

Center and periphery in phonology: A ‘stress-test’ for two Ligurian dialects

Lorenzo Filipponio,^a Davide Garassino^b

^a Institut für Romanistik, Humboldt-Universität zu Berlin <lorenzo.filipponio@hu-berlin.de>

^b Romanisches Seminar, Universität Zürich <davide.garassino@uzh.ch>

In this paper, we investigate the phonetic realization of vowel length in two related non-standard Romance varieties, the Ligurian dialects of Genoa (Genoese) and Porto Maurizio (Portorino, as representative of the Western Ligurian type). These varieties, albeit very similar, are usually said to differ in the implementation of vowel length, which seems more robustly attested in Genoese and appears to gradually fade along the Western coast of the region. Our analysis relies on two production tests, which also permit to investigate the effect of the utterance-final position and discourse focalization on the phonetic realization of vowel length. The results show that short and long vowels significantly differ in all the examined contexts and in both dialects. Moreover, the utterance-final position and focalization have a significant lengthening effect in Genoese and Portorino; however, their patterns, as expected, are quite different from each other. Furthermore, the phonological constraints on vowel length imposed by pre-pausal lengthening differ in the two dialects. Finally, although we can infer from the two experiments that the status of vowel length in the two varieties is relatively stable, we observed a tendency for vowel length contrasts to be easily outranked by other intervening factors as a primary cue for distinguishing various sub-minimal pairs.

KEYWORDS: northern Italo-Romance, Ligurian dialects, vowel length contrasts, experimental phonetics, the phonetics / phonology interface, utterance-final position, discourse focalization

1. *Vowel quantity contrasts in Northern Italian*

Starting from the pioneering works by Lüdtkke (1956) and Weinrich (1958), the presence of contrastive vowel length has been acknowledged in several areas of Northern Italy, viz. in Emilia (cf. Uguzzoni 1975, Uguzzoni & Busà 1995, Loporcaro *et al.* 2006, Filipponio 2012a), Lombardy (cf. Sanga 1984, Bosoni 1995, Willi 2016) and Liguria (cf. Forner 1975).¹ According to Lüdtkke und Weinrich (see also Loporcaro 2015), the first step of the process was a change which affected Late Latin: vowel quantity, which until then was phonologically relevant and not sensitive to syllable structure in stressed syllables (LĀ-TUS ‘side’ ~ LĀ-TUS ‘large.M.SG’; SĪC-CUS ‘dry.M.SG’, MĪL-LE ‘thousand’), became, at least in

Central Romance varieties, an allophonic feature depending on the syllable structure. As a result, open stressed syllables had only long vowels and closed stressed syllables only short vowels. Unstressed syllables could only host short vowels. Thus, all stressed syllables became bimoric:

- (1) LĀ-TUS / LĀ-TUS > ['la:to]; sĪC-CUS > ['sek-ko], MĪL-LE > ['mil-le]

In the Gallo-Italian varieties the allophonic length of the stressed vowels became again phonologically relevant, accompanied by the progressive loss of geminate consonants. The new vowel quantity pattern produced minimal pairs in paroxytones and, after the loss of unstressed final vowels, in oxytones. Long stressed vowels in proparoxytones were generally shortened in an early stage throughout the whole area.² Afterwards, in some dialects, the shortening wave also concerned first the paroxytones and then the oxytones. Gallo-Italian dialects nowadays show all stages: Emilian varieties have kept vowel quantity contrasts both in paroxytones and in oxytones. These contrasts have been maintained in secondary oxytones for example in Western Lombard, while in other varieties, as for instance Eastern Lombard, every difference regarding vowel quantity has completely disappeared:

(2)	Latin	Emilian (Bolognese)	Western Lombard	Eastern Lombard
	NŌVAM 'new'	['no:va]	['nøva]	['nøva]
	NĀSUM 'nose'	['nɛ:z]	['naz]	['naz]

In this picture, Ligurian dialects occupy a very interesting position. In the variety of the capital of Liguria, Genoa, every vowel can be long or short (Toso 1997: 16-17) and quantity is contrastive in both stressed and – due for instance to compensatory lengthening after the loss of *-l-* in word-internal coda position – unstressed syllables. The Genoese system thus allows for minimal pairs such as /'le:ze/ 'to read' vs /'leze/ 'law', /'pɔ:su/ '(I) rest' vs /'pɔsu/ '(I) can', etc., and (in unstressed, protonic syllables) /ka:'seta/ 'little sock' vs /ka'seta/ 'little ladle', etc. (Loporcaro 2015: 90). This distinction, albeit widespread in the region, is not shared by all Ligurian dialects. In the Intemelian variety of Ventimiglia, close to the French border, there is no difference (Azaretti 1982 [1977]: 24-25; cf. Garassino & Dipino *in press* for an experimental phonetic study), for instance, between the stressed /o/ in /'sonu/ '(I) play' (from Latin SŌNO) and /'sonu/ 'sleep' (from Latin SŌMNUM), which is short in both cases (contrary to Genoese, where the former is long) – a situation which is reminiscent of Eastern Lombard. Portorino, that is the Western Ligurian variety of Porto Maurizio, a small town located between Ventimiglia and Genoa (nowadays Porto Maurizio

is administratively part of Imperia together with the neighboring town Oneglia), represents an intermediary situation since vowel length can be contrastive in stressed syllables, as in /'pe:zu/ 'weight' vs /'pezu/ 'worse', but not in unstressed syllables.³

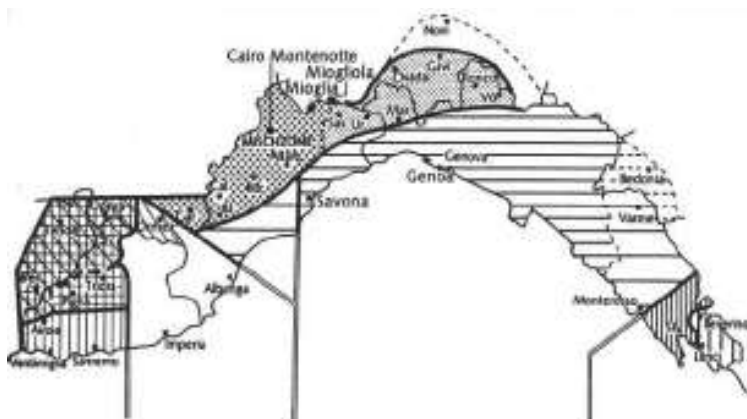


Figure 1. A linguistic map of Liguria (from Ghini 2001: xv, based on Forner 1988: 455)

Genoese and Portorino will be the objects of our analysis: by means of an experimental phonetic study, we will investigate the phonetic realization of vowel length in the two systems and consider the impact of different contexts on vowel duration (cf. §3.2).⁴ Before starting, it is necessary to explain what we mean by 'center' and 'periphery' in relationship to vowel quantity systems.

2. Centrality and peripherality of vowel quantity contrasts

Since Martinet (1956), it is well known that a good method to verify the presence of phonemic quantity contrasts in stressed vowels is to measure their duration in oxytones ending with a vowel, i.e., in a context where there is no interplay with following consonants.

By doing so, one can observe that, for instance, in some Emilian dialects of the Bolognese Apennine (as the one of Lizzano in Belvedere, in the province of Bologna) stressed vowels bear the phonemic feature of quantity, despite the existence of post-stress half-long consonants.⁵ The ultimate proof of the existence of this feature is provided by minimal pairs *à la* Martinet, such as, for instance, the fifth person indicative pre-

sent /kan'ta:/ ‘(you) sing’ and the past participle /kan'ta/ ‘sung’.

At a first glance, moving some kilometers in the southern direction, closer to the Adria/Ligurian Sea watershed,⁶ the situation displayed by the dialect of Castello di Sambuca (which, albeit situated in Tuscany, is still to be classified with the Gallo-Italian varieties) seems to be quite similar to Lizzanese. Besides the fact that the group of oxytones ending with a vowel is more restricted because of a less strong impact of apocope, one finds forms such as /ʃti'va:/ ‘boots’ (besides /tʃi'ta/ ‘town’), which account for the presence of phonemic vowel quantity (even in the absence of actual minimal pairs).⁷

However, the number of oxytones ending with a long vowel available in the lexicon is not the only difference between Lizzanese and the dialect of Castello. Another relevant difference concerns the phonetic realization of vowel quantity contrasts: in Lizzanese, length differences between for instance /kan'ta:/ and /kan'ta/ are systematically realized both in sentence internal context and in prepausal position, as shown by Loporcaro *et al.* (2006). On the contrary, in the dialect of Castello, differences such as those between the /a:/ of /ʃti'va:/ and the /a/ of /tʃi'ta/ are phonetically realized only in prepausal position, while they are neutralized in internal position, as shown by Filipponio & Nocchi (2010).

