite the semantic similarities between inverted and non-inverted questions, the literature suggests that with non-inversion may also come specific intonation contours to signal that this structural declarative has question force [3, 5].

A main concern of this investigation is the interaction of contour and inversion. One study found non-inverted questions for two male AAE speakers were produced with a significantly steeper pitch slope ($p=0.007$) than questions with auxiliary inversion [5]. In support of this type of finding, other literature provides some theoretical support for the possibility that syntactic structure may constrain intonation contour type in this variety. Auxiliary inversion must occur in embedded questions [12]. Given obligatory inversion in these environments where intonation clearly has no effect, it seems that when in matrix clauses, we may predict that even inverted PQs must be accompanied by a robust intonational cue.

1.3. Question intonation in AAE

Previous accounts suggest that as many as three distinct final contours can be associated with yes/no questions in AAE [13-14, 2, 1, 15, 4, 12]. These contours are typically described as rising, level, and falling tones, though, fine-grained prosodic descriptions of these contours are rare. Two main final contours associated with PQ intonation have been identified for AAE speaking youth in Seattle [2]. Level and some rising contours seemed to accompany PQs uttered by the AAE speakers in informal and non-threatening situations (i.e. speaking with other peers). Yet, mostly falling final contours were produced by these speakers in more formal and “threatening” scenarios such as when a Black student was talking with a white teacher. Leaving aside the possible pragmatic constraints on contours outlined, other work has confirmed the presence of final level or flat tones for AAE PQs in data from AAE speakers from

Southwest Louisiana [15]. Level contours have also been attested for children acquiring AAE [12]. While the questions typically exhibited a rise from the beginning of the utterance, that rise did not continue through the entirety of the question, but instead terminated in a plateau on the final tone. This pattern is similar to a global rise pattern previously observed [5].

The most detailed prosodic description of the variation in intonation patterns for yes/no questions in AAE comes from an experiment with AAE and SAE speakers that sought to examine the differences between intonation in questions and declaratives across varieties [1] by using Pierhumbert’s framework [16]. The AAE question data collected were taken from AAE speakers reading a dialogue containing information seeking and clarification question types as well as declaratives. One consistent finding across the AAE question data was the presence of an H* phrasal pitch accent. This H* accent was also noted in declarative sentences. However, what seemed to differentiate declarative intonation and question intonation in AAE was the inventory of boundary tones. Where declaratives consistently terminated in L-L% tones, questions were described as having either L-L%, H-L% or H-early H% boundary tones.

While it is unclear how these three contours match neatly with the fall, level, and rise distinctions of previous literature, the findings do work to confirm that three contours can be identified. See Figure 2 below for the typical TOBI transcription conventions of the relevant contours outlined for SAE, though the authors suggest that the tonal representations in the AAE question data they have proposed are somewhat different. For instance, the H-L% in AAE is not decidedly flat as indicated below, neither does the H% boundary tone following the high pitch accent require that the H% be up-stepped as in described for SAE.

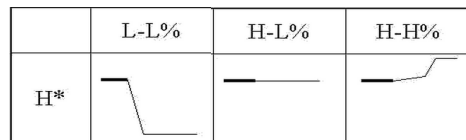


Figure 2: Inventory of boundary tones [16].

1.4. Predictions

The experiment investigated final question contour in AAE given inversion and truncation. Specifically, I control for the effect of syntactic structure on intonation contour, but unlike previous studies using corpus data from unfamiliar interlocutors [5] or reading passages [1], I use naturalistic question data elicited from AAE speakers from a homogenous speech community in the Mississippi Delta. Similarly, the game-based question task utilized elicited spontaneous generation of questions by participants increasing the naturalness of productions. I also focus on one question type, PQs, to exclude possible contour differences between polar and clarification questions. The experiment lays the groundwork to evaluate only PQs, and those specifically uttered by speakers of the Mississippi Delta AAE speech community when controlling for syntactic patterns of inversion and evaluating truncation processes.

We predict that true and meaningful variation exists if we find a statistical difference in final contour realization for questions with auxiliary inversion vs those with non-inversion. On the

other hand, if multisyllabic words differ from mono-syllabic words in the amount and direction of F0 pitch movement, we can look to truncation as a contributor to variable contour realizations. In this case, we could suggest that AAE PQ intonation consists of only one underlying contour—a final falling tune. If truncation is not found to affect final contour realization, then there is more evidence to believe that true meaningful variation exists in the inventory of available PQ intonation patterns in AAE.

2. Methods

2.1. Participants

A convenience sample of 12 Participants was recruited for this experiment in Mississippi. All subjects were native to the Mississippi Delta area (the north western corner of the state) and most subjects were college students at the same institution where most of the experimentation occurred. Participants ranged in age from 18 to 56 years. All participants were tested in dyads in sessions lasting approximately 15 minutes.

