

## **Lexical tone and stress in Goizueta Basque**

José Ignacio Hualde (University of Illinois at Urbana-Champaign)

Oihana Lujanbio (Euskal Herriko Unibertsitatea)

Francisco Torreira (University of Illinois at Urbana-Champaign)

### **ABSTRACT**

Research in the past few decades has shown that Northern Bizkaian Basque possesses a pitch-accent system of the Tokyo Japanese type, with a contrast between lexically accented and unaccented words. There is, however, a separate area of the Basque-speaking territory where we also find tonal accent phenomena: Western Navarre. In comparison with Northern Bizkaian, the Western Navarrese prosodic system has remained under-studied and ill-understood. In this paper, which focuses on the Western Navarrese Basque variety spoken in the town of Goizueta, we demonstrate that both stress and tone are lexically contrastive in this prosodic system. Words can be stressed on either the first or the second syllable of the stem and the stressed syllable is lexically specified as bearing one of two contours, in a way that is reminiscent of other European pitch-accent languages. We show that stress is consistently cued by both duration and relative intensity. Pitch contours are used for an independent contrast in accent type. The existence of contrastive tone in Western Navarrese Basque, in addition to contrastive stress, was not previously known. Basque may be one of the few languages where both Tokyo-type and Swedish-type lexical pitch-accent systems are concurrently attested in different dialects and can still be phonetically and phonologically investigated.

Keywords: stress, tone, Basque, accent

### **1. Introduction**

Goizueta is a town of about 900 inhabitants located in western Navarre, on the Gipuzkoan border. It is one of the towns where the Basque language enjoys the greatest vitality in the entire Basque Country. Although virtually all inhabitants are bilingual in Spanish and Basque, interaction within the town is almost exclusively in Basque. The local dialect is actively used by all generations in Goizueta, even though young speakers also learn standard Basque (and Spanish) through the school system.

One of the most interesting features of Goizueta Basque is its accentual system, which, until now has remained little studied and ill-understood. In this paper we show that both stress and tone are lexically contrastive in Goizueta Basque. This prosodic system is thus substantially different from any that has been previously described for other Basque varieties. Some of the Basque varieties of the northern Bizkaian area possess a pitch-accent system, reminiscent of Tokyo Japanese, with a lexical contrast between pitch-accented and unaccented words (Hualde 1991, 1999, Elordieta 1997, Hualde, Elordieta, Gaminde & Smiljanic 2002, Elordieta & Hualde 2003). The prosody of Goizueta Basque is strikingly different, as it involves both lexical stress and lexical tone. The Goizueta accentual system is thus rather more like that of Swedish (Bruce 1977, Riad 1998). Since the Goizueta and northern Bizkaian prosodic systems are clearly historically related, these facts are of great importance for our understanding of how one type of pitch-accent system may evolve into the other. In this paper, however, we will attempt to provide an adequate phonetic and

phonological characterization of Goizueta word-prosody, leaving historical considerations aside.

The existence of a Basque variety where both stress and tone are lexically contrastive is an unexpected discovery. Although some brief remarks on the musical nature of Western Navarrese accentuation are found in Ormaechea (1918, 1958), existing work on the accentual system of Goizueta Basque (or any other Western Navarrese varieties, for that matter) is fairly limited. A partial description of Goizueta word-prosody is found in Zubiri (2000) (see also Zubiri & Perurena 1998). Hualde (1997, 1999) does not include Goizueta in his overview of Basque accentual systems. Gaminde (1998a, 1988b) provides some examples for Goizueta, but he is not consistent in his transcription of phonological contrast or in the location of the stress. As for neighboring Western Navarrese varieties, Olano (2000) includes some brief remarks on the accentual system of Leizaola, and Ibarra (1996) includes observations on the prosodic system of Basaburua and Imotz. None of these sources refer to the possibility that both stress and tone may be lexically contrastive in these Navarrese varieties.

The most extensive previous investigation of Goizueta word-prosody is that in Zubiri (2000). Zubiri points out that words in Goizueta may receive stress on either the initial or the postinitial syllable, in a lexically contrastive manner, providing a number of minimal pairs. In addition, he notes that singular and plural forms of the same word are prosodically distinguished. Regarding the nature of this distinction, he relies on his perception and intuition as a native speaker of Goizueta Basque. In Zubiri's view, inflected words have two stresses, one on the stem and another one on their last syllable. In the singular, the stress on the last syllable is secondary, whereas in the plural both stresses would be primary. This relative prominence contrast would be enhanced by a somewhat complex contrast in duration.

Although building in part on previous research, our analysis also differs from previous work in important respects:

- a) First of all, we submit that in Goizueta Basque there is a lexical contrast in tone in addition to a contrast in stress. The stressed syllable may be lexically associated to one of two melodies, which we refer to as Accent 1 and Accent 2. Whereas Accent 1 is properly characterized as a wide circumflex contour HL over the stressed syllable, Accent 2 is best characterized as lacking the lexical H tone, since the stressed syllable is systematically lower in pitch than in words with Accent 1. In our analysis, then, Accent 1 involves a lexical H tone that is not present in accent 2.
- b) Secondly, the prominence on the last syllable noted by Zubiri in words in isolation, is a phrasal phenomenon, most likely related to the expression of focus, both in Accent 1 words and in Accent 2 words.
- c) Thirdly, the correlation between morphological number and accent type turns out to be less strict than previously assumed. Whereas most words do have Accent 1 in the singular and Accent 2 in the plural, this is not the only possibility. There are smaller classes of words with either Accent 1 or Accent 2 in both morphological numbers. We also note the existence of some accent changes in derivational morphology. Accent type is thus logically independent of inflectional morphology. Instead of speaking of a prosodic contrast between singular and plural forms, we will thus refer to an Accent 1 vs. Accent 2 contrast, which is only partially related to the singular vs. plural distinction.
- d) Finally, we establish that both duration and intensity are important cues of stress, whereas pitch distinctions are used to convey the superimposed lexical accent contrast.

In the remainder of this paper we first describe the lexical distribution of the prosodic contrasts. Then, we report on an investigation of the acoustic cues of stress and lexical pitch-accent. The description of Goizueta prosody in this paper is based primarily on the analysis of recorded speech data from three native speakers in their twenties, one female (g1f) and two male (g1m, g2m) with some additional data from a fourth, older, speaker (g3m). All four speakers have university education.

## 2. Word-prosodic contrasts in Goizueta Basque

In Goizueta Basque, the position of the stress is lexically contrastive. Words may be stressed either on the first or on the second syllable ([+1] vs. [+2]). In addition, the stressed syllable may be lexically associated with one of two tonal specifications, which we will call Accent 1 and Accent 2 and will represent with an acute and a grave accent, respectively. There is, thus, a four-way prosodic contrast, as illustrated in (1):

### (1) Prosodic contrasts

[+2], Acc1: ardíri ‘to the sheep, DATsg’, basóri ‘to the forest, DATsg’

[+2], Acc2: ardìri ‘to the sheep, DATpl’, basòri ‘to the forests, DATpl’

[+1], Acc1: úmeri ‘to the child, DATsg’

[+1], Acc2: ùmeri ‘to the children, DATpl’, bàsori ‘to the glass(es), DATsg/pl’

[+2], Acc1: amóna ‘the grandmother’

[+2], Acc2: amònak ‘the grandmothers’

[+1], Acc1: ámana ‘of the mother’

[+1], Acc2: ànima ‘the soul’, àmana ‘of the mothers’

As can be seen in the examples in (1), word-prosody is involved in both lexical and grammatical distinctions. In particular, whereas the position of the stress (on the first or on the second syllable) is fixed throughout the inflectional paradigm of a given word, singular and plural inflected forms of most words differ in accent type. For instance, as illustrated above, in the pair *basóri* ‘to the forest’ vs. *basòri* ‘to the forests’, the singular/plural contrast is signaled by a difference in accent type. The same is true for *úmeri* ‘to the child’ vs. *ùmeri* ‘to the children’, with stress on the initial syllable. On the other hand, in the case of *bàsori* ‘to the glass or to the glasses’, there is no singular/plural contrast, as this word has Accent 2 (on its initial syllable) in both singular and plural. To understand this prosodic system, it is necessary to consider the lexical and grammatical functions of word-prosody separately.

In uninflected forms, all four prosodic types are found, although not with equal frequency or lexical distribution. In (2) examples are given of uninflected words belonging to all four prosodic classes, classified also by number of syllables:

### (2) Stress and accent contrasts in uninflected words

Class

A [+2], Acc1:

ardí ‘sheep’                      mendí ‘mountain’              gizón ‘man’

alába ‘daughter’              ittúrri ‘fountain’              abérats ‘rich’

basérritar ‘farmer’              emákume ‘woman’              txistúlari ‘flutist’

B [+1], Acc1:

	lúr ‘land’	lán ‘work’	béltz ‘black’
	úme ‘child’	áma ‘mother’	séme ‘son’
C	[+2], Acc2:		
	intxàur ‘walnut’	purè ‘puree’	Fermin ‘a name’
	belàrri ‘ear’	tipùla ‘onion’	eskòla ‘school’
D	[+1], Acc2:		
	Jòn ‘a name’		
	bàso ‘glass’	mòro ‘Moor’	libru ‘book’
	mèdiku ‘doctor’	fàbrica ‘factory’	lèngusu ‘cousin’

By far the most common type is stress on the second syllable and Accent 1 (Class A). Class B, with stress on the first syllable and Accent 1, besides almost all monosyllabic words, contains a relatively small number of bisyllabic stems. Classes C and D, both with Accent 2 in their uninflected form, contain mostly borrowings and some etymologically-polymorphemic native words.

All inflected singular forms have the same prosodic properties as the uninflected form of the word. In the plural, however, Accent 1 is replaced by Accent 2 if the uninflected form has three or fewer syllables. That is, words in Classes A and B acquire Accent 2 in the plural except for stems with four or more syllables like *basérritar* ‘farmer’ and *emákume* ‘woman’. This is illustrated in (3) with examples in four morphological cases, absolutive, ergative, dative and comitative (absolutive and ergative plural are always identical):

### (3) Singular/plural contrasts

gizón ‘man’ (Class A)

	sg	pl
ABS	gizóna	gizónak
ERG	gizónak	gizónak
DAT	gizónari	gizónari
COM	gizónakin	gizónakin

mendí ‘mountain’ (Class A)

ABS	mendía	mendik
ERG	mendík	mendik
DAT	mendíri	mendiri
COM	mendíkin	mendikin

séme ‘son’ (Class B)

ABS	sémea	sèmek
ERG	sémek	sèmek
DAT	sémeri	sèmeri
COM	sémekin	sèmekin

Words with Accent 2 in the uninflected form (Classes C and D), as well as Accent 1 words with four or more syllables, do not participate in this alternation. In these words ABS

singular and plural are different, since they take segmentally different endings, but the singular/plural contrast is neutralized in other morphological cases, including the ERG, DAT and COM.

(4) Words without singular/plural contrast

	bàso ‘glass’	belàrri ‘ear’	emákume ‘woman’
	sg/pl	sg/pl	sg/pl
ABS	bàsoa/bàsok	belàrria/belàrrik	emákumea/emákumek
ERG	bàsok	belàrrik	emákumek
DAT	bàsori	belàrriri	emákumeri
COM	bàsokin	belàrrikin	emákumekin

We may thus capture the accent alternation facts by means of the rule in (5):

(5) Plural Accent Rule

Accent 1  $\diamond$  Accent 2 in plural (Condition: if stem has 3 or fewer syllables)

Differently stated, all plural words have Accent 2, except for Class A words with four or more syllable in the stem. If the word has Accent 2 in its uninflected and singular forms (Classes C and D), a rule assigning Accent 2 in the plural would apply vacuously.

