

# THE PHONETICS OF FINAL PITCH ACCENTS IN AMERICAN ENGLISH POLAR QUESTIONS

*Nancy Hedberg & Juan M. Sosa*

Simon Fraser University, Canada  
hedberg@sfu.ca; sosa@sfu.ca

## ABSTRACT

In an ongoing corpus study we have found that polar questions in American English tend to be low rising, characterized by a low final pitch accent followed by a rise to the end of the utterance. A study of a minority pattern of questions with a high final pitch accent followed by a rise reveals that such pitch accents often fall on a type of word that is typically unaccented, thus raising the question of whether these words are accented at all. For this paper, we subjected a small number of crucial tokens from our database to a close analysis in order to uncover the phonetic and pragmatic factors contributing to the patterns of prominence that we detected. The results suggest that many of our final high pitch accents are post-nuclear accents in the sense of Ladd [10].

**Keywords:** polar question, pitch accent, post-nuclear accent, American English, corpus study

## 1. INTRODUCTION

Traditionally, the nuclear accent is taken to be the last pitch accent in the intonation phrase and is considered to be the most important accent in terms of meaning in that it marks the ‘focus’ of the utterance (for a recent summary of information structure distinctions, see [6]).

Recently, however, the possibility of distinguishing focal, nuclear accents from final non-focal pitch-accented elements of the utterance has been articulated. Specifically, it has been proposed that there exist post-nuclear accents, which are edge tones, i.e. ‘phrase accents’ in ToBI, that are associated with post-nuclear lexically stressed syllables. Thus, Grice, et al. [8] propose that in the Eastern European Question Tune, the high phrase accent of the rise-fall (H-L%) question contour can be associated with a lexically stressed syllable, thereby creating a post-nuclear accent. (For discussion see [10], section 4.1.3).

Further examples of post-nuclear accents have been identified in Western Germanic fall-rise (L-H%) questions [8, 11] and in Romance languages

[12, 13]. In this paper, we provide evidence for the occurrence of post-nuclear pitch accents in some American English rising (H-H%) polar questions.

## 2. BACKGROUND AND METHOD

In previous work, we extracted 410 polar questions with the form of interrogative sentences from the speech files of the Callhome [4] and Fisher corpora [5]. Using Praat [3], we annotated their intonation according to the ToBI guidelines [2] and classified them according to their apparent nuclear contour as shown in Table 1. At that time, we defined the nuclear contour as the tune beginning with the final pitch accent of the utterance and continuing with the phrase accent and boundary tone.

**Table 1:** Distribution of Nuclear Contours: Initial Classification.

Nuclear contour	ToBI category	Number
Low rise	L*H-H%	325
	L*L-H%	2
High rise	H*H-H%	39
	!H*H-H%	5
High fall	H*L-L%	9
	!H*L-L%	1
	L+H*L-L%	7
Low fall	L*L-L%	6
Fall rise	H*L-H%	1
	L+H*L-H%	1
Level	H*H-L%	9
	!H*H-L%	3
	L*+HH-L%	2
<b>Total</b>		<b>410</b>

We then consulted the transcripts [5, 9] and attempted to determine meaning differences between questions with different final contours. For example, we determined that falling polar questions tend to function as non-genuine questions in the sense of Banuazizi and Cresswell [1]—e.g. questions that were used to make requests for action rather than requests for information.

We also classified words that follow the final pitch accent, finding that they tend to be pronouns or other words that are given in the discourse,

function words such as some adverbs, or words following normal early stress such as the head noun of a compound, as illustrated in (1)-(5).

- (1) So **have** you been **able** to get **close** to them?

H\*                    !H\*                    L\*H-H%

- (2) Can **you believe** that?

H\*   L\*H-H%

- (3) And **did** they **mention** their **other** children?

H\*            H\*    L-            L\*H-H%

- (4) Did you **get** my **letter** yet?

L+H\*   L\*H-H%

- (5) Did I **send** it to **you** on **computer** paper?

H\*            !H\*            L\*H-!H%

Crucially, when we examined high-rises, we found that unlike the pitch accents of the low-rise tunes, the high pitch accents tend to occur on words of the same type as final unaccented words, as illustrated in (6)-(10).

- (6) Do you **know** **them**?

L\*            H\*H-H%

- (7) Could there **be** a **reason** for **that**?

L\*   L\*+H            H\*H-H%

- (8) Is that **really** such an **awful** **job**?

L\*+H                    L\*+H   H\*H-H%

- (9) Did **she** **enjoy** **coming** **visiting** **here**?

H\*   L\*HH%   H\*   L\*+H   !H\*H-H%

- (10) Do y- would you like an **area** **code**?

L\*+H   H\*H-H

This finding raises the question of whether such final words are actually pitch accented at all. In order to answer this question, we subjected a subset of our tokens to a deeper phonetic analysis for the current study, in order to determine whether the tones that we classified as high pitch accents really are pitch accents.