By taking into consideration also the still Gallo-Italian variety of the tiny village of Stabiazioni (a few kilometers south of Castello), which completely lacks oxytones ending with long vowels either in prepausal or in internal position, the Apennine picture can be resumed as follows:

	[V:] ~ [V] prepausal	[V:] ~ [V] internal	/V:/ ~ /V/ diagnosis
Lizzano	+	+	Yes
Castello	+	-	<ul style="list-style-type: none"> ▶ no (Filipponio & Nocchi 2010) ▶ yes (Loporcaro 2015) ▶ restricted to specific contexts (= peripheral) (this paper; see below)
Stabiazioni	-	-	No

Table 1. Phonetic realization of vowel length in oxytones ending with a vowel in the Tosco-Emilian Apennine varieties of Lizzano, Castello di Sambuca and Stabiazioni.

Given this picture, Filipponio & Nocchi (2010) have described the situation of Castello’s dialect as typical of a ‘grey zone’ between two different systems (i.e., the Tuscan and the Gallo-Italian), while Loporcaro (2015: 223) considers the presence of oxytones ending with long vowels

in the lexicon as a sufficient parameter for justifying the phonological status of vowel quantity. Dispassionately, one could suppose that the former interpretation of the facts lacks the consideration of the internal coherency of the system, while the latter disregards the clear differences between the system of Lizzano and that of Castello.

Thus, it seems evident that vowel quantity contrasts in the variety of Castello di Sambuca have a different status than in Lizzanese, since they are never realized in internal position and appear only in prepausal context. Moreover, post-tonic gemination of consonants seems to be more stable in the former variety than in the latter. Finally, as already said, Castello's set of oxytones ending with a vowel is more restricted than in Lizzanese, and even those with a (theoretically) short stressed vowel are sometimes realized in a similar way to the others with long stressed vowels.

Even if we admit that vowel quantity plays a phonological role in the dialect of Castello, since it belongs to the lexicon, the implementation of this feature is less robust than in Lizzanese: in other words, one could say that phonological vowel quantity is a system-central feature in Lizzanese, while it is system-peripheral in a dialect as the one of Castello.

What we mean here by center and periphery can be related to the definition of fully integrated and non-fully integrated phonemes (“*phonèmes intégrés et non-intégrés*”) used by Martinet (1955: 79ff) and reported by exponents of the Prague Linguistic Circle such as Vachek. As Vachek (1964: 8) explains, “[a]s non-fully integrated [Martinet] denotes such a phoneme as is not linked by oppositions of its distinctive features to a larger number of other phonemes co-existing with it in the same system of phonemes”, which are supposed to be less stable than well-integrated oppositions – *stable* meaning here ‘not prone to the confusion of distinctive features’ rather than ‘not prone against changes’ (cf. Martinet 1955: 79).

Moreover, Vachek (1964: 8) claims that there are other features able to impart peripheral character to a phoneme. It is the case, for instance, of

those phonemes which are not fully utilized by the system of language on account of their slight functional yield. This means that a phoneme of the kind can only be functionally utilized in a very limited number of word-positions, or, that it actually functions only in a very limited number of words in which it is opposed to its nearest partner in the system.

Thus, in our terms, a vowel quantity opposition whose phonetic realization is stable in every context should be considered more central (or less peripheral) than another whose realization is restricted to a subset of contexts – exactly the picture shown by Lizzanese on the one hand

and Castello’s dialect on the other hand.

From the next section, we will use the categories of center and periphery to assess the status of Genoese and Portorino vowel quantity systems. Before we start, we would like to put forth two preliminary remarks, a theoretical and a procedural one:

1. There is no hint of teleology in our view: a peripheral feature may either become central or disappear.
2. In this paper, we focus on the phonetic realization of vowel length. For the time being, we leave aside its interaction with other phonetically / prosodically relevant parameters such as pitch, intensity and formant features, which will be considered in future work.

3. What is a ‘stress-test’?

Genoese and Portorino, although they share many unitary features belonging to the Ligurian group (as seen in §1), seem to display different vowel quantity patterns. First, the lexical implementation of vowel length contrasts is more restricted in Portorino than in Genoese (see also §5.3), mostly because of independent system-internal developments (as the different outcomes of Latin *-l-*, which has disappeared in Genoese and has changed into [ʊ] in Portorino). Second, a recent experimental study (Garassino *et al.* 2017), based on carrier sentences of the type ‘I have said X for the first/second/... time’, has shown that the durational difference between short and long vowels is more striking in Genoese, thus suggesting that vowel length is more stable and central in this variety than in Portorino, in which vowel length is thought to be more faintly represented (cf. Forner 1988).

	Phonological VL Patterns	Phonetic VL Implementation
Genoese (more robust phonetic realization, i.e., larger differences between short and long vowels)	Stressed vowels: Paroxytones and oxytones	[ˈbrytu] ~ [ˈfry:tu] ‘ugly ~ fruit’ [ˈfasu] ~ [ˈfa:su] ‘(I) do ~ false’ [ˈda] ~ [ˈda:] ‘(s/he) gives ~ to give’
	Unstressed vowels (protonic vowels):	[kaˈseta] ~ [kaˈseta] ‘little ladle ~ little sock’
Portorino (weaker phonetic realization)	Stressed vowels: Paroxytones and oxytones	[ˈbrytu] ~ [ˈfry:tu] [ˈda] ~ [ˈda:] But: [ˈfasu] ~ [ˈfa:su]
	Unstressed vowels (none):	[kaˈseta] ~ [kaʊˈseta]

Table 2. Vowel length patterns in Genoese and Portorino (according to Garassino *et al.* 2017)

Starting from these results and relating to the notions of centrality and peripherality as discussed in §2, the main aim of this paper is to assess the (relative) status of vowel length in Genoese and Portorino (between the center and periphery of the system) by relying on proper production tests.

In order to do that, we assume that the phonetic realization of vowel quantity contrasts can be affected by 'marked' contexts characterized by specific prosodic conditions, such as the utterance-final position and contrastive focalization. In a similar vein to the 'stress-tests' used as simulations of crisis scenarios in order to verify the solidity of financial institutions, the employ of our contexts aims at assessing the realization of vowel length and its stability in the two varieties under observation. Before formulating our research hypotheses, we will briefly describe the two prosodic conditions that are investigated in this paper.

The utterance-final position is a known factor for inducing lengthening effects, which are useful for prosodic reasons (i.e., as a way of signaling a prosodic boundary; cf., among many others, Wightman *et al.* 1992; Berkovits 1994; Cho *et al.* 2011; Cho 2016). Although utterance-final lengthening is considered a universal phenomenon, its manifestation in languages in which vowel length is phonemic has been controversial in the literature (cf. Nakai *et al.* 2009: 29-31 and the references discussed). One reason is that the overall vowel lengthening may lead speakers to confusion about the duration of short and long vowels and consequently to the instability, or even the loss, of contrastive vowel length in prefinal position (with possible disruptive consequences for this phonemic feature in the entire system). Nakai *et al.* 2009, however, report that utterance-final lengthening is robustly attested in (Northern) Finnish as well as in other languages presenting phonemic vowel length (such as Estonian, Hungarian and Swedish, cf. Nakai *et al.* 2009: 30). The implementation of final lengthening in these languages is nevertheless a complex phenomenon, due to the interaction with vowel quantity, which seems to be regulated by language-specific strategies.⁸

Focalization is also a trigger of enhanced durational effects in the languages of the world.⁹ Its most frequent correlate from a typological perspective is an increase in the values of F0, duration and intensity (cf., among many others, Ladd 2008; Selkirk 1984; on duration in particular, cf. Kügler 2008). Different types of focus can also have different phonetic effects: contrastive focus, for instance, is expected to have more striking effects compared to information focus (cf. among others the data provided by Breen *et al.* 2010 for English; cf. also the results in Katz & Selkirk 2011).¹⁰

Moreover, contrastive focus can have a 'magnifying' effect, increasing the differences between short and long vowels, as shown by de Jong

& Zawaydeh (1999, 2002) for Ammani-Jordanian Arabic.¹¹ The type of focus employed in these works (as well as in de Jong 2004) is a special instantiation of contrastive focus,¹² labeled phonological focus, in which “the speaker corrects a phonologically related item” (de Jong 2004: 496).¹³ It is important to observe that, according to the results provided by de Jong & Zawaydeh (2002) and de Jong (2004), phonological focus tends to enhance only linguistically relevant information in a given language.¹⁴ In this study, we also rely on the elicitation of phonological focus (here named corrective focus), cf. §5.2.

All in all, the lengthening effects of the utterance-final position and corrective focus should not be conflated. As observed by Berkovits (1994: 246-247), while the former tends to extend over several syllables due its specific articulatory nature (i.e., a deceleration effect that accompanies the end of the motor activity),¹⁵ the latter seems restricted to the vowel nucleus of the stressed syllable associated with a pitch accent.

4. Research questions and hypotheses

In light of the observations put forward in §§2-3, we expect to find in our data a lengthening effect induced by the utterance-final position as well as corrective focus in both dialects, although, since these are phenomena of a different nature, we do not expect analogous lengthening patterns.

