



Vocative Intonation in Bulgarian

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Abstract

The study investigates vocative intonation in Bulgarian. Nine female native speakers of Standard Bulgarian produce 3 repetitions of 10 names, 2 to 4 syllables long, with final or penultimate stress in 4 different scenarios within a Discourse Completion Task in order to elicit neutral vocative, insistent vocative, challenging chant and vocative chant. We find that speakers make both consistent and variable tune choices, with some using identical tunes across scenarios and others employing different tunes within the same scenario. If there is insufficient segmental material, speakers employ diverse strategies in the realization of the two chants, adding syllables or truncating the final part of the tune. In [-long] vocative tunes, non-high vowels in unstressed positions undergo raising without merging with their higher counterparts. In [+long] tunes, however, the final (posttonic) vowel does not undergo reduction, which contradicts the phonological vowel reduction pattern in Bulgarian, but is in line with findings for other languages. The study enhances the understanding of the interplay between phonetics and phonology in vocative intonation research.

Index Terms: Bulgarian vocative intonation, tune-text interaction, inter- and intraspeaker variability

1. Introduction

Stylized intonation which is used in calls across several languages (e. g. English [1], Greek [2], German [3, 4], Serbo-Croatian [5], Dutch [6], Hungarian [7], Spanish [8], Romanian [9], Polish [10], Arabic [11], Czech [12]) typically involves a rise to a high fundamental frequency (F0) level, followed by a sustained pitch in the middle range of the speaker. This tune is also referred to as vocative chant [1], chanted call [23], or stylized fall [25]. It is commonly associated with pleasant and friendly situations, and is typically used when calling children or close group members from a distance in everyday scenarios [10]. Different languages show variations in meaning and realization of the tune, often using additional prosodic modulations: stress shift, vowel lengthening, vowel insertion, promotion of reduced vowels to full (for an overview see [13]).

As for Bulgarian, [14] describe briefly four vocative contours based on pragmatic and functional considerations: (i) neutral vocative, (ii) insistent vocative, (iii) challenging chant, and (iv) vocative chant. The tune of the neutral vocative is L+H* L-%. The same pitch accent is used in the insistent vocative, but the nuclear and the final syllables of the name are lengthened (L+<H* L-% [+long]). The lengthening which causes the peak delay distinguishes the insistent from the neutral vocative. The tune of the challenging chant is analyzed as consisting of L* on the lexically stressed syllable followed

by the edge tones H-L% – a gradual rise whose peak is reached on the last syllable followed by a fall. The vocative chant is a rising pitch movement followed by a sustained high to mid plateau (L+H* !H-% [+long]). The final syllable is lengthened, has higher intensity, and a F0 change; also, its vowel does not undergo complete reduction, which contradicts the phonological vowel reduction pattern in Bulgarian [15].

In a recent study [16], the prosodic features of calling contours in the realizations of elderly bilingual speakers of Bulgarian and (Bulgarian) Judeo-Spanish (ages: 70-100, mean: 79.9), as well as elderly monolingual Bulgarian speakers as a control group (ages: 82-97, mean: 87.8), were examined across three pragmatic contexts: neutral, positive, and negative. The findings reveal that the two languages share the same inventory of calling contours: (i) the widely attested “vocative chant”, L+H* !H-%, (ii) L+H* H-L%, and (iii) L+H* L-%. However, these are not evenly distributed across contexts and languages: the monolingual and bilingual speakers were found to use predominantly (i) and (ii) in neutral and positive calling contexts and (iii) in negative contexts when speaking Bulgarian. In Judeo-Spanish, on the other hand, this tendency was less strong since (iii) also occurred regularly in neutral and positive contexts. Also, the bilingual speakers generally showed more variability across contexts when speaking Judeo-Spanish. Comparing the results from the two studies it can be concluded that the neutral and the positive vocative tune predominantly used by the speakers in [16] – L+H* !H-% with lengthened nuclear and post-nuclear syllable(s) – corresponds to the vocative chant in [14]. Whereas [16] only describe a single negative tune, [14] distinguish between two – insistent vocative and challenging chant. The tune used in the negative condition in [16] differs from the challenging chant in [14] only with respect to the nuclear pitch accent type (see Table 1).