We are also interested in a second question: If such items are indeed pitch accented, can these accents be explained pragmatically as focal accents, which would justify classifying them as nuclear accents; or should they instead be classified as non-focal, post-nuclear accents arising merely from the association of a phrasal edge tone with a lexically stressed syllable? To answer this question, we carefully examined how the question tokens in our subset fit into their discourse context.

In sum, our goal was to determine if there are objective criteria for distinguishing pitch accents from unassociated phrasal edge tones, and nuclear accents from post-nuclear accents.

The subset of 43 examples that we selected for close phonetic analysis was distributed as shown in Table 2.

**Table 2:** Distribution of analyzed final words.

	No accent	High rise	Low rise
Compound	8	2	-
<i>you</i>	6	2	2
<i>that</i>	11	3	3
<i>them</i>	5	1	-

### 3. RESULTS AND DISCUSSION

In some cases, the final pronoun is accented for information structure reasons because it is focused in some way. For example, in (11) the referent (the sixth) was mentioned more than 4.5 seconds before the pronoun, and there is an intervening topic shift. The accent is used to direct attention back to the referent for a second topic shift.

- (11) Is **anybody** **coming** before **that**?

L\*                    L\*                    H\*H-H%

410.61 412.82 A: Tova's coming the sixth I think

410.59 411.03 B: yeah

413.13 414.77 B: The sixth. Why was she going to (( )) [distortion]

414.08 416.62 A: yeah and she's going to some relatives or something I don't know

416.68 417.94 B: uh-huh that's nice

418.36 418.72 A: yeah

419.14 420.99 B: uh-huh is **anybody coming** before **that**?

In other cases, there is contrastive focus on the pronoun, as in (12), where the pattern of prominence on 'I' and 'you' evokes the contextual premise, 'you sound staticky to me'.

- (12) Do **I** sound **staticky** to **you**?

L\*                    H\*                    H\*H-H%

8.91 14.62 B: {breath} I think this is a really bad connection because, there's a d- there's a little bit of a lag.

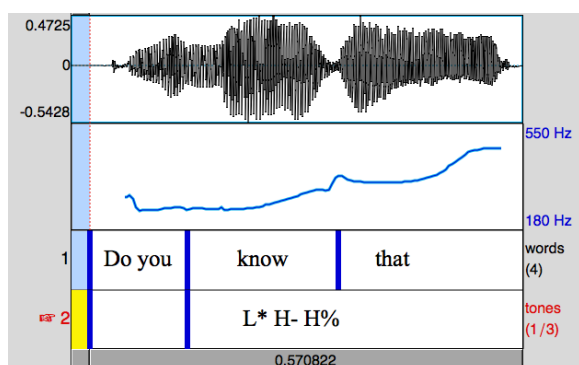
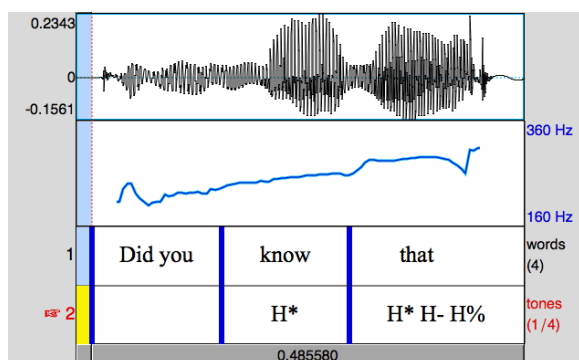
15.04 17.39 A: And it's, it's really staticky. Do **I** sound **staticky** to **you**?

The exchange in (13) illustrates well how information structure affects prosody. A says 'they don't know me', and then B asks, 'Do I know you', deaccenting the final pronoun because it is given and non-contrastive. Then A reciprocates, 'Do I know you?', placing a pitch accent on the final pronoun to signal contrast.

(13) 642.13 644.02 B: wait a second this is being recorded Michelle

644.33 645.82 A: I don't care they don't know me



**Figure 3:** Final unaccented 'that' (16).**Figure 4:** Final high-accented 'that' (17).

Because this prominence on 'that' in (17) does not appear to be conditioned by information structure, this pitch accent is a post-nuclear accent. This happened twice on 'that', once on 'them', and twice on compounds, always with H\*.

In our other examples, too, we found that the pitch movements on pronouns and compound head nouns that we had annotated as unaccented continue a rise that begins on the preceding pitch-accented word. By contrast, the final words that we had annotated with pitch accents (whether focused or not) exhibit a rise that begins on that word and is independent from any earlier rise.

#### 4. CONCLUSION

While the perception of prominence justifying pitch accent annotation seems to be conditioned by multiple factors, including duration, energy and vowel quality, we conclude that pitch rise onset should be taken as the primary criterion for distinguishing pitch accents from unassociated edge tones in polar questions. We also propose that the criterion for distinguishing nuclear accents from post-nuclear accents should be that the former but not the latter exhibit information structure focus.

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