2.2. Testing Environments

The experiment took place at Delta State University although three dyads were also run at a nearby residence. In both locations, the experiment was completed in a quiet room. Both participants wore head-mounted microphones and were recorded using a device approved for intonation fieldwork. The participants were given oral directions about how to complete the task from the experimenter who was also from the Delta speech community. Participants were both supplied with a “Guess Who” game board, which contained 32 plastic doors containing different pictures of Guess Who (GW) characters.

2.3. Procedure

The task was selected to elicit information seeking yes/no questions with inverted and non-inverted auxiliaries. At the start of each game, all doors on the game board were opened to display the possible characters of the opponent. For each game, participants choose a character card and would respond to questions from their opponent based on the characteristics of that individual. Each dyad was instructed to ask their opponent yes/no questions to ultimately identify the identity of their competitor’s character through process of elimination. Here is an example:

- (3) Participant A: Does your person wear glasses?
 Participant B: No.
 Participant A: (Eliminates all characters wearing glasses.)

For each dyad, 4-5 games were played consisting of a Control Period and an Inversion Period. During the Control Period, participants were given no restrictions on how to ask questions, beside the previous directions that they must be yes/no questions. During the Non-Inversion Period, however, participants were instructed to begin all questions with “Your person.” For example, instead of, “Is your person bald headed?” participants would ask, “Your person (is) bald-headed?” This period was designed to elicit information-seeking yes/no questions with non-inversion. Reminder prompts were given during the Inversion Period if participants began to produce Control structures.

2.4. Sample, Coding and Analysis

A sample of 30 questions from 6 participants were selected for analysis. These participants were chosen because they produced somewhat equal numbers of inverted and non-inverted questions. The sample contained 17 PQs with auxiliary inversion and 13 PQs that displayed non-inversion. To evaluate final contours for truncation effects, PQs were identified in which the word containing the nuclear pitch accent differed in number of post-nuclear syllables. The sample consisted of 8 monosyllabic, 18 bi-syllabic, and 4 tri-syllabic final words. Each individual question utterance was extracted from the complete game recording and transcribed using Praat [17]. Word segmentation was performed with the assistance of forced alignment technology [18]. Due to phonological differences between AAE and standardized American English, the dialect for which the forced aligner was engineered, and a low signal to noise ratio in the recordings, some word boundaries that were generated did not correspond to the appropriate segments. Therefore, files were also evaluated by ear, and boundaries manipulated if they were inaccurate [19].

First, question-types were coded for inversion and non-inversion [20]. Next, each question was annotated for auditory prominence in Praat, and the perceived boundary tone was also recorded. A difference score (henceforth called a Movement Score) was then calculated by subtracting the F0 value at the nuclear pitch accent (a) from that at the boundary (b). Therefore, below in Figure 3, a Movement Score of 50 Hz was calculated by subtracting the value at (b), 255 Hz, from the value at (a), 205 Hz. Positive Movement Scores correspond to falling contours, while negative scores suggest a rise from accent to boundary.

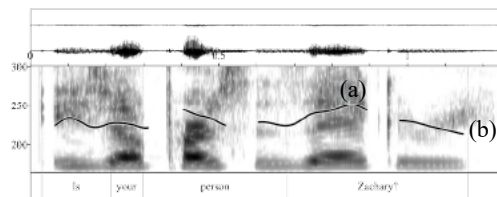


Figure 3: Pitch movement from H* to boundary tone.

Lastly, for each question the material preceding the nuclear pitch accent was evaluated to make sure there were no great differences in productions that might have affected the final contours. Auditory perception and viewing of each individual pitch track revealed that the material preceding the nuclear accent shared a consistent pattern. A slight prominence was identified by extracting the F0 max for the preceding material. The prominence typically corresponded with the word person, for each utterance as it was consistently found to have the highest pitch accent among the preceding material. While the highest F0 value in the preceding material, the prominence value was never higher than the nuclear pitch accent. While a prominence could be identified, acoustic and perceptual observations otherwise suggest that the preceding material seemed to be deaccented, or produced without the prosodic accents anticipated for this material [6]. Ultimately, the sample of 30 PQs were analyzed using a mixed effects statistical model with Movement Score as the dependent variable and inversion and syllable number as the independent variables to determine whether inversion or truncation can predict final contour realization.

2.5. Results

Two linear regression models with final pitch movement (Movement Score) as the dependent variable were run using the sample of 30 selected PQs from the Delta AAE speakers. Model 1 incorporated syllable number of the accented word as an independent variable. The syllable number variable was comprised of 3 levels corresponding to the number of syllables of the final word in the question (1, 2, and 3 syllables). The results of Model 1 show a significant positive linear relationship between syllable number and final pitch realization ($\beta = 8.303$, $F(1,28) = 5.944$, $p = 0.0214$ *). Thus, the greater the number of syllables (i.e. segmental material) between the H* nuclear pitch accent and the boundary, the greater the difference in Movement Score. Since an overwhelming majority of Movement scores were positive (23/30), we know that greater syllable number resulted in a larger fall from H* to the boundary. Model 2 incorporated auxiliary inversion with two levels corresponding to the presence or absence of inversion. However, the addition of the inversion variable did not significantly improve the model fit ($p = 0.1777$).

