

# Melodic contours of yes/no questions in Brazilian Portuguese

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## Abstract

In this paper I describe four melodic patterns which can occur in the yes/no question, namely: i) the final rise pattern, typical of the unmarked polarity yes/no question, ii) the internal rise pattern, correlated with positive polarity questions, iii) the delayed rise pattern, indicating negative polarity, i.e. the speaker's discordance with the sentence propositional content, and iv) the double rise pattern, found in rhetorical yes/no questions and requests. The relevance of phonological representation is discussed on the grounds of auditory tests with synthesized speech.

## Yes/no questions melodic contours

Questions in Brazilian Portuguese have been described as presenting three melodic contours according to their syntactic structure: rising, in the yes/no question, falling, in the wh-question and rising-falling, in the alternative question (Hochgreb 1983, Moraes 1998). A closer examination of the question intonation in spontaneous speech, however, reveals a much more complex picture as a consequence of the incidence of two pragmatic factors: the question's negative or positive polarity and its degree of dependence on the conversational context.

Together with the falling pattern, typical of statements, four interrogative patterns that characterize different types of yes/no questions were analyzed, viz.:

i) final rise, typically associated with the neutral yes/no question, considered unmarked as to the expected answer. This pattern is characterized by a medium level onset and a high level over the final stressed syllable (Fig. 1).

ii) internal rise, which is correlated with confirming questions bearing positive polarity, i.e. the speaker expects that the listener agrees with the propositional content of the question. The pattern is characterized by a rise at a high melodic level in the first stressed syllable, a level which continues to rise throughout the utterance, including the final prestressed syllable, to fall on the final stressed syllable (Fig. 2).

iii) delayed rise, which implies disbelief or doubt about what has just been said, therefore suggesting disagreement with the propositional content of the question. What distinguishes this pattern is the fact that the melodic

rising in its last stressed syllable starts only at its second third, creating a slightly concave-shaped rising (Fig. 3).

iv) double rise, which occurs in several discursive situations, among which are requests and questions that bear a “rhetorical” intention with an expected answer in the opposite direction of the propositional content expressed in the question. The pattern is characterized by a rising in the first stressed syllable, and a second, weaker, rise in the last stressed syllable (Fig. 4).

v) falling pattern, belonging to statements, is characterized by an onset at a medium level and by a low melodic level over the final stressed syllable (Fig. 5).

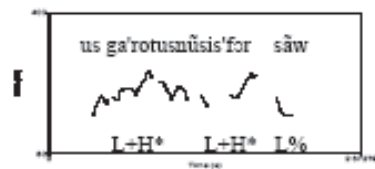


Fig. 1. Final rise melodic contour

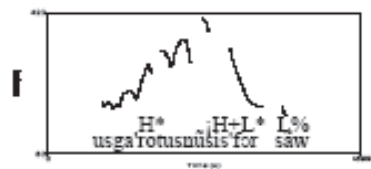


Fig. 2. Internal rise melodic contour

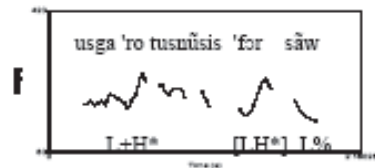


Fig. 3. Delayed rise melodic contour

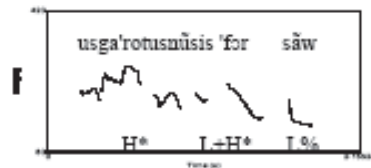


Fig. 4. Double rise melodic contour

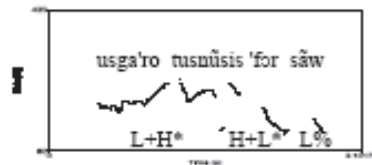


Fig. 5. Falling melodic contour

## Experiments with synthesized stimuli

An examination, even superficial, of these contours reveals that it is not a simple task to assign, with current notational conventions (Beckman et al. 2005), a phonological representation to these five patterns, as proposed at the bottom of the pitch curves in figures 1-5. Indeed, in order to represent the difference between these patterns, artificial solutions will have to be used, which will make the notation less phonetically transparent or ad hoc conventions, unforeseen by the system, must be established, such as the distinction between [LH\*] and L + H\* to indicate that the bitonal accent is located

over just one syllable or spreads over two syllables. Clearly, notations little motivated phonetically must be evaluated before being adopted. In fact, what is the real significance of the prenuclear accents melodic behavior (quite similar, in these cases) in the characterization and identification of the analyzed patterns? Besides the melodic level proper, what relevance can the intrasyllabic shape of the melodic contour have in stressed syllables?