Given this prediction, we aim at verifying whether the phonetic implementation of vowel length in our stress-tests shows homogeneous lengthening effects for both phonological long and short vowels or instead ‘blur’ quantity contrasts. Stable patterns in marked contrasts should be considered as an indicator of the system centrality of the feature ‘vowel length’. On the contrary, unstable patterns should be interpreted as an indicator of the peripherality of this feature. More precisely, stable patterns in both utterance-final and focal positions are expected to preserve the quantity system (i.e., the durational opposition between short and long vowels). Moreover, a phonetic ‘amplification’ of durational differences under the effect of focus could be considered a sign of the linguistic relevance of vowel length in our varieties.

Regarding possible cross-dialectal differences, based on the results of Garassino *et al.* 2017, we may expect that the more robust phonetic implementation of vowel length in Genoese will be confirmed by our data.

Finally, since we are interested in the manifestation of vowel length at the segmental level, we pay particular attention to post-stress consonants, because in some varieties (Hajek 1994; Filipponio 2012a; Loporcario 2015) their duration can provide syntagmatic cues which enable to dis-

tinguish between phonemic long and short stressed vowels. Generally, we expect post-stress consonants to be more affected by prepausal lengthening (since they are closer than stressed vowels to the prosodic boundary) than by focus (which mostly concerns the stressed vowel in the segment); moreover, with regard to the Ligurian dialects observed here, we expect that consonants following short and long vowels do not differ significantly, according to a general and well-known tendency of Northern Italo-Romance varieties to lack any distinction between long and short consonants (see for example Rohlfs 1966: §§229-230 and the data provided by Uguzzoni & Busà 1995: 10 for paroxytones in the Frignanese dialects).

5. *Methods and analysis*

5.1. *The speakers*

Five speakers were selected for Genoese and five others for the dialect of Porto Maurizio. All the speakers were born in and have resided for most of their lives in Genoa and Porto Maurizio (or surrounding areas) and use their own dialect on a daily, or almost daily, basis.¹⁶ The following table contains the list of the speakers with relevant information about their sex and age (at the time of the experiments, which took place in the summer of 2017).

Genoa (GE)	Porto Maurizio (PM)
CaPi (m, 59)	AcTo (m, 69)
DaGe (m, 66)	BoLu (f, 77)
CaFr (m, 19)	TeAn (m, 38)
CaTi (f, 30)	LaMa (f, 67)
ToFi (m, 54)	LuTo (m, 70)

Table 3. The speakers of Genoese and Portorino.

5.2. *The production experiments*

The data were recorded by using a handy recorder *Zoom H2n*; the interviews took place in quiet rooms, although not soundproofed. The audio files were subsequently separated, segmented and annotated via the programs Audacity (Audacity team 2018) and PRAAT (Boersma & Weenink 2018). More precisely, for each target item we annotated the stressed vowel and the subsequent consonant.

Two different experiments were used to gather information on the impact of utterance-final and focus-related lengthening on the realiza-

tion of vowel length: SVO/SVX sentences (henceforth: SV), in which the utterance-final is compared with the utterance-internal position, and contrastive carrier sentences (henceforth: CC), in which the focused position is compared with the non-focused position. In the following, we present some of the stimuli that we used in the two tests. In the square brackets the experimental conditions are reported.

SV SENTENCES, CONTROLLING FOR UTTERANCE-INTERNAL AND FINAL POSITION

- (3) Giovanni è partito a *maggio* (/ˈmazu/) [short vowel; final position]
'John left in *May*'
- (4) Giovanni è partito a *maggio* dell'anno scorso [short vowel, non-final position]
'John left in *May* of last year' (= 'John left last *May*')
- (5) Andrea si pulisce il *naso* (/ˈnazu/) [long vowel; final position]
'Andrew is wiping his *nose*'
- (6) Andrea si pulisce il *naso* col fazzoletto [long vowel; non-final position]
'Andrew is wiping his *nose* with a handkerchief'

CONTRASTIVE CARRIER SENTENCES, CONTROLLING FOR THE EFFECT OF CORRECTIVE FOCALIZATION

- (7) Ho detto *cenere* (/ˈsene/), non *cene* (/ˈse:ne/), stavolta
[short vowel, corrective focus]; [long vowel, no corrective focus]
'I have said *ash* not *meals* this time'
Ho detto *cene*, non *cenere*, stavolta
- (8) [short vowel, corrective focus]; [long vowel, no corrective focus]¹⁷
'I have said *meals* not *ash* this time'

Each sentence belonging to the SV types was first read aloud by the experimenters in Italian. The informants were asked to provide an immediate translation of the Italian SV sentences into their own dialect. The CC sentences were presented in Italian on a laptop screen: the informants were then asked to translate them into their dialect. In this case, we have chosen to avoid a direct interaction and the informants. In our opinion, this task required a more careful approach, since the informants had to reconstruct a metalinguistic context (the correction of a statement, which involves an additional cognitive effort), besides translating immediately each sentence from Italian into their dialect.

5.3. Minimal pairs

In selecting the minimal and subminimal pairs for our inquiry, we had to deal with an unexpected scarcity of items. Some pairs provided by the dialectological literature seem to be no longer known or used by the speakers: it is the case of /ˈsɛ:te/ ~ /ˈsɛte/, 'lightning ~ seven', in Genoese, which is still mentioned in Forner (1975: 50), and /ˈle:ze/ ~ /ˈleze/ 'to read ~ (the) law', in which case almost all informants have

made several mistakes in producing the target items. We have also found slightly different realizations in the two dialects, due to independent internal developments, which could impair a direct cross-linguistic comparison, as in the case of /'pe:zu/ ~ /'pezu/ ‘weight ~ worse’, which is to be found only in Portorino, while in Genoese it is common to find the diphthongized variant [pejzu] instead of [pe:zu], and /'pu:su/ ~ /'pusu/ ‘wrist ~ well’, present only in Genoese, while in Portorino, one observes [pursu] instead of [pu:su] due to a different development of -l- in word-internal coda position (see above §1). Moreover, in a case such as /'fi:tu/ ~ /'fitu/ ‘quick ~ rent’, Portorino lacks a phonetically / structurally equivalent lexical counterpart.¹⁸ Nevertheless, since the goal of this article is to compare the vowel length status of two dialects rather than to compare exactly the same minimal pairs across the two varieties, we decided to consider all (sub)minimal pairs still acknowledged by our informants (i.e., the target items that are still part of our informants’ lexicon), even if they are not present in both dialects (see Table 4).

The rising number of minimal pairs which no longer belong to the linguistic knowledge of speakers, as well as the more restricted inventory of (sub) minimal pairs in Portorino (cf. Garassino *et al.* 2017), are clearly hindering factors for a detailed experimental exploration of these non-standard Romance varieties. They might also suggest a slow drift of the phonemic feature of vowel quantity from the center to the periphery of the system (cf. §7 below).

An interesting example is provided by the minimal pair /'sene/ ~ /'se:ne/ ‘ash ~ meals’:

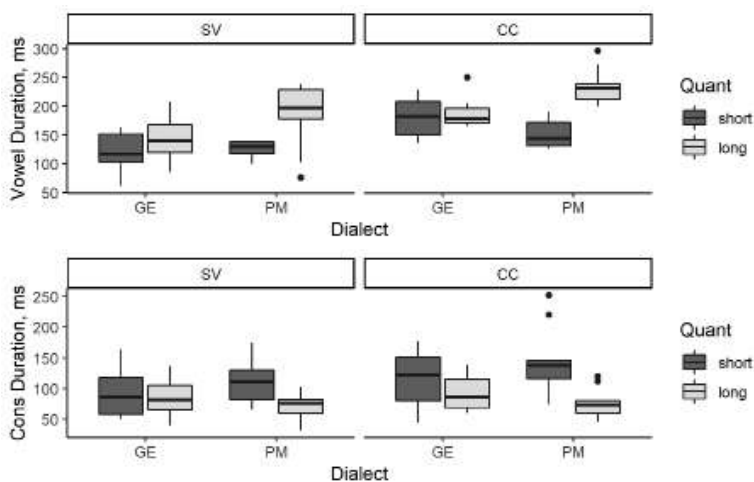


Figure 2. The minimal pair /'sene/ ~ /'se:ne/ in Genoese and Portorino. Vowels and post-stress consonants durations (SV = SVO/SVX test; CC = contrastive carrier sentences)

The minimal pair is very stable in Portorino in both the SV and CC sentences. The picture shown by Genoese informants seems to be more confused and blurred. An almost obvious explanation might be that four out of five informants use the form /'senje/ instead of /'sene/: thus, it seems that the insertion of an approximant is a sufficient condition for causing the (sub)minimal pair to collapse, i.e., to reduce or eliminate the impact of vowel duration differences (and, from a phonological point of view, vowel quantity contrasts) as a means for differentiating two lexical items.