3. Discussion

A sample of 30 PQs elicited from Mississippi Delta AAE speakers in the Guess Who experiment were found to exhibit the variation in final contour described in previous literature: Final level, and falling contours were dominant. While based on pitch tracks alone, 7 question contours displayed a rise in F0 from pitch accent to boundary, but these rises were less than 4 Hz on average, they were perceptibly indistinguishable from level contours. These final rises seem comparable to what has been described as a final plateau [15].

Results of the statistical tests showed that the number of syllables to the boundary tone was indeed a significant predictor of final pitch movement. As the majority of contours were falling contours, the predictive nature of syllable number shows that with greater segmental material between the boundary and accent, a greater fall is observed. This finding is in support of the truncation hypothesis, which suggests that no true variation in boundary tone exists, but instead, the amount of segmental material after the pitch accent determines how accurately the low boundary tone is approximated. Some data are given below in Figure 4 to demonstrate the general trend.

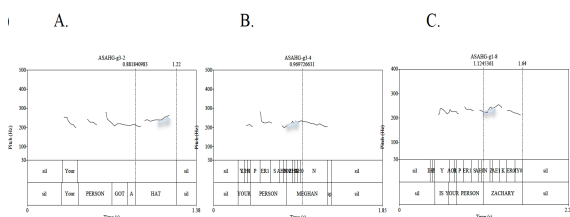


Figure 4: Final pitch movement by syllable number.

The examples in Figure 4 increase in syllable length (1-3) from A-C. In these examples also note the presence of initial stress in the multisyllabic words which situates the H* pitch accent one, then two syllables away from the boundary tone respectively. The H* accent in A is in the same syllable as the boundary. While the monosyllabic utterance in A shows a rising pattern from H* to its boundary, the same rise can be seen in the initial and stressed syllables of multisyllabic productions B and C. Based on the statistical regression, what looks like an

L-H% boundary tone in A can be seen as a rise to the pitch accent and no subsequent movement to an L% boundary as no segmental material is left to realize the fall. In B and C, however, we see the same type of rise to H* as in the monosyllabic contour, however, due to the availability of syllabic material between the H* and the boundary, we see distinct falls in both of the contours due to more faithful approximations of the low target tone. Thus, the appearance of three distinct contours is epiphenomenal. Results suggest that variation in PQ final contour in AAE is due to truncation effects similar to variation in PQ intonation patterns in Puerto Rican Spanish and declaratives varieties of British Englishes.

Next, results related to the syntactic form of the question, presence or absence of auxiliary inversion, did not show inversion status to be a significant predictor of final contour. Thus, based on this sample, one cannot conclude that specific question intonation patterns are constrained by syntax. It is also not the case that failure to syntactically encode question force by auxiliary inversion necessarily requires the production of a specific final contour to allow speakers to interpret non-inverted interrogatives. This outcome is in contrast to previous work that found questions without inversion were significantly more likely to rise than questions with fronted auxiliaries [5]. While the differing results could be due to differences in our speakers or elicitation methods, it is also possible that those results were based on the correlation of inversion and a global rising pattern, not pitch movement from nuclear accent to boundary. Therefore, this lack of difference may also be part and parcel of differing characterizations of rising intonation.

4. Conclusions

Results of the elicitation study show that PQs for AAE speakers from the Mississippi Delta do on the surface display the three final contours typically associated with AAE questions. While it is possible to associate final contours with the three boundary tones previously described [1], a more nuanced look at the contours controlling for segmental material between the pitch accent and the boundary suggests that truncation effects seem responsible for the apparent variation. Thus we can propose that AAE PQ intonation is characterized by a general fall consistent with either H-L% or L-L% boundary tones. Because the different final boundary realizations given syllable number is symptomatic of truncation effects, perhaps AAE PQ intonation may share more characteristics with question intonation from Spanish dialects than with standardized American English. Thus, further study of AAE intonation may consider the frameworks and contour inventories of Spanish varieties as more appropriate tools for accurate description. Future research would also benefit from experiments on PQs in AAE that control specifically for syllable number. I also show that final contour realization did not significantly vary given inversion vs non-inversion of the auxiliary. While a small sample size was a limitation of the study, the findings represents an important contribution given the paucity of research on AAE intonation.

Overall, the presence of the H* nuclear pitch accent seems the unifying characteristic of PQs in AAE which sets its question intonation apart from SAE, but allies it with Spanish and British dialects. Future research should compare rate of F0 fall from H* for AAE PQs like “You thought the *Jabberwocky* was the kid’s most interesting Halloween costume?” versus “You thought the kid’s most interesting Halloween costume was the *Jabberwocky*?” when the focused element is even further from the right edge of the question.

5. References

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