Article

Vocative Intonation in Language Contact: The Case of Bulgarian Judeo-Spanish

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Abstract: The present study investigates the prosodic realization of calling contours by bilingual speakers of Bulgarian and (Bulgarian) Judeo-Spanish and monolingual speakers of Bulgarian in a discourse completion task across three pragmatic contexts: (i) neutral (routine) context—calling a child from afar to come in for dinner; (ii) positive context—calling a child from afar to get a present; and (iii) negative (or urgent) context—calling a child from afar for a chastising. Through quantitative analyses of the F0 span between tonal landmarks, alignment of pitch peaks, intensity, and durational and prominence patterns, we systematically account for the phonetic characteristics of the contours and determine their tonal composition and meaning, thereby situating them within the intonation systems of Bulgarian Judeo-Spanish and Bulgarian. It is shown that both languages use the same inventory of contours: (1) L+H* !H-% (the so-called "vocative chant"), (2) L+H* H-L%, and (3) L+H* L-%. However, their distribution differs across contexts and varieties. Monolingual and bilingual speakers of Bulgarian, on the one hand, predominantly use (1) and (2) in neutral and positive contexts and clearly prefer (3) in negative contexts. In Bulgarian Judeo-Spanish, the bilinguals also more often recur to (3) in neutral and positive contexts and generally show more variation.

Keywords: vocatives; intonation; calling contours; Judeo-Spanish; Bulgaria; language contact

1. Introduction

Vocatives mainly serve the purpose of calling someone or attracting somebody's attention. Different languages use different means to mark them. In intonation languages, they are typically realized with particular calling contours. Nevertheless, vocatives are usually understudied in the intonational literature (Quiroz and Żygis 2017) and, even though the permeability of intonation in language contact is by now a widely established fact, there are hardly any studies on vocative intonation in contact situations to date (see Section 2.2). The aim of this paper is to contribute to closing this gap by investigating calling contours in Bulgarian Judeo-Spanish (BJS) and its main contact language, Bulgarian (BG). Judeo-Spanish refers to the varieties of Spanish spoken by the Sephardic Jews in their new areas of settlement (mostly in the former Ottoman Empire and North Africa) after their expulsion from the Iberian Peninsula at the end of the 15th century. The Bulgarian variety of the language is critically endangered at present and has probably less than 30 native speakers, all of whom are dominant in BG (see Section 2.1).

Despite several studies on BJS intonation (Andreeva et al. 2017, 2019), which have revealed that BJS and BG use the same repertoire of pitch accents and boundary tones and also share other prosodic characteristics, there are no descriptions of its intonational phonology so far. This paper, therefore, takes a first step in this direction in that it investigates calling contours in a new data set, recorded in November 2022 and March 2023 from 13 BJS–BG bilinguals and 6 BG monolinguals using a discourse completion task with three contexts designed for the elicitation of vocatives: (i) neutral (routine) context—calling a

child from afar to come in for dinner; (ii) positive context—calling a child from afar to get a present; and (iii) negative (or urgent) context—calling a child from afar for a chastising.

The aim of investigating vocative intonation is twofold. First, we wish to systematically examine the respective calling contours to account for their phonetic realization and determine their tonal composition and meaning, thereby situating them, insofar as the available research allows, within the intonation systems of BJS and BG, respectively. More particularly, quantitative analyses will be carried out across the following parameters: (i) F0 span between selected tonal landmarks with respect to the initial rise and the final fall, (ii) alignment of selected tonal landmarks with respect to the nuclear and final syllable, (iii) intensity, and (iv) duration of the stressed syllable and word. Second, we strive to analyze and relate the intonational strategies employed by the bilinguals in their two languages and find out how they compare to monolingual speakers of BG. The discussion of inter-language and inter-speaker variation will help assess whether (or how strongly) BJS is affected by intonational convergence with the dominant surrounding language, BG, and thus contributes to the growing knowledge about intonation in bilinguals and language contact. The results show that BJS and BG share the same three calling contours, which are phonetically realized in the same way across languages and pragmatic contexts: (1) L+H* !H-% (the so-called "vocative chant"), (2) L+H* H-L%, and (3) L+H* L-%. However, these contours are distributed differently across contexts and languages. Monolingual and bilingual speakers of BG, on the one hand, mainly resort to (1) and, to a lesser extent, (2) in neutral and positive contexts; in urgent contexts, they clearly prefer (3). In BJS, on the other hand, the bilinguals also frequently make use of (3) in neutral and positive contexts and their choices are generally less uniform, i.e., their intonation presents more variation.

The paper is structured as follows. Section 2 provides some background on (Bulgarian) Judeo-Spanish, its sociolinguistic situation, and intonation (Section 2.1) as well as on vocatives and their intonation in language contact (Section 2.2). Section 3 presents the material and methods of the present study. Section 4 lays out the results and Section 5 concludes the paper.

2. Background

2.1. (Bulgarian) Judeo-Spanish

The term Judeo-Spanish refers to the language spoken by the descendants of the Sephardic Jews who were expelled in 1492 from the Iberian Peninsula by the Catholic Monarchs, Isabella I of Castile and Ferdinand II of Aragon, during the violent (re-) Christianization following the *reconquista*. In the refugees' settlement areas, their Spanish, which is often called Ladino or Judezmo today (Schwarzwald 2018), came into contact with numerous typologically different languages, among them Arabic, Greek, Turkish, and Slavonic languages such as BG (see Minervini 2006; Quintana 2006a, 2006b, among others). Besides North Africa and Flanders (where the contact with the Hispanic world continued until the separation from Spain in 1789), the Ottoman Empire was the main area of settlement and, in its successor states (including Greece, Turkey, Serbia, and Bulgaria), large Sephardic communities existed until the 20th century. Judeo-Spanish was regularly acquired as an L1 in Sephardic families and used within these communities on a daily basis, while family-external communication with the non-Jewish population was held in Bulgarian (see, e.g., Canetti 1977). In 1934, about 50,000 inhabitants of Bulgaria, i.e., 0.8% of the population, were of Mosaic faith (Abramson 2005, p. 292). Despite Bulgaria's political alliance with Germany during the Second World War, they were largely spared from deportations, not least due to support from the government and the non-Jewish population (Abramson 2005, pp. 291–92; Hoppe 2009). The large wave of emigration, especially to Israel, which began after the foundation of the People's Republic of Bulgaria in 1946 and comprised about 90% of the Jewish population, considerably reduced the number of Sephardic Jews in Bulgaria. Today, fewer than 2500 Sephardim still live in the country (Studemund-Halévy and Fischer 2013) and probably less than 30 of them, born between the 1920s and the 1960s, can be considered native speakers of Bulgarian Judeo-Spanish

(BJS). All of them are clearly dominant in Bulgarian and most of them learned BJS only from their grandparents, while they used Bulgarian with their parents, i.e., they can be qualified as semi-speakers or terminal speakers in the sense of Grinevald and Bert (2012). We thus not merely deal with a highly endangered variety of Judeo-Spanish but also with a dying one, which is no longer transmitted to the next generations. Nevertheless, some of its speakers are still fairly fluent and the activities of the *Klub ladino*, founded in Sofia in 1998 to create a site where Judezmo speakers could meet and communicate in their language (Studemund-Halévy and Fischer 2013), recently led to some modest revitalization (including the publication of a series of books and leaflets). Unfortunately, these meetings had to be given up during the COVID pandemic and have not been taken up again since then; this was also due to the reduced mobility and, in some cases, demise of the participants. In general, the speakers whom the authors of this paper were in touch with reported that they virtually never speak the language nowadays because they have no one to speak to in it.

It comes as no surprise that a variety such as BJS, which has been used by multilingual speakers in multilingual contexts for more than five centuries, exhibits several linguistic characteristics that can plausibly be traced back to cross-linguistic influence from the surrounding language (BG). While these contact-induced features set BJS apart from other Judeo-Spanish varieties and may thus qualify as innovative structures, other characteristics rather pattern with those of Old Spanish and consequently can be interpreted as signs of archaism. Both innovative and archaic structures can be found at all linguistic levels and across all varieties of Judeo-Spanish (see, e.g., Quintana 2006a; Gabriel and Grünke 2022).

As for BJS, Fischer et al. (2014) and Gabriel and Grünke (2022) have shown that BJS speakers accept and produce constructions with preposed non-subject XPs in information-structurally neutral contexts, which is in line with both Old Spanish and BG but crucially not with Modern Mainstream Spanish. The same applies to the expression of possession, which is achieved through a wide range of constructions in BJS (Gabriel and Grünke 2022). Furthermore, Fischer and Vega Vilanova (2018) have shown that the verbal aspect exhibits a certain variability in BJS, which they trace back to contact with BG. Regarding phonetic and phonological aspects, recent studies have shown that bilingual speakers of BJS transfer the feature of unstressed vowel raising from the majority language (BG) to BJS (Fischer et al. 2014), though to different degrees depending on the variety of BG they acquired in early childhood (Gabriel and Grünke 2018; Grünke et al. 2023). The durational reduction in unstressed vowels is also mirrored in global speech rhythm, i.e., BJS is situated between monolingual Sofia BG and Castilian Spanish with respect to the variability of vocalic intervals in the speech signal (Fischer et al. 2014, p. 99). Gabriel and Kireva (2014a) consequently argue that Sofia Judeo-Spanish has strongly converged with BG at the rhythmic level. At the intonational level, as shown by Andreeva et al. (2017) for read data and by Andreeva et al. (2019, 2021) for spontaneous speech, BJS and BG use the same repertoire of pitch accents and boundary tones, which the authors again interpret as intonational convergence of BJS with BG in line with a series of recent studies showing that prosodic systems are prone to change and tend toward wholesale convergence in situations of extensive language contact (Matras 2009; Gabriel and Kireva 2014b; Grünke 2022; for an overview of case studies see Gabriel and Reich 2022 and Grünke 2022, pp. 97–103). However, as cross-linguistic influence not only affects tonal inventories but also operates at the pragmatic level, altering, e.g., the distribution of nuclear contours used to express certain meanings, the aim of the present study is to deepen the previous analyses into BJS intonation by investigating calling contours in a new data set recorded in November 2022 and March 2023. So far, there are no descriptions of BJS intonational phonology available besides the ones just mentioned, such that virtually nothing is known about the use and meaning of particular contours in BJS at the present stage. Furthermore, the authors are not aware of any accounts of calling contours in other Judeo-Spanish varieties either.

