New Trends on the Teaching of Intonation of Foreign Languages

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1. Introduction

The teaching of intonation of foreign languages poses many questions to the teacher related not only to the choice of the most appropriated theoretical model but also to the most effective approach to the teaching of students of diverse language groups. It has already been pointed that the level of proficiency achieved by the learner depends on the interaction of many factors (Mixdorff,1996; Flege,1995; Flege et al., 1995), including the nature of the language involved, pedagogical approaches and individual characteristics, such as ability, motivation, age, to mention a few. According to Beckman (1995), acquiring intonation similar to a native speaker is one of the most difficult tasks in the process of learning a foreign language. Though many intonation features be considered universal for being present in different languages, there are specificities proper to each one.

Vassière (1983:54) affirms that: "It's often assumed that the acoustic properties of speech are partly shaped by natural tendencies that have been conventionalized to various degrees depending on the language."

The speakers of different languages know how to vary fundamental frequency, the acoustic parameter most related to the production of intonation patterns, the same way they know how to vary duration and intensity. Nevertheless, the relative importance of each one of these elements for the meaning associated to intonation patterns is specific to each language.

Studies (Rocca & Marcelino, 1997; Rocca, 1998) have proved that one of the difficulties related to the acquisition of English intonation by Brazilian speakers is due to the diverse ways of conferring prominence by the two languages involved. While English confers prominence through pitch accent, the Brazilian Portuguese acoustic correlates of stress are related to longer duration on the stressed syllable conjoined with weakening of intensity on the post–stressed ones (Barbosa, 1996; Massini, 1991). As a result, the Brazilian students of English have a tendency to compensate the lack of adequate tonal movement by the lengthening of the duration of these same syllables.

These studies have also demonstrated that the approach to the teaching of intonation can not be based only on the ability of hearing and imitating tape recorders or native speaker's speeches, since perceptive analysis of non native features has been proved to be limited.Students have difficulties in perceiving what their ears are not prepared to hear the same way the native speaker teachers have difficulties in characterizing what they consider to be foreign accent in the speech of their pupils.

The acquisition of a foreign language is different from the acquisition of a first language in many respects, but the relationship between perception and production is crucial for both. The linking between production and perception is such that it prevents the adult learner from perceiving other distinctions besides the ones that are part of his/her native language phonological system. The result of the summing up of different types of deviations related to segmental and supra segmental features, including intonation, produces what is referred to as foreign accent.

These conclusions led to an experiment (Rocca, 2003) that aimed at the implementation and evaluation of techniques designed to improve Brazilian students' perception and production of English intonation contours by means of the analysis,

manipulation and visualization of the acoustic signal provided by speech analysis devises so as to guarantee what Jenkins (2000) called phonological intelligibility, that is to say, a successful communication. The approach applied made use of acoustic analysis tools in order to achieve the development of the perception and production of intonation patterns. The conclusions of this research suggest some devices that were successful in the teaching of intonation to Brazilian learners of English, which are considered in this paper.

2. The experiment

The experiment that gave rise to the suggestions focused in this paper tried to sort out if the teaching of intonation mediated by the visual aid of a computer screen could be of any value in a course on English intonation for Brazilian speakers.

Eight undergraduate students of the English language took part in the experiment that compared the achievement of two groups: the *experimental group*, which exercised the intonation contours with the speech technology support of WinSal, a Media Enterprise software, and the *control group*, which received the same training in the traditional language laboratory.

2.1 The corpus

The corpus focused on two frontier tones L% *(Low*) e H% (*High)*, the falling movement of the pitch being represented by declarative, imperative and *wh*- interrogative emissions and the rising movement exemplified by Yes*/No* questions.

The corpus comprised two types of recording: the stimulus and the production recordings.

The Stimulus Recording presented emissions**,** extracted from tapes designed to teach English intonation and intended to be followed as a model by the students in the three types of activities proposed;

- repetition of dialogues with the support of written text;
- repetition of isolated emissions without the written support;
- induced spontaneous production.

Each one of the subjects recorded the corpus individually in a sound proof room. After the training with varied material, the subjects recorded again the same corpus proposed by the stimulus recording.

The Production Recording was built with these two versions of the activities proposed by the stimulus recording: the initial recording produced before the training and the final recording of the same activities after the training.

