

# COMPENSATORY LENGTHENING AND POLYSYLLABIC SHORTENING IN THE GHEG DIALECT OF ALBANIAN

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## ABSTRACT

This study was concerned with understanding a case of diachronic vowel lengthening in the Gheg dialect of Albanian. Some of the long vowels of Gheg are thought to have emerged out of a historical process of compensatory lengthening following final schwa deletion. However, a confounding factor which may also explain why these vowels became longer is the effect of polysyllabic shortening being wiped out by schwa deletion. The main aim of this study was to disentangle the respective effects of compensatory lengthening and polysyllabic shortening on patterns of vowel duration in Gheg. An acoustic analysis of vowel duration in two word sets provided no evidence of an effect of polysyllabic shortening. Vowels were found to be longer, not shorter, in polysyllabic words, a fresh insight which suggests that vowel length may have instead been inherited from an open syllable and preserved when schwa was deleted.

**Keywords:** Gheg Albanian, vowels, syllable structure, compensatory lengthening, polysyllabic shortening

## 1. INTRODUCTION

This study probes into vowel length in the Gheg dialect of Albanian, with the aim of disentangling the respective effects of compensatory lengthening and polysyllabic shortening on patterns of vowel duration in a dialect for which empirical data is scarce.

Albanian is a language of the Indo-European family spoken by approximately 7 million people living mostly in Albania, Kosovo and North Macedonia [1]. In this study, we are concerned with Albanian spoken in Albania, which comprises two main dialects: Tosk, spoken in the southern part of the country; and Gheg, spoken in central and northern Albania, including in the capital Tirana [2], [3], [4]. We focus on a distinctive phonological feature of Gheg: contrastive vowel length.

The Gheg vowel inventory comprises 6 oral vowels which have short and long counterparts: /i y u e ə a/ and /i: y: u: e: ə: a:/ [2], [5], [6], [7]. Long vowels occur frequently in indefinite singular nouns, whereas the corresponding definite singular nouns have short vowels, as illustrated in (1):

(1) /'kali/-/ka:l/: *kali* ‘the horse’ vs. *kalë* ‘a horse’

The presence of a long vowel in *kalë* /ka:l/ has been attributed to compensatory lengthening [6], [7], [8], [9], [10]. The leading hypothesis in the literature is that Gheg used to have an unstressed schwa at the end of the indefinite noun, /'kalə/, which was eventually dropped. The loss of this segment was compensated by an increase in duration of the remaining stressed vowel, with subsequent phonologization [11], [12], [13]. However, the historical passage from /'kalə/ to /ka:l/ also involved a reduction in the number of syllables in the word, which raises the question of whether so-called polysyllabic shortening could have played a role.

Polysyllabic shortening is a process through which the duration of vowels or syllables shortens as the number of syllables within the word increases. A classic example is that of *speed* > *speedy* > *speediness* [14] in which stressed /i:/ is shorter in disyllabic *speedy* than monosyllabic *speed*, and shorter in trisyllabic *speediness* than disyllabic *speedy*. Polysyllabic shortening has been observed mostly in stress-timed languages like English, Dutch, German or Swedish [15]. Since Albanian also is a stress-timed language [16], [17], the possibility has to be considered that the longer duration of the stressed vowel in monosyllabic *kalë* /ka:l/ compared to old disyllabic *kalë* /'kalə/ is due to the effect of polysyllabic shortening being wiped out when the final schwa (and thus one syllable) was deleted.

It is difficult to disentangle the effect of compensatory lengthening from that of polysyllabic shortening being lifted because they yield the same result: a longer vowel in the modern form. To overcome this issue, we propose to use the following proxies. First, we will verify whether polysyllabic shortening is a phenomenon that is found in Gheg using a corpus of definite-indefinite noun pairs as in (2). These have an analogical structure to the /'kali/-/ka:l/ pair in (1), but the indefinite noun never had a schwa, which was thus never dropped, not triggering compensatory lengthening:

(2) /'dafi/-/daf/: *dashi* ‘the ram’ vs. *dash* ‘a ram’

If polysyllabic shortening is found in Gheg, we expect the stressed vowel to be longer in monosyllabic /daf/ than in disyllabic /'dafi/.