2.2. Vocatives and Their Intonation in Language Contact

The term *vocative* derives from the Latin noun *vocatīvus*, which, in turn, goes back to the verb *vocāre* 'to invoke, call, name a person or thing personified' (see González López and Schmid 2023). Vocatives were characterized from different perspectives: (i) morpho-syntactically (i.e., according to their belonging to a class of words and phrases and with respect to their positional mobility), (ii) semantic-pragmatically (i.e., regarding their meaning, primordial functions, and speaker-listener relationship), and (iii) phonologically (i.e., with respect to their intonational properties). Concerning the morpho-syntactic perspective, languages use a variety of strategies to mark vocatives, such as the morphological case as in Latin or Bulgarian[1] (Daniel and Spencer 2012; Stojanov et al. 1983, pp. 113–115; Radeva et al. 2003, pp. 232–233; see also 1, below, for some BG examples) or particles as in Arabic (Al-Bataineh 2020; for a general overview of vocative particles see Hill 2014, p. 45) as well as prosodic mechanisms such as specific intonation patterns, stress shifts, or truncation patterns (see García-Fernández 2023 for an overview). Vocatives are generally single-constituent nominal expressions and may constitute either an independent utterance (2a) or be part of another utterance (2b, c), in which they can appear in three different positions, namely initially, medially, and finally (Espinal 2013; Hill 2007, 2013; Slocum 2016). Nevertheless, they are extra-sentential elements in the sense that they are not part of the thematic grid of any element in the host sentence (see Moro 2003; for the internal syntax of vocatives see Corr 2022 and references therein).

(1)	BG	a.	Димитър	Димитре, ела тук! 'Dimitar, come here!'
			Dimităr[2]	*Dimitre, ela tuk!*
		b.	господин доктор	Господин докторе! 'Mister doctor!'
			gospodin doktor	*Gospodin doktore!*
		c.	Калина	Калино! 'Kalina!'
			Kalina	*Kalino!*
(2)	BJS	a.	Kalina!	
		b.	Kalina, ven aki!	
			'Kalina, come here!'	
		c.	Ven aki, Kalina!	
			'Come here, Kalina!'	

From a semantic-pragmatic perspective, vocatives are addressee-oriented linguistic units that can be used in a variety of speech acts such as greetings, calls, commands, or requests (Parrott 2010, among others). Research on their pragmatic function has shown that they can fulfill three main functions: attracting someone's attention, identifying someone as an addressee, and maintaining and reinforcing a social relationship (Zwicky 1974; Leech 1999; McCarthy and O'Keeffe 2003; Schaden 2010). When in phrase-initial position or in isolation, they usually fulfill a calling function, i.e., they are *calls* in Zwicky's (1974) terminology. In non-initial positions, they are *addresses*, i.e., they fulfill the phatic function of maintaining and/or reinforcing the contact between speaker and addressee (see also García-Fernández 2023).

With respect to the phonological perspective, vocatives have their own intonation, regardless of their position or their semantic-pragmatic function. When syntactically free, their intonation is independent of other constituents or intonational phrases of the utterance, i.e., they are interpreted as independent intonation phrases (IP) (Prieto and Roseano 2010). When bound, they are still prosodically separated from the rest of the utterance by (more or less) pronounced pauses, which in writing is signaled by commas (García-Fernández 2023) but their prosodic realization may be correlated to their position in the sentence (Abalada and Cardoso 2015). Their phonetic properties are also essential to distinguish them from other elements, such as subjects. In contrast to vocatives, the intonation of the subject is determined by the utterance (González López and Schmid 2023). Although the prosody of vocative forms also reflects the attitude adopted by the speaker

(e.g., kindness, reprobation, etc.), vocatives, and calling contours in general, are usually understudied in the intonational literature (Liberman 1979).

Many European languages associate vocative calls with a chanted or "stylized" (Ladd [1996] 2008, p. 117) tune consisting roughly of a rise followed by a sustained mid-tone (e.g., English, German, Dutch, and Polish as well as the Romance languages; see (Frota and Prieto 2015, pp. 407–9; Sóskuthy and Roettger 2020)). This contour, the so-called "vocative chant", is generally associated with positively connoted communicative contexts and with calling children, or intimate in-group members, from afar in routine contexts, such as coming to the table for dinner (see Arvaniti et al. 2016, p. 357). Yet, it is also known to display semantic and realizational differences across languages (see Ladd [1996] 2008, pp. 116–19; Arvaniti et al. 2016, pp. 357–58). For instance, as shown by Frota and Prieto (2015, pp. 407–9), the post-accentual down-stepped plateau occurs only on the last post-tonic syllable in Italian and Friulian whereas in other Romance languages it characterizes the whole post-nuclear stretch. Similarly, it is the main pattern for first or initial calls in most Romance varieties but is preferred for insistent calls in Catalan. It has drawn considerable attention as there is no obvious answer to how to represent a surface mid-tone within the Autosegmental-Metrical (AM) framework using only phonological high and low tones (see Ladd [1996] 2008, pp. 116–19; Arvaniti 2016).

Many studies, however, show that the vocative chant is not the only calling contour available to speakers (see Borràs-Comes et al. 2015 for Catalan; Göksel and Pöchtrager 2013 for Turkish and Austrian German; Arvaniti et al. 2016 for Polish; Grice et al. 2005; Niebuhr 2013, 2015 for German; Gussenhoven 2004 and Robles-Puente 2021 for English; Robles-Puente 2019, 2021 for Spanish; for an overview of vocatives in different Romance languages, see Frota and Prieto 2015, pp. 407–9; for further references of studies of vocative calls across a variety of languages see Arvaniti et al. 2016, pp. 338–42). Other types of calling contours have been associated, e.g., with urgent or stern contexts (for instance a rising-falling contour in Polish (Arvaniti et al. 2016) and French (Delais-Roussarie et al. 2015; Di Cristo 2016)) or with the expression of surprise (e.g., a high-falling contour in Asturian; García-Fernández 2023). Oftentimes, different contours are thus available for different pragmatic contexts. In this vein, the vocative chant is used in neutral contexts in most Spanish varieties whereas L+H* HL% is preferred for insistent or second calls (Estebas-Vilaplana and Prieto 2010; Hualde and Prieto 2015). In addition to these two contours, Mexican Spanish also features L* HL%, which is associated with admonitions or recriminations (de-la-Mota et al. 2010) and in Argentinian and Mexican Spanish, L+H* L% expresses sharp summons (Gabriel et al. 2010) or request vocatives (de-la-Mota et al. 2010). However, calling contours other than the vocative chant need not necessarily be pragmatically biased since some languages use them preferentially in neutral routine calls (e.g., L+H* HL% in Catalan or H* L% in Occitan, see Frota and Prieto 2015). Also, some studies, such as Huttenlauch et al. (2018) for Columbian Spanish, showed that there is no direct one-to-one correspondence between intonational contours and pragmatic conditions in vocatives, even though the pragmatic conditions affect the realization of vocatives in a more complex relationship.

Furthermore, factors such as the social and spatial distance of the interlocutors as well as politeness or intimacy may play a role in the selection of calling contours (Hill 2014). As a case in point, speakers of Central Catalan use L+H* HL% more frequently in first calls, with short physical distance, and when calling a superior rather than a subordinate person; whereas, L* H% is most commonly produced in situations where the speaker has no close relationship with the hearer (e.g., in work situations) or with bigger physical distance. The vocative chant is most representative of insistent calls in this language, i.e., it is usually used when the communication channel is already open (see Borràs-Comes et al. 2015). Similar results were reported for Spanish (and American English) by Robles-Puente (2019, 2021).

As for Bulgarian, i.e., the main contact language of BJS and the dominant language of its bilingual speakers, Andreeva and Dimitrova (2022a, forthcoming a, forthcoming b) distinguish four vocative contours in BG from a pragmatic and a functional point of view:

a neutral vocative, an insistent vocative, a challenging chant, and the vocative chant. The tune of the neutral vocative is L+H* L-%. The same pitch accent occurs in the insistent vocative but the nuclear and final syllables are lengthened, causing a delay of the peak (i.e., L+<H* L-% [+long]). The challenging chant consists of a gradual rise reaching its peak on the last syllable followed by a fall (L* H-L%). 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, shows higher intensity, an F0 change, and its vowel does not undergo complete reduction, which contradicts the BG phonological vowel reduction pattern (Ternes and Vladimirova-Buhtz 1999; Sabev 2023).

As pointed out in the previous section, nothing is known about BJS calling contours so far. The main goal of this paper is thus to expand the understanding of calling contours found in BJS across neutral, positive, and negative contexts, thereby expanding not only our knowledge of BJS intonation but also of intonation in language contact in more general terms. It is of particular interest to find out whether the same calling contours are used in Judeo-Spanish as in the contact language and whether they occur in the same pragmatic contexts.

