

A preliminary study of lexical pitch accents in the Split dialect of Croatian

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Abstract

The pitch accent system of the Split variety of Croatian exhibits an intermediate stage of the Neo-Štokavian retraction of stress, with the so-called “double accent” as the result. In this study, we examine acoustic data from eight female speakers of this variety. Although duration data point to stress on the initial syllable of the word – in line with the modern-day standard – energy data are more ambiguous. In addition, the rising lexical pitch accent is found to have a significant fall on the post-tonic syllable – a situation which suggests the separation of pitch from durational cues to stress.

Index Terms: lexical pitch accents, Croatian, dialectology, tonogenesis, sound change

1. Introduction

Croatian is a South Slavic language that, in the standard variety, is similar to the other officially recognized national languages Bosnian, Serbian and Montenegrin (collectively known as BCMS). Other South Slavic languages include Slovene, Macedonian and Bulgarian. These South Slavic languages, together with the Western and Eastern Slavic languages, are in turn descended from Proto-Slavic [1, p. 15].

In this paper, we consider the Split variety of Croatian [2], [3 p. 470–473]. Split is the second largest town in Croatia, with more than 160.000 inhabitants. In particular, we focus on the lexical pitch accents (LPAs) of the language, which in Croatian involve tonal alignment with the stressed syllable of the prosodic word.

Historically, BCMS is well-known for the leftwards retraction of stress, with the end result that the vast majority of words in the modern lexicon have stress (largely marked by extra duration) on the first syllable of the word [4, p. 671–733]. Consider the female name ‘Maria’ (in Croatian *Marija*), which in other European languages has stress on the second syllable:

ma.RI. ja

However, in Croatian, this word is stressed on the first syllable:

MA. ri. ja

Notably, this retraction of stress led to the creation of a contrast between rising and falling LPAs in the so-called Neo-Štokavian dialects, which are the basis for the standard language (in this paper, we also refer to the LPAs as “prosodemes”). Since historically a High tone was located on the stressed syllable of the word, the retraction of stress without a concomitant retraction of the High tone resulted in a pitch contrast that had not previously existed. In the case of ‘Maria’, it led to a rising pitch accent on the word (marked traditionally as *Màrija* in standard Croatian – note that the Croatian accentual notation does not correspond to the IPA), since the

high tone remained aligned with the second syllable /ri/, while the stress moved to the initial syllable /ma/.

MA. ri. ja

L H

In modern BCMS accentology, a Low tone is assigned to the first syllable of the rising prosodeme, to indicate a distinct low target on the stressed syllable – in a ToBI style notation [5], this has been denoted as L*+H (however for a different interpretation, see e.g. [6], [7]).

By contrast, a word such as *jàbuka* ‘apple’ has a falling pitch accent, whilst also having stress on the first syllable:

JA. bu. ka

H L

In this case, the High tone is aligned on the first syllable, but it also combines with a following Low tone to ensure that a fall occurs on the stressed syllable. In Godjevac’s ToBI analysis, this is denoted as H*+L.

Significantly, in the Split dialect of Croatian, the rising prosodeme has a variant that is referred to as a “double accent”. In this case, there is a perception of a rising accent on the initial, stressed syllable, followed by a fall on the post-tonic syllable. In the case of *Màrija* (with both a rising accent on the first syllable and a falling accent on the second syllable), one could hypothesise the following tonal associations:

MA. ri. ja

L H L

This “double accent” variant is considered a remnant of the historical state of the language before the leftwards retraction of stress [8, p. 9–11], [3, p. 470–471], [4 p. 49 (f. 107), p. 673, p. 686]. The old dialect of Split (one of the so-called Čakavian varieties) was characterized by older stress placement, closer to Proto-Slavic. The modern Split dialect is no longer Čakavian, but instead heavily Neo-Štokavianized due to the influence of the Neo-Štokavian hinterland and the standard dialect (Neo-Štokavian dialects have full stress retraction). However, the older Čakavian variants such as *Marìja* (with a falling accent on the second syllable) can still be heard from older speakers in Split, alternating with the double accent. Younger speakers alternate between the standard *Màrija* and the double accent.