Rule (5) has, in fact, a somewhat wider domain of application, since Accent 1 is also replaced by Accent 2 in superlative forms (suffix *-(a)na* ‘the most’), “excessive” forms (suffix *-(a)gi* ‘too’) and derived forms bearing certain other suffixes, including the adjectival *-ti* and *-tarr* ‘(who is) from’:

(6) Accent 1  $\diamond$  Accent 2 in derivational morphology

béltza ‘black, ABSsg’	bèltzana ‘the blackest one’, bèltzagi ‘too black’
zuría ‘white, ABSsg’	zurìna ‘the whitest one’, zurìgi ‘too white’
urdína ‘blue, ABSsg’	urdìnana ‘the bluest one’, urdìnagi ‘too blue’
beldúr ‘fear’	beldùrti ‘fearful’
herría ‘the village’	herritarra ‘the villager’
hiría ‘the town’	hiritarra ‘the citizen’

In the next section we turn to the acoustic characterization of the lexical contrasts in stress position and accent type in Goizueta Basque.

### 3. Acoustic correlates of stress and accent

#### 3.1. Methods

The speech data discussed in this section were elicited from three native speakers of Goizueta Basque, g1f, g1m and g2m. Participants were asked to read three times a list containing 44 nouns and adjectives in the comitative case (“with”, suffix *-kin*) in the frame *\_\_\_\_\_esan dut* “I said”. Basque is a verb final language, so that “X *esan dut*” is the unmarked order, pragmatically equivalent to English “I said X”. Both a Spanish translation and the target word in uninflected form were given in the written stimulus, as in the following example:

(7) Reading materials. Example

Written stimulus: con el monte (mendi) \_\_\_\_\_ esan dut  
Expected response: *mendikin (e)san dut*  
(‘I said with the mountain’)

The 44 items included 22 different words in the singular and in the plural and were presented in pseudo-random order, so that the singular and the plural of the same word were never adjacent. All items in the list are bisyllabic or trisyllabic stems. Words were chosen so that all five vowels and the most common final consonants would be included in stem-final position and both initial and postinitial stress would be represented. From Zubiri’s (2000) description and previous fieldwork, words were expected to be stressed on the same syllable in their singular and plural form, but to differ in accent type, with Accent 1 in the singular and Accent 2 in the plural. The existence of Classes C and D, with Accent 2 in singular and plural was not known before this recording, since earlier work did not identify these word classes. As it turns out, the small classes C and D are each represented by one item. This was determined a posteriori through further elicitation. The complete list of target items, grouped by accentual class, is given in (8). Again, for each item the comitative singular and plural were elicited:

(8) Target words

Class A: gizon ‘man’, aza ‘cabbage’, buru ‘head’, urre ‘gold’, urdin ‘blue’, azal ‘skin’, enbor ‘log’, baso ‘forest’, alaba ‘daughter’, hari ‘thread’, bildots ‘lamb’, mendi ‘mountain’, ardi ‘sheep’, haran ‘valley’, basurde ‘wild boar’

Class B: seme ‘son’, ahari /áři/ ‘ram’, miru ‘hawk’, ama ‘mother’, la(g)un ‘friend’

Class C: baso ‘glass’

Class D: belarri ‘ear’

The acoustic analysis of the data was performed with PRAAT (Boersma & Weenink 2006). The first two vowels of every target word (V1, V2) were manually segmented using standard criteria. The rest of the analysis, which included taking measurements of duration, intensity and pitch, was performed automatically, running a script written for this purpose. All tokens of *la(g)un* ‘friend’ were removed, as the /g/ was consistently deleted in this word by all speakers, which made the segmentation and analysis of this word problematic (should [w] in [lawn] be considered V2?). Obvious mistakes were also removed from the analysis after confirming with one of the speakers that they were indeed production errors.

Examples of sg/pl pairs are given in Figs. 1-4.

Fig. 1. *alábakin san dut* ‘I said “with the daughter”’ (G1f).

Fig. 2. *alábakin san dut* ‘I said “with the daughters”’ (G1f).

Fig. 3. mendikin san dut 'I said "with the mountain"' (G1f).

Fig. 4. mendikin san dut 'I said "with the mountains"' (G1f).

### 3.2. Results

Duration, intensity and pitch over the first two syllables of the word were measured as likely correlates of stress and/or lexical accent. In all tables presented in this section, items are grouped in 8 lexical classes (s =singular, p = plural): As, Ap, Bs, Bp, Cs, Cp, Ds, Dp. Since at issue are the effects of stress (initial = [+1] vs. postinitial = [+2]) and accent type (1 vs. 2), the statistics are based on a classification of items according to these two factors (each of them with two levels). Graphs are shown only for class A and B items, since classes C and D contained very small numbers of tokens.

#### 3.2.1. Duration

The duration of the vowel of the first two syllables, V1 and V2, was measured for all items. Means (and standard deviations) in ms. for each class of words are given in Table I for each speaker separately.

TABLE I

Notice that for words with stress on the second syllable (classes As, Ap, Cs, Cp) this difference is always negative, showing that the second syllable is longer, whereas for words with stress on the first syllable (Bs, Bp, Ds, Dp), the difference is positive. That is, the stressed syllable is always longer than the adjacent unstressed syllable in the stem, regardless of accent type. The boxplots in Fig. 5 show the difference in duration between V1 and V2 (duration of V1 minus duration of V2) for As, Ap, Bs and Bp words.

Fig.5. BOXPLOTS: difference in duration between V1 and V2

ANOVAs on the difference of duration between V1 and V2, for each speaker separately, with factors Stress Pattern (+1,+2) and Accent Type (1,2), show that Stress Pattern is a significant factor for all speakers [g1f:  $F(1,121)=339$ ,  $p<0.001$ ]; g1m:  $F(1,110)=225$ ,  $p<0.001$ ; g2m:  $F(1,122)=106$ ,  $p<0.001$ ]. Instead, no significant effect was found for Accent Type for any of the three speakers. The correlation between stress and accent was significant (g1f:  $p<0.001$ , g1m:  $p<0.001$ , g2m:  $p<0.05$ ). We conclude that duration is an important correlate of stress, but not of accent type, in Goizueta Basque. Stressed vowels are significantly longer than unstressed vowels.

#### 3.2.2. Intensity

To examine the possible role of intensity in cueing stress pattern and/or accent type, the ratio between peak intensity in V1 and V2 was calculated. Table II shows mean values (and standard deviations) in dB for each prosodic class. A difference of 6 dB would indicate that one of the two sounds compared is twice as loud as the other.

TABLE II

Peak intensity ratios for classes A and B are also shown graphically in the boxplots in Fig. 6.

Fig. 6. BOXPLOT peak intensity ratio

ANOVAs on the difference in peak intensity between V1 and V2 with Stress pattern and Accent type as factors show that for all three speakers both factors significantly condition differences in intensity. For stress, glf:  $F(1,121)=118$ ,  $p<0.0001$ ; glm:  $F(1,110)=196$ ,  $p<0.0001$ ; g2m:  $F(1,122)=220$ ,  $p<0.0001$ . From the boxplots in Fig. 6, showing the results for lexical classes A (with postinitial stress) and B (with initial stress) it is evident that stress pattern clearly separates the data. V2 has greater intensity than V1 when it is stressed, and vice versa.

Both from the tables and from the boxplot figures, it is clear that Accent type has a much smaller effect on intensity than stress position. Nevertheless, this effect too turns out to be significant. For accent type, glf:  $F(1, 121)=30$ ,  $p<0.0001$ ; glm:  $F(1,110)=16$ ,  $p<0.0001$ ; g2m:  $F(1,122)=7$ ,  $p<0.001$ . There is no interaction between both factors. Differences in intensity between stressed and unstressed syllables are greater under Accent 1 in words with postinitial stress, and under Accent 2 in words with initial stress. We conclude that, like vowel duration, intensity is primarily a cue of stress type (initial vs. postinitial).

### 3.2.3. Pitch

To analyze pitch patterns, F0 values were extracted at three equidistant points within each of V1 and V2: at 25%, 50% and 75% of the duration of the vowel. Mean values (with error bars) are plotted in Fig. 7 for words of lexical classes A (left panels) and B (right panels).

Fig. 7 (6 panels) F0 measurements

From Fig. 7, it appears that F0 is higher on the stressed syllable; the second syllable for class A words, and the initial for class B words. In addition, Accent 1 words (As and Bs) have higher pitch on their stressed syllable than Accent 2 words.

Mean F0 values at mid point of V1 and V2 are given in Table III

TABLE III

An ANOVA with dependent factor F0 at mid point of V1 minus F0 at mid point of V2 and independent factors Stress pattern and Accent type shows that both factors are significant and interact. For Stress pattern, glf:  $F(1,121)=76$ ,  $p<0.0001$ ; glm:  $F(1,110)=430$ ,  $p<0.0001$ ; g2m:  $F(1,122)=385$ ,  $p<0.0001$ . For Accent type, glf:  $F(1,121)=137$ ,  $p<0.0001$ ; glm:  $F(1,110)=73$ ,  $p<0.0001$ ; g2m:  $F(1,122)=27$ ,  $p<0.0001$ . The interaction,  $p<0.0001$  for all speakers.



The stressed syllable has a higher pitch at mid point under Accent 1 than under Accent 2. Accent 1 is thus associated with a higher tone.

#### 4. The nature of the Accent 1/Accent 2 contrast

As just mentioned, stressed syllables are significantly higher in pitch when associated with Accent 1 than when bearing Accent 2. The connected boxplots in Fig. 7 offer a rough approximation to the overall tonal contours associated with the two accents.

In a different recording session, speakers g1f, g1m and g2m were asked to produce a list of short sentences containing a small number of representative words each bearing several inflectional suffixes and in both singular and plural. The stimuli were written in both Spanish and standard Basque and the speakers were asked to provide oral translations in Goizueta Basque. For instance, for the word *amóna* ‘grandmother’, the following written stimuli were provided (we add English glosses):

##### (9) Examples of stimuli

Es la abuela (amona da) ‘it is the grandmother’

Son las abuelas (amonak dira) ‘they are the grandmothers’

Se lo ha quitado a la abuela (amonari kendu dio) ‘s/he took it away from grandma’

Se lo ha quitado a las abuelas (amonei kendu die) ‘s/he took it away from the grandmothers’

La abuela lo ha hecho (amonak egin du) ‘the grandmother did it’

Las abuelas lo han hecho (amonek egin dute) ‘the grandmothers did it’

Es el nombre de la abuela (amonaren izena da) ‘it is the grandmother’s name’

Es el nombre de las abuelas (amonen izena da) ‘it is the grandmothers’ name’

Es de la abuela (amonarena da) ‘it is the one of the grandmother’

Es de las abuelas (amonena da) ‘it is the one of the grandmothers’

Even though in standard Basque singular and plural forms are always segmentally different, in Goizueta they are segmentally identical except in the absolutive case. Two repetitions of the list were recorded by every speaker.