Previous studies of various contact situations have shown that vocative intonation is prone to be affected in situations of language contact. For instance, Vanrell et al. (2020) show that in the Algherese variety of Catalan spoken in Sardinia, vocatives can be truncated from the stressed syllable to the right and then, the pitch accent, L+H*, is shifted to the first syllable. The same pattern is also found in the contact language Sardinian but is completely absent from all other Catalan varieties. Similarly, Grünke (2022, p. 373) observed that, the pragmatic meanings associated with vocative contours in the Spanish variety spoken in the Catalan city of Girona rather correspond to the distribution of contours found in Catalan than in other Spanish varieties. Furthermore, intonation is also particularly affected in the case of L2 acquisition given that acquiring pragmatic competence and mastering sentence prosody in relation to the discourse context is challenging even for advanced learners (Kasper 2001; Hamlaoui et al. 2021; Ortega-Llebaria and Colantoni 2014; Trouvain and Braun 2020). Although there are relatively few studies of the second language acquisition of vocatives, Pešková (2019; 2023, pp. 241–58) has recently investigated the acquisition of vocative calls in L2 Spanish and L2 Italian by L1 Czech speakers. The three languages have in common the fact that they realize vocative calls with a chanting contour, consisting of a rise and a following mid tone. Although her speakers often demonstrate a native-like production of vocative calls, they also show a pattern, in Italian L2, which is found neither in L1 Italian nor in Czech: H*+L L%. This is interpreted by Pešková as a case of prosodic overgeneralization (see also Brown 2000; Gabriel and Kireva 2014b): the speakers use L2 tonal and durational patterns that otherwise exist in the target language but are appropriate in a different pragmatic context. Hamlaoui et al. (2022) show that in French as spoken in Cameroon by speakers of the tone language Basaá, which expresses vocatives by means of morphology, i.e., through a particle, vocatives preferentially show a melody consisting of lexical tones reflecting the citation form of the words in the standard target language independently of the context.

3. Materials and Methods

3.1. Data, Procedure, and Participants

To elicit vocative intonation patterns in BJS and BG across a set of contextual or pragmatic conditions, we designed a discourse completion task (henceforth DCT; Félix-Brasdefer 2010; Vanrell et al. 2018). In a DCT, the speakers are presented with specific discourse contexts that constrain their productions, which enables the researcher to obtain semi-spontaneous productions while controlling for specific pragmatic factors.

Following Arvaniti et al. (2016) and Quiroz and Żygis (2017), calling contours were elicited using three different contexts within a larger DCT. The participants were asked to imagine a mother calling her daughter, Kalina, who is playing in the courtyard, from the balcony of their house (i) to come to dinner, (ii) to meet her aunt who brought her a

birthday present, or (iii) to be chastised for having broken her mother's favorite vase (see Appendix A for the scenarios). Context I thus elicited a neutral routine call while contexts II and III elicited, respectively, a positive routine call and a negatively tainted urgent call, which conveys disapproval of the addressee's actions. We chose to represent the addressee as a child as we judged this to make for natural DCTs and to keep social distance and power constant across the pragmatic contexts. Nevertheless, the intuition of the authors, some of whom are native speakers of Bulgarian, is that none of the contours is confined to child-directed speech (though this is clearly a point that requires further investigation). Similarly, physical distance was kept constant, too. Notably, the proper name that should be called was (deliberately) the same across languages and pragmatic contexts to minimize the effects of segmental and syllable structure on the prosodic realization of the contours. A female proper name was preferable since it would diminish the odds of a vocative case ending being used in Bulgarian (see Section 2.2 and Note 1).

The experiment took place at the participants' homes in Sofia or in a quiet room of the Jewish community centers in Sofia and Plovdiv. Prior to the recording of vocatives, participants produced other kinds of sentences in other contexts (e.g., declaratives and questions) to get familiar with the procedure and the names. The three target contexts for the elicitation of the vocative calls were described orally by the experimenters to each of the 19 participants in the language of the desired response (i.e., in BG or BJS). The participants' responses were digitally recorded using a Marantz hard disk recorder (PMD671) and a Sennheiser headset microphone (ME64). Besides the DCT, the recording sessions also comprised semi-guided sociolinguistic interviews and a series of other tasks, which are beyond the focus of this paper. The mean duration of the entire DCT was 10 min and the full recording sessions lasted 70 to 90 min.

The bilingual speakers (born in Sofia, Plovdiv, Kjustendil, and Pazardžik) were first recorded in BJS (*n* = 13, 8m/5f, ages: 70–100, mean: 81.9) and then, in a separate recording session, also in BG, whenever possible (*n* = 8, 5m/3f, ages: 70–94, mean: 77.8, referred to as 'BG_bi' in what follows). Unfortunately, several of the participants passed away before they could be recorded in BG and some of them refused to be recorded in that language. For comparison, 6 monolingual speakers of BG (born in Sofia), matched for age, educational level, and social status, were recorded (*n* = 6, 2m/4f, ages: 82–97, mean: 87.8, referred to as 'BG_mono' in the following).

The DCT was originally designed to elicit isolated vocative forms (i.e., IPs containing only the vocative) but, in some cases, the participants produced them as part of an utterance, i.e., within the same IP with further material (see Section 2.2). Since such non-free-standing vocatives pragmatically constitute addresses rather than calls, which potentially may have an influence on their intonation, as has the different phrasing, they were dropped from further analysis (see Section 2.2). In these cases, the scenario was repeated to the participants and they were asked to call only the name (i.e., *Kalina*). Apart from such cases, we refrained from recording repetitions of the same scenario given that the recording sessions were already very long and exhausting for the participants. Taking into consideration their advanced age, any further extensions were not feasible. However, in some cases, participants spontaneously produced several suitable vocatives for a context. The total number of vocatives that could be retained for analysis was 86. Table 1 shows their distribution across speaker groups and contexts.

Table 1. Distribution of analyzed calling contours across varieties and contexts.

	Neutral	**Positive**	**Negative**	**All**
BJS	17	13	13	43
BG_bi	9	7	8	24
BG_mono	8	5	6	19
all varieties combined	34	25	27	86

3.2. Data Annotation and Analysis

The 86 productions were analyzed using Praat (Boersma and Weenink 2023). After the segmentation of phrase boundaries, the boundaries of syllables and segments were marked. Then, largely following Arvaniti et al. (2016) and Quiroz and Żygis (2017), the following tonal landmarks, i.e., the following points occurring on the F0 pitch contour of the utterances, were labeled manually across all productions (see Table 2).

Table 2. Tonal landmarks.

Tone	Description
I	initial point of F0 contour
H	maximum of F0 contour
F	final point of F0 contour

In the following step, a surface-oriented ToBI-style labeling, based on the ToBI systems proposed for Spanish (Hualde and Prieto 2015, among others) and Bulgarian (Andreeva and Dimitrova 2022a, forthcoming a), was carried out. More particularly, the productions were assigned a label mainly based on the F0 pitch shape in combination with perceptual analysis. The main reason for choosing the framework of the Autosegmental-Metrical Model was that it has widely been used to analyze vocatives and constitutes the only fully developed phonological framework for intonation so far. In addition, it was annotated as to whether the final syllables were perceived as lengthened or chanted since this is one of the most common characteristics of vocatives across languages (see Section 2.2) and each syllable was assigned a relative prominence value (ranging from 1 'not prominent' to 3 'highly prominent') in an auditory analysis carried out together by three of the authors of this paper. The motivation for this analysis was to complement the acoustic measures (see below) and to allow for a better comparison of BJS vocatives with the ones of the contact language BG, where final syllables show high intensity and do not undergo full vowel reduction (see Section 2.2). The factors taken into account in the analysis were pitch, duration, and loudness as well as segmental aspects such as quality of the vowel. Occasional disagreements between the raters could be resolved in all cases after discussion and repeated listening.

Additionally, Praat scripts were used to extract the (i) F0 span between the initial and maximum point (I–H), (ii) the F0 span between the maximum and final point (H–F), (iii) the proportional alignment of selected tonal landmarks with respect to the stressed or last syllable, (iv) intensity, (v) duration of the stressed vowel, the stressed and the last syllable, and the word, and (vi) ToBI labels. Furthermore, additional acoustic measures, such as the F0 difference between tonal landmarks in semitones, were calculated.[3] Measures of syllable and segment durations were normalized for speech rate by dividing them by the duration of the utterance.

The resulting data were analyzed using JMP (JMP 2023). Linear mixed effect models were employed for assessing the influence of VARIETY (BJS, BG_bi, and BG_mono), (pragmatic) CONTEXT (neutral, positive, and negative), and TYPE of the contour (!H, HL, and L) as independent variables on I–H and H–F spans, relative peak alignment, duration of the stressed vowel and syllable and of the last syllable, and intensity as dependent variables. SPEAKER was included as a random effect. In addition, interactions of CONTEXT and VARIETY were included to test whether the dependent variables were affected when varieties were compared across the three contexts. Nominal-logistic models were used to assess lengthening and the distribution of prominence patterns. Where necessary, post hoc Student *t*-tests were calculated for pairwise comparisons.

4. Results

The 86 productions retained for analysis showed a wide range of different F0 shapes, which were annotated by means of the 14 surface ToBI configurations shown in Table 3.

Most of these could be produced with and without (considerable) lengthening of the last syllable (see also Section 4.3). For further analysis, the productions were grouped into three main types. All but one of the surface realizations comprise an L+H* or H* pitch accent but differ with regard to the following boundary tones, which could be either !H-% (i.e., the vocative chant), H-L%, or L-%. The remaining configuration was L* H-L%. Given that all four shapes have been extensively documented in the literature across various languages, including Bulgarian (see Section 2.2), we assume that these represent underlyingly distinct calling contours (see also the discussion in Section 5). Table 3 gives an overview of the performed groupings into different types of calling contours.

Table 3. ToBI-style surface labels, number of tokens, number of tokens perceived as lengthened, and categorization (i.e., corresponding underlying representation and respective short label for the contour type).

Surface Label	*n*	of Which Lengthened	Underlying ToBI Representation	Type
L+H* !H-%	19	15		
H* !H-%	2	1	L+H* !H-% (24)	'!H'
L+H* H-%	3	2		
L+H* H-L%	13	7		
L+H* !H-L%	5	3		
L+¡H* H-L%	1			
L+H* H-!H%	6	1	L+H* H-L% (28)	'HL'
H* !H-L%	2	1		
H* H-L%	1	1		
L+H* L-%	21	5		
H* L-%	7		L+H* L-% (32)	'L'
%H H* L-%	4	1		
L* H-L%	1		L* H-L% (1)	other
L+H* !HH- !H%	1		L+H* !HH- !H% (1)	

In the remainder of this paper, we will focus on the three main types since L* H-L% and L+H* !HH- !H% appeared only once in our sample (produced in the negative context III by a BJS speaker and in the positive context II by a bilingual BG speaker). Based on the different boundary tones, we will refer to these three types as '!H', 'HL', and 'L' from this point. Figures 1–3 show examples of each type.