Second, we will use a corpus of definite-indefinite pairs like disyllabic *kali* /'kali/ and monosyllabic *kalë* /ka:l/ complemented with a third word, in this case *fal* /fal/ 'to forgive'. This third word has a similar phonological structure to /ka:l/, but it is unrelated to the definite-indefinite pair and has not been subject to diachronic lengthening. If polysyllabic shortening plays any role in Gheg, we expect to replicate the results from the previous corpus, i.e. find the stressed vowel in /fal/ to be longer than that in /'kali/. In addition, if the wiping out of the effect of polysyllabic shortening alone can explain lengthening, then the vowel in monosyllabic /fal/ should be as long as that in /ka:l/.

## 2. METHODS

### 2.1. Speakers and recordings

Speech was collected from 14 native speakers of Gheg, 7 women and 7 men aged 38 to 79 years old (mean 58). The participants were born and raised in the village of Bërzhitë, near Tirana. While in this area some traditional features of Gheg tend to disappear due to dialect contact and influence of standard Albanian, contrastive vowel length has been found to be well preserved [18].

The participants were digitally recorded (44,1 kHz, 16 bits) in quiet rooms at the local school or at home, using a Beyerdynamic TG H54c head-mounted microphone, a Tascam US-2x2 and the Speech Recorder software [19]. They took part in a reading task featuring two repetitions of target words in carrier sentences, for example *kali thoni kali* 'the horse, say the horse' where the target word is *kali* /'kali/. Since the different prosodic positions in which the words were produced, i.e. initial and final positions of the carrier sentences, may have an impact on vowel duration, the variance induced by the prosodic position will be modeled in the statistical analyses by the inclusion of a fixed factor (see 2.3), but its effect will not be further analyzed because it is not our purpose to investigate this issue. Each sentence was read twice, for a total of four repetitions of each target word per speaker.

The speech signal was forced-aligned using WebMAUS General [20], [21], then hand corrected when needed. The material was structured into an EMU speech database [22] for further analysis.

### 2.2. Materials

Of the 241 target words produced four times by each speaker, 77 were used in this study while the rest was intended for other analyses. These 77 words were split into two corpora: the "analogy corpus" and the "triplet corpus". The analogy corpus comprises 26

words forming 13 definite-indefinite pairs on the model of /'daʃi/-/daʃ/ in example (2). In each pair, the final unstressed vowel of the definite noun (/ 'daʃi/) is absent in the indefinite noun (/daʃ/), leading to a reduction of one syllable in the indefinite noun (/daʃ/). As shown in Table 1, which provides examples of definite-indefinite pairs from the analogy corpus, the stressed syllable is always in penultimate position in definite nouns (/ 'daʃi/), but in final position in indefinite nouns (/daʃ/). If polysyllabic shortening takes place in Gheg, the bolded vowels in the first row of Table 1 will be shorter than those in the second row.

<i>definite</i>	<b>dashi</b> 'the ram' /'daʃi/	<b>fiku</b> 'the fig' /'fiku/	<b>fisheku</b> 'the cartridge' /'fiʃeku/
<i>indefinite</i>	<b>dash</b> 'a ram' /'daʃ/	<b>fik</b> 'a fig' /'fik/	<b>fishek</b> 'a cartridge' /'fiʃek/

**Table 1:** Examples of word pairs in the analogy corpus. Vowels in bold are the nuclei of the stressed syllable

The remaining 51 words make up the triplet corpus, that is, 17 triplets on the model of /'kali/-/ka:l/-/fal/. In each triplet, the definite noun (/ 'kali/) comprises a final unstressed vowel; the indefinite noun (/ka:l/) does not, therefore it has one less syllable, as well as a historically lengthened vowel; the third unrelated word (/fal/) has the same vowel quality and number of syllables as the indefinite noun (/ka:l/). As can be seen in Table 2, the stressed syllable is always in penultimate position in definite nouns (/ 'kali/), but in final position in definite nouns (/ka:l/) and unrelated words (/fal/). If polysyllabic shortening plays a role in Gheg, the bolded vowels in the third row of Table 2 will be longer than those in the first row. The bolded vowels in the second and third rows of Table 2 should also have similar durations if syllable count is the sole factor explaining why /ka:l/ got lengthened after schwa deletion.