Table 1: Comparison of vocative tunes in different pragmatic conditions reported for Bulgarian.

	Grünke et al. (2023)	Andreeva & Dimitrova (forthcoming)
neutral	L+H* !H-% [+long]	vocative chant: L+H* !H-% [+long] neutral vocative: L+H* L-% [-long]
positive	L+H* !H-% [+long]	–
negative	L+H* H-L% [-long]	challenging chant: L* H-L% [-long] insistent vocative: L+<H* L-% [+long]

Building on the results by [14] and [16] and the sparse data in the literature, our research investigates vocative intonation in Bulgarian more systematically using data from a larger corpus of recordings by a younger speaker generation. Our research questions are:

- (1) What is the role of the pragmatic context in determining the phonological patterns of vocative intonation in Bulgarian?
- (2) Is there intra- and inter-speaker variation in the choice and realization of these patterns?
- (3) Is the observation in [14] regarding absence of vowel reduction in the vocative chant confirmed by the empirical data?

2. Method

To answer our research questions, following the methodology used for other languages [4, 10], we designed a discourse completion task (DCT) in (the) four different pragmatic conditions (reported by [14]). Using DCT, we were able to obtain semi-spontaneous productions while controlling for specific pragmatic factors.

2.1. Corpus and participants

We recorded 11 female speakers producing 36 names in quiet environments with a Shure WH20 dynamic headset mounted microphone, digitized with a Behringer U-Phoria UMC202HD audio interface unit at a sampling rate of 44,100 Hz and a 24-bit resolution, stored as PCM-encoded single channel wav files. To elicit vocative intonation, we asked the participants to address an interlocutor by (i) asking them a question (neutral vocative), (ii) scolding them (insistent vocative), (iii) threatening them (challenging chant), and (iv) calling the person’s name to attract their attention (vocative chant). Each speaker recorded three blocks of utterances. In each block the pragmatic contexts (to which we will also refer as “scenarios”) were randomized and within each scenario the names were also presented in random order. Examples of the different scenarios, using the name ‘Ivona’, are given in Table 2.

Table 2: *Pragmatic scenarios and target utterances for elicitation of vocative intonation.*

scenario	target utterance
(i) <u>neutral vocative</u>	
You meet your friend Ivona in the street.	Ивона, къде отиваш? (Ivona, where are you going?)
(ii) <u>insistent vocative</u>	
Ivona’s behavior is unacceptable and you have warned her several times.	Ивона, прекаляваш! (Ivona, you are going too far!)
(iii) <u>challenging chant</u>	
Ivona is up to mischief, and you are threatening to punish her.	Ивона, внимавай! (Ivona, be careful with your actions!)
(iv) <u>vocative chant</u>	
You call Ivona’s name from a distance to attract her attention.	Ивона! (Ivona!)

For the present study we analyzed a group of nine female speakers of Standard Bulgarian (mean age 48.4, median age: 43, SD 11.3) producing the following ten names, 2 to 4 syllables long, with stress on the final or the penultimate syllable: Мадлен /mæ'dlɛn/, Ивон /i'vɔn/, Любов /lʉ'bɔf/, Аспарух

/ɛsprɛ'ruħ/, Борко /'bɔrko/, Ивона /i'vɔnɐ/, Александър /ɛlɛ'ksandr/, Десислава /desi'slavɐ/, брато /brɛ'tɔ/, душко /'duʃko/. The last two are frequently used forms of address which were included in order to provide the material needed for investigating the current impressionistic observations on the vowel reduction patterns in Bulgarian vocatives reported in [14].

2.2. Annotation

First, target word (name), syllable, and vowel boundaries were labelled manually in Praat [17] on the basis of the synchronized spectrogram, waveform, and audio signal. Vowel boundaries were determined by the presence of clear formant structure and sharp changes in intensity. Additionally, all accented syllables were marked. Finally, the pitch accents and boundary tones were annotated by the authors using BG_ToBI [14]. Occasional disagreements were resolved after discussion and repeated listening. The target name always constituted a separate intermediate (ip) or intonation phrase (IP). Praat scripts were used to extract midpoint F1 and F2 frequencies and the annotated tune labels per speaker, scenario and name.