The distribution of the calling contour types across contexts (neutral—I; positive—II; and negative—III) and varieties is illustrated in Figure 4. Although they must be taken with due caution given the (inevitably) low numbers of cases in each condition, some fairly clear tendencies emerge. In the neutral context (I), both bilingual and monolingual Bulgarian prefer type '!H' (50% and 67%, respectively), while also admitting 'HL' (and marginally 'L'). In BJS, on the other hand, 'L' and 'HL' occur to the same extent (41%), while '!H' is relatively infrequent (18%). A similar picture arises in the positive context (II): the Bulgarian varieties pattern together in that they most frequently opt for the vocative chant ('!H', 60 and 67%), whereas BJS rather prefers 'HL' (46%) followed by '!H' (31%) and 'L' (23%). Still, 'HL' and 'L' are not fully excluded in BG. Both contours were occasionally produced in this context by the bilinguals (each 17%). In monolingual BG, however, only 'HL' is observed (40%). Finally, in the negative context (III), all varieties pattern alike. Here, 'L' is the preferred contour type (67–75%), while 'HL' appears to a lesser extent (25–33%). The vocative chant is entirely absent from this context. Overall, it becomes visible that BJS is not only different from Bulgarian but also shows more variation.
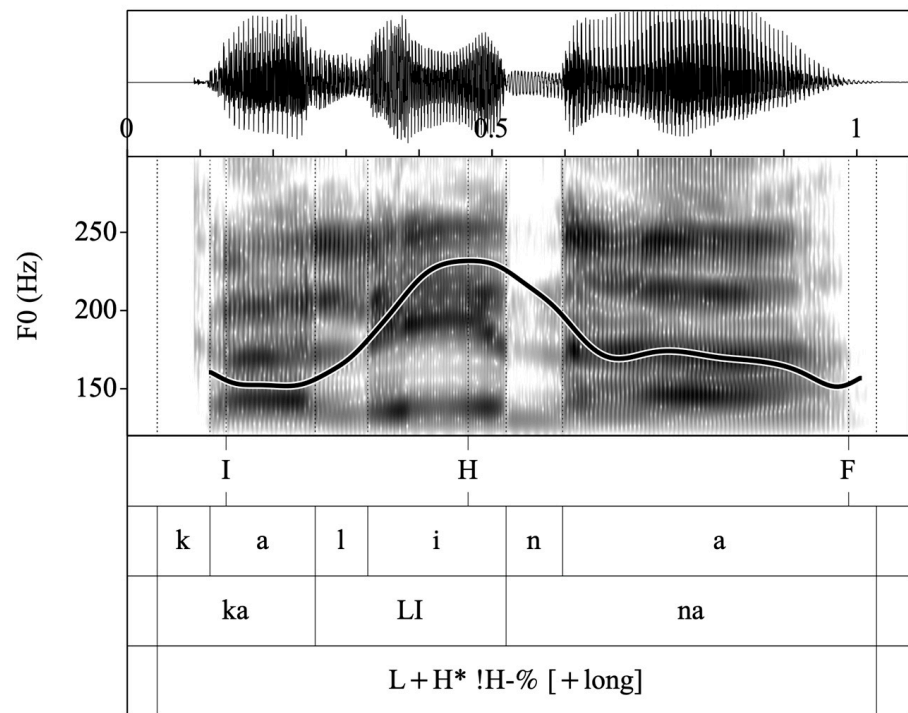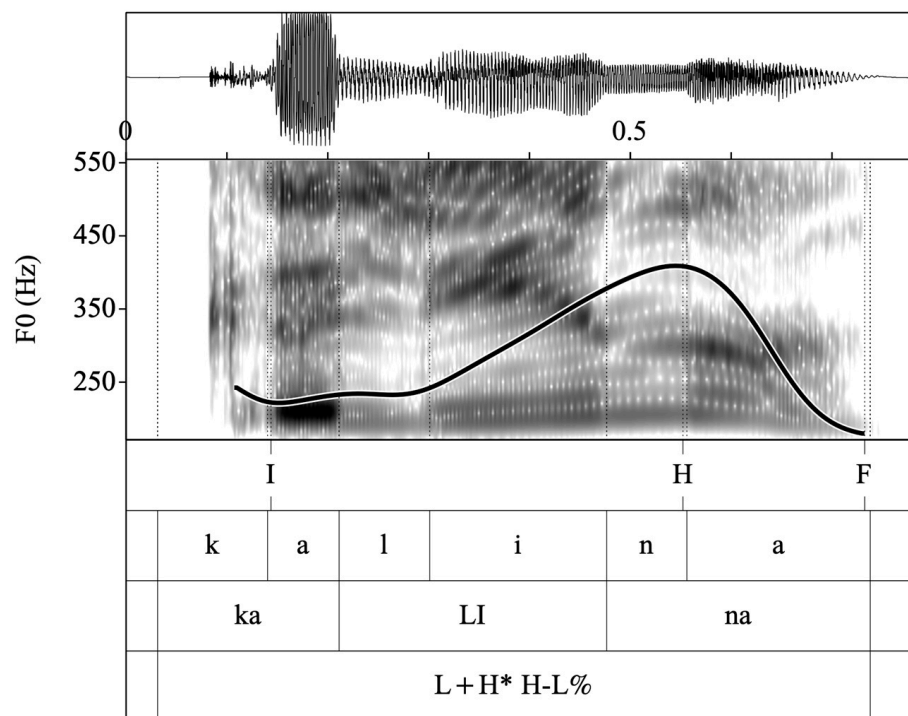
Figure 1. Example of an L+H* !H-% contour (type '!H').

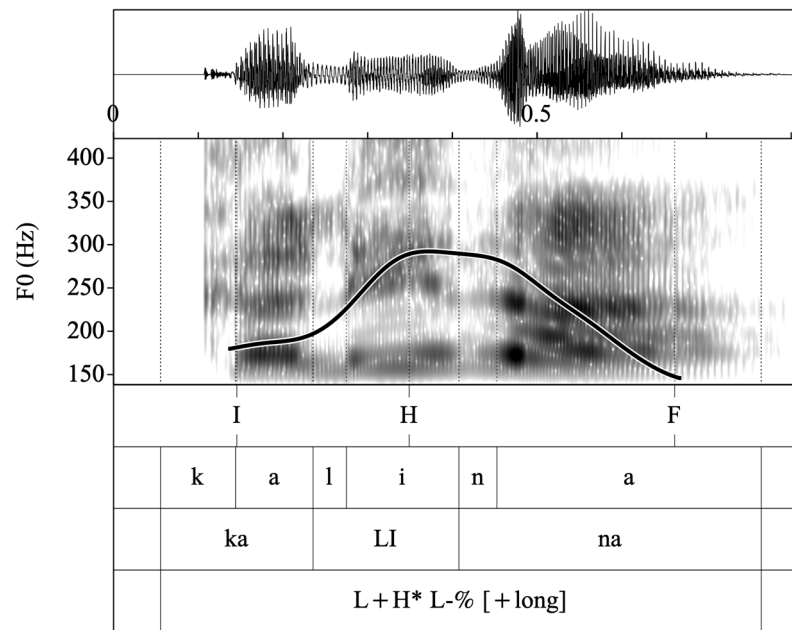**Figure 2.** Example of an L+H* H-L% contour (type 'HL').

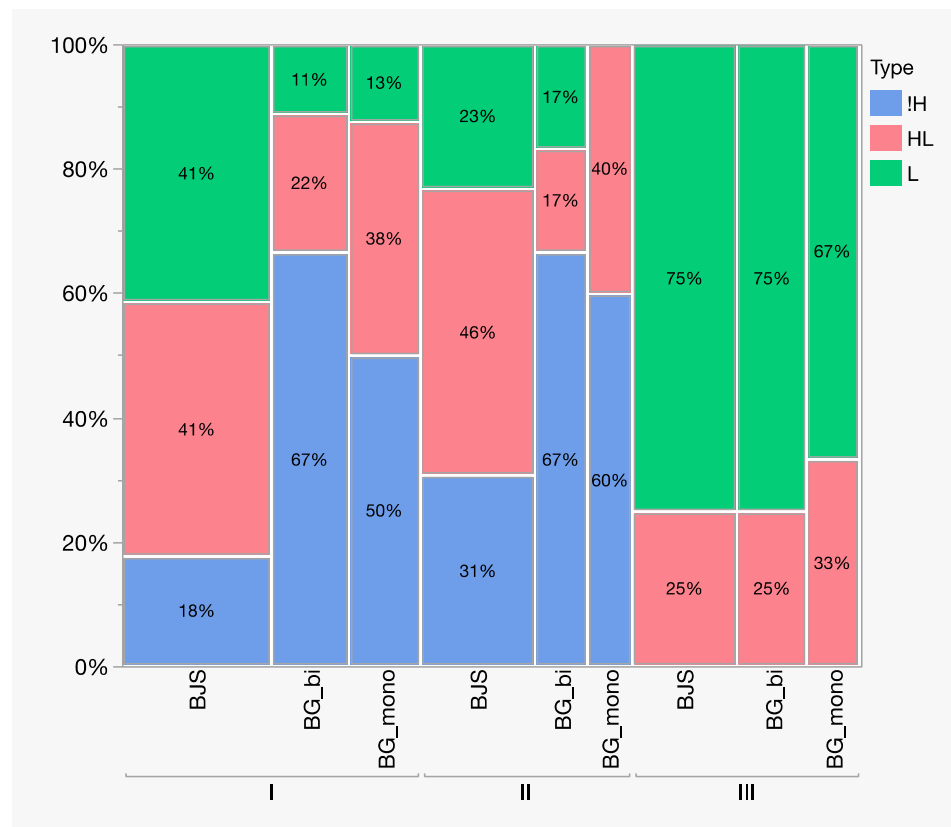**Figure 3.** Example of an L+H* L-% contour (type 'L').