On the contrary, other (sub)minimal pairs seem to be robust, as for instance /'mazu/ ~ /'nazu/ 'May ~ nose':¹⁹

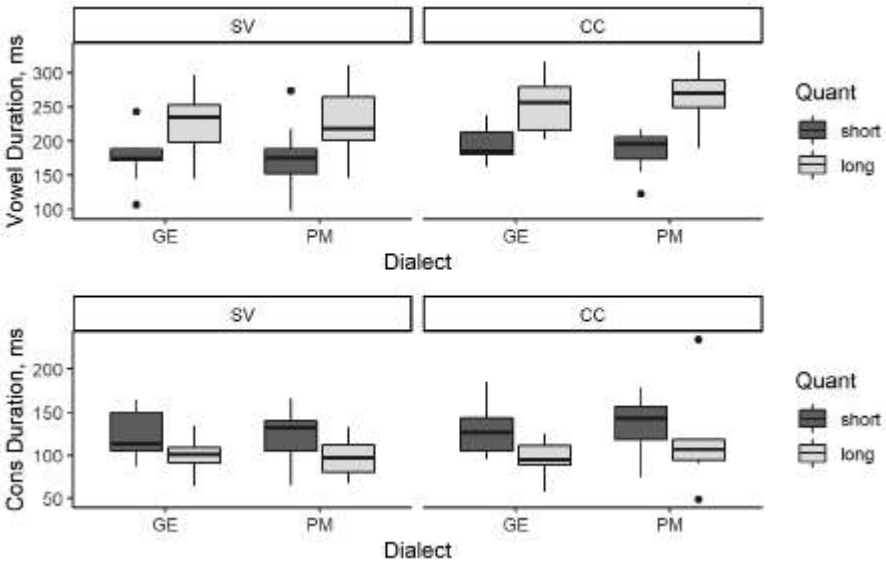


Figure 3. The minimal pair /'mazu/ ~ /'nazu/ in Genoese and Portorino. Vowels and post-stress consonants durations (SV = SVO/SVX test; CC = contrastive carrier sentences)

It is worth noticing that the remarkable duration of the phonologically short /a/ may be due to the well-known fact that low vowels are inherently longer than higher vowels (cf. Lehiste 1970: 18). Nevertheless, differences between the realization of short and long /a/ are evident, the latter being also followed by a shorter consonant, as is clearly shown by the differences in the post-stress consonants' durations (see below §6.4). In both varieties, /a/ seems less prone than /a:/ to phonetic lengthen-

ing induced by prepausal or focal position, which can be considered an argument for the phonological stability of quantity contrasts. Portorino informants tend to lengthen the post-tonic consonant after phonologically short vowels in every prosodically marked position.

This minimal pair has thus been included within our target items, together with the following ones:

Vowels	Genoese	Portorino
/a:/ ~ /a/	/ ¹ na:zu/ ~ / ¹ mazu/ 'nose ~ May'	/ ¹ na:zu/ ~ / ¹ mazu/ 'nose ~ May'
/e:/ ~ /e/		/ ¹ se:ne/ ~ / ¹ sene/ 'meals ~ ash'
/e:/ ~ /e/		/ ¹ pe:zu/ ~ / ¹ pezu/ 'weight ~ worse'
/i:/ ~ /i/	/ ¹ fi:tu/ ~ / ¹ fitu/ 'soon ~ rent'	
/ɔ:/ ~ /ɔ/	/ ¹ pɔ:su/ ~ / ¹ pɔsu/ '(I) rest ~ (I) can'	/re ¹ pɔ:su/ ~ / ¹ pɔʃu/ '(I) rest ~ (I) can'
/u:/ ~ /u/	/ ¹ du:se/ ~ / ¹ duze/ 'sweet ~ twelve'	/ ¹ du:se/ ~ / ¹ duze/ 'sweet ~ twelve'
/u:/ ~ /u/	/ ¹ pu:su/ ~ / ¹ pusu/ 'wrist ~ well'	
/y:/ ~ /y/	/ ¹ fry:tu/ ~ / ¹ brytu/ 'fruit ~ ugly, dirty'	/ ¹ fry:tu/ ~ / ¹ brytu/ 'fruit ~ ugly, dirty'

Table 4. The target items.

It is easy to recognize that 'canonical' minimal pairs represent only a subset of the items in the table; moreover, the segmental contexts of the various (sub)minimal pairs are not homogeneous. However, in spite of these aforementioned limitations, we were still able to collect a fair number of pairs which permit to address our research questions.

5.4. Analysis of the data: an overview

As a first step, we offer a general view of the data by visualizing the realization of short and long vowels in both dialects across speakers (Figure 4) and words (Figures 5 and 6): being a general overview, the durational values in utterance-internal and utterance-final position in SV sentences as well as the focal and non-focal positions in CC sentences are conflated.

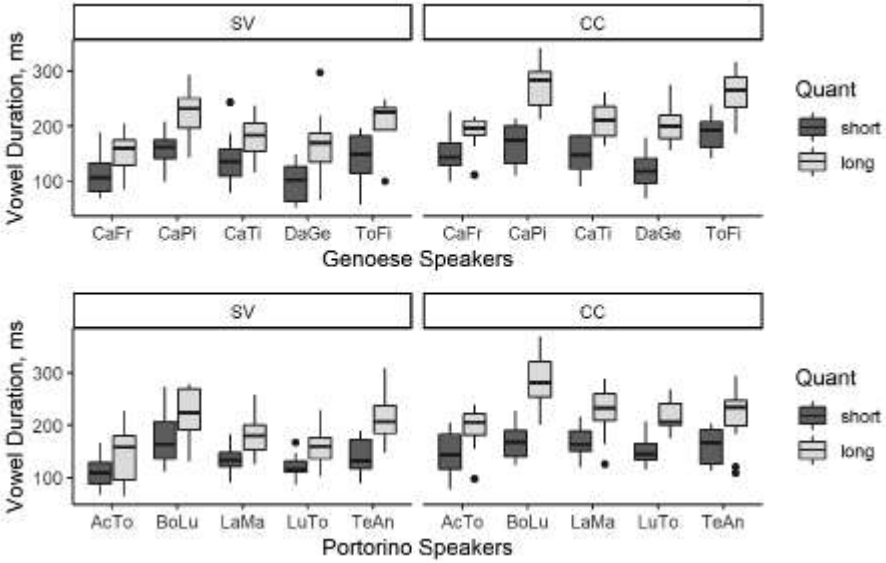


Figure 4. Realization of short and long vowels by Genoese and Portorino speakers (SV = SVO/SVX test; CC = contrastive carrier sentences)

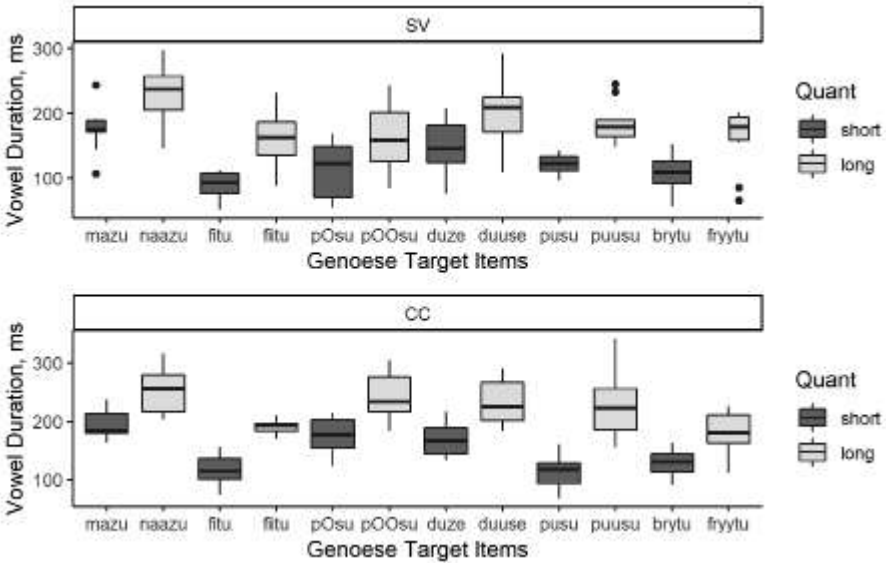


Figure 5. Realization of (sub)minimal pairs in Genoese (N = 227); SV = SVO/SVX test (N = 115); CC = contrastive carrier sentences (N = 112)²⁰

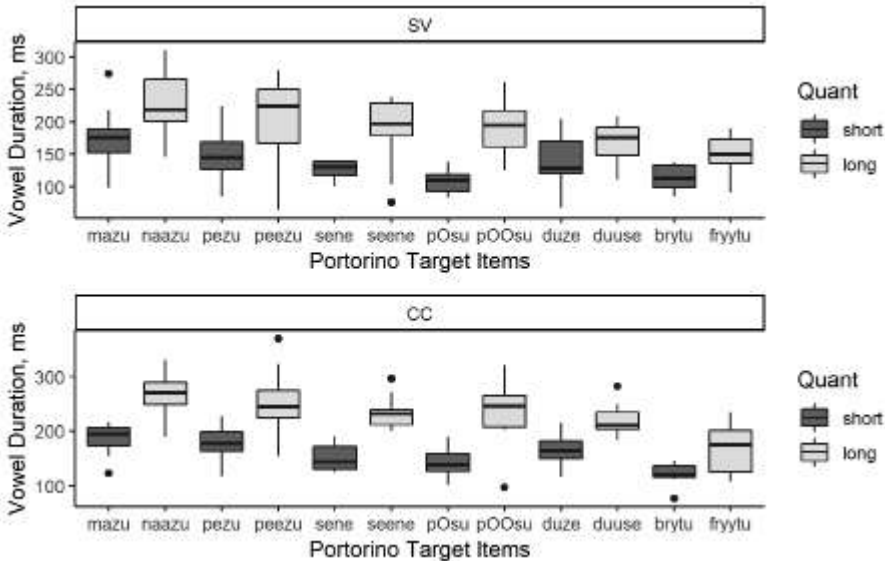


Figure 6. Realization of (sub)minimal pairs in Portorino (N = 223); SV = SVO/SVX test (N = 112); CC = contrastive carrier sentences (N = 111)

We notice immediately that for each speaker and each pair of vowels there is a more or less pronounced difference in the realization of phonemic long and short vowels, which could be viewed as a sign of the relative stability of the vowel length distinction in both varieties. However, as already mentioned, Figures 4-6 are not completely informative since they hide the possible impact of some important prosodic and discourse effects on vowel duration, which we further investigate in §6.