2.3. Statistical analyses

To determine the patterns of vowel reduction observed in [14] in the different scenarios, linear mixed models with the respective measure (VOWEL DURATION, F1, F2) as dependent variable, SPEAKER and NAME as random factors, and VOWEL (/a/[+str], /a/[-str], /ɔ/[+str], /ɔ/[-str], /u/[+str]) as independent variable, were computed for [+long] vs. [-long] boundaries in separate analyses by means of JMP 17.2.0 [18]. Separate Tukey post-hoc tests were carried out per variable, if appropriate. The confidence level was set at $\alpha=0.05$.

3. Results

3.1. Use of phonological patterns in different pragmatic contexts

In each scenario we found a predominant tune as well as inter- and intra-speaker variation in the choice of pitch accents and boundary tones. Table 3 illustrates the distribution of the tunes attested in our corpus in the different pragmatic contexts.

Table 3: *Distribution of tunes across different pragmatic contexts (NV: neutral vocative, IV: insistent vocative, CC: challenging chant, VC: vocative chant).*

tune	NV	IV	CC	VC
L* H-H%, L+H* H-H%	168	129	53	5
(L+)H* L-%, H+!H* L-%	65	84	18	48
L* H-L% [+long]	13	39	183	-
L+H* (!)H-% [+long]	21	16	2	217
Uncertain	2	4	3	-
Total	269	272	259	270

For the neutral and insistent vocatives, we found that the predominant tune is a rising one (see Figure 1). It is used in 63% and 47% of the cases, respectively, which contradicts the description in [14].

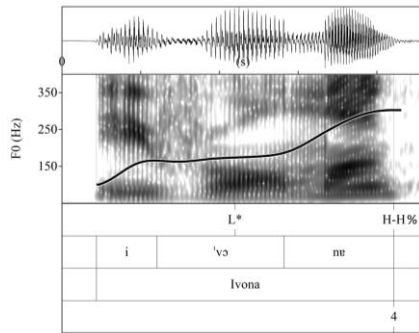


Figure 1: *The default neutral vocative tune L* H-H%*

The falling tune is also used (see Figure 2), but only in 29% of the cases in the neutral vocative scenario. In 8% of the cases a sustained mid plateau is used. However, in the insistent vocative scenario the falling tune is used almost as frequently as the rising one – in 45% of the cases.

The predominant tunes of the challenging (see Figure 3) and the vocative (see Figure 4) chants are the same as those described in [14]. They are used in 71% and 80 % of the time, respectively. However, in our data it is the challenging chant and not the insistent vocative that is characterized by the feature [+long].

Our analyses of the tunes found in the data revealed that in some of the pragmatic contexts under investigation the speakers used vocative tunes not previously mentioned in the literature. Besides, we found that some speakers used the same tune in different pragmatic contexts; for example, the rising tune L* H-H% was used by most speakers in both the neutral and the insistent vocative scenarios. On the other hand, some speakers used different tunes in the same pragmatic context; for example, they used both the falling and the rising tune in the insistent vocative scenario.

As for the vocative chant, we observed a lot of variability when the name has final stress. Five of the speakers consistently added a syllable in order to provide enough segmental material for the realization of the default tune (see Figure 5). One of the speakers never added a syllable but preferred to use a final falling tune (see Figure 6) or a high sustained plateau without any downstep. The latter strategy is typical for truncating languages: the second (downstepped) part of the contour is not realized and the tune ends high. The remaining three speakers used all three strategies described above.

