

# Vowel length in Intemelian Ligurian. An experimental and cross-dialectal investigation

Davide Garassino, Dalila Dipino

University of Zurich, Switzerland  
davide.garassino@uzh.ch, dalila.dipino@uzh.ch

## ABSTRACT

According to the non-experimental literature, Intemelian Ligurian, unlike closely-related dialects such as Genoese and Western Ligurian, does not display vowel length distinctions anymore. This research is the first attempt to carry out an experimental analysis of temporal and spatial correlates of vowel length (i.e. vowel and post-tonic consonant durations; F1 and F2 formant values) in Intemelian, compared with the neighboring dialects and across different prosodic contexts (i.e. utterance-final position and discourse focus).

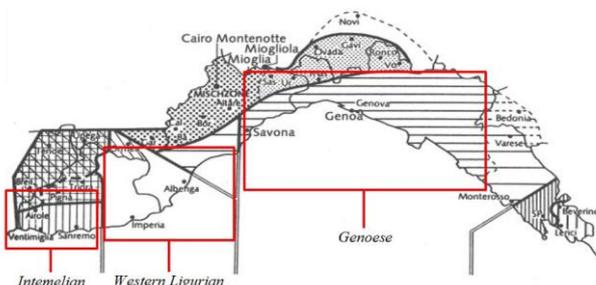
Two patterns were detected: the first one represented by Genoese and Western Ligurian, where temporal differences between long and short vowels are consistently implemented, and the second one by Intemelian, in which such opposition is not found, thus confirming the impressions provided by the previous literature. Finally, we discuss some variation observed in the Intemelian vowel space and we assess the impact of different prosodic contexts on both vowel quantity and quality.

**Keywords:** Vowel quantity and quality, Ligurian, Italo-Romance, phonetics/prosody interface.

## 1. INTRODUCTION

Intemelian is an Italo-Romance dialectal group belonging to Ligurian [11] (see Figure 1) and including several varieties spoken between Taggia and Monaco. Like the other closely-related Ligurian dialects [22], the Intemelian group is definitely endangered.

**Figure 1:** A linguistic map of Liguria ([14], adapted from [11]).



Despite the high degree of structural uniformity shared by Ligurian varieties [19, 26], Intemelian differs from Genoese and other closely-related dialects in one crucial phonological feature: contrastive vowel length. According to the historical grammar of Ventimigliese by [1], vowel quantity, once present in Intemelian [20], has completely disappeared (at least in coastal Intemelian; some internal varieties maintain contrastive vowel length, limited to oxytones [5]).

Genoese is the Ligurian dialect in which vowel length is more robustly attested in both stressed (e.g. /'le:ze/ 'to read' vs. /'leze/ 'law'; /'da:/ 'to give' vs. /'da/ '(s)he/it gives') and pretonic vowels (e.g. /ka:'seta/ 'little sock' vs. /ka'seta/ 'little ladle' [20]). In Western Ligurian, spoken between Noli and Taggia, on the other hand, the status of contrastive vowel length is less clear, since it is restricted to a lower number of (sub)minimal pairs and does not occur in unstressed vowels (cf. [13] on the Western Ligurian dialect spoken in Porto Maurizio, Portorino). Experimental studies on Ligurian are essentially limited to [13] and [9] on Genoese and Portorino. Moreover, no experimental study has been carried out yet on Intemelian varieties in order to verify whether vowel quantity has totally disappeared or has left residual traces.

## 2. RESEARCH QUESTIONS AND HYPOTHESES

In this paper, we intend to provide an acoustic analysis of vowel length in Intemelian, in terms of vowel duration and other phonetic correlates, in particular post-tonic consonant duration and vowel quality. Our main research questions are as follows:

- Do Intemelian speakers display durational or qualitative differences in words (i.e. (sub)minimal pairs) which in Genoese and Western Ligurian show an opposition between long and short vowels?
- What role is played in Intemelian by prosodic contexts which have well-known lengthening effects, such as the utterance-final position and discourse focus?
- Based on the experimental data on vowel length, how can Intemelian be described with reference to Genoese and Western Ligurian?

As far as the first research question is concerned, we expect no significant difference between short and long vowels in Intemelian. Similarly, no durational difference is expected between post-stress consonants, since Northern Italian dialects usually lack a distinction between short and long consonants [25]. Concerning the second question, we will examine the effects of the utterance-final position [4, 23] and discourse focus (i.e. phonological focus [6]) on vowel and consonant durations. As far as Genoese and Western Ligurian are concerned, [9] showed an overall increase in durational values both in the utterance-final position and contrastive focus, while significant length contrasts are maintained between short and long vowels. In Intemelian, we expect both focus and boundary position to increase vowel (and consonant) durations, independently of whether vowel length contrasts are present.