2.2 The training

The students` training lasted 10 weeks, a session of 1 hour and a half per week. The experimental group guided their perception and production by means of the visualization of the sound signal provided by the program WinSal. They could hear the model emissions or just part of it, record their production, evaluate their production comparing the F0 contour with the native speaker's production. In summary, they had oral and visual feedback at their disposal, while the control group had the same training in the language laboratory with oral feedback.

2.3 Analysis of the data

The Production Recording Data were submitted to the *perceptual analysis* of 40 native speakers of English. Bilinguals and language teachers were not accepted as evaluators. The perceptual test aimed at answering two basic questions:
1 – Would native speakers evaluate differently the students´ initial and final recordings?
2 – Would there be any difference between the two trainings as far as results were concerned?

The scores of such evaluation received statistical treatment by means of the SPSS software- Statistical Package for Social Sciences.

Only the *Yes/No* questions produced by the experimental group were submitted to the acoustic analysis, since they displayed statistical significant improvement ($p < 0,05$) after the training, according to the perceptual evaluation of the native speakers.

The control group, which had been submitted to the language laboratory training, did not present any significant improvement in their production.

The acoustic analysis employing the Computarized Speech Research Environment from Avaaz Coorporation investigated F0 and duration characteristics, in order to interpret the results of the perceptive test.

The production of the students (first and second recordings) was compared with the native speaker's models so as to find an explanation for the improvement in the students' production signaled by the native speakers' perceptual evaluation.

2.4 The results of the experiment

The results of the acoustic analysis pointed at several factors interfering in the perception and production of foreign accent in relation to the intonation contour of Yes/No questions: pitch variation inside a single vocalic nucleus, co articulation and re-syllabification phenomena, word junctures, interaction of segmental and supra segmental levels, and the global rising contour, which was considered the most important one, since its absence cannot be compensated by the presence of other relevant features. When teaching Yes/No questions to Brazilians, the devised activities must aim at developing attention to these factors.

3. Pedagogical implications

The successful results displayed by the evaluative test suggest that trained eyes can help in the perception of what non-native ears do not hear and that the visual support of F0 contour provided by the computer window screen can be an important guide for students in their training.

The application of such approach to the teaching of intonation implies instructing the students to extract and use F0 contour as a phonetic representation, a visual support for their emissions and self corrections.

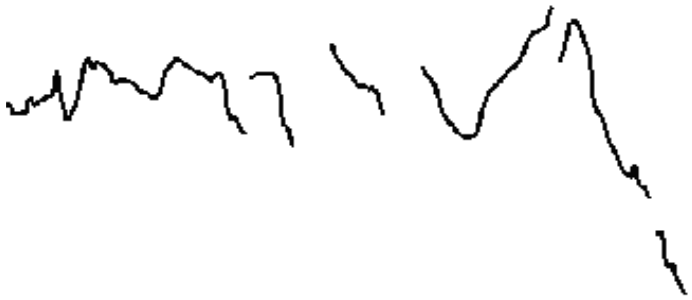

Figure 1. Pitch contour of the emission: *Legumes are a good source of vitamins*
(declarative, falling final contour)

The adequate reading of the intonation contour displayed in Figure 1 implies learning that F0 is not defined for voiceless consonants as indicated in Figure 2.

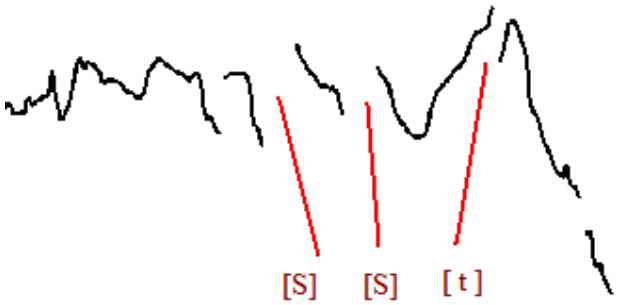

Figure 2. F0 is not defined for consonants without vocal fold vibration

So the training based on the visual support provided by the graphics requires learning about micro prosody, the disturbances on the F0 contour due to the articulatory and dynamic transitions between segments imposed by the vibration pattern of the vocal folds (Hardcastle e Hewlett, 1999; Laver, 1994).

