

# Word Stress and Phrase Accent in Georgian

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## Abstract

This paper investigates the properties of stress in Georgian (Kartvelian). There is no agreement in the literature as to the existence or location of stress in Georgian; initial, penultimate or antepenultimate syllables are often quoted as possible stress loci, with potentially more than one of these carrying stress in longer words. It has also been noted that the F<sub>0</sub> contour of a word/phrase plays an important role in Georgian, leading to hypotheses that pitch might be the primary cue for stress in Georgian. This paper reports on a pilot study that contributes to disentangling these issues. It concludes Georgian has fixed initial stress, which is primarily duration-based and is easiest to detect in shorter words, while in longer words its durational effect is obscured by polysyllabic shortening. There is no evidence, however, for a similar duration-based stress-like target on the antepenultimate/ penultimate syllable. Instead, it is a pitch target that is part of the prosodic makeup of a phrase. The high importance of this pitch target for the prosodic felicity of an utterance, and the insignificant role that stress plays in the overall phonological make-up of Georgian, raise questions about the typological properties of the loci of word-level and phrase-level prominence.

**Index Terms:** stress, phrasal intonation, phrase accent, pitch contour, Georgian.

## 1. Introduction

Georgian is a Kartvelian language spoken in the Caucasus by over four million people; it is the official language of the Republic of Georgia. Known among phoneticians and phonologists mainly because of its complex consonant clusters, Georgian also exhibits other interesting phonological properties. Specifically, placement and even existence of stress in Georgian have been a matter of ongoing debate. This paper provides evidence in favor of fixed initial stress in Georgian, but also highlights that, despite there being acoustic evidence in favor of its existence, stress does not play any role in the overall phonological makeup of Georgian.

Native speakers of Georgian have no consistent intuitions about stress placement, other than that stress never targets the final syllable of a word. There are no minimal pairs based on stress and no regular variation in stress placement in declensional or conjugational paradigms. Authors who advocate for the existence of word-level stress acknowledge its acoustic weakness and often remark on the uncertainty of their observations [1]–[3]. There is considerable literature on the subject, both instrumental and based on introspective observations by native speakers. An overall conclusion that can be made from the literature is that stress targets the initial syllable in di- and trisyllabic words, while in longer words

there is another stress-like target on the antepenultimate or penultimate syllable. In such longer words either the initial syllable and/or the (ante)penult have been variably analyzed as carrying (primary) stress, with the other locus possibly carrying secondary stress [1], [3]–[13].

This uncertainty has led some authors to suggest that the assumption that the domain of stress assignment in Georgian is a lexical word is misguided. Instead, they proposed that this domain is larger than a lexical word, and may be characterized as a “syntactic group” [6], “accentual complex” [7] or “rhythmic group” [14]. It has also been suggested that “stress” found in such larger domains represents one of the pitch targets that constitute the prosodic make-up of a phrase/utterance and should not be thought of as word-level stress [2], [10], [15], [16].

There also are mixed accounts, which suggest that word-level stress and pitch targets attributable to phrasal prosody co-exist in Georgian [16]–[18]. Specifically, Jun et al. [17] and Vicenik & Jun [18] suggest that word-level stress is fixed on the initial syllable, while the antepenult and penult are loci of intonational pitch targets in Georgian.

Instrumental studies have also suggested that the intonational pattern of prosodic words and phrases, and not word-level stress, serves as the primary word-boundary demarcating tool in Georgian [19], and that the final two syllables of a word serve as the locus for tonal targets [14], [20]. Specifically, borrowing the terminology from Jun et al. [17] and Vicenik & Jun [18], the final syllable carries a boundary tone (Ha/La) of an Accentual Phrase (AP; each prosodic word typically forms an AP [17], [18]), while the penult is a target for a phrasal tone L that appears on the predicate in questions and focal contexts [21], [22].

The current study builds on these previous results, especially Jun et al. [17], Vicenik & Jun [18], and Borise [22], while also qualifying some of them. Section 2.1 introduces the data that the conclusions reached here are based upon. In Section 2.2, the hypothesis of fixed initial stress and the question of its acoustic realization is addressed. The small pilot study mentioned in Vicenik & Jun [18, N. 1] reports greater duration of the first syllable as compared to subsequent ones in words of two to five syllables. According to the current study, greater duration of the initial syllable is only found in di-syllabic and trisyllabic words, with the effect disappearing in words of four or more syllables.

Next, the question about the status of the antepenult/penult with respect to stress is addressed in Section 2.3. The current study found no acoustic evidence for there being a stress-like target on the antepenultimate or penultimate syllable. Following Jun et al. [17], Vicenik & Jun [18], and Borise [22], we suggest that the antepenult and penult in Georgian are loci

for pitch targets that are part of the prosodic make-up of a phrase, such as phrase accents. Section 3 discusses some of the implications Georgian data has for the typology of stress.