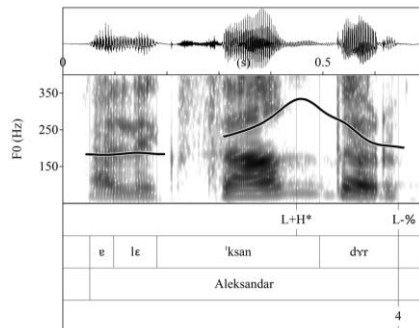


Figure 2: *The falling neutral vocative tune L+H* L-%*

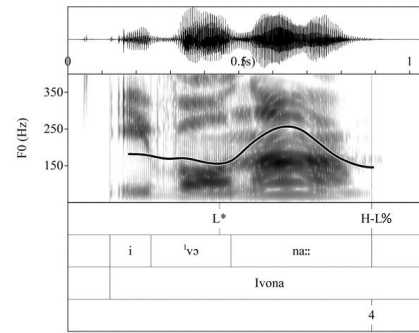


Figure 3: *The default challenging chant tune L* H-L%*

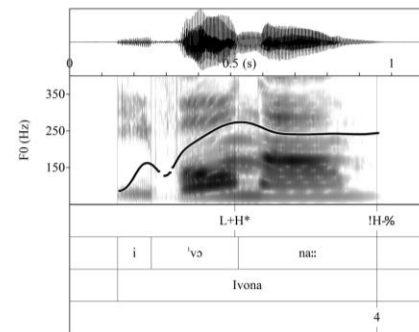


Figure 4: *The default vocative chant tune L+H* !H-%*

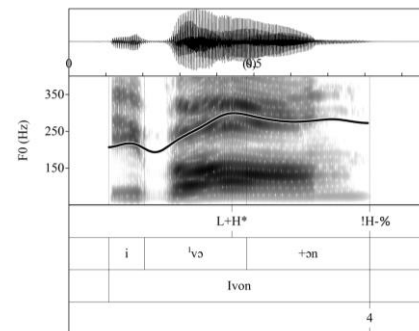


Figure 5: *Realization of the vocative chant tune with an added syllable [+ən] on the name /i vɔn/*

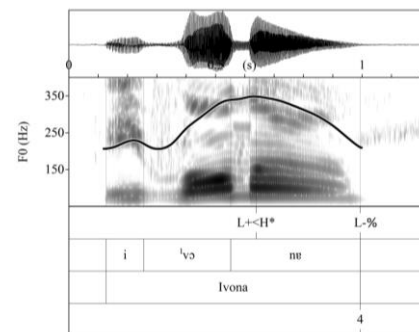


Figure 6: *Final falling tune L+<H* L-% used in the vocative chant scenario*

When the nuclear syllable is the last one in the phrase, the prevailing intonation pattern L* H-L% in the challenging chant is fully realized if there is enough segmental material (open syllable or closed syllable with sonorant coda). However, if the final syllable is closed by an obstruent, the final falling part of the intonation pattern is truncated.

3.2. Tune-text interaction

The Standard Bulgarian stressed vowel system consists of six vowel phonemes, which phonetically range from high /i u/, to mid /ɛ ɤ ə/, to low /a/. The non-high /a ə/ are raised in unstressed position and merge with their higher counterparts /ɤ u/, respectively [15,19, 20]. If the observations in [14] are true, we expect unstressed /a/ and /ə/ to remain similar to their stressed counterparts /ɤ/ and /u/, respectively, instead of being raised in final position in [+long] realizations of vocative and challenging chant tunes.

Our analyses reveal significant main effect of vowel as independent factor on duration, F1 and F2. Unstressed /a/ (303.57 ms) is longer than /ɤ/ (209.21 ms) which in turn is longer than stressed /a/ (156.65 ms) (F [1, 9.6] = 42.0910, $p < .0001$). This somewhat surprising result can be explained by the fact that unstressed /a/ in our target names appears in final position, and is affected by the feature [+long] characteristic of these vocative contours; in addition, it is also subject to final lengthening. On the other hand, stressed /a/ does not occur in final position in our data. Unstressed /ə/ (285.94 ms) is also longer than stressed /ə/ (207.52 ms) and /u/ (116.60 ms) (F [3, 431.1] = 61.8350, $p < .0001$). Since stressed /ə/ also appears in final position in our data, the difference in duration between it and unstressed /ə/ is smaller than the difference between stressed and unstressed /a/.

We also found a main effect of the independent variable vowel on F1 and F2. With respect to F1, stressed and unstressed /a/ are more open than /ɤ/ (F [1, 202.4] = 97.7183, $p < .0001$), while stressed and unstressed /ə/ are more open than /u/ (F [3, 202] = 74.5846, $p < .0001$). With respect to F2, /ɤ/ is more fronted than stressed and unstressed /a/ (F [1, 201.9] = 3.3927, $p = .0355$), and stressed /u/ is more fronted than unstressed /ə/ (F [3, 363.9] = 3.4616, $p = .0086$).