Fig. 8 shows time-normalized F0 contours over the syllables of the stem (that is, excluding inflectional suffixes, which vary among the examples) for all tokens of the words *amóna* ‘grandmother’ and *míru* ‘hawk’. The word *amóna* is a Class A word, with stress on the second syllable, Accent 1 in the singular and Accent 2 in the plural. The word *míru*, on the other hand, belongs to Class B, with stress on the initial syllable and the same accent alternation between singular and plural (a few tokens containing obvious pitch tracking errors, mostly due to glottalization of word-initial vowels, have been excluded from the figures). Other words show similar patterns.

Fig. 8. *amona, miru* 3 speakers

Observation of these figures allows us to obtain a more accurate overall impression of the tonal contours associated with Accent 1 and Accent 2 words in declarative contexts. As can be seen, Accent 1 includes a prominent peak on the stressed syllable that is not present in

words under Accent 2. Instead, Accent 2 can be characterized as a fall over most of the stressed syllable from a syllable-initial mid level. It appears to us that an adequate characterization of the phonological contrast is as the presence of a H\* tone in Accent 1 vs. its absence in Accent 2. Accent 2 words have significantly lower pitch than Accent 1 words. This difference in pitch height is in fact also observable in Fig. 9, containing a sg/pl minimal pair pronounced in isolation.

Fig. 9. *mendíri* / *mendiri*

What characterizes Accent 2 is not just a slower fall than in Accent 2 but also a lower peak. Whereas Accent 1 includes a wide circumflex contour over the stressed syllable, Accent 2 is realized as a fall from a mid value towards the beginning of the stressed syllable.

### 5. Secondary stress on final syllables?

For Zubiri (2000), who does not consider the existence of a tonal contrast, a difference between singular (Accent 1) and plural (Accent 2) words is that in the plural the last syllable of the word is as prominent as the stressed syllable of the stem. As can be seen in Fig. 9, in citation forms there is indeed a tonal peak over the last syllable of the word, which is downstepped with respect to the peak on the stressed syllable under Accent 1, but not under Accent 2, lending the final syllable greater prominence in the latter case. This is further illustrated in the sg/pl pair in Figs. 10-11

Fig. 10. *alába*

Fig. 11. *alábak*

To test the hypothesis of greater prominence on the final syllable of the word in words bearing Accent 2, in the recorded data described in section 3 (all in the comitative case, with suffix *-kin*), we measured the duration and peak intensity of the word-final rhyme */-in/* as well as the pitch at mid point of the duration of this sequence. Results are shown in boxplots in Fig. 12-14. Duration values are also given in Table IV.

TABLE IV

For all speakers, F0 in */-in/* turned out to be significantly higher under Accent 2 than under Accent 1 (see Fig. 14) [g1f:  $F(1,123)=114$ ,  $p<0.001$ ; g1m:  $F(1,112)=36$ ,  $p<0.001$ ; g2m:  $F(1,124)=516$ ,  $p<0.001$ ]. Intensity differences (Fig. 13) were only significant for one speaker, g1f:  $F(1,123)=7$ ,  $p<0.01$ , with greater intensity in Accent 2 words. Regarding duration (Fig. 12), */-in/* was significantly longer under Accent 2 for two speakers, g1f:  $F(1,123)=6$ ,  $p<0.05$  and more clearly, g2m:  $F(1,124)=24$ ,  $p<0.001$ .

From these data, thus, it does appear that the last syllable of the word has greater prominence under Accent 2 than under Accent 1, as suggested by Zubiri (2000). This greater prominence is mostly manifested by higher pitch.

There are, however, reasons to believe that the peak on the final syllable of words is

an intonational effect related to focalization. Whereas Accent 2 words often have a prominent rise and their last syllable, as in Figs. 9 (right hand contour) and 11, systematic comparison of Accent 1 and Accent 2 in a number of different prosodic contexts shows that the tonal contour on the last syllable may be absent for both types of words. Fig.15 and Fig. 16, for instance, show the words *ardiri* ‘to she sheep, DATsg’ and *ardiri* ‘to the sheep, DATpl’ respectively, before a verbal participle and without in intervening a prosodic break. Notice that the contours on the lexically accented syllables are very similar to those in Fig. 9, but there is no tonal prominence on the last syllable of the word in either case.

Fig. 15. *ardiri man dio* ‘he gave it to the sheep (sg)’

Fig. 16. *ardiri man dio* ‘he gave it to the sheep (pl)’

We would suggest that the H tone on the last syllable of words given in citation form is a phrasal accent that has to do with the expression of focus, as in Swedish (Bruce 1977). In our recorded materials elicited in the frame \_\_\_-*kin (e)san dut* ‘I said with the \_\_\_’, the target word would tend to be focalized.

The Accent 1/Accent 2 contrast is further illustrated, in the absence of a following H in the same word in Fig. 17 *amóna da* ‘(she) is the grandmother’ and Fig. 18 *amónak dia* ‘(they) are the grandmothers’. The copula *da* ‘is’/*dia* ‘are’ is integrated in a single prosodic phrase with the preceding noun and receives a phrasal H. Observe that, whereas the Accent 1 word *amóna* ‘grandmother’ has a wide rise and fall contour, its plural, *amónak*, which has Accent 2, lacks a high tone and instead shows a fall over the stressed syllable from a mid point, so that the accent on the copula has higher pitch.

Fig. 17. *amóna da* (gm1) ‘(she) is the grandmother’

Fig. 18. *amónak dia* (g1m) ‘(they) are the grandmothers’

In sentence-medial position, Accent 2 words, which lack a lexical H on the stem, appear to have a greater tendency to induce a phrasal-break to the right, anchoring a phrasal H on their last syllable, but this is not a necessary feature of Accent 2 words. In certain contexts, such as in pronominal genitive modifiers, a prosodic break between genitive and the noun is unlikely, and consequently no word-final H will tend to occur. This is shown with pronominal genitive examples in Fig. 19 and Fig. 20.

Fig. 19. A. *amónan izena da* ‘it is the grandmother’s (sg) name’ (g1f)

Fig. 20. *amónan izena da* ‘it is the grandmothers’ (pl) name’ (g1f)

Furthermore, the fact that the distinction between these two classes of words relies on the shape of the accent on the stressed syllable of the stem is obvious when we consider that the contrast is maintained in inflected words where the stressed stem syllable is also the last syllable of the word, as in *ardik* ‘the sheep, ERGsg’ vs. *ardik* ‘the sheep, ERGpl’ in

Fig. 21 and Fig. 22.

Fig. 21. *ardík jan do* (g1m) ‘the sheep has eaten it’

Fig. 22. *ardik jan dute* (g1m) ‘the sheep have eaten it’

For comparison, another bisyllabic minimal pair but with stress on the first syllable, *úmek* ‘the child, ERG’ vs. *ùmek* ‘the children, ERG’ is shown in Fig. 23 and Fig. 24.

Fig. 23. *úmek galdu do* (g1m) ‘the child has lost it’

Fig. 24. *ùmek galdu dute* (g1m) ‘the children have lost it’

To conclude, whereas Accent 2 words display a prominent rise on their final syllable in phrase-final position (including in citation form), this H tone is not part of the lexical specification of Accent 2 words, since it may be absent in other phrasal contexts. The contrast, instead, relies on the tonal shape associated with the stressed syllable of the stem.

## 6. Conclusion

Previous research on Goizueta Basque accentuation revealed that in this Basque dialect, words can be contrastively stressed on the initial or the postinitial syllable. A given stem is always stressed on the same syllable, throughout the word’s inflectional paradigm, both in the singular in the plural. However, with most words, there is also a prosodic contrast between singular and plural forms. The nature of this contrast has not been properly understood in the limited work that had been done on this topic.

In this paper we have shown that this contrast, which we have labeled Accent 1 vs. Accent 2, involves different tonal melodies. Furthermore, contrary to previous assumptions, the contrast in lexical tone is not totally dependent on inflectional morphology. Although most words have Accent 1 in the singular and Accent 2 in the plural, there are words with Accent 2 in both singular and plural (Classes C and D) as well as words with Accent 1 in both morphological numbers (Class A words with long stems).

We have argued that Accent 1 and Accent 2 words differ on the tonal configuration that is lexically associated with the stressed syllable. Whereas Accent 1 has a prominent rise, Accent 2 is a falling contour from a mid point at the beginning of the stressed syllable. We have analyzed this contrast as the presence of a H\* in Accent 1 words vs. its absence in Accent 2 words.

Lexical stress, which falls on the same syllable in all inflected forms of a given lexical stem, is cued by significant differences in duration and intensity.

In focalized words, including citation forms, there is a rise-fall contour on the last syllable, which is downstepped by Accent 1 but not by Accent 2. We have argued that final-prominence is independent from lexical stress and accent. In focalized words the final syllable bears a phrasal-accent H, in a way that is reminiscent of Swedish.

We have thus demonstrated that in Goizueta Basque both tone and stress are independent, lexically contrastive features. Like, for instance, in Swedish (Bruce 1977, Riad 1998) and Serbian/Croatian (Godjevac 2000, Smiljanic & Hualde 2000, Smiljanic 2002), stressed syllables are lexically associated with one of two melodies.

From the lexical distribution of prosodic patterns it is clear that both prosodic contrasts in stress position and accent type in Goizueta Basque are diachronically related to the single contrast between lexically accented and unaccented words in the Basque varieties of the northern Bizkaian area. The typological interest of Goizueta Basque is thus increased by the fact that it is historically related to a very different type of pitch-accent system. In Hualde et al. (2003), the Tokyo-type pitch-accent system of Northern Bizkaian Basque, with a contrast involving presence vs. absence of accent, is distinguished from pitch-accent systems with a tonal contrast superimposed on stress, as in Swedish and several other European languages. It turns out now that both types of pitch-accent system are found in Basque, which raises interesting questions regarding the possible evolutionary paths of word-prosodic systems.

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We are grateful to our Goizueta speakers for their collaboration. We also want to thank Juan Joxe Zubiri and Gorka Elordieta for stimulating discussion.

