

# Toward a description of digor lexical prosody

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## Abstract

In this paper, I report on the initial results of instrumental research on the lexical prosody of Digor Ossetic (Iranian < Indo-European). Despite speakers of Digor having some intuition regarding the placement of stress, no consensus on its acoustic cues exists in the literature. In this study, I analyzed disyllabic and trisyllabic words with vowels of the same quality within the word form. The results show a tendency for the ultimate vowel of the word to be the longest and for the initial vowel to possess the highest intensity value, albeit trisyllabic words with weak vowels were shown to serve as an exception to the latter trend. This and other relevant acoustic patterns may support the existence of quantitative stress in Digor Ossetic.

Keywords: stress correlates, lexical prosody, vowel length, vowel intensity, Ossetic language.

## Introduction

Digor is one of the two main dialects of Ossetic, alongside Iron. Both Iron and Digor have their own standard variety; in this paper, I discuss Standard Digor. The total number of speakers of Ossetic is around 450 000, of which around 100 000 speak Digor.

While the suprasegmentals of Iron Ossetian have already been described in detail, no conclusion on the nature of Digor stress has been reached thus far. M. Isaev [1966] described Digor lexical accent as dynamic but claimed that the intensity of vowels correlated with their phonological length. E. Henderson [1949], on the other hand, believed that “what is felt to be the accent is in most cases closely linked with vowel quantity”. She noted that stress was not recognized by native speakers of Digor and the placement of stress was subject to a high degree of variability.

For my study, stress is defined as increased prominence of one vowel per phonological word. I do not discuss secondary stress. Since vowel quantity and intensity were mentioned by previous researchers as likely correlates of Digor stress and are two of the three most widespread phonetic features to correspond with stress cross-linguistically [Gordon & Roettger 2017], they were considered as potential acoustic cues for lexical stress in Digor. Given that both of these characteristics are affected by vowel quality, the word list for this research consists only of multisyllabic words with vowels of the same quality

within a word form. Two features, length and intensity, were compared separately, with the expectation to see either a) consistent dominance of vowels in the same position, indicating the feature to be a correlate for fixed stress, b) consistent dominance of a certain vowel within a set of utterances of the same word as opposed to dominance of another vowel for another word, implying variable stress, or c) no consistent dominance of one vowel, meaning that stress in Digor, if it exists at all, does not correlate with a given feature.

The speakers reported stress to be not easily distinguishable and to rarely fall on the leftmost syllable. Speakers familiar with Iron Ossetic noted that, unlike the latter, Digor stress can fall on the third and further syllables from the left. One of the speakers suggested that stress can move to the leftmost syllable when the word is under emphatic stress (see Perception of length).

## Methodology and data

Data for this study were collected in Vladikavkaz in August 2023. They were obtained from four consultants aged 20 to 67, who were all either university graduates or undergraduate students and spoke Russian fluently. The sound was recorded on Zoom H5 recorder using a WH20XLR microphone. The consultants were asked to translate the words selected from the dictionary from Digor to Russian. After the subset of words that exist in their personal vocabulary has been determined, the consultants were asked to pronounce these words in a natural manner (elicitation type 1) and then repeat it twice with a pause after each utterance. Thereafter the utterances of the same words were elicited in phrases like *zɜʁaj* [...] ‘‘Would you say [word]’’ (type 2) and *fʁi zɜʁtaj?* – [...] ‘‘What did you say? – [word]’’ (type 3). In total, 267 utterances of disyllabic and trisyllabic were analyzed in this research.

## Results

Data presented below consist of values normalized as follows:  $(x - x_{mean}) / \sigma$ , where  $x_{mean}$  is a mean value for all of the vowels in all of the utterances of a single lemma by a single speaker. Alpha level of .01 is used in hypothesis tests.

### Vowel length

MWU tests were run on each pair of groups presented in Figure 1a. The difference in duration of non-ultimate and ultimate vowels was shown to be statistically significant:  $p < 0.001$  for the two vowels of disyllabic words,  $p < 0.001$  for the last vowel of trisyllabic words in comparison to the first and the second;  $p < 0.001$  for all ultimate vowels compared to all non-final vowels. There is no difference between the ultimate vowels of disyllabic and trisyllabic words in terms of length ( $p = 0.225$ ); differences between the first vowels of disyllabic and trisyllabic words are considered insignificant given that  $\alpha = 0.001$

( $p = 0.022$ ). The second vowels of trisyllabic words are both significantly longer than the first ( $p = 0.008$ ) and shorter than the third ones ( $p < 0.001$ ). The penultimate vowels were shown to be significantly shorter in disyllabic than in trisyllabic words ( $p < 0.001$ ).