Figure 4. Distribution of calling contours across varieties (BJS, BG_bi, and BG_mono) and contexts (I–III). The numbers in the bars represent rounded percentages.

4.1. F0 Span between Tonal Landmarks

The initial rise from landmark I to H is similar in contours of the type '!H' and 'HL' but shallower in the 'L' type due to the fact that the call starts generally at a higher level. The mean span in semitones is given in Table 4; Figure 5 illustrates the distributions. The span of the rise differs significantly across TYPE ($F_{(2, 70.26)} = 4.757$, $p = 0.012$) but is the same within

each type across VARIETY and CONTEXT. Post hoc *t*-tests confirm that the rises are identical in '!H' and 'HL' calls, which differ significantly from calls of the type 'L' ('HL' vs. 'L': $t_{(72.94)}$ = −2.921, *p* = 0.005; '!H' vs. 'L': $t_{(72.94)}$ = −2.380, *p* = 0.020). With regards to the final fall from H to F, there is a highly significant difference across the three TYPES ($F_{(2, 69.13)}$ = 19.26, *p* = 0.001), all of which differ from one another according to post hoc *t*-tests ('HL' vs. '!H': $t_{(72.94)}$ = 3.480, *p* = 0.001; 'L' vs. '!H': $t_{(67.81)}$ = 6.200, *p* < 0.001; 'L' vs. 'HL': $t_{(67.40)}$ = 3.100, *p* = 0.003). The fall is most pronounced in the 'L' type calls, somewhat less in type 'HL', and least in type '!H'. Again, there is no difference across varieties or contexts.

Table 4. Mean span between tonal landmarks in semitones (and standard deviations).

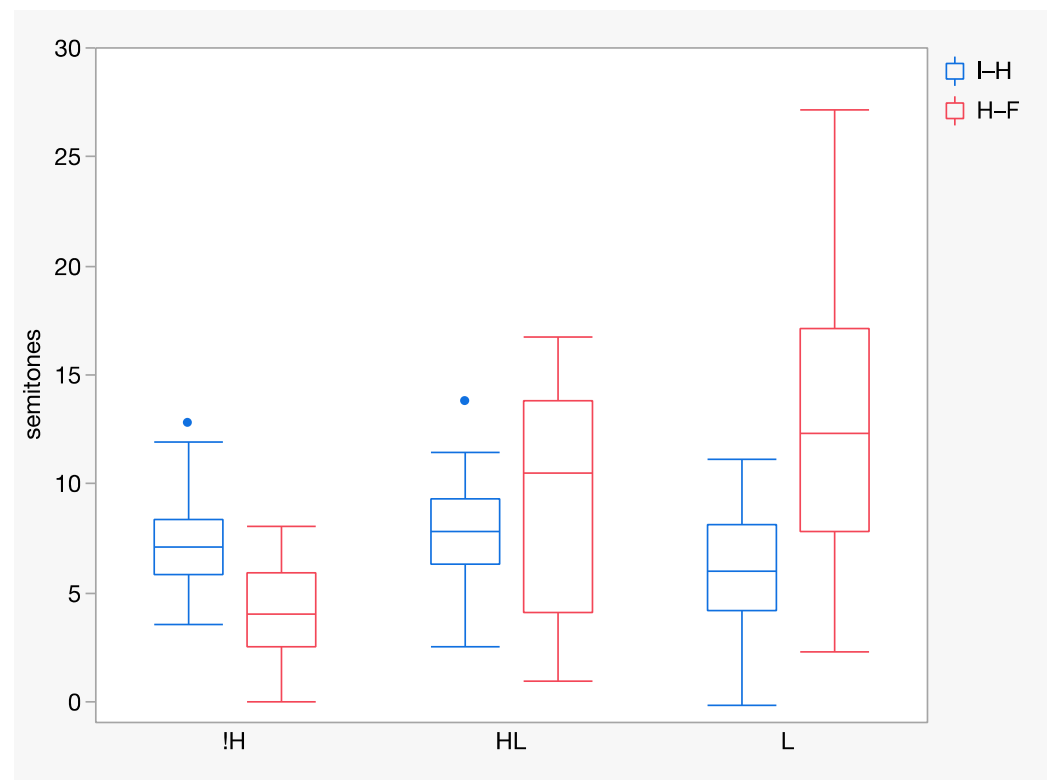|	!H	HL	L
I–H	7.3 (2.3)	7.9 (2.3)	5.7 (2.9)
H–F	4.1 (1.9)	9.6 (5.0)	12.8 (6.1)

Figure 5. Pitch span of the initial rise and of the final falls in semitones in different types of calling contours.

4.2. Peak Alignment

The alignment of the peak, i.e., of landmark H, is influenced significantly merely by TYPE ($F_{(2, 69.42)}$ = 18.671, *p* < 0.001) and not by VARIETY or CONTEXT (or any interaction of these). Post hoc *t*-tests confirm that the alignment differs significantly across TYPE ('HL' vs. '!H': $t_{(73.00)}$ = 2.700, *p* = 0.009; 'L' vs. '!H': $t_{(68.20)}$ = −2.810, *p* = 0.007; 'L' vs. 'HL': $t_{(67.80)}$ = −6.110, *p* < 0.001). As can be seen from Figure 6, the data show that H aligns typically after the stressed syllable in 'HL', toward the end of the stressed syllable in the vocative chant ('!H'), and in the second half of the stressed syllable in 'L'.
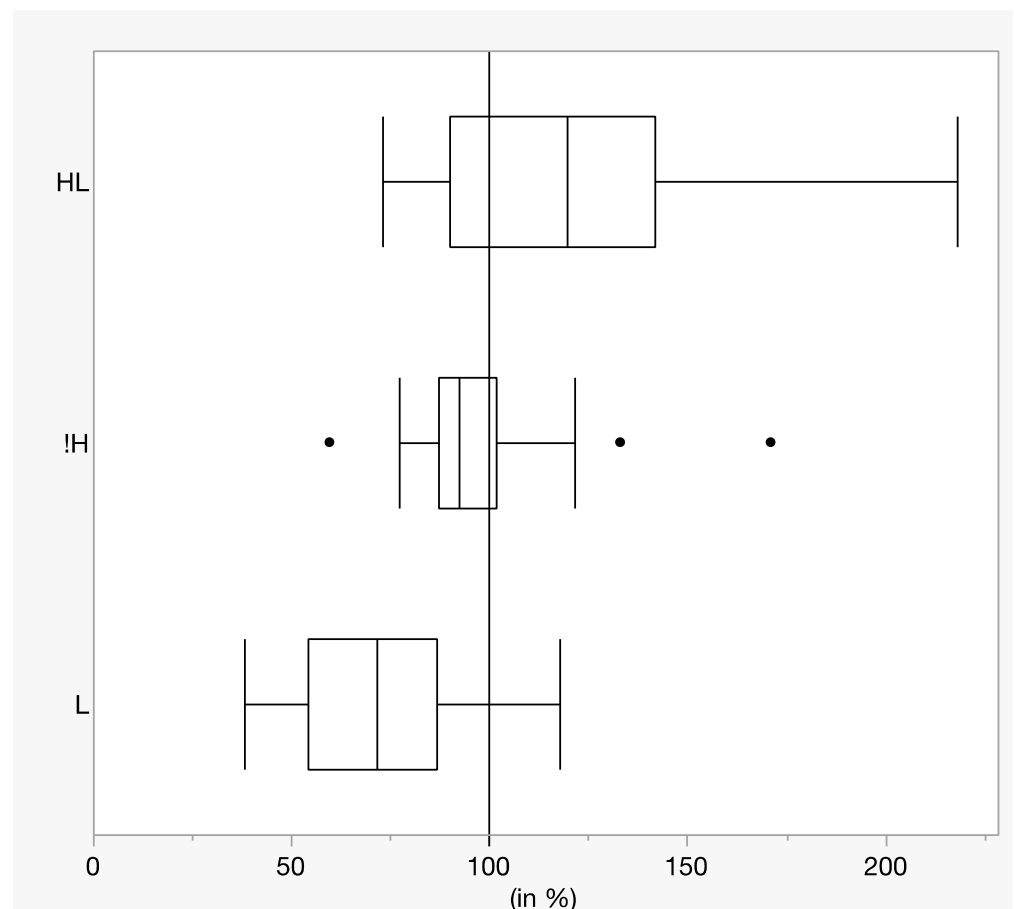
Figure 6. Relative alignment of the peak (H) in different types of calling contours. Values between 0% (onset) and 100% (offset) indicate that the tone was realized within the stressed syllable, values exceeding 100% represent alignment in the post-tonic syllable.

4.3. Durational Properties

The auditory analysis of lengthening revealed clear differences with regard to the three types of calling contours (Figure 7). While the vocative chant, i.e., '!H', is usually produced with a clear lengthening (perceived in 75% of the cases), 'L' is produced without such lengthening in most cases (81%). With 'HL', roughly half of the productions were perceived as lengthened. A nominal-logistic model confirmed that lengthening is distributed differently across TYPE ($\chi^2_{(2)}$ = 14.220, p < 0.001) but not affected by VARIETY, CONTEXT, or their interaction.