In this study, we explore the duration, energy and pitch properties of the Split dialect prosodemes, with the aim of trying to understand the historical stages between stress retraction and the creation of distinct lexical prosodemes.

1.1. Some additional information on LPAs in Croatian

In addition to the contrast between rising and falling pitch accents, standard Croatian has a vowel length contrast which in traditional accentology combines with the pitch accents to create a 4-way contrast: Short Rising (SR), Short Falling (SF), Long Rising (LR) and Long Falling (LF). Although Croatian orthography provides accentual markings for all four prosodemes, in practice they are not written except to avoid

ambiguity, and most readers are not familiar with the accentual system. It should be noted that the vowel length contrast in principle carries a high functional load in both standard Croatian and in the Split variety, both lexically and grammatically (e.g. nominative versus genitive case). The system of pitch accents is likewise greatly affected by grammatical elements such as noun case. However, there are very few minimal pairs involving pitch only, and even fewer that involve the same grammatical class (using the traditional accentual notation, examples of nouns in the nominative include *pàra* (SF) ‘steam’ : *pàra* (SR) ‘money’, *Lúka* (LF) ‘Luke’ : *lúka* (LR) ‘port’).

It is also important to note that the contrast between rising and falling accents exists almost exclusively on polysyllabic words with stress on the first syllable. This is because monosyllabic words almost always have a falling accent (given that the pitch peak in the rising accent occurs on the second syllable – exceptions involve the deletion of a final vowel); and polysyllabic words with stress on a non-initial syllable almost always have a rising accent (in line with the historical situation for the language) – e.g. *iznòsiti* ‘to carry out’, which has a Short Rising pitch accent and stress on the second syllable. For this reason, in the present study, we only consider polysyllabic words with stress on the initial syllable.

Figure 1: Lexical pitch accents of standard Croatian.

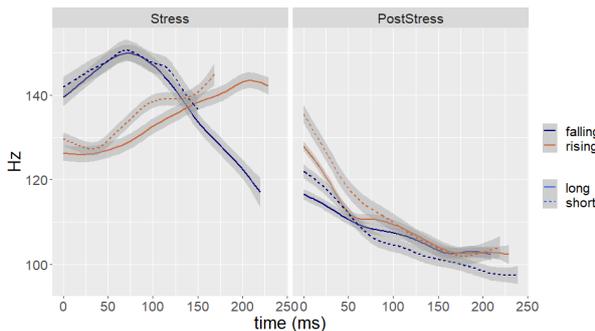


Figure 1 shows a typical pattern for the lexical pitch accents of standard Croatian. The rising and falling pitch accents are denoted by colour differences, and the length contrast is denoted by linetype. These data are based on 256 word tokens produced by the second author of this paper, a speaker of Standard Croatian, using the same set of stimuli as were used for the recordings of Split speakers (details below).

It can be seen that the falling prosodemes have a clear fall on the initial stressed syllable. The rising pitch accents have a rise over the course of the initial stressed syllable; however, the starting point of the rise is higher than the end point of the falling pitch accent, due to the presence of a low phrasal tone at the right-edge of the single-utterance for this speaker. In the post-stress syllable, the rising prosodeme begins slightly higher than the falling prosodeme, but within 50 ms of the post-stress vowel, the differences are almost non-existent (these data have been GAM-smoothed for ease of interpretation).

Figure 2 shows boxplots for duration of the stressed vowel (left panel) and the post-stress vowel (right panel), for the same data as was shown in Figure 1. It can be seen that while the short vowels in the stressed syllable tend between 100 and 150 ms, the long vowels tend between 150 and 200 ms. Importantly, there is a tendency for the rising prosodemes within each length pair to be longer than the falling prosodemes. It is usually

assumed that this is due to the greater time required to achieve a rise in pitch, as opposed to a fall in pitch [9]. By contrast, vowel duration in the post-stress syllable tends to be between 50 and 100 ms (the great variability in this panel is due to the fact that the data only represent one speaker, and we did not control for post-tonic phonemic vowel length).

Figure 2: Duration of stressed and post-stressed vowels in standard Croatian.