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## TABLES

**Table I. Duration of V1 and V2 (means and stdev in ms.)**

a) speaker g1f

Class	stress pattern	Accent	N	duration V1	duration V2	V1-V2
As	+2	1	45	71.5 (17.95)	102.9 (18.35)	-31.4 (21.68)
Ap	+2	2	43	76.30 (17.41)	118.69 (16.27)	-42.44 (23.33)
Bs	+1	1	13	110.23 (29.79)	75.06 (10.03)	27.4 (27.7)
Bp	+1	2	12	131 (29.12)	72.5 (8.82)	58.66 (28.86)
Cs	+2	2	3	56.33 (5.5)	109.66 (5.03)	-53 (9.84)
Cp	+2	2	3	48 (5.29)	134 (5.19)	-85.66 (9.86)
Ds	+1	2	3	134.33 (10.21)	49.33 (14.97)	84.66 (20.98)
Dp	+1	2	3	136 (18.35)	50.33 (8.62)	86.33 (22)

b) speaker g1m

Class	stress pattern	Accent	N	duration V1	duration V2	V1-V2
As	+2	1	43	76.44 (20.37)	112.23 (34.29)	-35.69 (30.32)
Ap	+2	2	36	82 (23.6)	141.97 (19.49)	-59.88 (24.94)
Bs	+1	1	12	117.16 (38.01)	92.08 (10.79)	24.91 (30.67)
Bp	+1	2	11	150.81 (47.96)	92.9 (14.58)	58.09 (45.22)
Cs	+2	2	3	54 (10)	114.66 (7.09)	-60.66 (17.03)
Cp	+2	2	3	62.33 (7.76)	117 (16.82)	-54.33 (8.5)
Ds	+1	2	3	139.33 (20.98)	73.66 (15.01)	65.66 (7.63)
Dp	+1	2	3	148 (5.29)	87 (6.08)	61.33 (8.5)

c) speaker g2m

Class	stress pattern	Accent	N	duration V1	duration V2	V1-V2
As	+2	1	45	92.84 (16.72)	108.62 (20.07)	-15.82 (20.56)
Ap	+2	2	45	96.37 (21.9)	116.53 (16.02)	-20.13 (22.57)
Bs	+1	1	12	103.16 (21.85)	85.08 (10.36)	18 (20.83)
Bp	+1	2	12	120.75 (34.02)	87.41 (9.16)	33.33 (32.56)
Cs	+2	2	3	82.33 (7.09)	111.66 (5.85)	-29.33 (3.51)
Cp	+2	2	3	76.66 (9.5)	117.33 (6.8)	-41 (13)
Ds	+1	2	3	131.66 (9.45)	90.66 (10.4)	41 (14.52)
Dp	+1	2	3	125.33 (4.93)	83.33 (15.14)	42.66 (11.71)



**Table II. Peak intensity of V1 and V2 (means and stdev in dB.)**

a) speaker g1f

Class	stress pattern	Accent	N	Intensity V1	intensity V2	V1-V2 (dB)
As	+2	1	45	60.7 (3.42)	65.92 (3.7)	-5.22 (2.71)
Ap	+2	2	43	61.74 (3.68)	64.97 (3.61)	-3.22(2.97)
Bs	+1	1	13	65.59 (3)	64.53 (2.66)	1.06(1.09)
Bp	+1	2	12	62.50 (3.63)	60.07 (3.1)	2.42 (2.58)
Cs	+2	2	3	64.48 (2.4)	64.29 (3.38)	0.18 (1.08)
Cp	+2	2	3	65.35 (1.31)	64.51 (3.1)	0.83 (2.1)
Ds	+1	2	3	64.94 (4)	59.45 (2.9)	5.49 (1.1)
Dp	+1	2	3	64.54 (3.32)	60.19 (2.78)	4.35 (0.9)

b) speaker g1m

Class	stress pattern	Accent	N	intensity V1	intensity V2	V1-V2 (dB)
As	+2	1	43	71.05 (3.22)	77.35 (2.17)	-6.29 (2.56)
Ap	+2	2	36	72.52 (3.73)	77.42 (2.58)	-4.89 (2.84)
Bs	+1	1	12	76.26 (1.74)	74.99 (2.22)	1.26 (1.35)
Bp	+1	2	11	77.04 (1.66)	74.6 (2.46)	2.43 (1.47)
Cs	+2	2	3	75.36 (1.61)	76.04 (1.86)	-0.68 (0.41)
Cp	+2	2	3	75.06 (1.37)	76.4 (1.84)	-1.34 (0.46)
Ds	+1	2	3	77.69 (1.74)	72.37 (3.13)	5.31 (1.92)
Dp	+1	2	3	77.26 (0.71)	73.81 (2.69)	3.44 (2.21)

c) speaker g2m

Class	Stress pattern	Accent	typ	N	intensity V1	intensity V2	V1-V2 (dB)
As	+2	1		45	71.40 (2.66)	77.69 (3.03)	-6.28 (2.1)
Ap	+2	2		45	71.92 (3.84)	77.09 (2.39)	-5.17 (2.86)
Bs	+1	1		12	78.14 (3.17)	77.02 (3.31)	1.12 (2.38)
Bp	+1	2		12	76.56 (2.58)	75.12 (4.22)	1.43 (2.54)
Cs	+2	2		3	72.78 (4.71)	78.12 (3.41)	-5.33 (1.61)
Cp	+2	2		3	72.65 (2.01)	78.22 (0.42)	-5.57 (1.79)
Ds	+1	2		3	78.28 (3.99)	72.08 (3.85)	6.19 (1.61)
Dp	+1	2		3	78.18 (1.64)	72.66 (2.94)	5.51 (1.76)

**Table III. F0 at mid point of V1 and V2 (means and st dev in Hz)**

a) speaker g1f

Class	stress pattern	Accent	N	F0 V1	F0 V2	F0 V1-V2
As	+2	1	45	164 (23.2)	191 (8.9)	-37 (22.5)
Ap	+2	2	43	153 (13.3)	160 (6.9)	-7 (11.2)
Bs	+1	1	13	186 (8.2)	167 (3.2)	19 (9)
Bp	+1	2	12	164 (5.8)	148 (3.3)	16 (5)
Cs	+2	2	3	173 (2.5)	159 (1.1)	14 (1.5)
Cp	+2	2	3	167 (2.3)	153 (4.7)	14 (3.6)
Ds	+1	2	3	156 (7.2)	153 (6.1)	3 (1.1)
Dp	+1	2	3	159 (5.5)	155 (9.1)	4 (12.7)

a) speaker g1m

Class	stress pattern	Accent	N	F0 V1	F0 V2	F0 V1-V2
As	+2	1	45	119 (5.2)	151 (11.6)	-32 (11.3)
Ap	+2	2	43	124 (5.3)	132 (9)	-8 (9.7)
Bs	+1	1	13	150 (7.9)	119 (7.6)	31 (7.5)
Bp	+1	2	12	135 (6.5)	112 (5.3)	23 (3)
Cs	+2	2	3	127 (2.1)	123 (2.5)	4 (4.6)
Cp	+2	2	3	125 (3.2)	125 (11.2)	0 (8.5)
Ds	+1	2	3	125 (13.4)	112 (8)	13 (10.2)
Dp	+1	2	3	128 (1)	115 (2.6)	13 (1.7)

a) speaker g2m

Class	stress pattern	Accent	N	F0 V1	F0 V2	F0 V1-V2
As	+2	1	45	164 (7)	197 (7)	-33 (8.6)
Ap	+2	2	43	166 (9.7)	186 (6.1)	-20 (11.1)
Bs	+1	1	13	193 (7)	176 (5.4)	17 (7.1)
Bp	+1	2	12	181 (5.6)	171 (3)	16 (5.8)
Cs	+2	2	3	162 (8.1)	177 (1.7)	-15 (6.5)
Cp	+2	2	3	162 (2)	184 (8.2)	-12 (10.2)
Ds	+1	2	3	175 (1)	173 (2.1)	2 (3.1)
Dp	+1	2	3	177 (4.9)	170 (3.1)	7 (6)

**Table IV. Duration of /-in/ in ms. by accent type (means and st dev)**

	g1f	g1m	g2m			
Acent type	N	ms	N	ms	N	ms
1	58	95.79(14.77)	55	177.52(64.42)	57	113.12(13.68)
2	67	103.07(17.34)	59	176.23(57.62)	69	128.63(20.51)

FIGURES

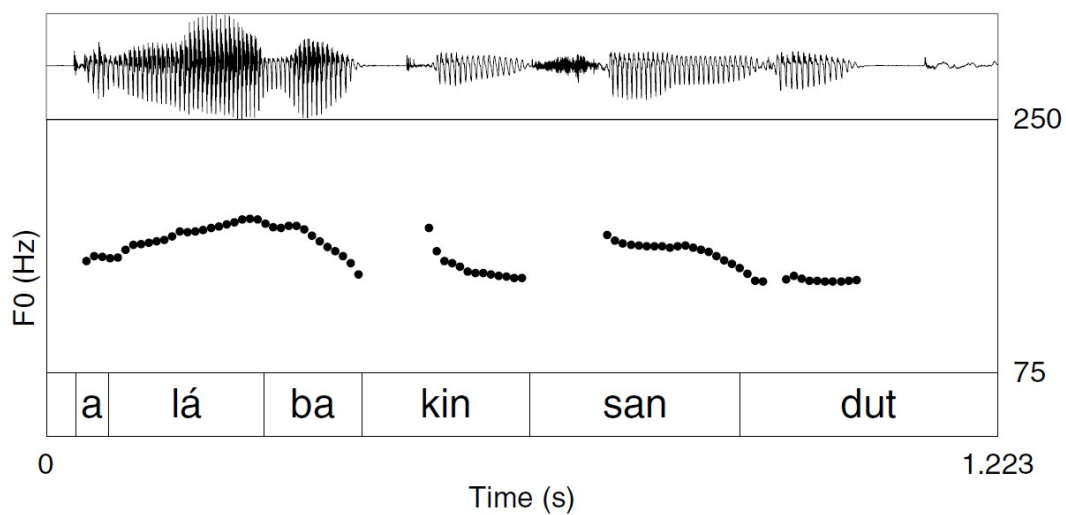


Fig. 1. alábakin san dut 'I said with the daughter' (g1f)

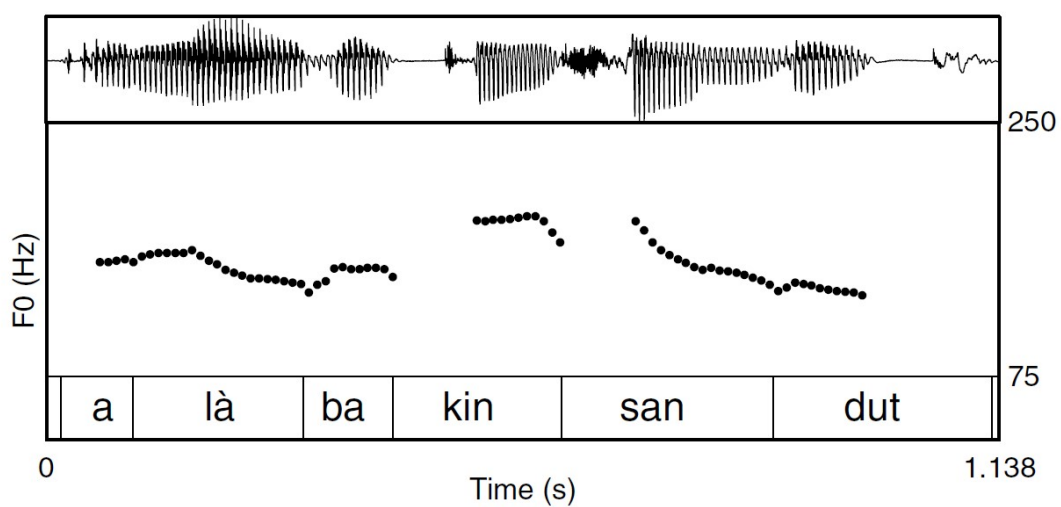


Fig. 2. alàbakin san dut 'I said with the daughters' (g1f)