These observations are confirmed by the measurements of utterance and (normalized) syllable duration. Calls with '!H' and 'HL' were significantly longer than calls with 'L' ($F_{(2, 70.08)}$ = 6.06, p = 0.004; mean durations (in s): 0.81 ('!H'), 0.77 ('HL'), 0.66 ('L')). Furthermore, as illustrated in Figure 8, final unstressed syllables were relatively longer than the preceding stressed syllable across calling contour types. Mixed models showed that the duration of the final syllable is significantly influenced by the TYPE of the calling contour ($F_{(2, 33.76)}$ = 4.265, p = 0.022) and post hoc t-tests disclosed that syllable duration is significantly longer in '!H' than in 'L'-type contours ('!H' vs. 'L': $t_{(18.40)}$ = −2.940, p = 0.009) whereas 'HL' overlaps with both other types (normalized mean durations: 50.1 ('!H'), 47.4 ('HL'), 42.3 ('L')).
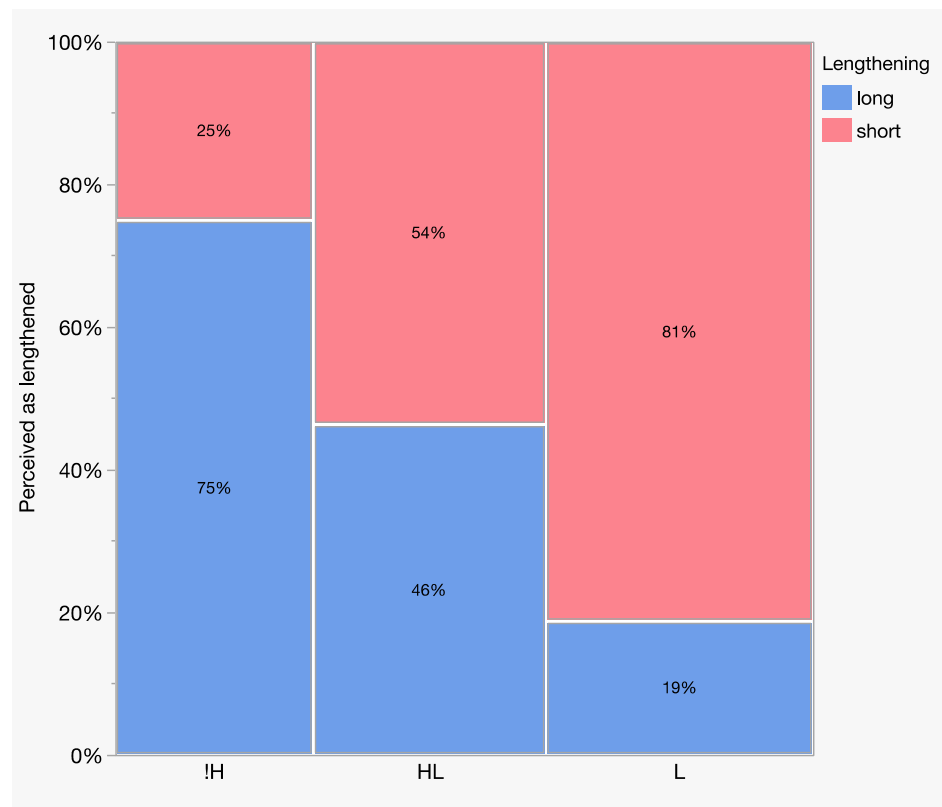
Figure 7. Percentage of the contours that were perceived as considerably lengthened across different types ('!H', 'HL', and 'L').
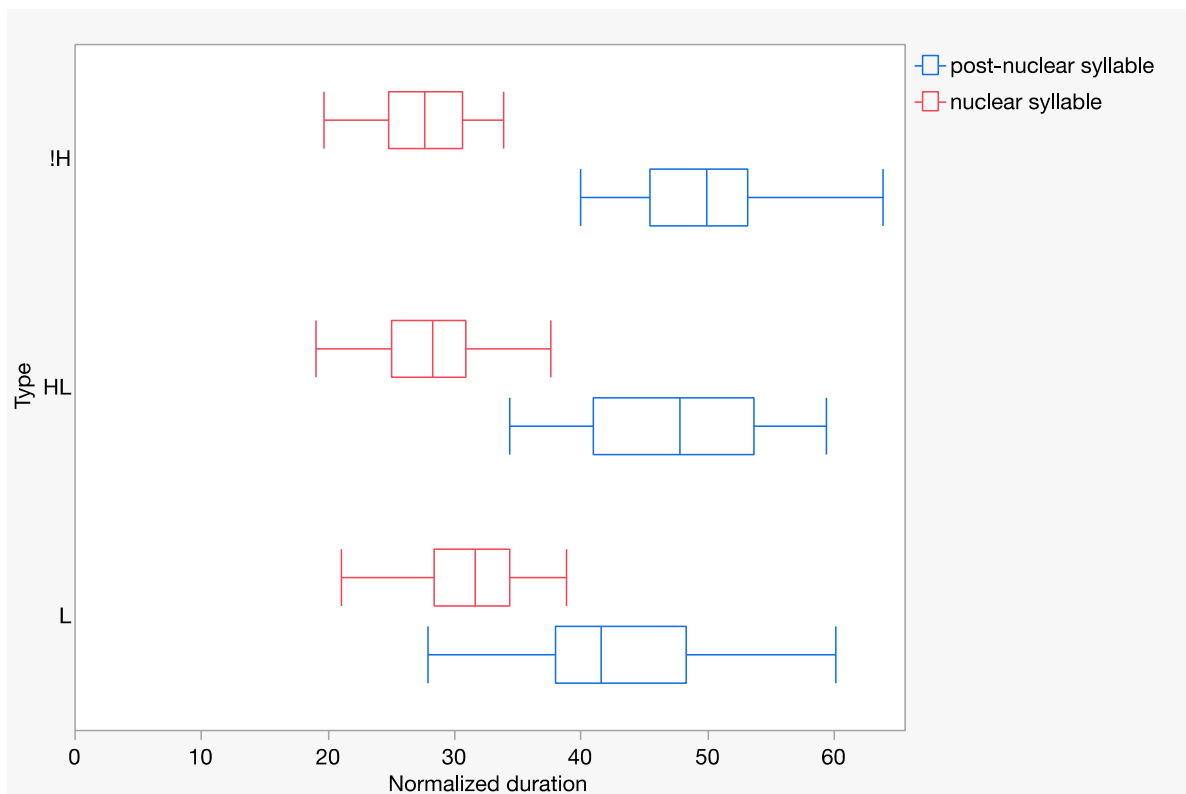

Figure 8. Normalized duration of the nuclear and post-nuclear syllables across different types of calling contours (as percentages of the total duration of the vocative).

4.4. Intensity

The intensity was overall lowest in the initial (unstressed) syllable and strongest in the second, i.e., in the stressed and nuclear syllable of the call (Figure 9). There are no significant differences across TYPES or VARIETIES in this regard. With regard to the final (unstressed) syllable, its intensity is almost as high as in the nuclear syllable (final syllable means (in dB): 67.5 ('!H'), 66.6 ('HL'), and 64.0 ('L'); nuclear syllable means: 67.8 ('!H'), 68.7 ('HL'), and 69.5 ('L')). Again, there is no significant difference across VARIETIES. However, there is a significant difference across TYPES ($F_{(2, 14.25)}$ = 13.8, $p < 0.001$). Post hoc *t*-tests show that the intensity of the last syllable in 'L' contours is significantly different from the two other types ('L' vs. '!H': $t_{(63.90)}$ = −2.659, $p = 0.010$; 'L' vs. 'HL': $t_{(63.50)}$ = −4.450, $p = < 0.001$; 'HL' vs. '!H': $t_{(70.0)}$ = 1.310, $p = 0.100$).
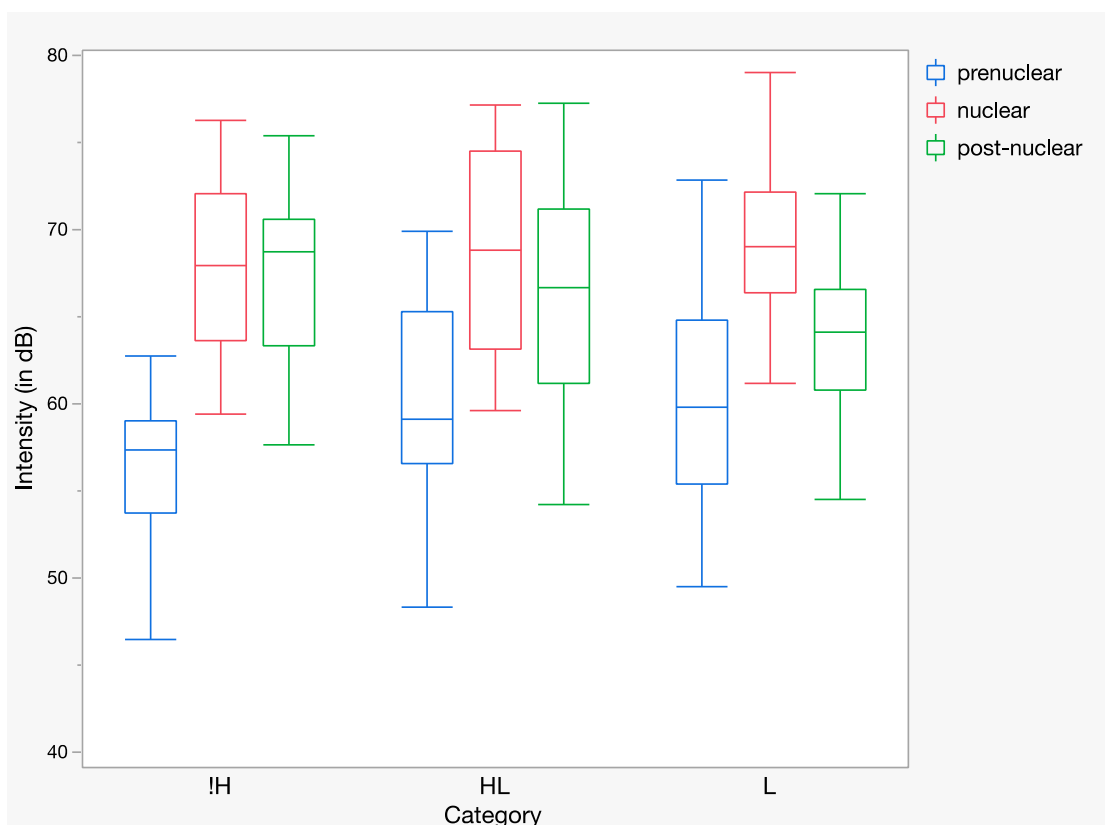

Figure 9. Intensity in prenuclear, nuclear, and post-nuclear syllables across different types of calling contours (in dB).