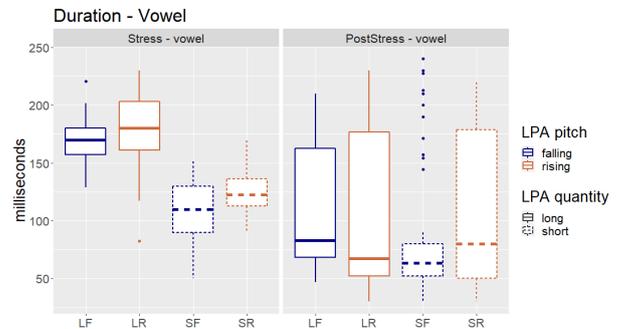


Figure 3: Mean RMS Energy of stressed and post-stressed vowels in standard Croatian.

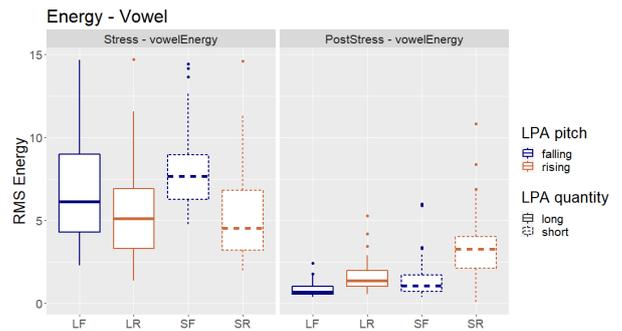


Figure 3 shows the mean RMS energy calculated across the entire vowel for this same set of data. It can be seen that the stressed vowel (left panel) clearly contains more energy than the post-stressed vowel (right panel), thus providing further evidence of lexical stress on the initial syllable of the word. It may also be noted that the falling pitch accents have more energy than the rising accents for the stressed vowel, while the opposite pattern holds for the post-stressed vowel. This mirrors the overall pitch levels across the respective syllables.

In the remainder of this paper, we present the prosodemes of the Split dialect, and consider to what extent they reflect the historical situation of stress retraction.

2. Method

2.1. Speakers and recordings

Eight female speakers of the Split variety were recorded in March 2022 at the Department of Phonetics recording studio at the Faculty of Humanities and Social Sciences, University of Zagreb, under the supervision of a recording technician and the second author. All speakers were born in Split between 1996 and 2002 (with most born between 1999 and 2002), and had arrived in Zagreb for their university studies between 2015 and 2021.

lexical high at the left edge. By contrast, the variety shown in Figure 1 has a much more distinct rise over the course of the stressed vowel, due to a lower initial starting point.

Please note that the great variability seen in the pitch contours at the right edge of the post-stressed vowel, especially the short vowels (dotted lines), is likely due to the different intonation patterns adopted by different speakers – some adopt a final fall, some a rising contour, and some a level contour.

Figure 5: Duration of stressed and post-stressed vowels in Split variety.

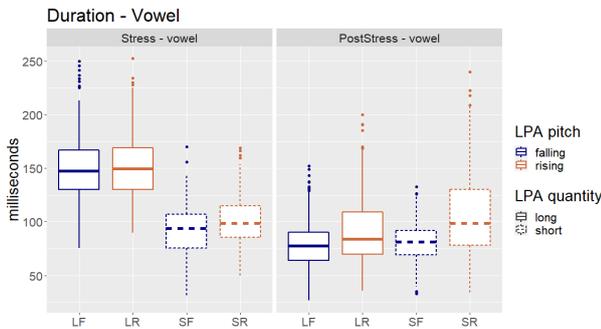


Figure 6: Mean RMS Energy of stressed and post-stressed vowels in Split variety.