Expecting to contribute with a tentative answer to these questions, an experiment was designed using 19 resynthesized prosodic variants of the sentence *Os garotos não se esforçam* (The boys don't try hard), with pitch modifications at prenuclear and nuclear accents. The stimuli were placed in three groups for forced choice tests, and were randomly presented to 25 subjects that estimated the effect of the melodic modifications on their meaning.

## Results of the perception tests

### Test I On the significance of the prenuclear accent

The first test aimed at the assessment of the importance of the prenuclear accent on the recognition of intonational meaning. The five natural sentences were resynthesized in such a way as to neutralize the melodic distinctions that occurred at the prenuclear accent. The results showed that the intentions assigned by the speaker to both the natural sentences and the sentences in which the prosodic information at the prenuclear accent was eliminated were correctly identified by the listeners in a statistically significant level ( $\chi^2 = 56.51$  and  $p < 0.0001$ ;  $\chi^2 = 82.97$  and  $p < 0.0001$ , respectively).

### Test II On the rising or falling configuration of the final H\* of final rise and double rise patterns

Based on the final rise pattern with neutralized prenuclear accent, eight variants were produced, four of them with rising intrasyllabic configuration and four with the falling one, lowering by 30Hz the mean value in each curve, as it can be observed in figure 6, below:

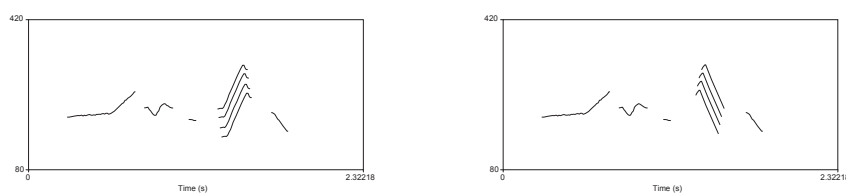


Fig. 6. Eight synthesized variants of the final rise pattern with rising and falling shape over the final stressed syllable

The tests results indicated that the melodic shape of the final stressed syllable is the feature responsible for the identification of neutral (rising) or rhetorical (falling) questions ( $\chi^2 = 52.36$ ;  $p < 0.0001$ ), and not the distinction represented as L+H\* and H\* pitch accents in the prenuclear position, as proposed in the notation on figures 1 and 4, respectively.

### Test III On the rising shape of the final H\* of final rise and delayed rise patterns

Based on the delayed rise pattern, six stimuli were generated, crossing the shape of the melodic rising, convex or concave, with three distinct syllabic durations: the original one, one increased by 30% and the other decreased by 30%.

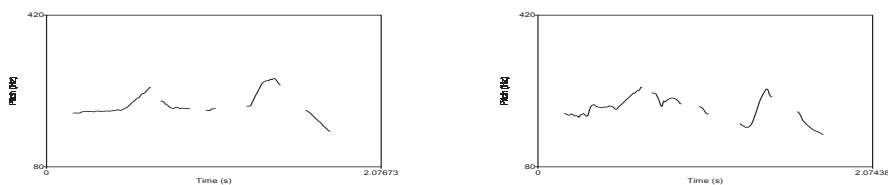


Fig. 7 Convex and concave shapes of the final rise, respectively.

The test results showed that the shape of the rising configuration on final stress syllable is the feature which leads to the identification of neutral (convex shape) or disbelief (concave shape) questions ( $\chi^2 = 77.63$ ;  $p < 0.0001$ ).

### Final remarks

Our results strongly suggest that the current phonological representation does not account for aspects that are important to the characterization of the intonation patterns described here. On the one hand, the representation of the prenuclear accent is irrelevant, since the opposition between the patterns is concentrated on the nuclear accent. On the other hand, the direction, falling or rising, of the melodic modulation over stressed syllables, and even its sharpness must be taken into account since they are factors that effectively participate in the distinction of these patterns.

### References

- Beckman, M., J. Hirschberg and S. Shattuck-Hufnagel 2005. The original ToBI system and the evolution of ToBI framework. In Jun, S.-A. (ed.) *Prosodic Phonology. The Phonology of Intonation and Phrasing*, pp 9-54. Oxford, OUP.
- Hochgreb, N. 1983. *Análise acústico-perceptiva da entoação do português: A frase interrogativa*. Tese de doutorado, Universidade de São Paulo.
- Moraes, J. A. 1998. Intonation in Brazilian Portuguese. In Hirst, D. and A. Di Cristo (eds.) *Intonation Systems: a Survey of Twenty Languages*, 179-194. Cambridge, CUP.