<i>definite</i>	<b>kali</b> 'the horse' /'kali/	<b>pisha</b> 'the pine' /'piʃa/	<b>dora</b> 'the hand' /'dɔra/
<i>indefinite</i>	<b>kalë</b> 'a horse' /'ka:l/	<b>pishë</b> 'a pine' /'pi:ʃ/	<b>dorë</b> 'a hand' /'dɔ:r/
<i>unrelated</i>	<b>fal</b> 'to forgive, INF' /'fal/	<b>pish</b> 'to drink, 2SG SJV' /'piʃ/	<b>mor</b> 'to take, 3SG SP PSS' /'mɔr/

**Table 2:** Examples of word triplets in the triplet corpus. Vowels in bold are the nuclei of the stressed syllable

### 2.3. Statistical analyses

The statistical analyses were carried out on the duration of the vowel in the stressed syllable in the 77 words forming the analogy and triplet corpora. Two separate mixed effect linear regression models were fitted [23], [24], one per corpus. For both analyses, the dependent variable was log-transformed, which helps reduce the skewness of residuals of non-

negative continuous values like durations.

A first model was fitted to the data from the analogy corpus using the R syntax in (3):

$$(3) \text{lmer}(\log(\text{duration}) \sim \text{definiteness} + \text{repetition} + (\text{definiteness}|\text{speaker}) + (\text{definiteness}|\text{wordpair}))$$

where *definiteness* is the two-level fixed factor (definite, indefinite) of interest. *Repetition* is a two-level fixed factor modeling the variance induced by the different prosodic positions in which the words were produced, but not further analyzed (see 2.1). The interaction term *definiteness\*repetition* was dropped because it was not significant. The model also includes random effects for *speaker* and *word pair* (e.g. *dashi* and *dash* correspond to the same word pair) and random slopes per *definiteness*.

A second model was fitted to the data from the triplet corpus using the same R syntax as in (3). However, the *definiteness* fixed factor had three levels (*definite*, *indefinite*, *unrelated*), and *word triplets* instead of *pairs* were set as random factor (e.g. *kali*, *kalë*, *fal* correspond to the same triplet). The interaction term *definiteness\*repetition* was also dropped from this second model.

*P*-values were computed with *lmerTest* [25] and relevant pairwise comparisons with *emmeans* [26].