These findings confirm the observation made in [14]. We can conclude that in Bulgarian vocative tunes with the feature [+long] affecting the final syllable of the segmental string vowel reduction is blocked.

With respect to the vocative tunes not characterized by additional lengthening of the final syllable, which we mark as [-long], we expect raising of the non-high vowels /a ə/ and merging with their higher counterparts /ɤ u/ in unstressed position. We did not find significant differences in duration between stressed and unstressed /a/, and stressed and unstressed /ə/. The only difference was that unstressed /ə/ was longer than stressed /u/ (F [1, 52.9] = 3.3168, $p = .0440$). Stressed /a/ is more open than unstressed /a/, which is more open than /ɤ/ (F [1, 124.1] = 51.6939, $p < .0001$). The same holds true for stressed /ə/ which is more open than unstressed /ə/, which in turn is more open than stressed /u/ (F [1, 42.9] = 52.9829, $p < .0001$).

With respect to F2, /ɤ/ is more front than stressed /a/, which in turn is more front than unstressed /a/ (F [1, 130.0] = 13.5823, $p < .0001$), and stressed /ə/ and /u/ are more front than unstressed /ə/ (F [1, 206.6] = 25.2104, $p < .0001$). Our results corroborate claims in the literature that the non-high vowels /a/ and /ə/ in unstressed position undergo raising. However, in our data there

is no evidence of these vowels merging with their higher counterparts /ɤ/ and /u/.

4. Discussion

In this study, we systematically explored vocative intonation in Bulgarian, building upon previous research [14, 16] and utilizing a corpus of recordings from a younger speaker generation. Our research questions focused on the role of pragmatic context in determining phonological patterns, the examination of intra- and inter-speaker variation in tune choice, and the confirmation of previous observations on vowel reduction.

Our findings provide valuable insights into the phonological landscape of vocative intonation in Bulgarian. Contrary to previous descriptions [14], we observed that the rising tune dominates in both neutral and insistent vocative scenarios. The challenging and vocative chants largely adhered to the patterns reported in [14], constituting the predominant tunes in 71% and 80% of the instances, respectively. However, our investigation revealed additional vocative tunes, suggesting a broader array of intonational possibilities than previously documented in the literature. Furthermore, we identified instances of both consistency and variability in tune selection across different pragmatic contexts and speakers.

In cases where vocative tunes lacked additional lengthening (marked as [-long]), our results supported claims for unstressed /a/ and /ə/ raising, but did not indicate merging with their higher counterparts /ɤ/ and /u/. In contrast, for tunes marked as [+long], our analysis of vowel duration, F1, and F2 indicated that extreme lengthening hindered posttonic vowel reduction. This result aligns with prior studies on Bulgarian, (Bulgarian) Judeo-Spanish, European Portuguese, and Chukchi [14, 16, 21, 22] and contributes to the ongoing discourse on the potential phonological status of lengthening, echoing proposals by [21, 23, 24] that if lengthening can override such obligatory phonological processes, it suggests a non-phonetic nature.

The lack of reduction of the final vowel in both challenging and vocative contexts in our data can be attributed to association rules between tune and text in Bulgarian: the phrase accent is secondarily associated with a posttonic metrically strong syllable, if there is one [25]. The longer duration of the final posttonic syllable in the vocative and the challenging chant results from the insertion of an additional beat on it, making it metrically strong which blocks the reduction of its vowel. As a consequence of this restructuring of the metrical grid, the phrase accent H- is secondarily associated with this syllable.

Considering the impact of duration on vowel behaviour in our study, we suggest that future research to explore the perception of vocative intonation is needed to illuminate the significance of duration in the prosodic representation of calling contours. This avenue of inquiry has the potential to contribute valuable insights into the broader understanding of the interplay between phonetics and phonology in vocative intonation across diverse linguistic contexts.

In conclusion, our study enhances the understanding of vocative intonation in Bulgarian. The observed patterns highlight the dynamic nature of intonation in different pragmatic contexts. Our findings contribute not only to the knowledge of Bulgarian intonation but also to the broader field of studies on vocative intonation.

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