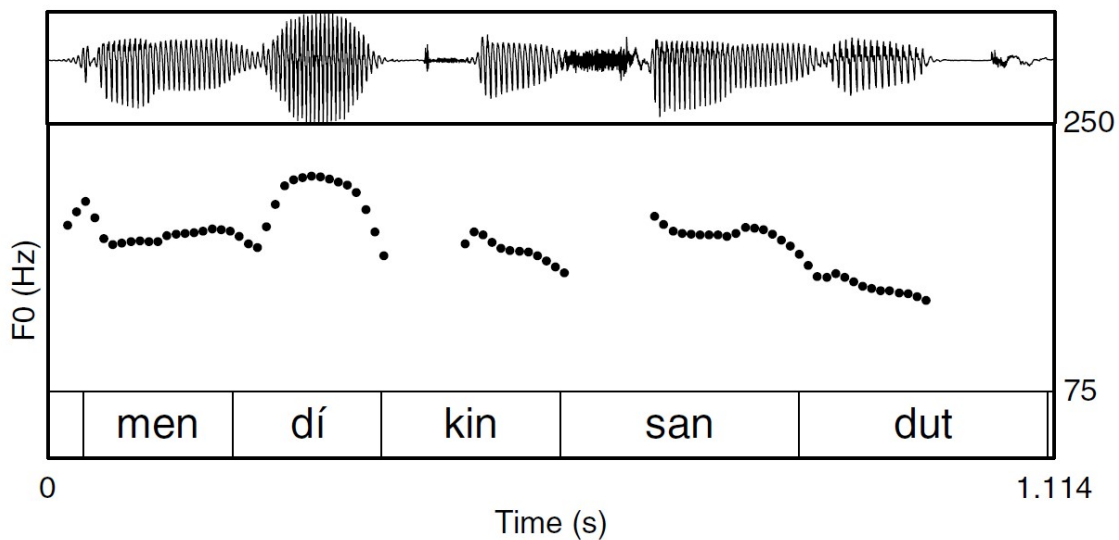


Fig. 3. mendíkin san dut 'I said with the mountain'

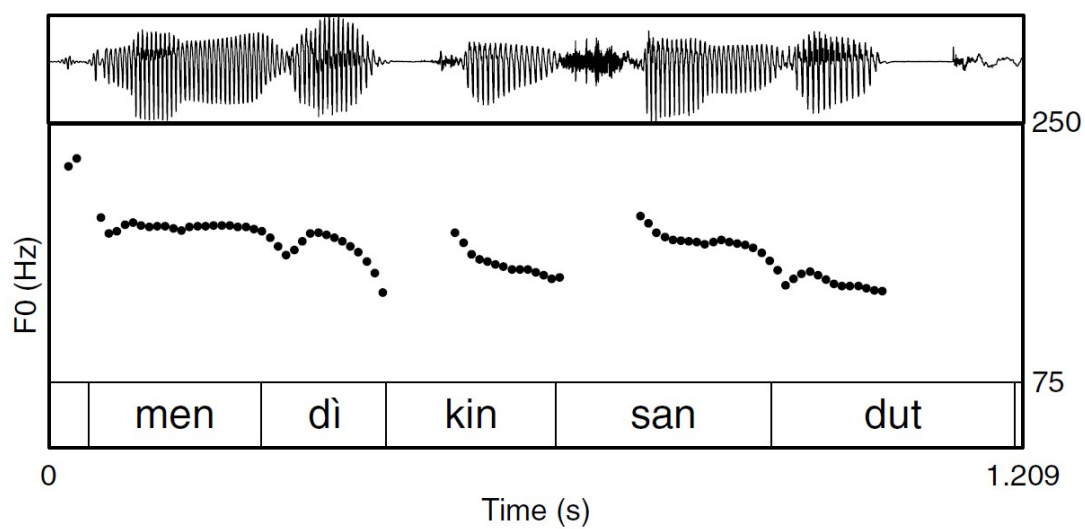


Fig. 4. mendíkin san dut 'I said with the mountains' (g1f)

## V1-V2 (ms)

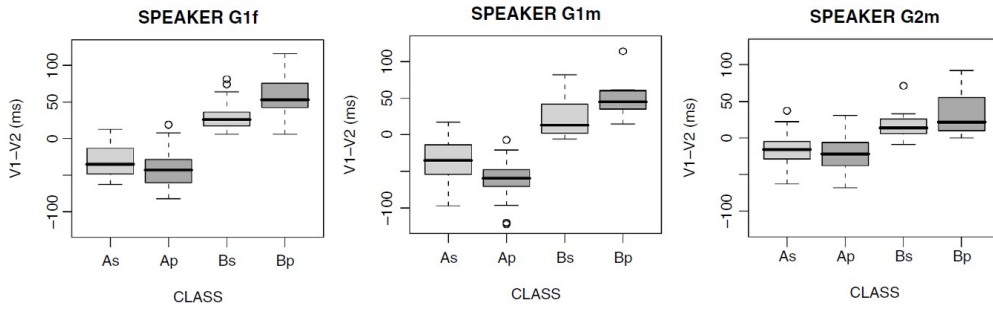


Fig. 5. (3 panels) Difference in duration between V1 and V2. Negative numbers on y-axis indicate that V2 is longer than V1.

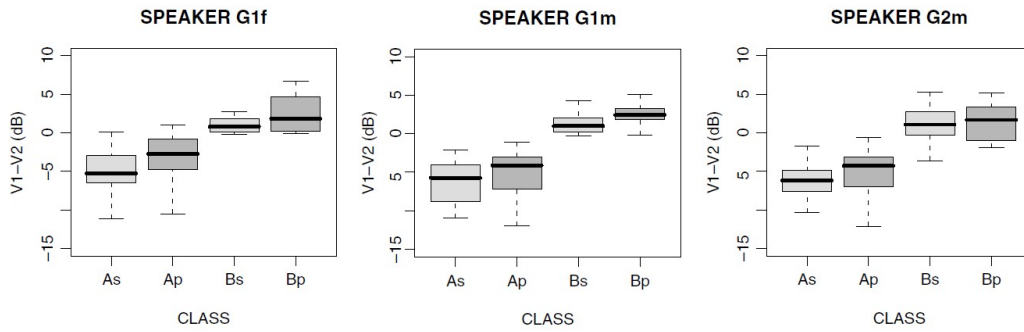


Fig. 6. (3 panels). Difference in peak intensity between V1 and V2.

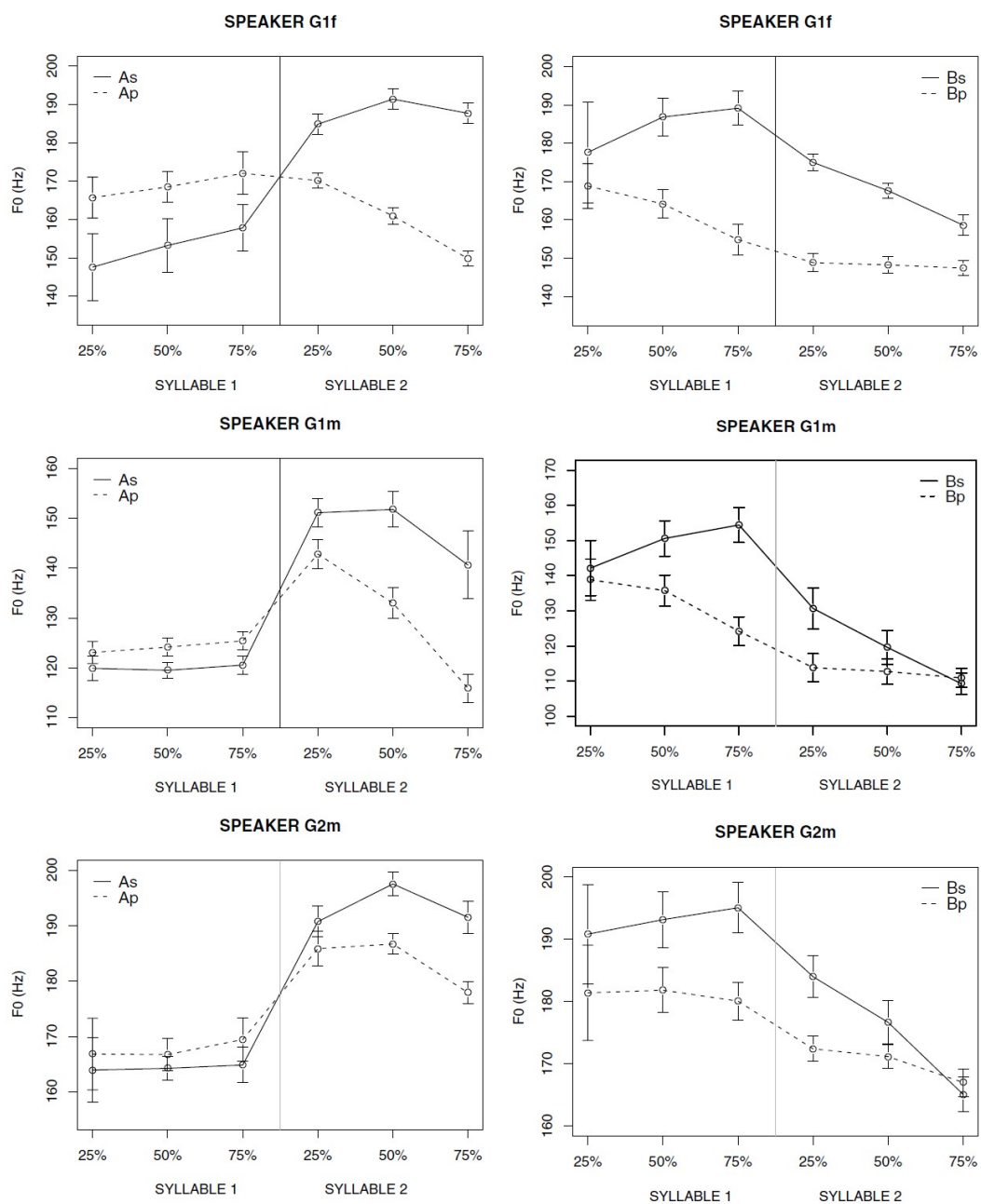


Fig. 7. (6 panels) F0 values at 3 equidistant points in each of V1 and V2 for classes As (postinitial stress, Accent 1) Ap (postinitial stress, Accent 2), Bs (initial stress, Accent 1) and Bp (initial stress, Accent 2).