According to Mira Mateus (1990:193), for instance, at the beginning of vowels followed by voiceless plosives, an increase in F0 values is expected. To avoid vibration of vocal folds while producing voiceless consonants, the tension of the vocal cords is increased resulting in higher F0 measures.

> ... durante a fase de vibração das cordas vocais das oclusivas sonoras, é necessário relaxar as cordas vocais para que a vibração se mantenha, o que tem, como efeito, baixar também a freqüência fundamental. Pelo contrário, para evitar a vibração durante a produção das consoantes surdas, a tensão das cordas vocais é aumentada e a freqüência fundamental eleva-se (Mira Mateus, 1990:193).

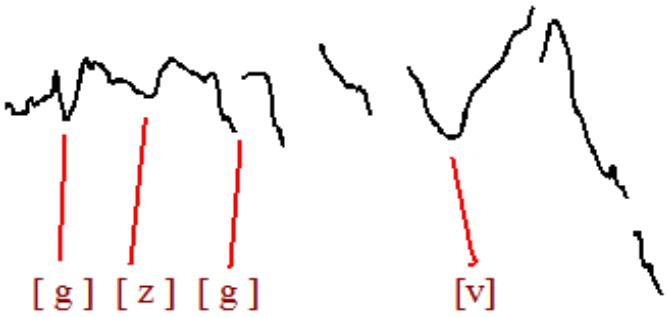

Figure 3. F0 disturbed by consonants with an extreme constriction in the vocal tract

Students have to be instructed not to consider these micro prosodic distortions when analyzing macro prosodic aspects such as pitch patterns, since the perception of the intonation contour abstracts away from these alterations. In the emission of a *Yes/No* question of English, their attention should be towards the rising contour, which is of extreme importance even in a declarative sentence that is meant to be understood as a question.

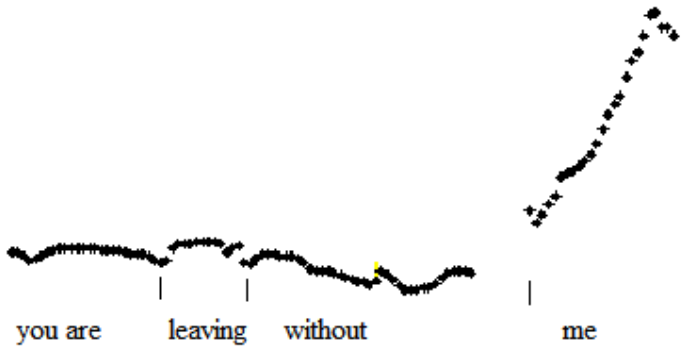

Figure 4. A declarative sentence emitted as a question: rise from the pitch accent on ME to the end of the sentence.

The acoustic analysis of the *Yes/No* questions of the experiment has demonstrated that even when more than one pitch accent is present, the F0 value of the last syllable must be higher than any other value in the emission. Productions that do not display this pattern are not well evaluated by native speakers, in spite of ending in a final rising contour as exemplified in Figure 5. All the emissions of *would you please explain this word?* produced by different speakers present two pitch accents and rising final contours, but the one represented by the blue line with dots has received the best evaluation from native speakers. It was the only one in which the last syllable has F0 measures superior to the values of the preceding ones, including the syllable that carries a previous pitch accent.

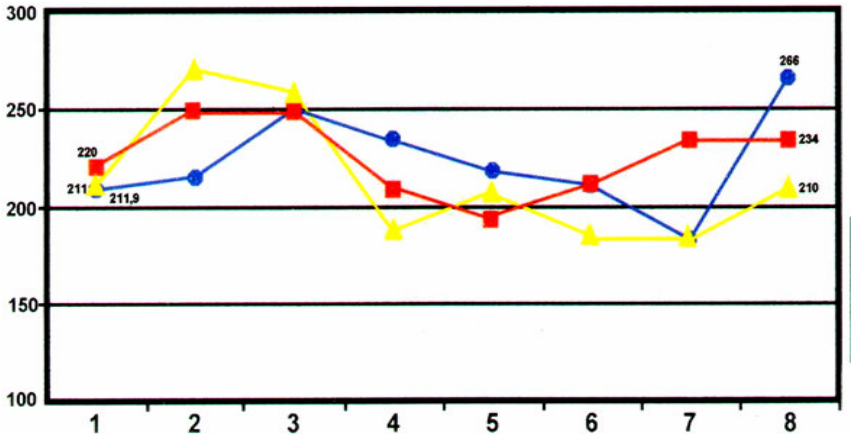

Figure 5. F0 contour of the question *would you please explain this word?* produced by three speakers.