Moreover, it is crucial to recognize that vowel length distinctions are instantiated in (sub)minimal pairs differing in word length and structure as well as segmental composition (not to mention the oscillation shown by speakers between alternative forms of the same lexical types, such as [ˈpɔsu] and [ˈpɔʃu], cf. §5.3), as is revealed by Figures 5 and 6. This lack of homogeneity may result in a hardly predictable source of variation.²¹ Also, hardly predictable is the variability observed in Figure 4, which seems to be dependent on the idiosyncratic characteristics of each speaker.

These sources of unpredictable variation (due to the items and the speakers selected) need to be carefully accounted for in order to put forward a reliable in- and across-group analysis of the data. In light

of this observation, we will rely on the use of mixed linear models (cf. Baayen 2008; Winter 2013; Levshina 2015), which are apt for taking into account the so-called ‘random’ variation in a dataset.²² In the following sections, we thus present a fine-grained analysis of the two productions tests.

6. ‘Stress-tests’

6.1. *The statistical analysis: a foreword*

Mixed linear models incorporate both fixed-effect and random-effect terms. The dependent variable in our models is absolute Vowel Duration in milliseconds (or, alternatively, the Post-stress Consonant Duration). The fixed-effect terms that we consider are: (i) Dialect (with two levels: Genoese ~ Portorino), (ii) Vowel Length (phonologically short ~ long vowels), (iii) Position in the sentence in the SV test (utterance-internal ~ utterance-final position) and, finally, (iv) Position in the sentence in the CC test (Focalized position ~ Non-focalized position). In each model, Speakers and Target Items are inserted as random factors.

Different models with random intercepts including a three-way interaction term (Dialect * Vowel Length * Position in the sentence) are incrementally built and tested for significance by comparison with ANOVA based on the Likelihood ratio test. More detailed information about the models is provided in the following sections.

Finally, a few outliers were removed from the dataset before running the statistical analysis since we considered them production errors (e.g., vowels longer than 400 ms). The statistical analysis in §6 is conducted by means of the software R (R Development Team 2018) and the package *lme4* (Bates *et al.* 2015). The best model is selected in each case by comparison to the other models based on the AIC and the BIC values²³ (i.e., the best model is the one in which both values are minimized).

6.2. *SV production test*

The duration of phonologically short and long vowels (upper panel) and of the following consonants (bottom panel) in the SV experiment in Genoese and Portorino is depicted in Figures 7 and 8:

Center and periphery in phonology: A 'stress-test' for two Ligurian dialects

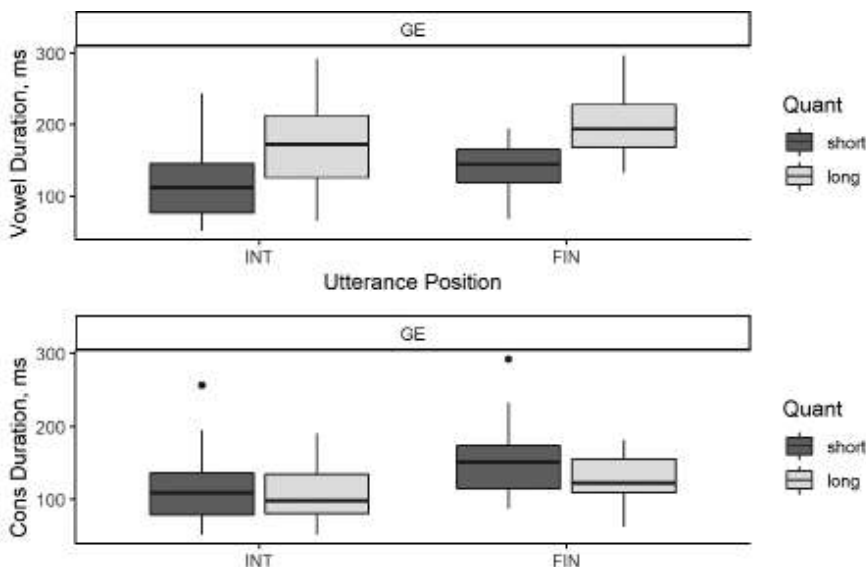


Figure 7. Realization of long and short vowels and realization of post-stress consonants after long and short vowels in the SV test in GE(noese) (N = 115; INT = 58, FIN = 57); INT = utterance-internal position; FIN = utterance-final position.

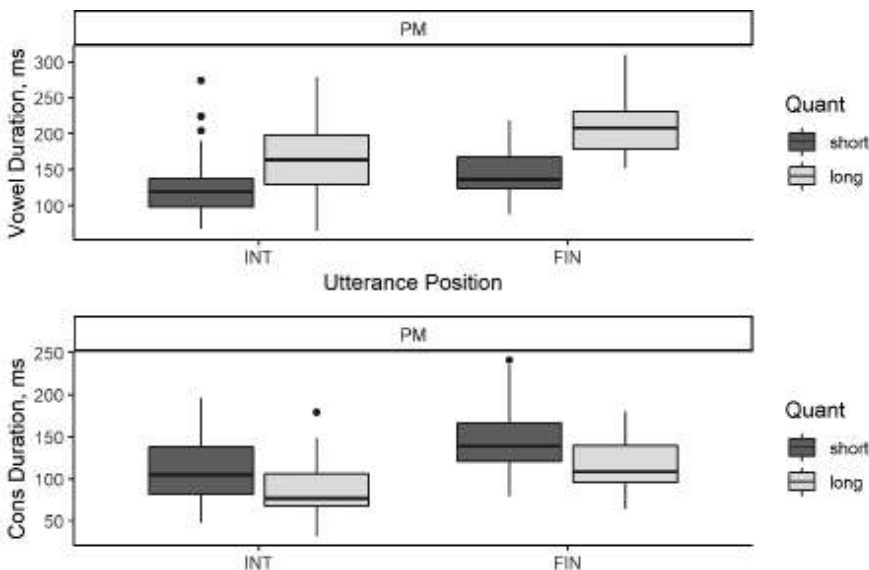


Figure 8. Realization of long and short vowels and realization of post-stress consonants after long and short vowels in the SV test in PM (Portorino) (N = 112; INT = 57; FIN = 55); INT = utterance-internal position; FIN = utterance-final position.

As expected, according to the best model (in which ‘Vowel Length’ and ‘Position in the sentence’ are included as fixed factors and ‘Speakers and Target Items’ are the random factors) the utterance-final position has a significant lengthening effect in respect to the internal position ($\beta = 28.91$, $SE = 4.13$, $p < .0001$) in Genoese and Portorino. Moreover, in both positions and dialects, the realization of vowel length is highly significant since long vowels are much longer than short ones ($\beta = 44.21$, $SE = 10.70$, $p < .0001$). Finally, no significant interactions between the factors have been detected.²⁴

According to the best model (in which ‘Position in the sentence’ is the only fixed factor, whereas ‘Speakers’ and ‘Target Items’ are the random factors), consonants in final position are significantly longer than consonants in internal position ($\beta = 31.98$, $SE = 3.84$, $p < .0001$).

However, the duration of the consonant does not vary as a function of ‘Vowel Length’ ($\beta = 19.31$, $SE = 10.82$, $p = .09$; the coefficient only shows a tendency for consonants following a short vowel to be longer).