In addition, we will also consider effects on vowel quality (F1 and F2 formant values) in Intemelian, in order to verify if additional cues for vowel distinction are to be found. We do not expect any spectral change related to a difference between short and long vowels. However, in case durational differences are observable, based on the literature ([16, 17, 18]; [27] on some Emilian dialects), we expect short vowels to have a smaller vowel space than long vowels. Finally, both the utterance-internal position and discourse focus are expected to increase the vowel space [4] on the whole.

### 3. DATA AND METHODS

#### 3.1. Speakers, experiments and target items

Six native speakers (4 males and 2 females; average age: 61.83, sd: 10.85) from Camporosso and the neighbouring town Vallecrosia (both belonging to coastal Intemelian) were selected for an interview and recorded by means of a *Marantz PMD 561* recorder and a *Røde NTG-2* condenser shotgun microphone. The informants were asked to carry out three production tests in the same session: (a) carrier sentences (henceforth: CS), (b) SVX sentences (henceforth: SV) and (c) contrastive carrier sentences (henceforth: CC). Type (a) is represented by frames like ‘I have said X for the first / second time’; type (b) by canonical sentences characterized by a subject-verb-direct object (or another complement) word order, as in ‘The boy picked a *fruit*’ and ‘The boy picked a *fruit* with red skin’ and, finally, (c) contrastive carrier sentences such as ‘I have said X, not Y this time’ and ‘I have said Y, not X this time’. Tests (b) and (c) were used to assess the effect of the utterance-final position (compared to the utterance-internal one) and the focal position

(compared to the non-focal one) on vowel and consonant duration. After a brief training session, sentences (a) and (c) were presented to the speakers in standard Italian on a laptop screen and sentences (b) were read aloud by one of the experimenters also in standard Italian. In all three cases, the speakers were then asked to translate the sentences into their native dialect. Table 1 includes the target items used in the three tests:

**Table 1:** The target items.

Vowels	Target items
/a:/ ~ /a/	/'na:zu/ ~ /'mazu/, ‘nose ~ may’ /'se:ne/ ~ /'sene/, ‘meals ~ ash’
/e:/ ~ /e/	/'pe:zu/ ~ /'pedʒu/, ‘weight ~ worse’ /'le:dʒe/ ~ /'ledʒe/, ‘to read ~ law’
/i:/ ~ /i/	/'ri:ku/ ~ /'riku/, ‘Henry ~ rich’
/u:/ ~ /u/	/'du:se/ ~ /'duze/, ‘sweet ~ twelve’
/y:/ ~ /y/	/'fry:tu/ ~ /'brytu/, ‘fruit ~ ugly’

For the sake of a cross-dialectal comparison, the selected target items are words which are shared by Intemelian, Genoese and Portorino. However, while in the last two varieties such words are part of (sub)minimal pairs with a phonemic long or short vowel, their phonological status in Intemelian has to be properly assessed. Moreover, in the case of /'le:dʒe/, /'ledʒe/ and /'pedʒu/ two Intemelian speakers consistently produced [ɛ] instead of [e]. The tokens of ['pe:zu] ~ ['pedʒu] produced by them were discarded from the durational and the formant analysis since they would no longer form a (sub)minimal pair, whereas the tokens of ['le:dʒe] and ['ledʒe] were excluded from the formant analysis only. All in all, we examined a total of 393 vowels and as many consonants for the investigation of duration and 311 vowels for the analysis of formants (one speaker had to be excluded because of an overall anomalous vowel space). For the comparative analysis in § 4.2. we relied instead on 843 vowels and consonants (including Genoese and Portorino; for a detailed analysis of these data, we refer to [9]).

Durational values for stressed vowels and post-stress consonants were automatically extracted with a script in PRAAT [3]. Vowels and consonants were manually segmented, by looking at the presence (or absence) of the full formants structure and placing segment boundaries at zero crossings [21]. Formants values for F1 and F2 were automatically extracted at five different points in the vowel (20%-33%-50%-66%-80%, [12]) by means of LPC in PRAAT and then averaged. Suspect outliers were manually checked.