4.5. Syllable Prominence

Regarding syllable prominence, the initial syllable was always perceived as not prominent by the authors: it was assigned the prominence value 1 in all cases. On the other hand, the nuclear syllable was assigned the highest prominence value (3), with only three exceptions. The perceived prominence of the final syllable varied considerably. In the vocative chant ('!H') and in calls of the 'HL' type, it was equally prominent as the stressed syllable in half of the cases. In the majority of the remaining cases, it was rated as "rather prominent" (i.e., 2) but there were three items in which it was perceived as more prominent than the stressed syllable. As opposed to this, the final syllable was rated as not prominent (i.e., 1) in 53% of the 'L' contours. A nominal-logistic model confirmed that the distribution of prominence patterns differs significantly across TYPE ($\chi^2_{(24)}$ = 64.2, $p < 0.001$). Although VARIETY does not come out as a significant factor in the model, there seems to be an overall tendency for the final syllable to be more prominent in BJS than in Bulgarian across TYPE. This can be seen in Figure 10.
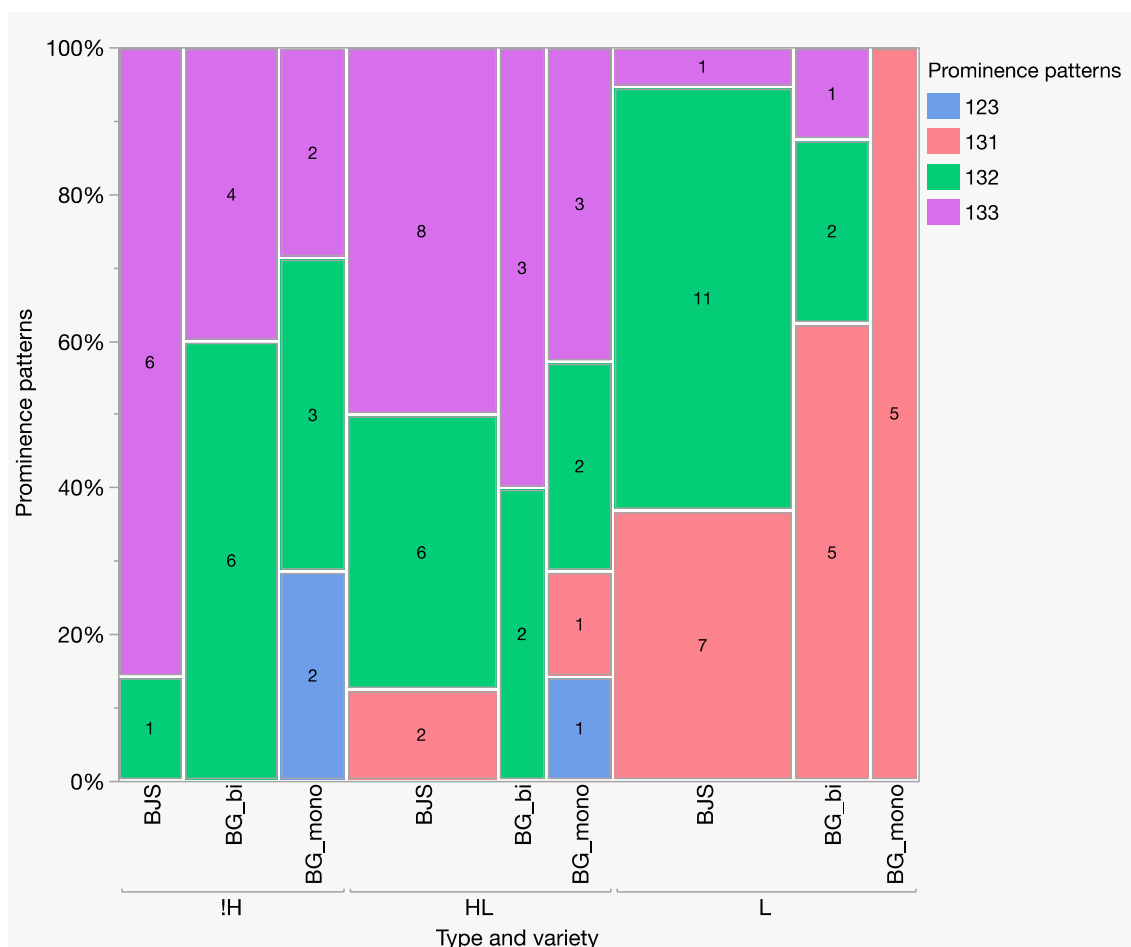
Figure 10. Distribution of syllable prominence levels according to variety across different types of calling contours. 1 indicates no prominence, 2 indicates some prominence, and 3 indicates high prominence. The numbers in the bars represent token counts.

5. Discussion

The intonational analysis of vocatives in BJS and in BG spoken by BJS–BG bilinguals and BG monolinguals has revealed that the varieties share the same inventory of calling contours; namely, (1) the (cross-linguistically) widely attested "vocative chant", L+H* !H-% ('!H'), (2) L+H* H-L% ('HL'), and (3) L+H* L-% ('L'). These are not only the configurations given by Andreeva and Dimitrova (forthcoming a) for BG but also have been reported for a wide range of languages in the intonational literature (among them English, Spanish, Catalan, and German; see also Section 2.2). Interestingly, however, the two languages under consideration differ somewhat as to the distribution of the three calling contours across different pragmatic contexts. Monolingual and bilingual speakers of BG, on the one hand, predominantly use '!H' and, to a lesser extent, 'HL' in neutral and positive calling contexts and clearly prefer 'L' in urgent or negative contexts. In BJS, on the other hand, the speakers more often resort to 'L' also in neutral and positive contexts and generally show more variation. It can thus be assumed that, as in many other languages, the '!H' and 'HL' represent neutral or positively charged calls, possibly with different degrees of insistence as in Spanish or Catalan (see Section 2.2) whereas the meaning of 'L' is less clear. Andreeva and Dimitrova (forthcoming a) describe this latter contour as "neutral vocative" for Bulgarian[4] and the same holds true for other Slavic languages such as Czech (see Pešková 2023, forthcoming). In the present data set, however, it is clearly favored in the negative context; although, in BJS it also appeared with some regularity in the neutral context and was occasionally produced by single bilinguals in the positive context (in both BJS and BG). At least

in Bulgarian, its use thus seems to parallel the "urgent call, which conveys disapproval of the addressee's actions" in Polish (Arvaniti et al. 2016, p. 338) and German (Quiroz and Żygis 2017). In other languages, like Catalan, the contour appears rather rarely and its meaning thus far is not very clear (see Borràs-Comes et al. 2015). In Spanish, it is found only in a minority of the dialects whose intonation has been described so far, including Mexican Spanish, where it is again associated with "request vocatives" and an admonitory meaning (de-la-Mota et al. 2010), and Argentinian Spanish, where it is characterized as a "sharp summon […] which attempts to get the addressee to stop doing something" (Gabriel et al. 2010, p. 308). Furthermore, it is worth pointing out that the single instance of an L* H-L% contour, produced in the negative context by a BJS speaker, corresponds to Andreeva and Dimitrova's Bulgarian "challenging chant". In Spanish, it is only present in the Mexican variety, in which it expresses a similar meaning, viz. recriminations with a nuance of admonition (for other Romance varieties see Frota and Prieto 2015).

As for the higher amount of variation in BJS than in BG, it can be hypothesized that this is a consequence of BJS being a non-standard variety and also the non-dominant language of the speakers, both of which are factors that give rise to variation. Moreover, this finding is in line with Grünke (2022), who equally observed various competing contours being used to express the same pragmatic meanings in a different situation of intensive language contact, for which he established a link between the high amount of prosodic variation observed in bilinguals and their language dominance (pp. 335–40). He further concluded that an increase in prosodic variation is indicative of such contact scenarios (pp. 381–8), which seems to be confirmed by the findings of the present study.

In summary, the somewhat different distribution of calling contour types across languages suggests that the BJS intonation was not initially the same as in Bulgarian and that we are in fact dealing with remnants of an originally diverse system that has largely—though not yet fully—converged with the dominant ambient language at present (see Andreeva et al. 2017, 2019, 2021). While this study thus provides further evidence in support of Matras' (2009) assumption that prosody strongly tends to converge in (intense) language-contact situations, it also shows that prosodic transfer does not occur all at once, i.e., in the sense of the transfer of complete intonation systems, but that it takes place step by step and that this process is intertwined with the different pragmatic meanings of the tunes involved (e.g., the expression of personal attitudes to the person who is called).

