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## THE SCALING OF UTTERANCE-INITIAL PITCH PEAKS IN PUERTO RICAN SPANISH: EVIDENCE FOR TONAL PREPLANNING

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For this study, an experiment was created to test for the existence of tonal preplanning in Puerto Rican Spanish. The scaling of utterance-initial F0 high peaks was examined as a function of utterance length, which was defined as total utterance duration (in seconds). Eight speakers from Caguas, Puerto Rico, were recorded reading 24 distinct utterances of varying length for analysis. The data revealed that all eight of the subjects began higher in their pitch range as utterance length increased. Results show that tonal preplanning is present and that the

preplanning (Lieberman & Pierrehumbert 1984, Prieto et. al. 2006).

### 1. Introduction

The goal of this paper is to examine the phenomena of preplanning in the tonal production of Puerto Rican Spanish through the investigation of the scaling of utterance-initial F0 peaks.

#### *1.1 Background and Current Work*

Tonal preplanning refers to a *lookahead* strategy by which a speaker will vary the initial F0 values of an utterance depending on how long the utterance is, by setting the initial F0 value higher for longer utterances. The degree to which speakers utilize such a *lookahead* mechanism has been heavily debated (Lieberman & Pierrehumbert 1984, Prieto & Shiil

its optional implementation may vary by speaker and/or by language. One prediction of this approach is that speakers may run out of range or hit asymptote before the end of the utterance.

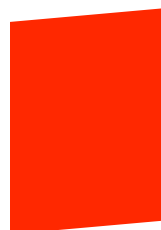
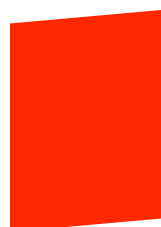
The *lookahead* problem of advanced planning is briefly mentioned in *Intonational Phonology* by Ladd, “part of the reason it is difficult to provide quantitative descriptions of F0 trends is that in general such trends are quite plainly dependent on the length of the domain to which they apply” (Ladd 1996). Ladd goes on to state that a lookahead mechanism “may be psycholinguistically implausible,” but he does not make any reference to utterance-initial pitch, only to declination and the outcome of the slope over time (Ladd 1996).

In attempting to pull apart these issues, current studies have addressed preplanning more directly. Hansson discusses that “hard” preplanning refers to articulatory processes that *need* to be mapped out before a phrase begins, while ‘soft’ preplanning refers to *optional* production strategies that the speaker may make before beginning” (Hansson 2003). Hansson states that “an obligatory adjustment of the F0 starting point to phrase length, as suggested in the early work on downstep by Bruce (1982a), would also require some lookahead and hard preplanning” (Hansson 2003). However, in her work on spontaneous Swedish speech, she found that speakers are not using *hard* tonal preplanning in spontaneous speech and instead presents data that they are making decisions on a phrase-by-phrase basis, (i.e. *soft* preplanning).

A recent study by Pri

**Table 1:** Example utterances by number of pitch accents. The number of intervening unstressed syllables varies between pitch accents.

# of Accents	Example/Translation
1	<i>Le amaron.</i> They loved him/her.
2	<i>Amaba la mina.</i> He/She loved the mine.
3	<i>María mira al niño.</i> Maria looked at the child.



**Figure 1:** Utter 0 12 162.912 134.16 708.9e

For every speaker, the graphs in Fig. 1 clearly show a positive trend line (the linear regression), which displays a positive correlation between utterance-initial F0 peak height (in Hz) and utterance length (in sec.). The slopes of the regression lines vary by graph, with some more

(6) 53(7)



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