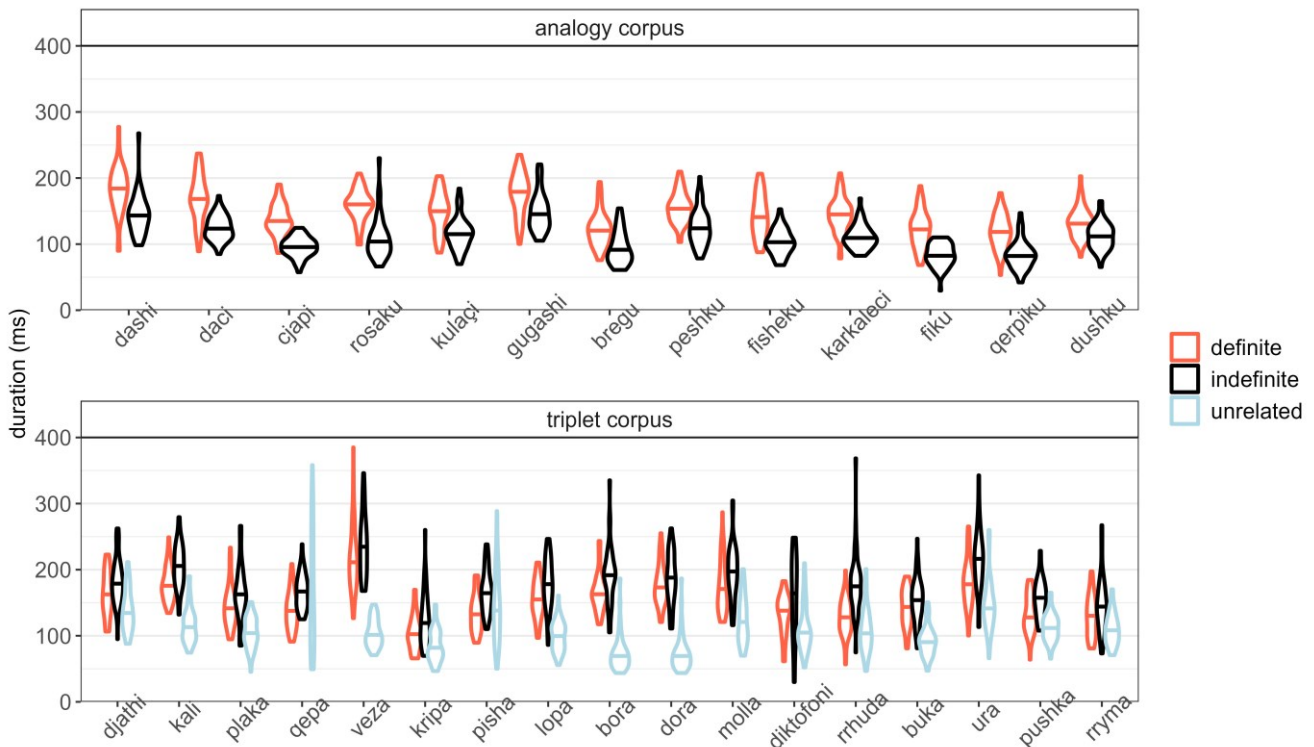
### 3. RESULTS

The top row of Figure 1 shows duration data for the stressed vowels in the 13 word pairs of the analogy corpus, while the bottom row shows data for the 17

word triplets of the triplet corpus. The words on the horizontal axis correspond to the definite nouns, i.e. those with one more syllable than their corresponding indefinite nouns and unrelated words.

For every word pair of the analogy corpus (top row), the duration of the stressed vowel is longer in the definite than indefinite nouns. That is to say, duration decreases as the number of syllables decreases (e.g. /'daʃi/ > /daʃ/). This trend goes in the opposite direction from that expected from polysyllabic shortening, where the words represented by the black violins would have had the longest duration because they have one less syllable. The results of the statistical analysis indicate that the duration of the stressed vowels in the definite words is significantly longer than that in the indefinite words ( $F[1, 20.36] = 80.12, p < 0.001$ ).

The data from the triplet corpus shows that the vowels from the unrelated words tend to have the shortest duration, though this does not hold true for every triplet (e.g. *pisha-pishë-pish*). Overall, this replicates the trend observed in the analogy corpus: duration decreases as the number of syllables decreases, for instance from disyllabic definite /'kali/ to monosyllabic unrelated /fal/. This goes in the opposite direction from that expected from polysyllabic shortening, and certainly does not suggest that syllable count is the sole explanation for the increased length in indefinite nouns like /ka:l/, as the duration of their vowel does not resemble that of the unrelated words. For most triplets, vowel duration



**Figure 1:** Violin plots of stressed vowel duration (ms) in word pairs from the analogy corpus (top) and word triplets from the triplet corpus (bottom). Definite nouns have one more syllable than the others, and are shown on the horizontal axes



is longest in the indefinite nouns, that is, those which have undergone diachronic lengthening. The results of the statistical analysis reveal a significant effect of the *definiteness* factor on vowel duration ( $F[2,16.78]=46.68, p<0.001$ ). Post hoc pairwise comparisons indicate that vowel duration in every pair of words is different from each other. Indefinite nouns have a significantly longer vowel than both definite nouns ( $t[15.9]=5.34, p<0.001$ ) and unrelated words ( $t[20.2]=7.49, p<0.001$ ). Unrelated words also have a significantly shorter vowel than definite nouns ( $t[20.3]=4.56, p<0.001$ ).