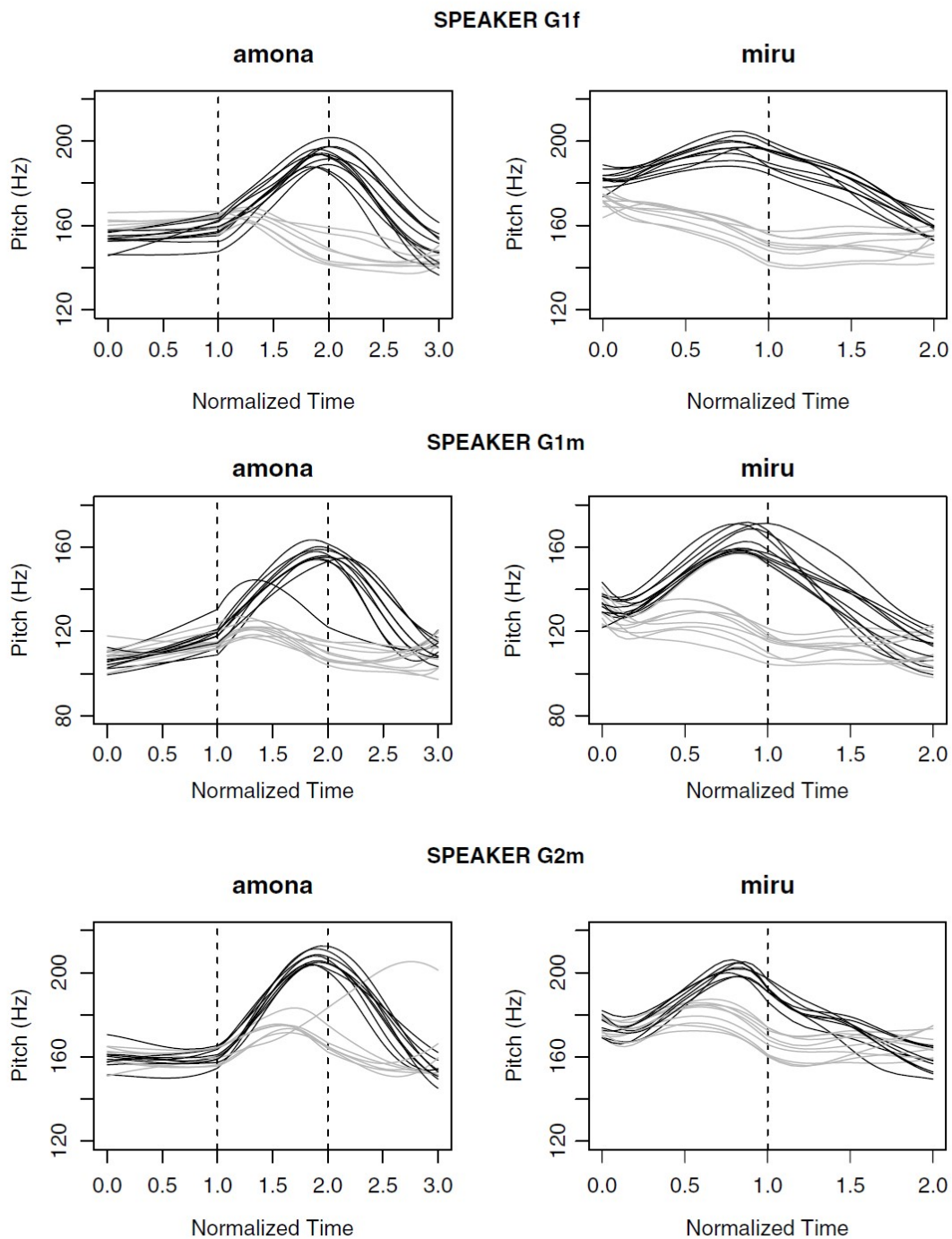


Fig. 8. Time-normalized F<sub>0</sub> contours over the syllables of the stem for representative examples of lexical classes A (*amona*) and B (*miru*). Singular tokens are represented in black and plural tokens in grey.

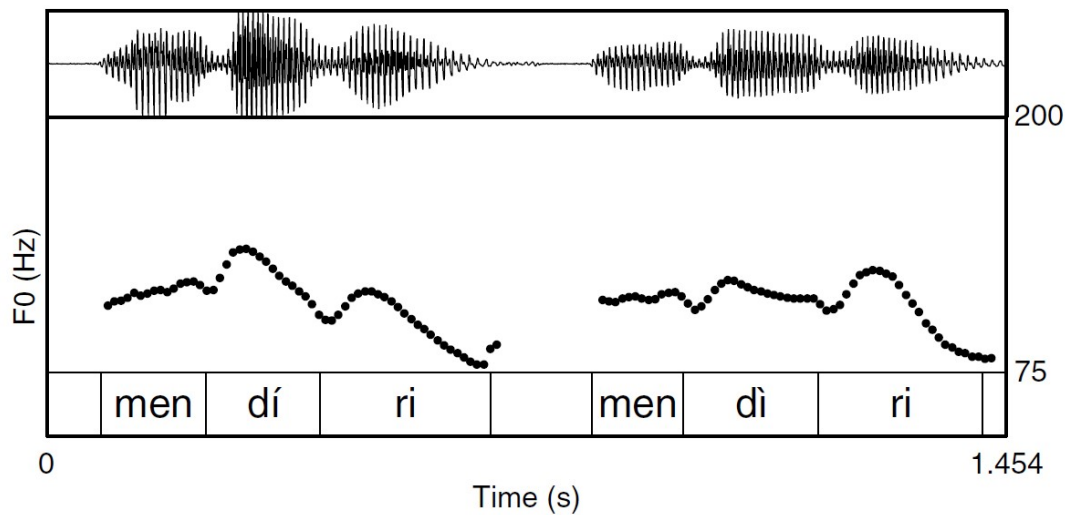


Fig. 9. *mendiri* 'to the mountain, DAT' (Accent 1), *mendiri* 'to the mountains, DAT' (Accent 2) (g3m, adapted from Hualde in press)

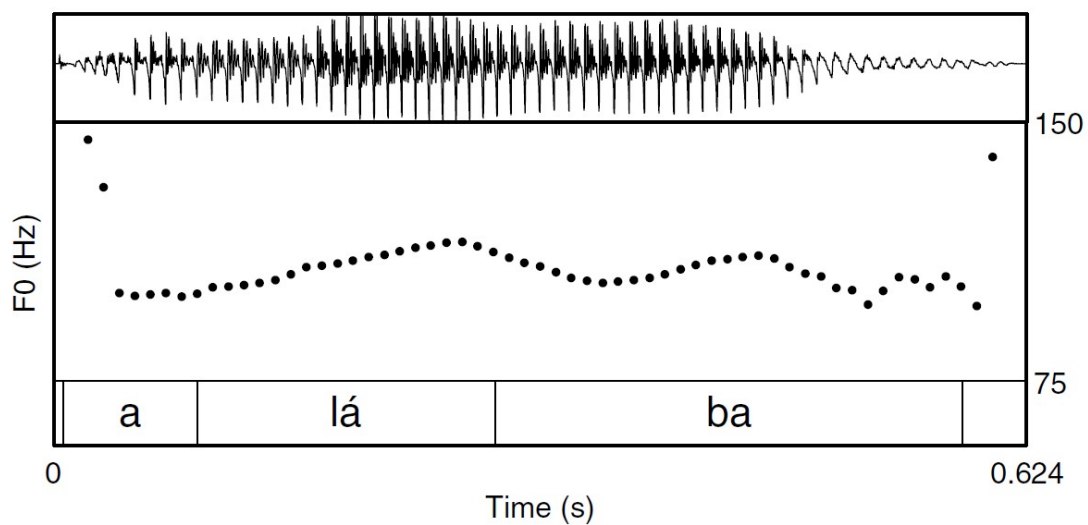


Fig. 10. *alába* 'daughter', citation form (g1m)



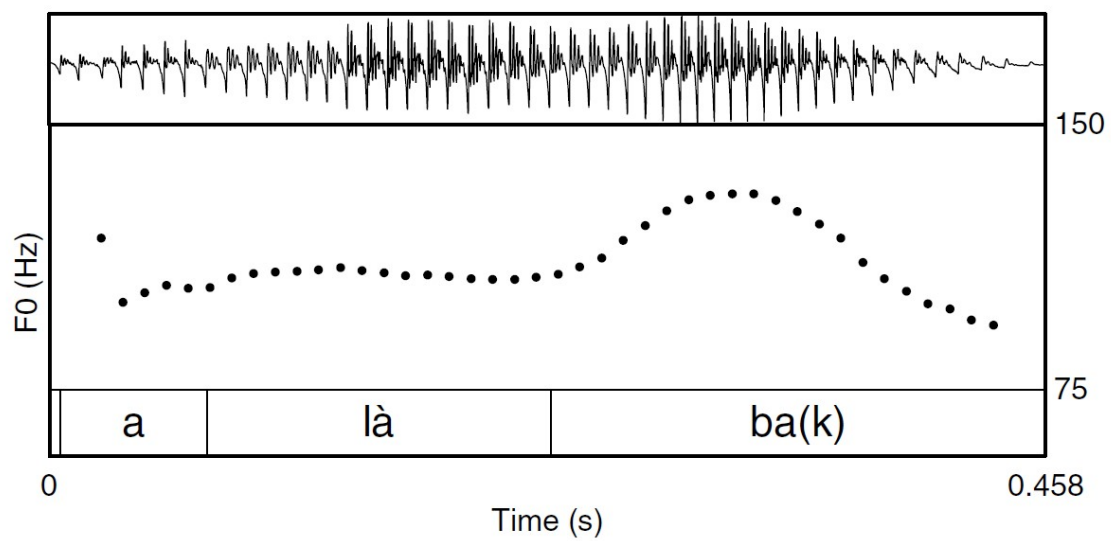


Fig. 11. *alàbak* ‘daughters’, citation form (g1m)