### 3.2. Statistical analysis

The data were analysed by means of linear mixed models in R [24] with the *lme4* toolbox [2]. In each case, the best model (the one with lowest AIC and BIC values) was selected through model comparison with ANOVA based on Likelihood ratio test. The dependent variable was (absolute) Vowel Duration in ms. (or, alternatively, Consonant Duration in ms.). The fixed part of the models consisted of the following independent variables: (i) Vowel Length (levels: phonologically long / short vowels), (ii) Production Tests (CS / SV / CC sentences) and (iii) Position within the SV sentence (utterance-internal / utterance-final) or Position within the CC sentence (focal / non-focal).

For the comparative analysis carried out in § 4.2., the Dialect factor (Genoese / Intemelian / Portorino) was included as well. The random effects inserted in all models were Speakers and Target Items. For further information on the variables used for the spectral analysis, cf. § 4.3. For reasons of space, in the next paragraphs we will only report the most interesting results in relation to our research questions.

## 4. RESULTS

### 4.1. Vowel and Consonant duration in Intemelian

#### 4.1.1. Vowel duration

The difference between (allegedly) long and short vowels did not prove significant in the CS production test ( $p=0.29$ ). The same result was confirmed for the SV ( $p=0.40$ ) and the CC ( $p=0.76$ ) sentences. In the SV sentences, the only significant difference involved the utterance-internal and final position (this last one having a lengthening effect,  $p<0.001$ ). In the CC test, the difference between non-focal and focal position (the latter displaying a lengthening effect,  $p<0.001$ ) was highly significant as well.

#### 4.1.2. Post-stress consonant duration

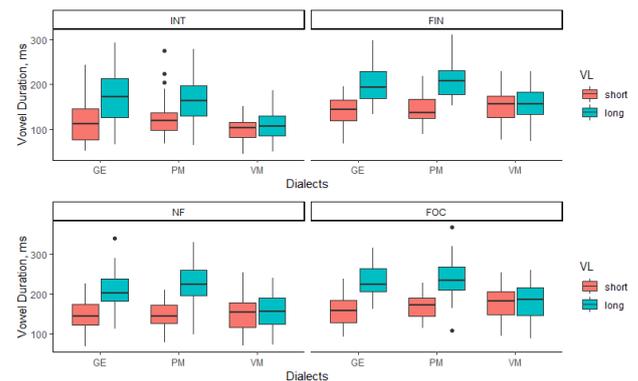
Post-tonic consonants did not show any significant difference in duration following long or short vowels in any context: CS ( $p=0.57$ ), SV ( $p=0.85$ ) or CC ( $p=0.76$ ). As in the cases of stressed vowels, both the utterance-final position ( $p<0.001$ ) and discourse focus ( $p<0.01$ ) had a lengthening effect.

### 4.2. A cross-dialectal comparison of vowel and consonant duration

The comparison between Intemelian and two Ligurian varieties that maintain contrastive vowel

length was made possible by the homogenous elicitation methods and target items used in [9], from which the Genoese and Portorino data were drawn. Since [9] only considers SV and CC sentences, we restricted our comparison to these two production tests. Figure 2 provides an overview of vowel duration in these contexts.

**Figure 2:** Vowel Duration in Genoese (GE), Portorino (PM) and Intemelian (VM) [INT=internal, FIN=final position; NF=non-focal, FOC=focal position].

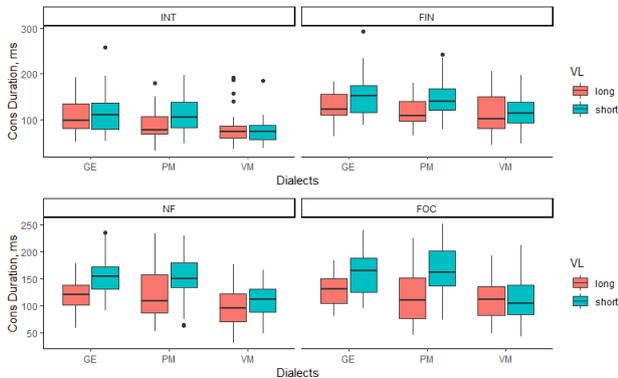


In the SV test, interactions between the variables Vowel Length and Dialect (long vowels being shorter in Intemelian compared to Genoese,  $p<0.01$ , and Portorino,  $p=0.06$ ) as well as between Position in the SV sentences and Dialect (the utterance-final position had an overall stronger lengthening effect on Intemelian than Genoese,  $p<0.05$ , and Portorino,  $p<0.001$ ) were detected. This finding might suggest the action of phonological constraints on prosodic lengthening in Genoese and Portorino (a typical situation for varieties displaying vowel length [23]). Similarly, in the CC context, we observed a significant interaction between Vowel Length and Dialect, leading to a shortening of long vowels in Intemelian compared to both Genoese and Portorino ( $p<0.001$ ).

