

Utterance-initial F0 movements in the spontaneous speech of Hungarian learners of Spanish

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Abstract

Apart from various pronunciation errors at the segmental level, anomalous stress and intonation patterns are reported to be a salient area of negative transfer in the case of Hungarian learners of Spanish (HLS) [1]. This comparative study deals with utterance-initial melodic traits in the spontaneous declarative utterances of HLS, as contrasted to native Spanish (NS) prosodic patterns.

The corpus consists of map task activities: 100 utterances by 16 European Spanish speakers, and 160 utterances by 16 Hungarian informants.

The method applied in the research is Cantero Serena's 'Prosodic Analysis of Speech' [2], which represents intonation by objectively comparable standardized melodic curves. In this study, the focus was on the tonal movements from the utterance-first syllable to the first f0 turning point of the sentence, supposing that these would rather rise in the case of NS speakers, as opposed to a fall in the case of HLS.

According to the results, Hungarian learners of Spanish do produce utterance-initial syllables followed by a fall rather than a rise as a consequence of presumable negative transfer from their mother tongue, but the native Spanish corpus used for this study is not exclusively characterized by a definite rise from the utterance-first syllable to the first peak either.

Keywords: intonation, stress, transfer, Spanish, Hungarian.

1. Introduction

Prosodic stress is the result of the prominence given to a syllable compared to the rest of the syllables in a word, but as for Spanish, there is no complete unanimity in the literature whether this prominence is achieved by changes in the fundamental frequency, intensity or duration with respect to its context (cf. [3], [4] and [5]). In Hungarian, word stress is realized by extra intensity and/or higher fundamental frequency [6].

Hungarian and Spanish stress systems are inherently different in the sense that Hungarian,

contrarily to Spanish, has a word-initial fixed position for lexical stress [7]. In Spanish, the position of the stressed syllable is most typically the penultimate one [8]. This implies that for Hungarian learners of Spanish (HLS), this constitutes a challenging area of language acquisition.

This study aims at analysing utterance-initial tonal patterns in the spontaneous speech of 16 advanced level Hungarian learners of Spanish, as compared to the spontaneous speech of 16 native Spanish speakers. The investigation is based on the intonational theory and representational methodology 'Prosodic Analysis of Speech' [2], which works with standardized data regardless of irrelevant prosodic variations.

In native Spanish declarative sentences, the shape of the intonation contour reminds us of a suspension bridge (cf. [9]), in which internal word stresses are not given melodic prominence, only the first and the last ones (referred to as the first peak and the nucleus, respectively, [10]). In Hungarian, the mother tongue of HLS, declarative utterances are accompanied by a continuously descending melody from the first syllable on [11], cf. Fig. 1.



Figure 1: The typical declarative intonational contour in Spanish ([9]) and in Hungarian ([11]).

This means that the Spanish utterance-first syllable is by default followed by a rise until the first peak which in general coincides with the first stressed syllable (or often with the syllable after that, cf. [10]). As Hungarians give prominence to first syllables, the Spanish declarative sentences realized by HLS are expected to start from a high f0 value followed by a fall instead of a rise, just as in their mother tongue.

2. Theoretical background

The theoretical background is based on [2], [12] and [13]. In this framework, intonation must be

interpreted strictly as the succession of relevant f_0 variations, acting at three levels – the prelinguistic, the linguistic and the paralinguistic one.

Stress is marked by melodic means as part of the prelinguistic level of intonation. At the prelinguistic level, intonation only plays part in the segmentation of speech into units, but it does not convey any additional meaning. As non-native segmentation patterns automatically trigger the perception of speakers as foreigners, this level is closely connected to the impression of ‘foreign’ accent.

At the linguistic level, intonation adds meaning to the utterance in the sense that it can express three aspects: whether it is interrogative, ‘finished’ (that is, not followed immediately by other utterance) or emphatic. Other meanings such as ‘sadness’ or ‘irony’ are not expressed by intonational means exclusively, as they belong to the paralinguistic level of intonation and are complemented by other prosodic devices, such as duration or intensity. Thus, listeners can only identify whether the intonation of an utterance is emphatic, i.e., not neutral; but the expression of incredulity, rage or other emotions is the result of the interplay between other prosodic or even non-linguistic factors, for instance gestures.

This study focuses on the prelinguistic aspect of intonation, the examined aspect being the interface between stress and tone. The research question is whether, due to Hungarian stress assignment rules and as a negative transfer from Hungarian to the target language, intermediate level HLS tend to produce falling melodies from the utterance-first syllable to the first f_0 turning point in their Spanish declarative sentences.