6.3. CC production test

Figures 9 and 10 display the duration of phonologically short and long vowels (upper panel) and of the following consonants (bottom panel) in the CC experiment:

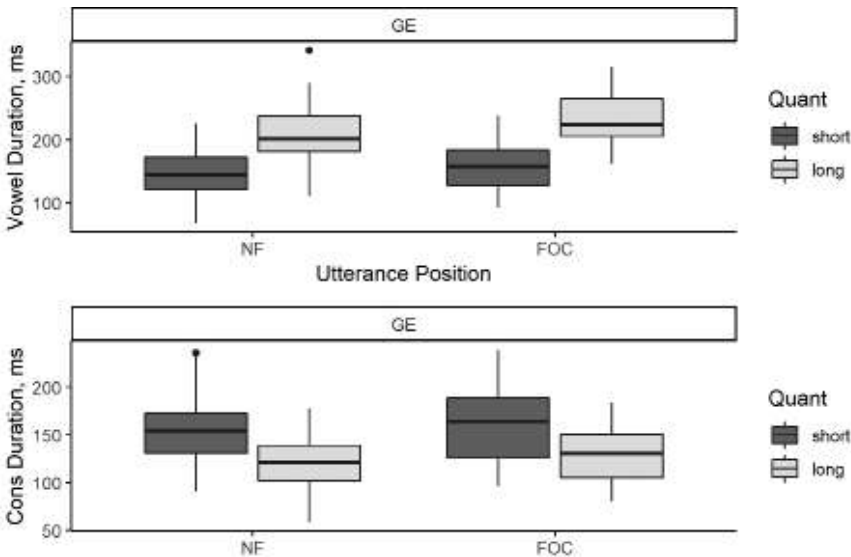


Figure 9. Realization of long and short vowels and realization of post-stress consonants after long and short vowels in the CC test (N = 112; NF = 56, FOC = 56); NF = non-focalized position; FOC = focalized position.

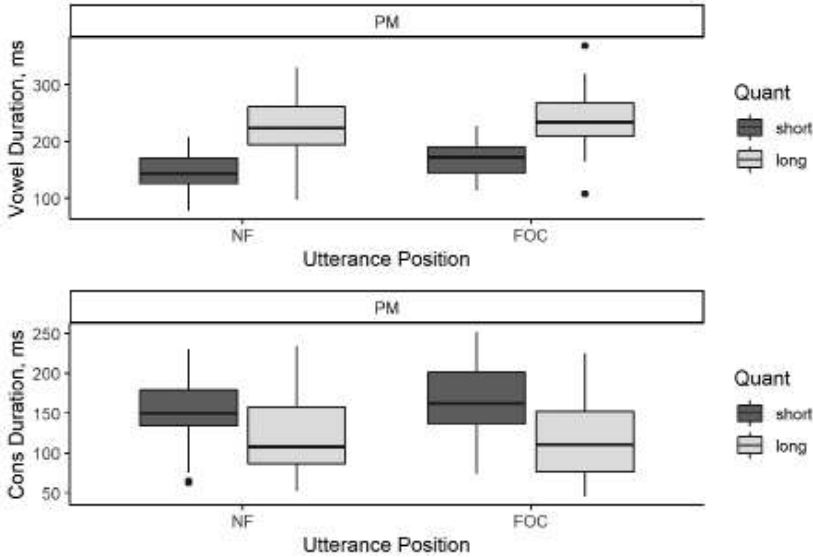


Figure 10. Realization of long and short vowels and realization of post-stress consonants after long and short vowels in the CC test (N = 111; NF = 56, FOC = 55); NF = non-focalized position; FOC = focalized position.

The difference between the focalizing and non-focalizing context is highly significant according to the best model (in which ‘Dialect’, ‘Vowel Length’ and ‘Position in the sentence’ are present as fixed factors; ‘Speaker’ and ‘Target’ Items are the random ones): vowels in a focalizing context are longer than their non-focalized equivalents ($\beta = 17.99$, $SE = 3.76$, $p < .0001$) and phonologically long vowels are longer than short vowels, independently of the dialect ($\beta = 74.70$, $SE = 13.61$, $p < .0001$). In the case of post-stress consonants, the best model (‘Vowel Length’ and ‘Position’ as the fixed factors and ‘Speakers’ and ‘Target Items’ as the random ones) shows that the post-stress consonants vary significantly as a function of the preceding vowels (consonants following short vowels are longer in both varieties, $\beta = 42.37$, $SE = 12.90$, $p < .01$), as well as a function of the focalized position ($\beta = 8.21$, $SE = 4.05$, $p < .05$).

6.4. Discussion

As expected (cf. §§3-4), the utterance-final position has a significant lengthening effect on vowel duration as well as on the duration of post-stress consonants, thus revealing the existence of an overall lengthening effect extended to the segmental level. This effect is stable in both dia-

lects: no significant difference has been observed between Genoese and Portorino speakers.

One must also observe that our target items consist of disyllabic words with a stressed penultimate syllable (i.e., the accented syllable is not immediately adjacent to the final prosodic boundary): the significant lengthening effect may thus be interpreted as an evidence for a progressive effect induced by the final position, which concerns not only the syllable immediately near the boundary but also other syllables (stressed or not) within the last word of the utterance (cf. the data provided by Berkovits 1994 for Hebrew and Nakai *et al.* 2009 for Northern Finnish): not by chance, post-stress consonants, which are closer to the final boundary than the stressed vowels, are subject to a more consistent lengthening effect than the stressed vowels, as shown in Tables 5 and 6:

Lengthening effect	Genoese	Portorino
V	21%	11%
V:	18%	28%

Table 5. Lengthening of short and long vowels from utterance-internal to final position

Lengthening effect	Genoese	Portorino
(V)C	35.5%	34%
(V:)C	21%	32.5%

Table 6. Lengthening of post-stress consonants from utterance-internal to final position

The lengthening effect observed in both Genoese and Portorino is overall robust for both short and long vowels and hint at two different phonological strategies concerning the conservation of vowel length contrasts in the final position: while in Portorino there seems to be a constraint on the lengthening of short vowels (a ceiling effect, cf. Nakai *et al.* 2009), in Genoese the lengthening effect on short and long vowels is similar.

The results provided by the CC sentences also show an overall lengthening effect induced by corrective focalization which enhances the difference between short and long vowels. Being consistent with the interpretation of corrective (phonological) focus provided by de Jong (2004), according to which focus can expand only linguistically relevant information, leaving or reducing non-phonologically relevant information, our results suggest the phonologically-relevant status of vowel length distinctions in both varieties. The focus-induced amplitude of

vowel length contrasts also has an effect on the duration of post-stress consonants.

In the following tables, we report the lengthening effect of corrective focus (comparing non-focalized and focalized vowels):

Lengthening effect	Genoese	Portorino
V	9%	14%
V:	10%	7%

Table 7. Lengthening of short and long vowels from the non-focalized to the focalized position

Lengthening effect	Genoese	Portorino
(V)C	3%	16%
(V:):C	9%	-6%

Table 8. Lengthening of post-stress consonants from the non-focalized to the focalized position

The lengthening displayed by focalization (compared to the non-focalized position) is phonetically less striking in both varieties for vowels and consonants than the one induced by the final prosodic boundary (compared to the utterance-internal position).

Contrary to what we expected based on previous work (Garassino *et al.* 2017), no significant cross-dialectal difference has emerged between Genoese and Portorino: the phonetic realization of short and long vowel is significant in the two dialects in both experiments. At the moment, we are not able to provide a convincing explanation for this difference, but the different results might be motivated by methodological issues (cf. Garassino *et al.* 2017 rely, in fact, on a different type of carrier sentences; see Garassino & Filippino in press for a more detailed discussion).

Finally, also contrary to our expectations (cf. §4), the phonetic realization of post-stress consonants shows, at least in the CC sentences (see above Figures 9 and 10), a complementary effect, which can only be considered a tendency in the SV sentences. In terms of cross-dialectal variation, although no statistically significant difference has emerged between Genoese and Portorino in our study, a context such as the utterance-internal position (cf. Figures 7 and 8 as well as footnote 2) might be interesting to investigate in a further study, since it seems to hint at the rise of an allophonic gemination effect in Portorino. Traces of this V/C complementation in Portorino (see Hajek 1994 for Bolognese; cf. also Filippino, Garassino & Dipino *forthcoming*) can be found also in the

behavior of post-stress consonants under focus effect (cf. Table 8): while the segments after short vowels are strongly lengthened, those after long vowels become even shorter compared to the non-focused position.

7. Concluding remarks

Our aim was to verify how the phonetic realization (in terms of duration) of a phonological feature (vowel length) reacts to prosodically marked contexts, which we have named ‘stress-tests’, in two closely related Italo-Romance varieties. The use of such experiments has indicated that the utterance-final position and corrective focalization have a significant lengthening effect on the duration of vowels in both dialects, showing however different patterns (cf. §6.3). What is important to highlight here is that the phonetic temporal distinction between phonemic short and long vowels is preserved in the two contexts. This effect seems robust in both dialects, in which no significant difference in terms of the realization of vowel length has been observed. All in all, by referring to the distinction between central and peripheral phonological features introduced in §2, and basing our observation on vowel duration as the primary phonetic cue for the vowel length contrast, we can conclude that vowel length is (still) central in both phonological systems.

However, one has to consider this conclusion more critically in light of the discussion presented in §5.3.

In particular, the overall number of (sub)minimal pairs has been diminishing. We have singled out several causes, both external and internal, for this state of affair. In certain cases, speakers do not seem able to have access to certain lexical items anymore; in other cases, one has to take into account different historical developments in the two varieties, such as the Portorino outcome of *-l-* in internal coda position which inhibited the lengthening of the preceding stressed vowel. Moreover, as shown by the discussion on /^hsenje/ ‘ash’ in Genoese (cf. §5.3), the presence of an approximant seems to be enough to make the subminimal pair collapse (and, ultimately, vowel quantity contrasts themselves). This observation is interesting because it permits to infer that, at least in certain subminimal pairs, vowel duration can be out-ranked as the primary phonetic cue for differentiating two lexical items when there are other intervening segmental and contextual cues. This speculation should be verified by analyzing other subminimal pairs and, above all, by relying on proper perceptual experiments.