## 2. Methodology

### 2.1. Data

The data for the current pilot study was obtained from a native speaker of Georgian (native of Tbilisi, female) in College Park, MD. The data was collected with the help of a Zoom H2n recorder in a quiet classroom. The stimuli consisted of Georgian words (n=179), one to six syllables long, of CV structure (C = nasal, liquid or voiced stop or fricative; V = any vowel). It has been suggested that morphological structure is irrelevant for stress placement in Georgian [4]; similarly, none of the grammars or observations by native speakers address morphological structure as a relevant factor in stress placement. Therefore, both mono- and polymorphemic words were used in the current study. The stimuli were embedded in a carrier phrase of the type *Me sit'q'va* '[stimulus] *vimghere/vixmare/davts'ere* "I sang/used/wrote the word [stimulus]". Each stimulus was iterated 3 times, adding up to 537 stimuli tokens. Because no context was provided for the stimuli, and none of the words in the phrases carried focus, the information structural status of the stimuli is that of neutral/broad focus declaratives. Duration, F0, and intensity for each syllable were measured in Praat [23]. After eliminating 22 disfluent tokens (due to pauses, creaky voice, etc.), the resulting dataset consisted of 515 word tokens (= 1796 syllable tokens). A representative sample of the stimuli as well as total numbers of stimuli is given in Table 1. Statistical analysis of the data was performed using R [24].

Table 1: Sample stimuli

Syllable Count	Sample Stimuli	Total N of Stimuli
1 $\sigma$	<i>ra</i> 'what' <i>bu</i> 'owl'	25
2 $\sigma$	<i>mama</i> 'father' <i>bude</i> 'nest'	82
3 $\sigma$	<i>zizini</i> 'bird twitter' <i>malamo</i> 'balm'	146
4 $\sigma$	<i>bagabugi</i> 'thumping' <i>monazoni</i> 'monk'	158
5 $\sigma$	<i>gagorebuli</i> 'rolled' <i>ramodenime</i> 'multiple'	92
6 $\sigma$	<i>gadanebuli</i> '(water) taken off the heat' <i>gadavadebuli</i> 'rescheduled'	12
<b>Total: 515</b>		

### 2.2. Initial syllable

The analysis showed that the initial syllable is significantly longer than the second one in disyllabic (paired t-test,  $p < .01$ ) and trisyllabic words (paired t-test,  $p < .01$ ), as well as the third syllable in trisyllabic words (paired t-test,  $p < .01$ ). In longer words, there is no such effect. Duration of the initial syllable is comparable to that of the subsequent syllable in

four and five syllable words, and slightly shorter than the subsequent syllables in six syllable words (Table 2, Figure 1).

Table 2: Average syllable duration in words 1-6 syllables long (s)

$\sigma$ no. $\rightarrow$ $\sigma$ count $\downarrow$	1 <sup>st</sup> $\sigma$	2 <sup>nd</sup> $\sigma$	3 <sup>rd</sup> $\sigma$	4 <sup>th</sup> $\sigma$	5 <sup>th</sup> $\sigma$	6 <sup>th</sup> $\sigma$
1 $\sigma$	0.350					
2 $\sigma$	0.264	0.226				
3 $\sigma$	0.225	0.207	0.208			
4 $\sigma$	0.198	0.191	0.192	0.189		
5 $\sigma$	0.186	0.183	0.180	0.173	0.167	
6 $\sigma$	0.181	0.190	0.182	0.185	0.178	0.155

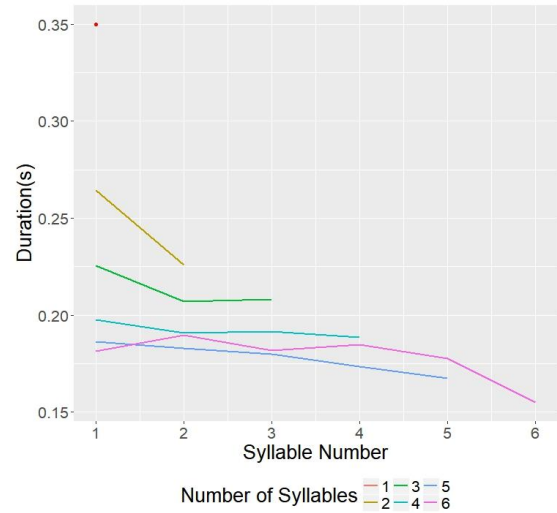


Figure 1: Average syllable duration in words 1-6 syllables long

In terms of the F0 contour, all stimuli show an overall rising pattern, regardless of syllable count (Table 3, Figure 2). This is typical of Georgian APs found in neutral declarative contexts: they are characterized by a low pitch accent L\* on the initial syllable, and a high final boundary tone Ha [17], [18], [22]. The rise on the final syllable, corresponding to the Ha boundary tone of an AP, is a highly significant (paired t-test,  $p < .05$ , as compared to the penult).