#### 4. DISCUSSION & CONCLUSION

In this study, we measured duration of stressed vowels in two word sets produced by Gheg speakers in order to better understand the respective effects of compensatory lengthening and polysyllabic shortening on length patterns in this dialect.

No evidence for an effect of polysyllabic shortening was found. Words with a larger number of syllables did not have shorter vowels than words with fewer syllables. This was found for both the definite-indefinite pairs from the analogy corpus and the definite-unrelated pairs from the triplet corpus. The main reason for supposing that polysyllabic shortening could be happening was that Albanian has a similar prosodic structure to that of languages where this phenomenon has been observed [16], [17]. However, there are other documented cases of languages with lexical stress which do not have polysyllabic shortening, e.g. Estonian and Finnish [15]. Therefore, perhaps more surprising than the absence of polysyllabic shortening is the consistent opposite effect found in this study. Words with fewer syllables, i.e. indefinite nouns in the analogy corpus and unrelated words in the triplet corpus, were found to have shorter stressed vowels than the definite nouns.

We relate this to a difference in syllabic structure: in definite nouns, the stressed syllable was open (*dashi* /'da.ʃi/, *kali* /'ka.li/), while it was closed in indefinite nouns in the analogy corpus (*dash* /daʃ/) and unrelated words in the triplet corpus (*fal* /fal/). There is indeed a tendency across languages of the world for vowels in open syllables to have a longer duration than in closed syllables, all other things being equal [27]. The effect of syllable structure thus seems to outweigh that of syllable number in Gheg, at least under stress.

The finding that syllable structure seems to be the predominant factor does not allow us to rule out any effect of polysyllabic shortening in Gheg. An analysis of words with a closed penultimate stressed syllable would be necessary to shed more light on this issue.

However, while principles of syllabification may vary across languages, it is usually agreed that Albanian favors open syllables unless phonotactic rules are violated [28], [29], [30]. Heterosyllabic intervocalic consonant clusters are thus rare, which may prove challenging for a targeted follow-up study of this factor.

The results also provided empirical confirmation, from a more controlled word set than ever before (c.f. [18]), of the longer duration of vowels thought to have undergone compensatory lengthening (/ka:l/). Given that the wiping out of the effect of polysyllabic shortening can be discarded as a potential explanation of the longer duration of these vowels, compensatory lengthening remains a plausible alternative, as hypothesized in earlier literature [6], [7], [8]. This being said, the marked difference in vowel duration depending on syllable structure found in this study tends to support the listener-oriented account of compensatory lengthening proposed by [13]. For sound changes of the CVCV > CV:C type, like old Gheg /'kalə/ > modern Gheg /ka:l/, the model in [13, p. 9] suggests the following: “Prior to the deletion of the final vowel, the longer vowel duration characteristic of open syllables is correctly parsed by listeners as a phonetic consequence of syllable structure in the first syllable of a CVCV sequence, and is discounted [...]. Upon deletion of the final vowel, however, the duration of the vowel in the newly-closed syllable becomes inexplicable, since it is longer than is expected in the closed syllable”, setting the right conditions for this vowel to be reanalyzed as phonologically long (see also [31]). As argued in [11], this listener-based account departs from earlier models which mostly saw compensatory lengthening as a strategy of structure preservation, i.e. speaker-oriented, but it also puts into question the compensatory nature of the process. Length did not arise in order to compensate for the loss of schwa if it was already a property of the open syllable.

Even though our database still comprises only a small number of participants, which limits generalizability and statistical power, it includes rich material for detailed future work on vowel duration in Gheg, e.g. across positions within carrier sentences or vowel heights, as well as on syllable-level or word-level durations. In addition, of particular interest for future work on the topic is Tosk, the other main dialect of Albanian. Contrary to Gheg, Tosk has kept the final schwas in indefinite nouns and has not experienced diachronic lengthening [6], [8]. However, there have been reports some 50 years ago that Tosk speakers had started to occasionally drop schwas (e.g. [6]). Future work will thus examine length patterns in what can be seen as an earlier stage of the sound change that took place in Gheg.

## 5. ACKNOWLEDGMENTS

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