Abbreviations

β = coefficient; CC = contrastive carrier sentences; GE = Genoese, dialect of Genoa; p = p-value (significance); PM = Portorino, dialect of Porto Maurizio; SE = Standard Error; SV = SVO/SVX sentences

Notes

¹ For a more detailed history of vowel length in Romance languages, see Filipponio (2012a) and Loporcaro (2015).

² There are some exceptions: in Emilian, for instance, proparoxytones with long stressed vowels occur when a stressed vowel (with the exceptions of the outcomes of Latin Ĕ and Ō) is followed by a fricative or a sibilant and the consonant following the post-stress vowel is a sonorant (e.g. /tɛ:vla/ 'table' < *tavula < TABŪLAM, /dzaɣven/ 'young' < IŪVĒNEM). The structural reasons are explained in Filipponio (2012b: 78-79). Long stressed vowels in proparoxytones are present also in Genoese (Toso 1997: 16).

³ One must notice that the lack of massive reduction of unstressed syllables, which is a typical feature of many Ligurian dialects, does not provide the large amount of secondary oxytones characterizing the other Gallo-Italian dialects. However, some internal Intemelian varieties, where the effects of apocope are much more remarkable than in the coastal dialects, permit to find another intermediary stage, corresponding to Western Lombard. Indeed, some dialects spoken in the Val Roja, more specifically in Breil and Briga, still present contrastive vowel length in secondary oxytones (/na:z/ 'nose' ~ /bras/ 'arm', see Dalbera 1994: 126-129).

⁴ It is important to remember that Genoese and Portorino are characterized by a very different sociolinguistic background. While Genoa is a quite large urban center, Porto Maurizio is a small city with considerably different social dynamics. We believe that the structural scope of our paper remains substantially unaffected by these considerations which, however, become of fundamental relevance if one considers the sociophonetic aspects related to vowel length.

⁵ These consonants occur only after short vowels (cf. Malagoli 1930: §14). The same situation is shown by the experimental measurements in Loporcaro *et al.* (2006). The data drawn by Filipponio (2012a: 245-247) show a different picture, without post-tonic gemination: the differences from the previous studies are probably not due to a change in progress, but to differences in the tests (see Garassino & Filipponio *in press*).

⁶ As long as the Arno River flows in the Ligurian Sea, which is called by many northern and central Tuscans *Tirreno* (although the Tyrrhenian Sea begins south of Elba Island).

⁷ Probably with the only exception of /se/ '(you) are' ~ /se:/ 'six'.

⁸ One possible strategy being a constraint on the phonetic lengthening of short vowels (Nakai *et al.* 2009: 30).

⁹ It is important to stress that our goal in this paper is not a fine-grained analysis of focus and its manifestation in the two dialects. For our current purposes, instead, we intend to observe the relation between focus, here conceived as a stress-test, and the realization of contrastive vowel length.

¹⁰ Such distinction needs to be approached with caution. Kügler (2008), for instance, did not find any significant difference between contrastive and information focus in his German data. Thus, he concludes that "semantically different focus types do not show categorical differences in the phonetic implementation" (Kügler 2008: 594). This fact may suggest that a phonologically relevant distinction between different types of focus is

language-specific, cf. for instance Breen *et al.* (2010) who come to a very different conclusion for English. Furthermore, in other languages an increased duration does not correlate with focus prominence at all, as in the case of Japanese (cf. Maekawa 1997), in which one can only observe an increase in F0 and special effects on the vowel formants values.

¹¹ In Ammani-Jordanian Arabic, the authors found an ‘exasperation’ of the differences between short and long vowels under focus (i.e., phonologically long vowels tend to become longer, whereas short vowels tend to become shorter).

¹² According to Krifka & Musan (2012: 8), correction is one of the most typical pragmatic uses of contrastive focalization.

¹³ An example is provided by the sentence *he said BAT, not bad*, whose aim is to assess the effect of focus on voicing (de Jong 2004: 499).

¹⁴ Thus, focus enhances the differences between short and long vowels, but not the ones due to voicing (i.e., the effect of the voicing of a following consonant on vowel duration) in Ammani-Jordanian Arabic, in which the former has phonological status but not the latter. The opposite is to be observed in English, in which voicing effects have a phonological status, but not vowel quantity (de Jong 2004).

¹⁵ However, as shown by recent research conducted at the phonetics-prosody interface, boundary effects cannot be merely reduced to the bio-mechanics of speech production. As mentioned in Cho *et al.* (2011), English and Korean speakers tend, for instance, to produce more prosodic phrases in clear speech than in casual speech, thus showing some degree of control over the prosodic structure in different communicative settings.

¹⁶ The age of our informants could have an impact on the duration of vowels (cf. Fletcher *et al.* 2015, who find a significant effect of aging on the increased duration of vowels). However, since age is a context-independent bias, that should not represent a critical problem for our research goal (which is instead ‘contextual’ and aims at assessing the effect of prosodic contexts on the realization of vowel length).

¹⁷ The contexts ‘utterance-final correctively focalized’ vs ‘utterance-final non-correctively focalized’ (i.e., the interaction between prosodic boundary and focus effects, as in Cho *et al.* 2011) still require to be investigated. They belong to the future work within our research project (see footnote 1).

¹⁸ Instead of [ʰfi:tu], one finds in Portorino either the form [ʰtɔstu] or [ʰprestu], the latter being heavily influenced by Italian.

¹⁹ Contrary to what was expected, the voiced fricative sound [z] in *mazu* does not have an allophonic lengthening effect within this item, cf. Toso (1997: 16); see also Loporcaro (2015: 92-93). For a description of the segmental contexts triggering allophonic vowel lengthening in Ligurian dialects, cf. Forner 1988.

²⁰ This graph and the following ones have been realized with the help of the package *ggplot2* (Wickham 2016) in R. The vowel transcription relies on X-SAMPA because of compatibility issues with the software R.

²¹ Of course, some of the differences between the (sub)minimal pairs in Figures 5 and 6 can be amenable to the well-known effect of intrinsic vowel height (cf. among others Lehiste 1970). However, the above-mentioned inhomogeneity at the word-level may be responsible for an unpredictable source of variation that, in our opinion, motivates the status of target items as a random variable in the mixed linear models that we have chosen for carrying out the statistical analysis of our data (§6.1).

²² Random factors being defined as “factors with levels randomly sampled from a much larger population” (Baayen 2008: 241).

²³ The AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) are goodness-of-fit measures for the comparison of models with different numbers of parameters, cf. Levshina (2015: 194).

²⁴ The interaction term Vowel Length * Dialect * Position in the sentence showed a tendency for Portorino vowels to be longer in utterance final position than in Genoese but did not prove to be significant ($\beta = 27.48$, $SE = 16.24$, $p = .09$).

Bibliographical References

- Audacity Development Team 2018. *Audacity* (computer program), version 2.2.2., <www.audacityteam.org> (Last control: 30.05.2019).
- Azaretti, Emilio 1982 [1977]. *Etimologia dei dialetti liguri attraverso l'evoluzione del ventimigliese*. Sanremo: Casablanca.
- Baayen, R. Harald 2008. *Analyzing Linguistic Data. A Practical Introduction to Statistics using R*. Cambridge: Cambridge University Press.
- Bates, Douglas; Maechler, Martin; Bolker, Ben & Walker, Steve 2015. Fitting Linear Mixed Effects Models Using lme4. *Journal of Statistical Software* 67,1. 1-48.
- Berkovits, Rochele 1994. Durational effects in final lengthening, gapping, and contrastive stress. *Language and Speech* 37,3. 237-250.
- Boersma, Paul & Weenink, David 2017. *Praat: doing phonetics by computer* (computer program), version 6.0.12, <www.praat.org> (Last control: 30.05.2019).
- Bosoni, Giorgio 1995. Dialettologia lombarda: un esempio di approccio strumentale allo studio delle opposizioni di quantità vocalica in sillaba tonica. *Studi Italiani di Linguistica Teorica* 24. 345-364.
- Breen, Mara; Fedorenko, Evelina; Wagner, Michael & Gibson, Edward 2010. Acoustic correlates of information structure. *Language and Cognitive Processes* 25,7/8/9. 1044-1098.
- Chen Yiya; Po-Lun Lee, Peppina & Pan, Haihua 2016. Topic and Focus Marking in Chinese. In Féry, Caroline & Ishihara, Shinichiro (eds.), *The Oxford Handbook of Information Structure*. Oxford: Oxford University Press. 733-752.
- Cho, Taehong; Yoonjeong, Lee & Sahyang, Kim 2011. Communicatively driven versus prosodically driven hyper-articulation in Korean. *Journal of Phonetics* 39. 344-361.
- Cho, Taehong 2016. Prosodic Boundary Strengthening in the Phonetics-Prosody Interface. *Language and Linguistic Compass* 10,3. 120-141.
- Dalbera, Jean-Philippe 1994. *Les parlers des Alpes-Maritimes. Etudes comparative, essai de reconstruction*. London: Association internationale d'Études Occitanes.
- de Jong, Kenneth J. 2004. Stress, lexical focus, and segmental focus in English: patterns of variation in vowel duration. *Journal of Phonetics* 32. 493-516.
- de Jong, Kenneth & Zawaydeh, Bushra 1999. Stress, duration, and intonation in Arabic word-level prosody. *Journal of Phonetics* 27. 3-22.
- de Jong, K. & Zawaydeh, Bushra 2002. Comparing stress, lexical focus, and segmental focus: patterns of variation in Arabic vowel duration. *Journal of Phonetics* 30. 53-75.
- Filipponio, Lorenzo 2012a. *La struttura di parola dei dialetti della valle del Reno. Profilo storico e analisi sperimentale*. Sala Bolognese: Forni.
- Filipponio, Lorenzo 2012b. Reflexionen über die Diachronie des Galloitalienischen Rhythmus. In Schafroth, Elmar & Selig, Maria (eds.), *Testo e ritmi. Zum Rhythmus in der italienischen Sprache*. Frankfurt: Peter Lang. 61-87.
- Filipponio, Lorenzo & Nocchi, Nadia 2010. Diagnostica fonetica e diagnosi fonologica. Ossitoni lunghi di sillaba libera a Sambuca Pistoiese (PT). In Schmid, Stephan; Schwarzenbach, Michael & Studer-Joho, Dieter (eds.),