On the phonetic level, the acoustic analysis of the three contour types has revealed both similarities and clear differences with regard to their realization: all contours start with an initial rise, which is comparable in '!H' and 'HL' but shallower in 'L', where it typically begins at an overall higher level. Still, we take this rise to be an effect of underlying L+H* nuclear pitch accents in all cases, with H* being a frequent surface variant (i.e., a variable leading tone).[5] The pitch peak following the initial rise tends to align with the second half of the nuclear syllable in 'L', toward the end of that syllable in '!H', and in the post-nuclear syllable in 'HL'. The final falls are weakest with '!H', show an intermediate level with 'HL', and are most pronounced in 'L'-type contours. We therefore consider them to represent different underlying boundary tones. Furthermore, the three contours differ also in their durational patterns: while the final syllable is typically lengthened and even longer than the nuclear syllable across all types, this lengthening is most marked in '!H' and least in 'L'. It also entails that contours of the '!H' and to a lesser extent of the 'HL' type are often perceived as considerably lengthened, while those of the 'L' type are usually not. These differences between types are also reflected in their intensity and prominence patterns. While the initial syllable is clearly the least loud and never perceived as prominent across contour types, the nuclear syllable and the post-nuclear syllable typically show similar intensity values and are both perceived as highly prominent in many cases. However, this is usually the case only with contours of the '!H' and 'HL' type whereas the final syllable in 'L'-type contours tends to be somewhat less loud than the nuclear syllable and is perceived as non-prominent in most cases. Interestingly, the tendency to realize final syllables as strongly prominent seems to be more pronounced in BJS than in Bulgarian, es-

pecially in the vocative chant ('!H'), pointing to some cross-linguistc variation. Similarly, with 'L' contours, final syllables tend to show some prominence in BJS whereas they tend not to be perceived as prominent in BG. More research is needed, however, to confirm these (rather subtle) cross-linguistic differences and to find out why they occur. With regard to the different pragmatic situations, no influence of context could be found on the realization of the calling contour types, which is in line with the findings of Hamlaoui et al. (2021) for Metropolitan and Cameroonian French, where context did not have a significant influence on acoustic parameters, such as F0, span, or duration, either.

A point that is worth some further discussion, however, is the general high prominence of the final syllables in the analyzed vocatives. Besides being lexically unstressed, these syllables are not only longest across contour types and varieties but also exhibit virtually the same intensity as the stressed syllables. In many cases, they are perceived as equally prominent. In this regard, they clearly differ from the initial unstressed syllable of the calls. The same applies to their segmental characteristics: despite phonological vowel reduction (i.e., raising) being pervasive in both BJS and BG (see Grünke et al. 2023)—and in stark contrast to the /a/ vowels of the initial unstressed syllable—the final vowels of the calls are realized as full, unraised vowels, i.e., the vocative form of *Kalina*, whose citation form is [kəˈli.nə] in both BJS and BG, is pronounced [kəˈli.naː].[6] This blocking of vowel reduction (or even deletion) in vocatives has also been reported for European Portuguese, which shows reduction patterns that are similar to those of the languages under consideration here (Frota and de Moraes 2016; Frota 2014). In one case, the final vowel was even clearly split up into two syllables, which is a strategy reported for the tonic syllable in some languages when there is no post-tonic material for the realization of boundary tones (Andreeva and Dimitrova, forthcoming b for Bulgarian; Frota and de Moraes 2016 for Portuguese; see also Roettger and Grice 2019). In general, this type of enhancement of the final syllable is well established in vocatives. In the present case, relevant intonational information, namely the three-way distinction in boundary tones (!H vs. HL vs. L), needs to be conveyed across a higher-than-usual physical distance. Along the lines of Sóskuthy and Roettger (2020), it can thus be suggested that the tone-carrying properties of this syllable are optimized for both the production and the perceptual retrieval of pitch (for the trade-off between a bias toward optimizing message-transmission accuracy and a bias to reduce resource cost see also Hall et al. 2018). Furthermore, Roettger and Grice (2019) observed that such tune-driven adjustments of the text typically occur with tonal configurations involving a high pitch component. Fittingly, in our data, final syllables are most often enhanced with contours of the '!H' and 'HL' types but usually not with 'L'.

Finally, all these observations indicate that the standard ToBI labels are not sufficient to adequately represent all prosodic characteristics of the vocative calling contours in our corpus, especially regarding the duration and prominence strength of the final syllable. There are two possible ways to deal with this challenge. First, as proposed by Andreeva and Dimitrova (forthcoming b) for Bulgarian, the absence of reduction of the final vowel in both challenging and vocative contexts can be explained by association rules between tune and text: if there is a metrically strong syllable between the nuclear syllable and the right boundary of the intonation phrase (marked by the boundary tone, T%), then the phrase accent (T-) has a secondary association with this syllable (Andreeva 2009). The longer duration of the final syllable and its higher intensity result from the insertion of an additional beat on it, making it metrically strong. Through this restructuring of the metrical grid, the phrase accent is secondarily associated with this syllable, blocking the reduction in the vowel in it.

Alternatively, since phrase accents are usually dispensed with in most analyses of Romance intonation (see, e.g., Frota and Prieto 2015), a question can be raised as to if there could actually be two pitch accents in at least some of the vocative calls under study (e.g., L+H* !H* H-% or L+H* H+L* L-%).[7] Such an analysis has been proposed, e.g., for vocatives in Sardinian and Algherese Catalan by Vanrell et al. (2015) as well as for vocatives in which the speaker's intention is to gently demand attention in Canarian Spanish by

Cabrera Abreu and Vizcaíno Ortega (2010). Whether this would also involve two stressed syllables, i.e., the lexically stressed one and the final one, however, is a question that goes beyond the scope of this paper and must be left for future research. Still, it is worth mentioning in this context that BG is not only a language that presents a comparatively high density of stressed syllables but also one that allows prosodic words with two stressed syllables in some cases (e.g., in adjectives and adverbs in their comparative and superlative forms, as, e.g., *по-силен* [ˈpɔˈsilɛn] 'stronger') and even tolerates stress-clashes in more than half of the potential cases (53–56.3%; Dimitrova 1998; Andreeva and Dimitrova 2022b). Double stress in vocatives would thus not be something exceptional in BG, even if it leads to stress clashes. Furthermore, Dimitrova (1998) and Andreeva and Dimitrova (2022b) also showed that native speakers of BG overuse stress clashes in the L2s English and German, producing them to the same extent as in their L1. It is thus imaginable that the same could apply to a non-dominant language of bilinguals with BG as their dominant language such as BJS.

6. Conclusions

The analysis of vocative intonation in BJS as well as in bilingual and monolingual BG has shown that the three varieties share the same inventory of calling contours: (1) the widely attested "vocative chant", L+H* !H-% ('!H'), (2) L+H* H-L% ('HL'), and (3) L+H* L-% ('L'). However, these are not evenly distributed across contexts and varieties: more particularly, the BG varieties were found to use predominantly (1) and (2) in neutral and positive calling contexts and (3) in urgent or negative contexts. In BJS, on the other hand, this tendency was less strong since (3) also occurred regularly in neutral and positive contexts. Also, BJS showed generally more variability across contexts. Taken together, the findings suggest that the intonational system of the minority language BJS was once different from the one of the dominant surrounding language, BG, but is now on its way to fully converging with the latter not only with regard to its inventory of pitch accents and boundary tones, as shown in previous studies (Andreeva et al. 2017, 2019, 2021), but also regarding the pragmatic functions and uses of particular tonal configurations. In this sense, the present study provides further evidence for the assumption that prosodic systems strongly tend to converge in situations of intense language contact (Matras 2009), but, at the same time, it also indicates that this happens step by step and includes phases of increased intonational variation.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

The scenarios used for the elicitation of the vocative calls were the following:

- Context I: 'Kalina is playing in the courtyard. Lunch is ready and her mother calls her from the window.'
  BJS: *Kalina esta djugando en el kortijo. La komida ya esta pronta i su madre la yama por la ventana.*
  BG: *Калина играе на двора. Майка ѝ я вика от прозореца за обяд.*
- Context II: 'It's Kalina's birthday and she is playing in the courtyard. Her aunt carries with a big present. Her mother calls Kalina from the window so she can come and get her present.'
  BJS: *Es el aniversario de Kalina y eya esta djugando kon las otras kriaturas en el kortijo. Su tiya arriba kon un regalo muy grande. La madre va a la ventana i yama a Kalina para ke veya la sorpresa.*
  BG: *Калина има рожден ден и играе с децата на двора. Леля ѝ идва с голям подарък. Майка ѝ я вика от прозореца, за да си получи подаръка.*
- Context III: 'Kalina's mother comes home from work and sees that her favourite vase is broken. Kalina is playing in the courtyard. Her mother calls her furiously from the window.'
  BJS: *La madre de Kalina arriba del lavoro i ve ke su vazo preferido esta roto. Kalina esta en el kortijo. Su madre la yama arraviada por la ventana.*
  BG: *Майката на Калина се прибира от работа и вижда, че любимата ѝ ваза е счупена. Калина е на двора. Майка ѝ я вика ядосано от прозореца.*

Notes

[1] Morphological vocative marking through suffixes is not obligatory and restricted to singular nouns in Bulgarian. While it is common with masculine singular nouns, it is generally considered rude or even tactless when addressing female persons (see Radeva et al. 2003, pp. 232–33; Stojanov et al. 1983; Andreeva and Dimitrova, forthcoming a).

[2] The transliteration norm used for Bulgarian is ISO 9:1986.

[3] The formula used was 39.863*log10(maximum F0/minimum F0) (Reetz 1999).

[4] One possible reason for these different results could be related to the fact that the Bulgarian speakers analyzed in Andreeva and Dimitrova (forthcoming a) were significantly younger. As shown by Dimitrova et al. (2018), speaker age has a considerable influence on intonation in Bulgarian.

[5] It is likely that the phonetic implementation of the initial rise also depends on the interplay between tune and text, e.g., on the availability of pre-tonic material and the voicing characteristics or sonority of the segments involved, as shown by García-Fernández (2023) for Asturian vocatives. However, this could not be tested in the present study given that the advanced age of the participants did not permit longer experiments.

[6] Also, in the very few cases in which the morphological vocative case was used in Bulgarian, *Калино* was rendered as [kə.ˈli.nɔː], i.e., the underlying /ɔ/ was not raised to [u] as would otherwise be expected.

[7] If such an analysis were to be correct, the additionally-inserted pitch accent in vocatives could represent some sort of vocative marker similar to the morphologized intrusive vowels discussed by Sóskuthy and Roettger (2020). As García-Fernández (2023) shows, morphologization processes of vocative markers have also taken place in other Romance languages like Asturian, where [a] originally preceded merely vocatives beginning with a stressed syllable (to provide a pre-nuclear syllable for the high leading tone of an H+L* pitch accent) but by now has become a general vocative marker.

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