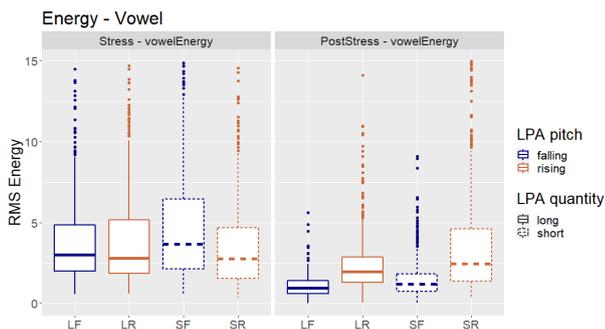


Figure 5 shows the duration data for stressed and post-stress vowels for the Split variety – this figure is parallel to Figure 2. Similar durational differences between the long and short prosodemes are once again evident in the stressed vowel (left panel). However, it seems that the differences in duration between rising and falling prosodemes in the stressed vowel are not so obvious in the Split variety as they are in some other varieties. It would also appear that there is not quite so much difference between stress and post-stress vowel duration in the Split variety (at least, comparing short stressed vowels with post-stressed vowels). However, given that we have not been able to control for post-tonic vowel duration, this observation is very tentative; it should also be noted that post-tonic vowel length mostly occurs following rising prosodemes (in both the standard and in the Split variety of Croatian).

Figure 6 shows the mean RMS energy for stressed and post-stress vowels for the Split variety – this figure is parallel to Figure 3. It can be seen that the difference in energy between the stressed vowel and the post-stress vowel is not as great in the Split variety as in the standard. Indeed, a calculation of differences in energy between the stressed and post-stress vowel gives a mean value of 4.2 dB for the variety deemed the standard here, but only 1.2 dB for the Split variety. This suggests that one of the standard cues to lexical stress is not as

strong in the Split variety, a fact which may contribute to the perception that it is more difficult to locate the “stressed” syllable in this variety. It may also be noted that whilst the rising prosodemes have more energy than the falling prosodemes in the post-stress syllable in the Split variety, any differences are less clear in the stressed syllable. This difference in the post-stress syllable is possibly a reflection of the greater differences in pitch in the post-stress syllable as compared to the stressed syllable.

4. Discussion

Our results confirm the possibility of a “double accent” for the Split rising prosodemes (brown lines). There is indeed a high fall on the post-tonic syllable (as opposed to a mid fall in the standard variety), following an initial rise on the stressed syllable. Notably, this initial rise is not quite as extensive as the rise that is typically observed for the standard variety (as exemplified by the second author of this paper).

A second finding of the present study concerns a possible post-lexical High tone at the left edge of the prosodic unit (word or phrase) in the Split variety. This possible High tone serves the function of raising the overall pitch on the initial syllable. As a result, the falling prosodeme (blue lines) begins extra high, without the initial slight rise in pitch that is seen in the standard variety. It is possible that this initial High interacts with the lexical pitch accents, either adjusting their timing, or adjusting the f_0 target. To what extent such an initial post-lexical High tone may play a role in diachronic changes in stress and lexical pitch accents is an interesting consideration.

A third finding of our study concerns the important cues to lexical stress, namely duration and energy. Duration results confirm that lexical stress is located on the initial syllable of the words in the Split variety, as is also the case for the standard Croatian language. However, the energy results for Split did not show quite the same difference between the stressed and post-stressed syllables that were evident in the “standard” speech of the second author. In terms of energy, the first two syllables may be perceived as being relatively more even in the Split variety. It is quite likely that this relatively equal energy, combined with the high fall in the post-stress syllable for the rising prosodemes, is an important factor in the perception that the location of stress is not quite so obvious in the Split variety, particularly for the rising prosodemes. As such, speakers may perceive neither the fully retracted Neo-Štokavian *Màrija*, nor the unretracted Čakavian *Marìja*, but an intermediate double accent form: *Màrija*.

At this stage, we may tentatively hypothesize that historical stress retraction does not involve the simultaneous retraction of all cues to stress. In the present case, it seems that whilst durational cues retracted, energy cues may not have – or alternatively, energy cues were not present, but were subsequently innovated when duration cues retracted. Importantly, the High tone that did not retract (i.e. the High tone of the rising prosodeme) seems to be extra high in the Split variety, leading to the perception of a fall in the originally stressed syllable. In the standard variety, the High tone of the rising prosodeme is not quite as high: this suggests that the retraction of stress later led to a more salient pitch movement (i.e. a rise) on the newly stressed syllable.

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