- La dimensione temporale del parlato. Atti del V Convegno Nazionale AISV.* Torriana: EDK. 225-248.
- Filipponio, Lorenzo; Garassino, Davide & Dipino, Dalila *forthcoming*. Tra fonetica e tipologia: la quantità consonantica in due dialetti italo-romanzi settentrionali. *XV Convegno Nazionale AISV*.
- Fletcher, Annalise R. & McAuliffe, Megan J., 2015. The relationship between speech segment duration and vowel centralization in a group of older speakers. *Journal of the Acoustical Society of America* 138,4. 2132-2139.
- Forner, Werner 1975. *Generative Phonologie des Dialekts von Genua*. Hamburg: Buske.
- Forner, Werner 1988. Areallinguistik I. Ligurien / Aree linguistiche I. Liguria. In Holtus, Günther; Metzeltin, Michael & Schmitt, Christian (eds.), *Lexikon der Romanischen Linguistik Vol. IV*. 453-469.
- Garassino, Davide; Loporcaro, Michele & Schmid, Stephan 2017. La quantità vocalica in due dialetti della Liguria. In Bertini, Chiara; Celata, Chiara; Lenoci, Giovanna; Meluzzi, Chiara & Ricci, Irene (eds.), *Fattori biologici e sociali nella variazione fonetica / Social and Biological factor in Speech Variation*. Milano: Officinaventuno. 127-144.
- Garassino, Davide & Filipponio, Lorenzo *in press*. The impact of information and prosodic structure on the phonetic implementation of vowel length. A contrastive analysis of two Ligurian dialects. In Teixeira Kalkhoff, Alexander; Selig, Maria; Mooshammer, Christine (eds.), *Prosody and conceptional variation. Situational conditions of communication, degree of communicational planning, and activity types as parameters for prosodic design*. Bern: Peter Lang.
- Garassino, Davide & Dipino, Dalila *in press*. Vowel Length in Intemelian Ligurian. An experimental and cross-dialectal investigation. Proceedings of the *19th International Congress of Phonetic Sciences* (Melbourne, 5-9 August 2019).
- Ghini, Mirco 2001. *Asymmetries in the phonology of Miogiolia*. Berlin / New York: Mouton de Gruyter.
- Hajek, John 1994. Phonological Length and Phonetic Duration in Bolognese: Are They Related? In Togneri, Roberto (ed.), *Proceedings of the Fifth Australian International Conference on Speech Science and Technology. Vol. 2*. 662-667.
- Katz, Jonah & Selkirk, Elisabeth 2011. Contrastive Focus vs. Discourse-New: Evidence from Phonetic Prominence in English. *Language* 87,4. 771-816.
- Krifka, Manfred & Musan, Renate 2012, Information Structure: Overview and linguistic issues. In Krifka, Manfred & Musan, Renate (eds.), *The Expression of Information Structure*. Berlin / New York: Mouton de Gruyter. 1-43.
- Kügler, Frank 2008. The role of duration as a phonetic correlate of focus. In Barbosa, Plínio A.; Madureira, Sandra & Reis, César (eds.), *Proceedings of the Speech Prosody 2008 Conference*. Campinas: Editora RG/CNPq. 591-594.
- Ladd, Robert D. 2008 [1996]. *Intonational Phonology* (2nd edition). Cambridge: Cambridge University Press.
- Lehiste, Ilde 1970. *Suprasegmentals*. Cambridge, MA: MIT Press.
- Levshina, Natalia 2015. *How to do Linguistics with R. Data Exploration and Statistical Analysis*. Amsterdam / Philadelphia: John Benjamins.
- Loporcaro, Michele 2015. *Vowel Length from Latin to Romance*. Oxford: Oxford University Press.
- Loporcaro, Michele; Delucchi, Rachele; Nocchi, Nadia; Paciaroni, Tania & Schmid, Stephan 2006. La durata consonantica nel dialetto di Lizzano in

Center and periphery in phonology: A 'stress-test' for two Ligurian dialects

- Belvedere (Bologna). In Savy, Renata & Crocco, Claudia (eds.), *Analisi prosodica. Teorie, modelli e sistemi di annotazione*. Torriana: EDK. 491-51.
- Lüdtke, Helmut 1956. *Die strukturelle Entwicklung des romanischen Vokalismus*. Bonn: Romanisches Seminar an der Universität Bonn.
- Maekawa, Kikuo 1997. Effects of focus on duration and vowel formants frequency in Japanese. In Sagisaka, Yoshinori; Campbell, Nick & Higuchi, Norio (eds.), *Computing Prosody: Computational models for processing spontaneous speech*. New York: Springer. 129-153.
- Malagoli, Giuseppe 1930. Fonologia del dialetto di Lizzano in Belvedere (Appennino bolognese). *L'Italia dialettale* 6. 125-196.
- Martinet, André 1955. *Économie des changements phonétiques*. Berne: Francke.
- Martinet, André 1956. *La description phonologique avec application au parler francoprovençal d'Hauteville*. Genève: Librairie Droz.
- Moosmüller, Sylvia & Brandstätter, Julia 2014. Phonotactic information in the temporal organization of Standard Austrian German and Viennese dialect. *Language Sciences* 30. 1-12.
- Nakai, Satsuki; Kunnari, Sari; Turk, Alice; Suomi, Kari & Ylitalo, Riikka 2009. Utterance-final lengthening and quantity in Northern Finnish. *Journal of Phonetics* 37,1. 29-45.
- R Development Team 2018. *A Language and Environment for Statistical Computing*, v 3.4.2. Wien: R Foundation for Statistical Computing. <www.R-project.org> (Last control: 30.05.2019).
- Rohlf, Gerhard. 1966. *Grammatica storica della lingua italiana e dei suoi dialetti. Fonetica*. Torino: Einaudi.
- Sanga, Glauco 1984. *Dialettologia lombarda: lingue e culture popolari*. Pavia: Università di Pavia.
- Sorianello, Patrizia 1994. Il processo dell'allungamento prepausale. Dati ed interpretazioni. *Quaderni del Dipartimento di Linguistica dell'Università di Firenze* 5. 47-73.
- Toso, Fiorenzo 1997. *Grammatica del genovese*. Recco: Le Mani.
- Uguzzoni, Arianna 1975. Appunti sulla evoluzione del sistema vocalico di un dialetto frignanese. *L'Italia Dialettale* 38. 47-76.
- Uguzzoni, Arianna & Busà, Maria Grazia 1995. Correlati acustici della opposizione di quantità vocalica in area emiliana. *Rivista Italiana di Dialettologia* 19. 7-39.
- Vachek, Josef 1964. On Peripheral Phonemes of Modern English. *Brno studies in English* 4. 7-109.
- Weinrich, Harald 1958. *Phonologische Studien zur Romanischen Sprachgeschichte*. Münster: Aschendorff.
- Wickham, Hadley 2016. *ggplot2: Elegant Graphics for Data Analysis*. New York: Springer.
- Wightman, Colin W.; Shattuck-Hufnagel, Mari; Ostendorf, Mari & Price, Patti J. 1992. Segmental durations in the vicinity of prosodic phrase boundaries. *The Journal of Acoustical Society of America* 91,3. 1707-1717.
- Willi, Luca 2016. Il ritmo di alcuni dialetti valtellinesi nel panorama gallo-italico: assetto sincronico e considerazioni diacroniche. *Quaderni Grigionitaliani* 85. 120-142.
- Winter, Bodo. 2013. *Linear models and linear mixed effects models in R with linguistic applications*. arXiv:1308.5499, <arxiv.org/pdf/1308.5499.pdf> (Last control: 30.05.2019).