3. Corpus

The native Spanish corpus was obtained from the ‘map task’ activities from the Interactive Atlas of Romance intonation (cf. [14]), in which the speakers had to inform each other about the correct itinerary based on a map. It contains only spontaneous speech samples by 16 informants (3 men and 13 women), from recordings of 51 minutes and 23 seconds in total. Only monolingual areas were chosen for the analysis, thus leaving out territories such as Catalonia, Valencia or the Balearic Islands (Catalan-speaking zones), Galicia (Galician-speaking zone), the Basque Country and La Rioja (Basque-speaking zones), so as to avoid potential influence by other co-official peninsular languages in Spain. The average age of the informants was 29.7 years (SD: 7.37).

The corpus of Hungarian learners of Spanish consists of 16 audio recordings realized in a soundproof room of 80 minutes 53 seconds within a map task activity by 16 speakers (2 men and 14

women). All the Hungarian informants were students learning Spanish, with a B1 level proficiency in the target language according to the *Common European Framework of Reference for Languages* (CEFRL, [15]). The average age of the speakers was 22.6 years (SD: 14.8). Altogether there were 160 declarative utterances analysed.

In both corpora, only declarative utterances of at least three syllables were taken into consideration, so as to observe the evolution of f_0 movements on a sufficient number of segments.

4. Method

Within this approach, melodic curve f_0 values are standardized, so that the contours can be objectively comparable. In the following sections the phases of standardization are discussed.

The first phase of the analysis is applied to get rid of all irrelevant micromelodic variations, by reducing each syllable to a characteristic tonal value, the one measured by default at the centre of the syllable by an acoustic analysis software such as *Praat* [16]. However, if there are tonal inflections within syllables, that is, interior tonal movements superior to 10%, the extreme values of f_0 are taken into account, and not the central one. The process is illustrated by Figure 2: in the utterance *Vas a pasar una casita* ‘You will pass by a small house’, the syllable *a* (a preposition) is characterized by 244Hz at the beginning, and at its endpoint the f_0 value measured is of 211Hz. This implies that there is a tonal instability within this syllable, so we cannot take its f_0 value measured at the centre of the syllabic nucleus, but the two extreme values must be taken into account instead.

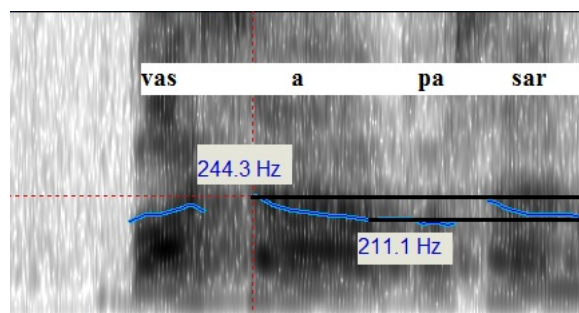


Figure 2: A spectrogram of the first part of the Spanish utterance *Vas a pasar una casita* ‘You will pass by a small house’ (the text is my addition), in which the second syllable is characterized by an inner inflection; its highest f_0 value is 244Hz (at the beginning) and the lowest f_0 value is 211 Hz (at the end).

In this case, both tonal values are represented in the curve (by inserting a dot within the syllable, so as to indicate the presence of an inner inflection within the syllable). The standardized contour is represented by a line starting with an arbitrary value

of 100% and anchoring in each syllable. The syllables are characterized by a percentage based on their tonal position as compared to the previous syllable. If the syllable has a lower f0 value, it receives a negative percentage, and if it is higher than the previous syllable, a positive value is assigned. In the case of the previous utterance, the first syllable *va* (literally ‘go’), with 210 Hz, receives the arbitrary value of 100 in the standardized curve, and the next value (of 244Hz) is assigned 116 in the standardized curve, as 244Hz is 16% higher than 211Hz (cf. Fig. 3).

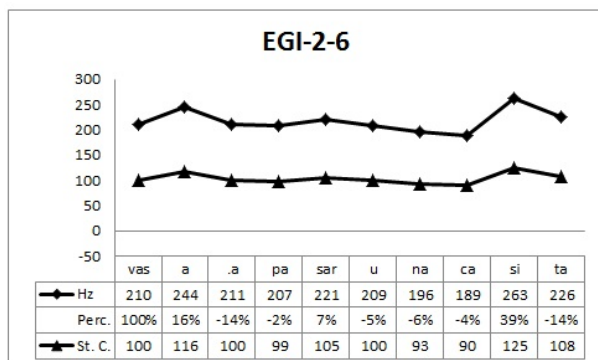


Figure 3: The absolute and the standardized f0 values of the utterance *Vas a pasar una casita* ‘You will pass by a small house’.

Both the absolute curve and its standardized copy are melodically identical, though in order to verify whether the standardized copy sounds the same as the original, it can be resynthesized in *Praat* and then submitted to a perceptive test. In case correction is needed, it can be realized as a final phase. The standardized curve ensures that the analysed melodies are objectively comparable to each other, what matters are the proportions of the tonal movements regardless of the individual tonal characteristics of the informants (cf. [13]).