Regarding the status of post-stress consonants (see Figure 3), in the SV sentences we found a significant interaction between Dialect and Vowel Length (Intemelian consonants following short vowels are shorter than in Genoese,  $p<0.05$ , and Portorino,  $p<0.01$ ). The same interaction was found in the CC context compared to the other two varieties (Intemelian consonants following short vowels are shorter than in the other two dialects,  $p<0.01$ ).

All in all, the shortening of ‘long’ vowels as well as post-tonic consonants following ‘short’ vowels in Intemelian suggests that vowel length contrasts in this variety are no longer realized.

**Figure 3:** Post-tonic consonant duration in Genoese (GE), Portorino (PM) and Intemelian (VM) after long and short vowels [INT=internal, FIN=final position; NF=non-focal, FOC=focal position].



#### 4.3. Some preliminary observations on vowel quality: F1 and F2 in Intemelian

In order to evaluate possible changes in vowel quality in the Intemelian variety, we ran a new battery of linear mixed models in which the dependent variable was represented by the normalized F1 and F2 formant values (obtained by means of Lobanov normalization [15, 7]). The fixed factors were Vowel Length and Production Test and the random factors were Speakers and Target Items (cf. § 3.2.). Vowel Length was included in the model in order to test our research question whether speakers still differentiate between short and long vowels, this time from a qualitative point of view. The non-significant results for most of vowels suggest that this is not the case. However, unexpectedly on the basis of the durational findings, F2 of /i/ turned out lower in words that used to have short /i/ than in the ones that used to have /i:/,  $p < 0.001$  in the SV and the CC tests. A similar result was found for /y/: F2 of short /y/ was lower in the SV sentences ( $p < 0.05$ ). These findings, restricted to high palatal vowels and to specific contexts, seem difficult to explain in a variety which does not display vowel length anymore and need to be verified on the basis of a larger dataset.

On the other hand, the Production Test factor had a significant main effect on F1 of /a/ as well as on F2 of almost every vowel in the dataset. More precisely, F1 of /a/ was significantly higher in the CC test, i.e. /a/ was lower within the vowel space, compared to the CS sentences ( $p < 0.05$ ). In the SV test, compared to the CS sentences, F2 of /a/ ( $p < 0.05$ ) was lower (i.e. /a/ was more retracted), while F2 of /i/ ( $p < 0.05$ ) was higher (i.e. /i/ was more advanced). Regarding the CC test, F2 of /e/

( $p < 0.001$ ) and /i/ ( $p < 0.001$ ) was higher, while F2 of /u/ ( $p = 0.06$ ) only showed a tendency to decline.

The addition of the Position within the SV and the CC sentences to the analysis has revealed that F2 of /a/ ( $p < 0.05$ ) was higher in the final position, compared to the internal one. The impact of focalization, compared to the non-focal position, had a raising effect on F1 of /a/ ( $p < 0.001$ ) and F2 of /e/ ( $p < 0.01$ ).

## 5. CONCLUSION

Our inquiry has shown that a phonetic difference between short and long stressed vowels is not to be found anymore in Intemelian, which may suggest the complete disappearance of vowel length contrasts. Moreover, at the segmental level, post-stress consonants do not exhibit any difference in duration [25]. A comparison with two other Ligurian varieties revealed different patterns concerning vowel and consonant durations in Liguria. The first one is represented by Genoese and Portorino, in which vowel length is signaled by the robust phonetic implementation of durational differences between long and short vowels. Additionally, and surprisingly, post-tonic consonants show complementation effects (cf. the data in [9] and [10]). The second pattern is represented by Intemelian, in which there is no durational difference between short and long vowels (as well as between short and long consonants).

The investigation of different prosodic contexts has shown that Intemelian displays an overall increase of durational values in the utterance-final and the focus positions. In the former context, this effect has proven to be proportionally more robust than in the other two varieties. Regarding the analysis of F1 and F2 in Intemelian, no consistent differences related to vowel length were found, except in the case of high palatal vowels. These exceptions need further investigation and a full-fledged comparison with Genoese and Western Ligurian data. Finally, F1 of /a/ and F2 of almost every vowel were affected by the SV and the CC contexts in terms of an expansion of the vowel space.

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