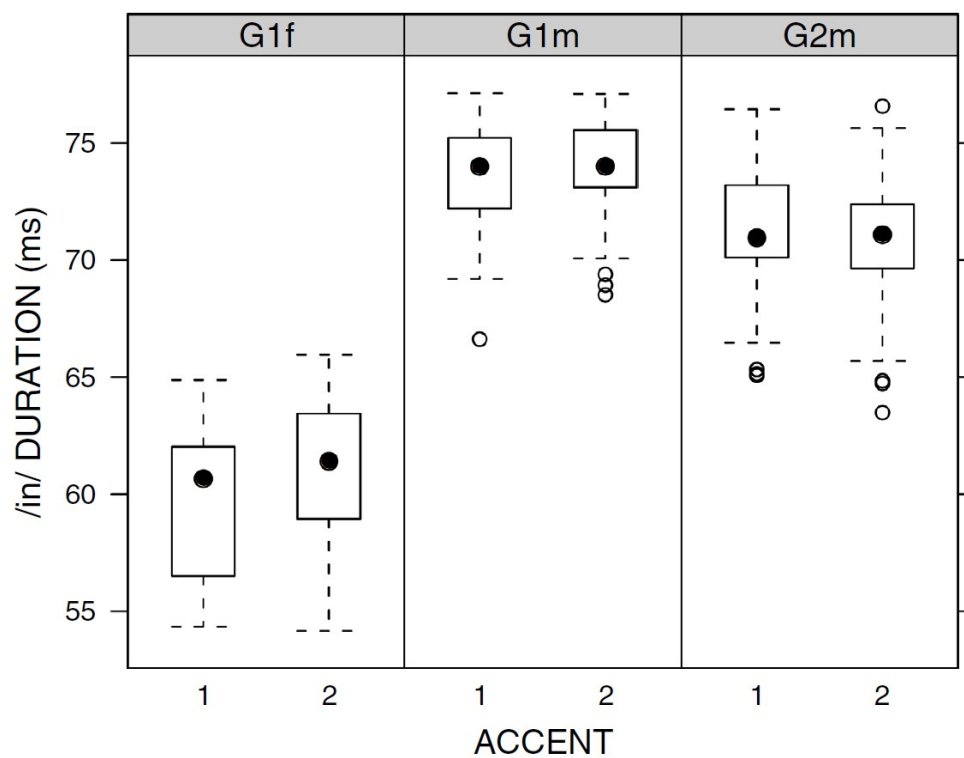


Fig. 12. Duration of /-in/ by Accent type

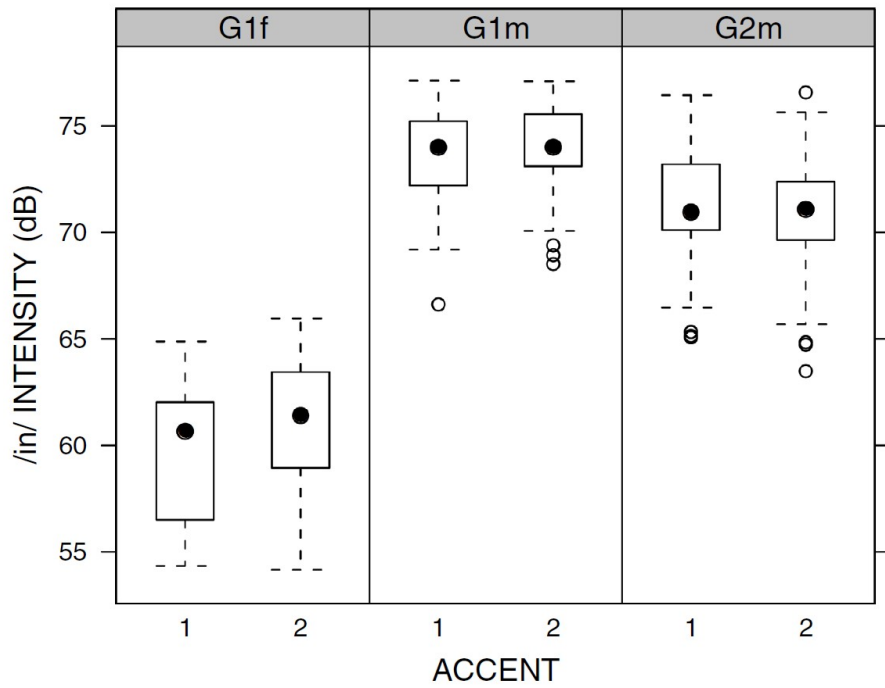


Fig. 13. Peak intensity of /-in/ by Accent type

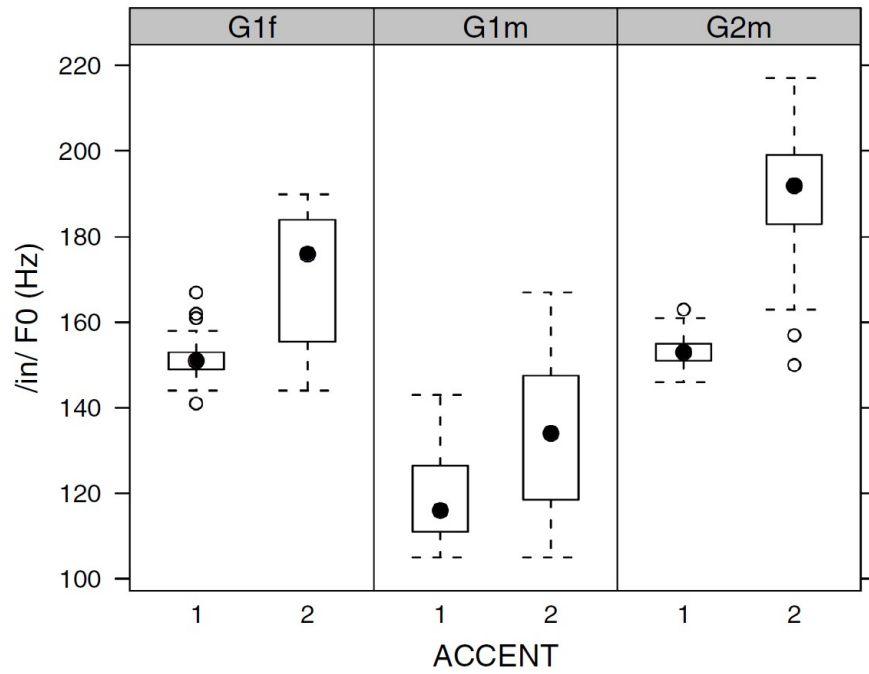


Fig. 14. F0 at mid point of /-in/ by Accent type

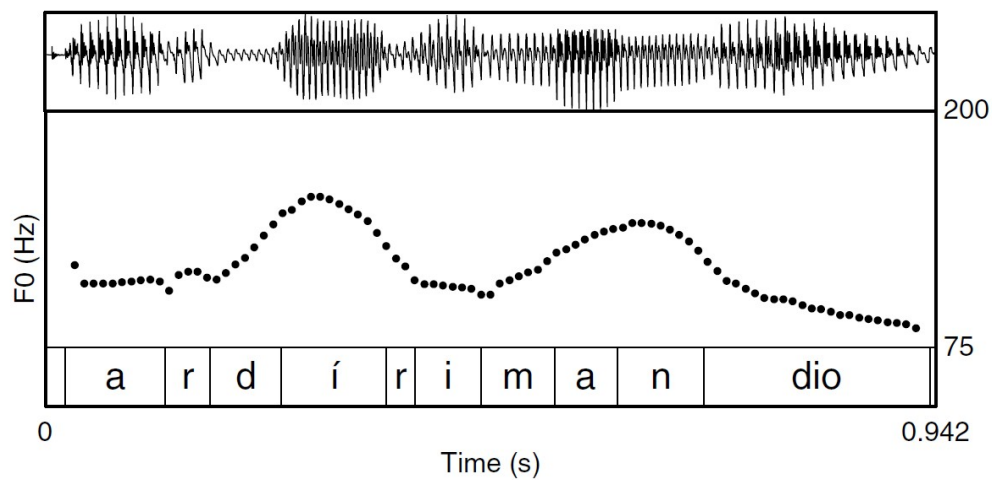


Fig. 15. ardíri man dio 'he gave it to the sheep (sg)' (g1m)

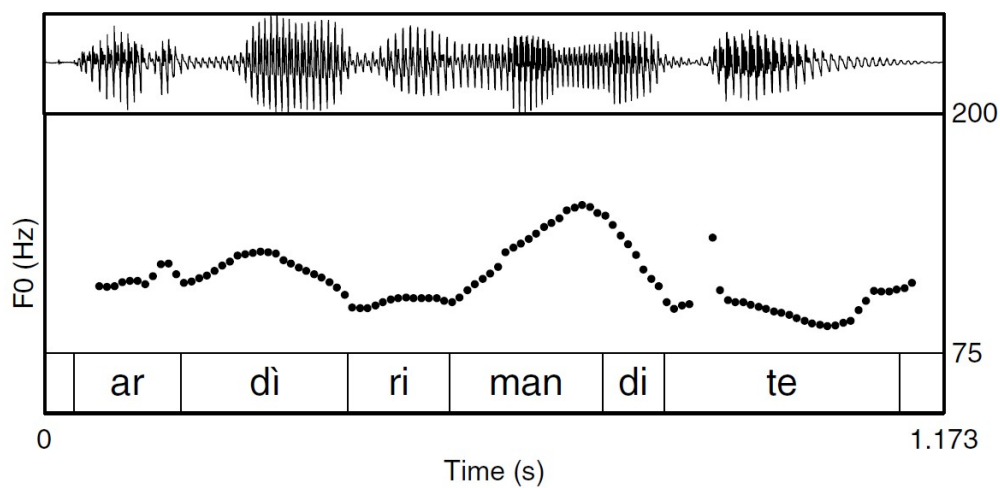


Fig. 16. ardìri man dì te 'he gave it to the sheep (pl)' (g1m)

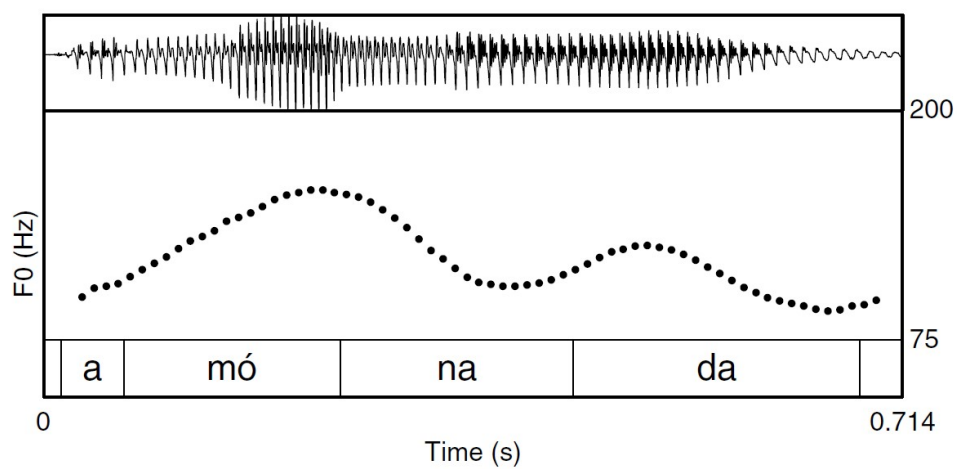


Fig. 17. amóna da 'it is the grandmother' (g1m)

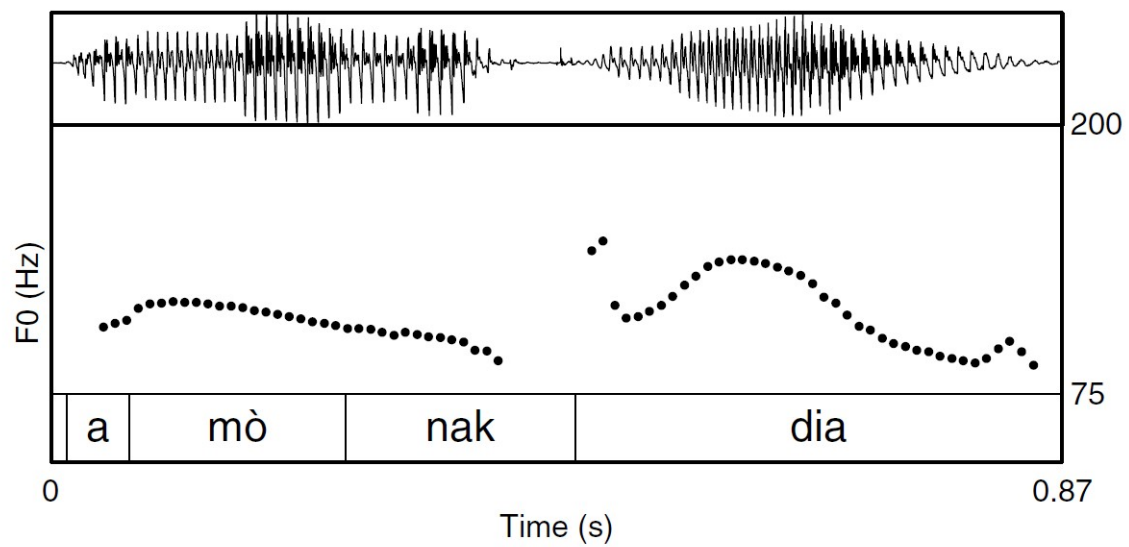


Fig. 18. amònak dia ‘they are the grandmothers’ (g1m)