So, when practicing English *Yes/No* questions, students should draw their attention to the abstract rising lines represented in Figure 6 below, since the F0 value is a feature that identifies foreign accent in the speech of non natives.

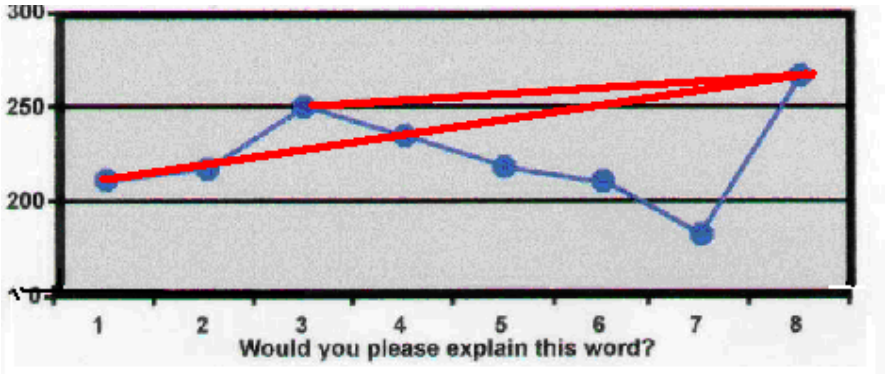

Figure 6. Native speaker` s emission: Would you please explain this word?

To consider the semantic, pragmatic implications related to intonation patterns, students have to learn to identify pauses, pitch accents and patterns of pitch accents. They must learn that *Stress* is a structural property of a word that marks a potential (arbitrary) location for an *Accent* to occur, while *Accent*, referred here as p*itch accent*, is a property of a word in context, a way to mark intonation prominence in order to give emphasis to important words in the discourse. In relation to *Yes/No* questions of English, which are characterized by a rise from the main accent to the end of the sentence, it is important for students to practice emissions in contexts that display different alignment as in Figures 7, 8 and 9.

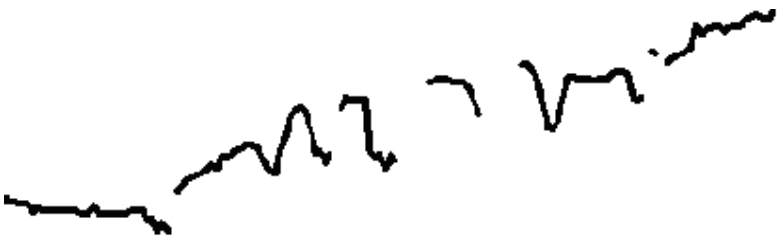

Figure 7. Rise from the main accent to the end of the sentence. Pitch accent on Legumes

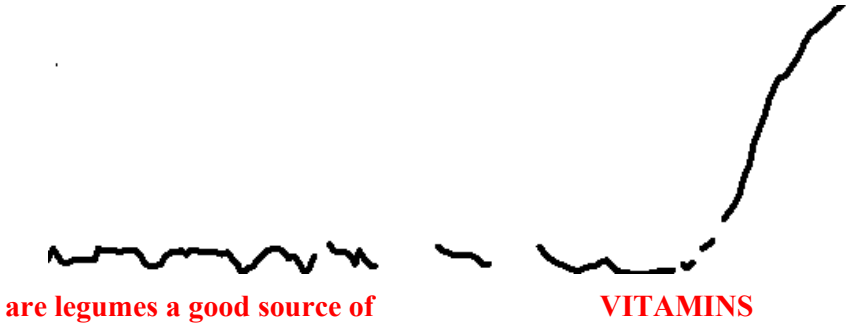

Figure 8. Rise from the main accent to the end of the sentence. Pitch accent on Vitamins

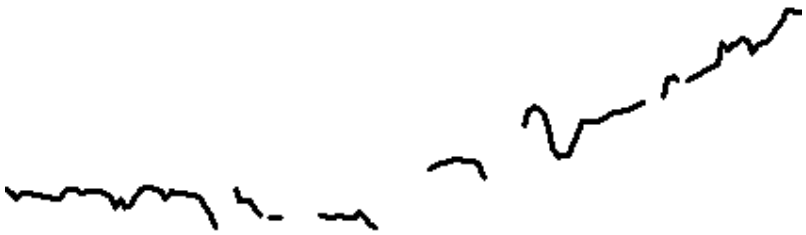

Figure 9. Rise from the main accent to the end of the sentence. Pitch accent on Good.