Other than the presence of L\*, there is no discernable F0 event on the initial syllable in words of one to three syllables. In words of four or more syllables F0 starts high on the initial syllable and falls to the second syllable, but the difference in F0 between the first and second syllables is not statistically significant (four syllable words:  $p = 0.5$ ; five syllable words:  $p > 0.1$ , six syllable words:  $p > 0.1$ ). High F0 found on the initial syllable in words of four to six syllables is part of the rhythmic pattern [25], [26] found in longer words, which manifests itself in Georgian as alternation in rising and falling F0.

There is no detectable pitch target on the antepenultimate or penultimate syllables. Mean F0 of the penult is comparable to that of the preceding syllables.

Table 3: Average F0 values per syllable in words of 1-6 syllables (Hz)

$\sigma$ no. → $\sigma$ count ↓	1 <sup>st</sup> $\sigma$	2 <sup>nd</sup> $\sigma$	3 <sup>rd</sup> $\sigma$	4 <sup>th</sup> $\sigma$	5 <sup>th</sup> $\sigma$	6 <sup>th</sup> $\sigma$
1 $\sigma$	187.9					
2 $\sigma$	167.1	191.1				
3 $\sigma$	169.7	169.5	198.7			
4 $\sigma$	166.0	164.8	170.3	198.3		
5 $\sigma$	166.1	162.8	165.5	166.4	201.6	
6 $\sigma$	174.9	167.9	169.9	168.9	168.4	197.0

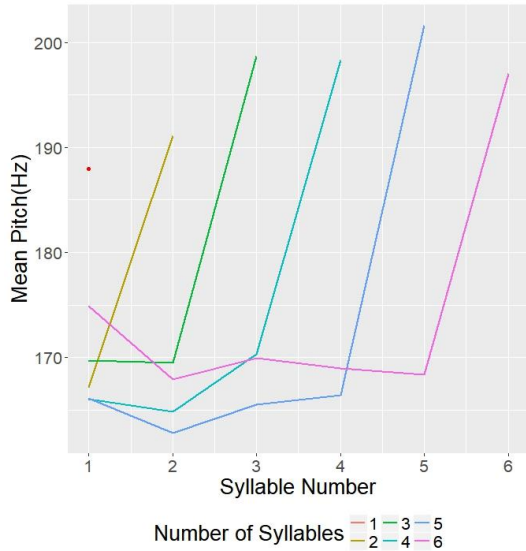


Figure 2: Average F0 values per syllable in words of 1-6 syllables

The notable increase in duration that the first syllable receives in di- and trisyllabic words is consistent with the hypothesis that the initial syllable carries stress, for which duration is the primary acoustic cue. In longer words, this cue is obscured by polysyllabic shortening [27].

### 2.3. Antepenultimate and penultimate syllables

As shown in the previous section, neither the penult nor the antepenult is distinguished by F0 or duration from neighboring syllables, which raises questions about why these syllables are often analyzed as carrying primary or secondary stress. Following Zhghenti [14], Alkhazishvili [28], Jun et al. [17], Vicens & Jun [18], and Borise [22], we suggest that the pitch target on the antepenult/penult is phrasal in nature, and is found in particular in certain discourse contexts, such as questions and utterances containing focal items. The prosody of such contexts is significantly different from the prosody of neutral/broad-focus declaratives. The latter typically consist of successive APs, each with an intonational contour rising from a low pitch accent L\* to a high AP boundary tone Ha. The stimuli discussed in the previous subsection, embedded in a carrier phrase, illustrate this rising contour. In questions and focal contexts, however, the penult of the predicate carries a low phrase accent L. Since there is no question particle in Georgian, such prosodic marking is the only way to signal that an utterance is a question. Because Georgian allows considerable freedom of word order, it is easy to show that the

phrase accent is indeed anchored to the predicate. Also, this is true for both verbal and non-verbal predicates. Examples of yes-no questions with the L phrase accent on the predicates are shown in Figures 3-5, with the predicate placed initially, medially, and finally [22].

- (1) *Še-č'am-a Manana-m alubali?*  
PRV-eat-AOR.3SG Manana-ERG cherry.NOM
- (2) *Manana-m še-č'am-a alubali?*  
Manana-ERG PRV-eat-AOR.3SG cherry.NOM
- (3) *Manana-m alubali še-č'am-a?*  
Manana-ERG cherry.NOM PRV-eat-AOR.3SG  
'Did Manana eat the cherry?'