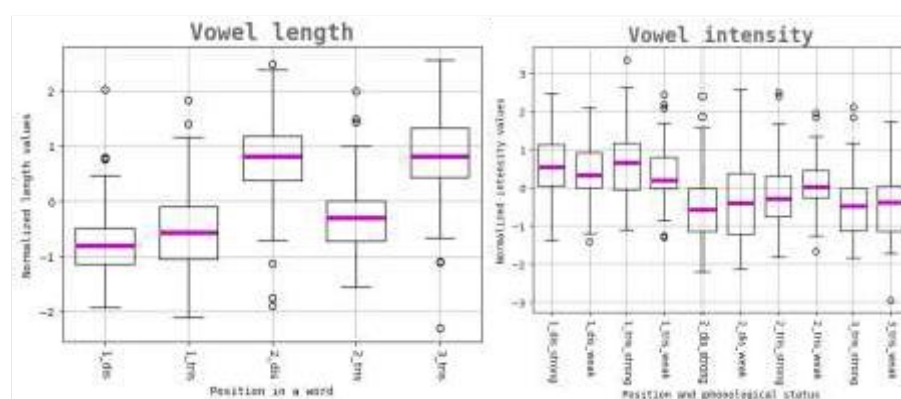


Figure 1 (a-b). Normalized vowel length by position in a word (1, 2, 3), number of syllables in a word (dis for disyllabic, tris for trisyllabic) and, for intensity, vowel type (weak [i, ɜ, u] or strong [a, o, e]).

### Vowel intensity

MWU tests have shown intensity to be significantly greater in the first syllable of disyllabic words in comparison to the second regardless of phonological strength of vowels ( $p < 0.001$  for both strong and weak vowels; see Figure 1b); for phonological status of vowels see Table 1. However, in trisyllabic forms first vs non-first vowel contrast is only confirmed for words with strong vowels ( $p < 0.001$  when compared to the second and the third vowels separately; no substantial difference is found between the groups of the second and the third vowel in terms of intensity:  $p = 0.012 > \alpha$ ). The difference between the intensities of the first and third vowels is also relevant for words with weak vowels ( $p < 0.001$ ), but differences between the first and the second were found to be statistically insignificant ( $p = 0.03$ ), which indicates that there exists at least one type of words with no clearly dominant vowel in terms of intensity. This finding weakens the claim for dynamic stress in Digor.

### Possible arguments for quantitative stress

The study did not discover any minimal pairs which would unambiguously indicate a certain type of stress in terms of 1) its main acoustic correlate and 2) contrastiveness or lack thereof. The more indirect findings that could speak in favor of quantitative contrastive stress are presented below.

### Words with no quantitative dominance of the final vowel

One lemma (*dʒaman* ‘time’) was found to counter the tendency for the longest last vowel, which agrees with the speakers’ reports of Digor words to rarely be stressed on the first syllable. MWU test run on 18 utterances of *dʒaman* and 36 utterances of *arʒaw* ‘tale’ and *sajtan* ‘devil’ (both with the dominant last vowel) showed that the “paroxytonic” group lacks contrast in length between the syllables ( $p = 0.021 > \alpha$ ), unlike the “oxytonic” group (for which  $p < 0.001$ ). The lack of contrast instead of the expected significantly greater length of the first vowel could be explained by the partial compensation, which may occur due to frequent decrease in speech rate toward the end of the utterance.

### Perception of length

One speaker reported a stress shift to the first vowel in emphatic contexts (elicitation type 3; see Methodology and data). This introspective assumption was proven wrong within the full dataset. However, an elimination of quantitative vowel contrast in the emphatic context caused by the lengthening of the first vowel ( $p = 0.016 > \alpha$ ; compare to  $p < 0.001$  for non-emphatic contexts type 1 and 2) characteristic of this speaker’s idiolect could be a proof of an existing connection between vowel length and the perception of stress.

## Conclusion

The results show a tendency for Digor vowels of the last syllable to be the longest within the word and vowels of the first syllable to have the greatest intensity, given that all of the vowels in the word represent the same phoneme. Trisyllabic words with weak vowels, however, counter the latter generalization. This fact, along with multiple observations on the rarity of word-initial stress made by our consultants, indicates that the presence of dynamic stress in Digor is unlikely. It could be argued that evidence from perception and word forms with initial vowel lengthening point toward a contrastive quantitative stress. However, given the lack of prototypical minimal pairs or formal perception experiments, we find this hypothesis to be in need of further testing.

## References

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