In this respect, the Brazilian learner faces several problems with the *Yes/No* questions of English. The results of the perceptive test have shown that the pitch range employed by native speakers of English is larger than the one employed by Brazilian speakers of English, who have difficulty in keeping a continuously rising F0 contour when a single pitch accent occurs at the beginning of the emission as in Figure 7.They also present different degrees of difficulty when the prominent syllable is carried by the last word of the emission as in Figure 8. In general, Brazilian speakers do not produce pitch variation inside a single vocalic nucleus as in the native speaker's emission represented in Figure 10.

Figure 10. Pitch movement in a single vowel of the word museum in the emission *The mus**U**em hires musicians every evening*

The smaller pitch range of Brazilian speakers associated with the difficulty in reproducing the rising movement inside the limits of a single phonetic segment explains the greater difficulty presented by the emission *Would you please explain this word?,* with pitch accent on the monosyllabic term *WORD,* when compared with other emissions such as *Are you going to take a vacation ?* or *Could I borrow some sugar?* , in which the rising intonation contours occur on words of two and three syllables, giving the student more space to perform the ascending movement.

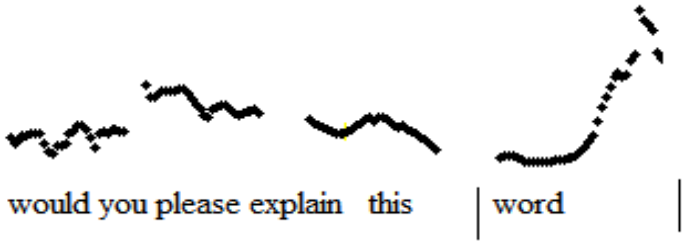

Figure 11. F0 contour of the emission *Would you please explain this word?*

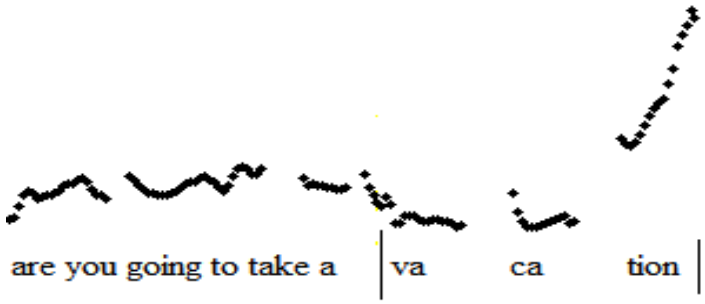

Figure 12. F0 contour of the emission *Are you going to take a vacation ?*

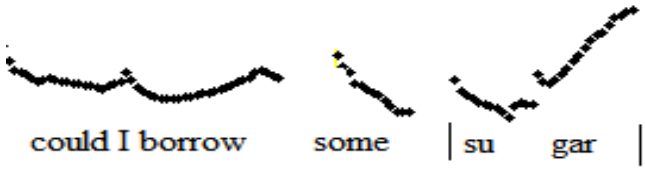

Figure 13. F0 contour of the emission *Could I borrow some sugar?*

The emission represented in Figure 11 also displays more problematic phonetic contexts for Brazilian speakers, such as the unreleased final stop of the term *WORD*, the co articulation in the juncture of the segments *THIS WORD*, emphasizing the important role the interaction of segmental and supra segmental levels play in the oral production of the students. Learners can be made aware of issues related to the reduction of vocalic segments, co articulation and resyllabification phenomena by means of the visual support provided by acoustic analysis devices and their practice should be directed to the questions indicated as the most troublesome.

4. Final remarks

The achievement presented by the students of the experimental group suggests that acoustic analysis is essential as an instrument of identification of the L2 features that are not perceived/produced by the non native speaker thus becoming an important basis for the construction of teaching material. Training derived from the results of such analysis and based on the visual support provided by the computer screen can improve the teaching of the intonation of a foreign language.

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