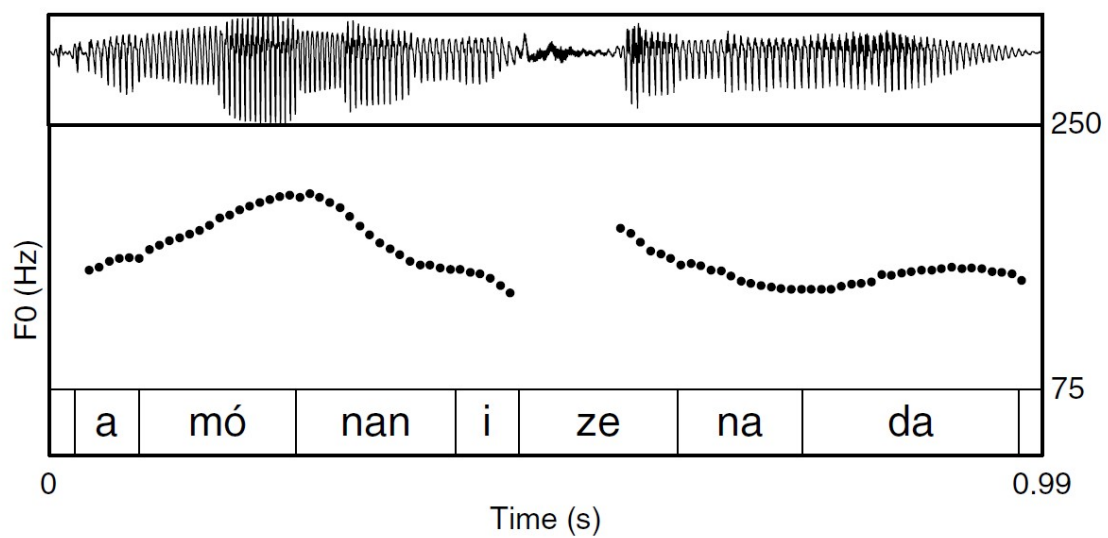


Fig.19 . amónan izena da ‘it is the grandmother’s (sg) name’ (g1f)

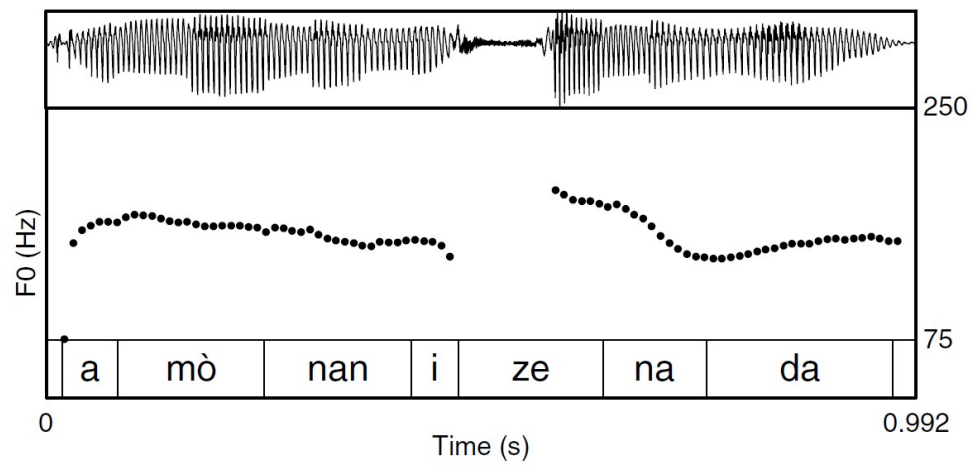


Fig. 20. *amònan izena da* 'it is the grandmothers' (pl) name' (glf)

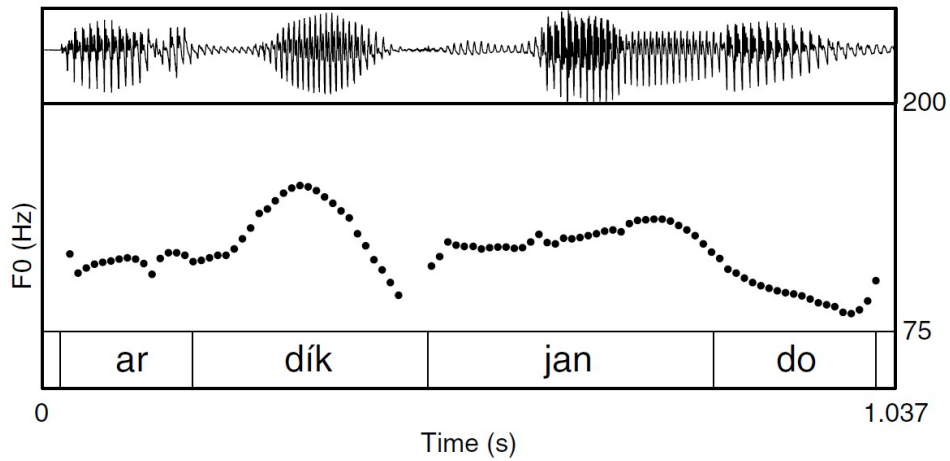


Fig. 21. *ardík jan do* 'the sheep has eaten it' (glm)

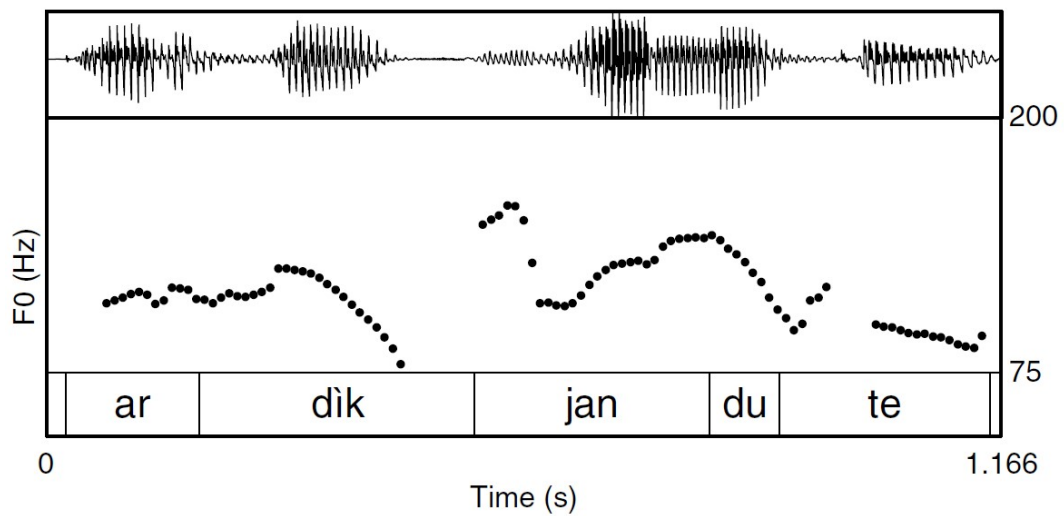


Fig. 22. *ardik jan dute* ‘the sheep have eaten it’ (g1m)

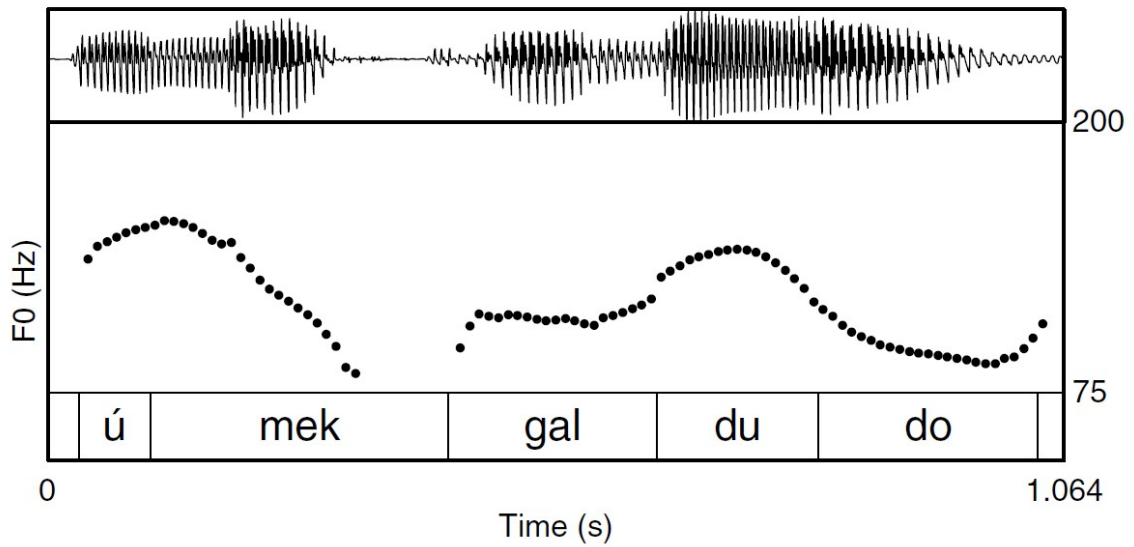


Fig. 23. *úmek galdu do* ‘the child has lost it’ (g1m)

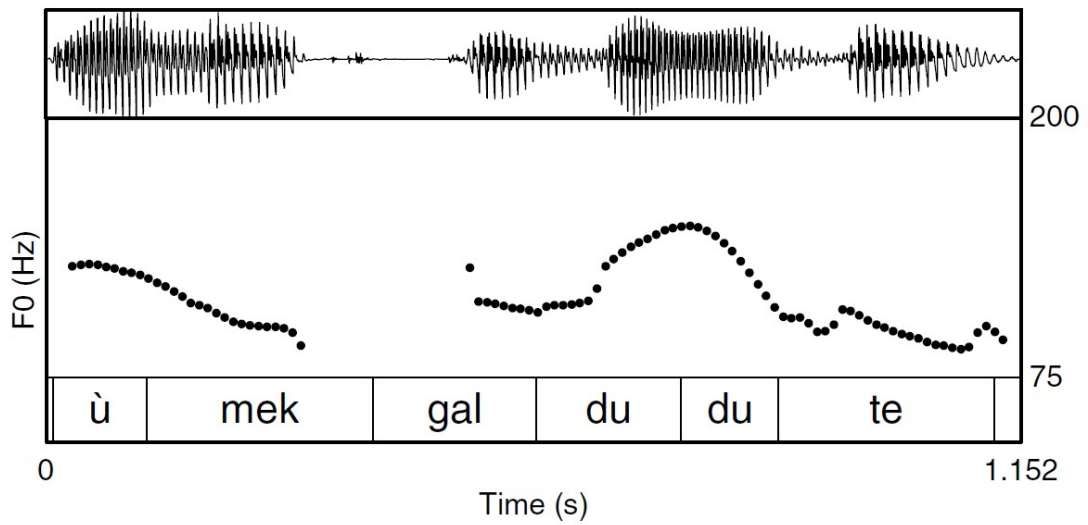


Fig. 24. *ùmek galdu dute* ‘the children have lost it’ (g1m)

## Notes

Some aspects of the phonological analysis that we propose here were advanced in Hualde (in press), but there are substantial differences between both analyses.

In terms of the specific items that they contain, these two classes correspond to a large extent to the unaccented class of Northern Bizkaian. Compare, for instance, Lekeitio (Northern Bizkaian), accented *belárri* ‘ear’, *tipúla* ‘onion’, *eskóla* ‘school’, *mediku* ‘physician’, *fabrika* ‘factory’, *lengúsu* ‘cousin’ vs. unaccented *alaba* ‘daughter’, *itturri* ‘spring, fountain’, *aberats* ‘rich’ (see Hualde, Elordieta & Elordieta 1994).

An exception is *basérritar* ‘farmer’, which has Accent 1, even though its base, *basèrri* ‘farm’ (itself a compound) has Accent 2.

The superlative is identical to the genitive plural; cf., e.g. *ámana* ‘the one of the mother’, *àmana* ‘the one of the mothers’. Thus *bèltzana* is both ‘the blackest one’ and ‘that of the black ones’.

This was done by asking the speaker to listen to the recorded item and provide the meaning in cases where it was suspected that the speaker had produced the wrong word.