The model was first applied to the description of the intonation of Spanish ([17], [18], [19]), and later it has been extended to the study of intonation concerning other languages, such as Catalan ([20], [21], [22]) or Chinese ([23]). The model has also been applied to the description of interlanguage intonation, such as the Spanish spoken by Brazilians ([24]), Italians ([25]), Swedes ([26]) or Hungarians ([27], [28], [29], [30], [31] or [32]).

This study deals with the range of the tonal movement expressed in terms of percentages from the utterance-first syllable to the next f0 turning point. The f0 turning point is defined as the first segment from which the direction of the melody changes (even if the change is of only 1%). The succession of rises or falls implies that relative values measured at subsequent syllables are

accumulated (and thus if for instance the first syllable is given the arbitrary 100%, the second, 120%, and the third, 125%, up to this syllable the value of tonal rise is of 25%).

Stressed and unstressed utterance-initial syllables were treated separately, as it was plausible that unstressed utterance-initial syllables would be more likely followed by a rise in native Spanish sentences than stressed utterance-initial syllables, these latter being potential f0 peaks by themselves. For this reason, only the results in the case of unstressed utterance-initial syllables were included in the analysis.

5. Results

According to the results, Hungarian learners of Spanish do realize utterance-first syllables followed by a fall rather than a rise, but this is also true for native Spanish spontaneous declarative sentences somewhat surprisingly, as attested in the corpus of this study, cf. Fig. 4 and Table 1:

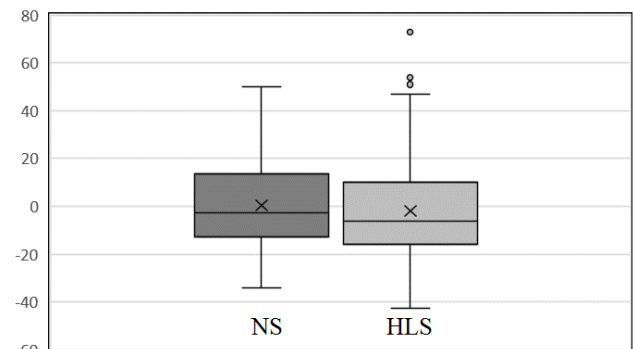


Figure 4: % of tonal movement to the first f0 turning point in both corpora

Table 1: The comparison of tonal movements to the first f0 turning point in both corpora.

	NS	HLS
Proportion of utterances with falling tonal movement to the first f0 turning point (%)	56.9	59.7
% of tonal movement to the first f0 turning point (average)	0.32	-1.91
Results (t-test for difference of means; equal variances)	Sig. 2-tailed: 0.49; p>0.05	

Unstressed utterance-initial syllables were followed by a fall in 56.9% of the native Spanish occurrences, in the case of HLS, this proportion was not significantly higher, 59.7%. Although the tonal movement to the first f0 turning point was characteristically a fall in both the native Spanish and the Hungarian Spanish realization, the average proportion of tonal change is positive in the case of NS (0.32% as the average value), and negative in the case of HLS (-1.91% as the average value).

Differences, however, have not proved to be statistically significant according to the two-tailed t-test for equality of means, at the 95% confidence interval ($p > 0.05$).

6. Discussion

The results found in this paper indicate that in fact HLS tend to produce utterance-initial segments in declarative sentences closer to their native patterns, with a fall from the first syllable on, as opposed to the normative rise which theoretically characterize native Spanish samples. Still, NS informants have not produced such radical utterance-initial rises either in this corpus, and in more than the half of the cases the tonal movement to the first f_0 turning point was a fall. This divergence from native patterns described in the literature can be explained by the fact that, as opposed to former works on pattern description, in this corpus the analysed utterances were spontaneous, not read or elicited. It is plausible that in spontaneous speech speakers are less conscious and reproduce normative intonational patterns less carefully.

Evidently, a more extended corpus and further intonational parameters analysed would help us to specify further which other prosodic cues (e.g., intensity, duration) contribute to the reported unnatural stress realization of HLS.

7. Conclusions

As Hungarians have word-initial stress by default, HLS were supposed to produce Spanish declarative utterances by additional prosodic prominence on the utterance-first syllables. As for melody, the prosodic trait investigated in this paper, this prominence was present in a sense that utterance-first syllables were characterized by high f_0 values followed by a fall. Still, results did not contrast remarkably with native Spanish patterns, as though Spanish neutral declarative sentences are reported to have a ‘suspension bridge’ shape melody, with a rise from the utterance-first syllable to the first peak, in this study this rise was less characteristic in the case of native Spanish samples.

As for future investigations, intensity values should also be discussed in order to have a more comprehensive description of Hungarian-Spanish interlanguage prosody, defining this way areas of negative linguistic transfer in second language acquisition, which need to be addressed in Spanish as a foreign language classrooms.

8. Acknowledgements

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