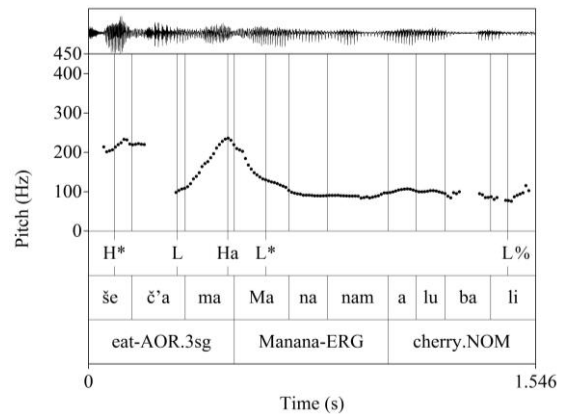


Figure 3: Yes-no question with an initial predicate

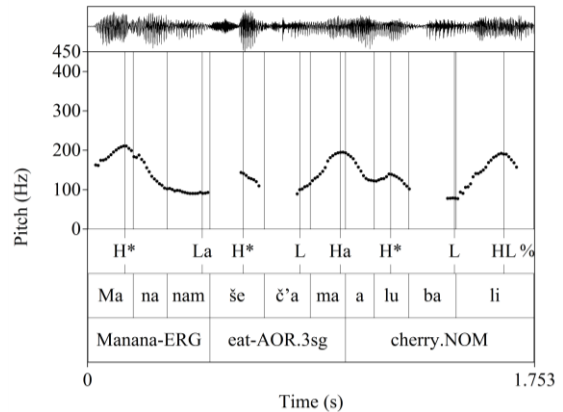


Figure 4: Yes-no question with a medial predicate

Because there is no evidence that this pitch target is present in broad focus declarative contexts, such as the ones used in the present study, it is not surprising that we found no evidence for a pitch target on the antepenultimate or penultimate syllable.

It should be pointed out that the exact nature of this target is unclear. It is referred in the literature as a phrase accent [17], [18], [22], but its distribution, targeting predicates and/or phrase-final words in questions and focal contexts, requires further investigation.

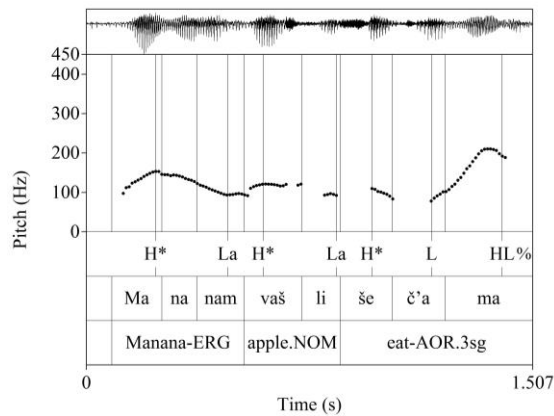


Figure 5: Yes-no question with a final predicate

Additional evidence for there being a pitch target on the penult comes from some Georgian dialects, such as the Mtiuli (mountain) dialects for Georgian, in which the tonal realization of this pitch target is reported to be particularly distinct [15], [29], [30]. Zhghenti [30] also reports that the penultimate stress placement in the Xevsuri and Moxeuri dialects of Georgian is particularly easy to notice before a question particle *-a* (*qatʃayád-a?* ‘bandit-Q?’, *vin-a?* ‘who-Q?’). This aligns with the facts from standard Georgian, and lends support to the hypothesis that the pitch target in question is phrasal in nature and its distribution is restricted to certain contexts, such as questions.

### 3. Discussion

Even though there is evidence for fixed initial stress in Georgian, stress does not play a significant role in the overall phonological make-up of the language. For instance, it does not cause other phonological processes, such as reduction of vowels in the unstressed syllables, or morphological processes, such as regular variation in stress placement in declensional or conjugational paradigms. Following Hyman’s [31] analysis of the various degrees to which languages ‘care’ about their stress systems, Georgian patterns with languages in which stress is not subject to *phonological activation*. The notion of phonological activation is due to Clements [32, p. 2]: “features are specified in a given language only to the extent that they are needed in order to express generalizations about the phonological system”. With respect to stress, this notion can be used to account for the following cross-linguistic patterns: “Languages such as Hungarian or Turkish seem different because their metrical structure has little or no relevance outside the stress system itself. The contrast with English, whose phonology cares so much about stress, is quite striking. At the other extreme, Bella Coola cares so little that we can’t even determine if it has word stress at all” [31, p. 34]. Georgian, therefore, patterns together with Bella Coola, Hungarian and Turkish, as opposed to languages like English.

Furthermore, Georgian exhibits no evidence of nuclear stress [15], [33], though nuclear stress is commonly assumed to be anchored to word-level stress either on the most deeply embedded constituent [34], [35] or on the highest phrase within the vP [36]–[39]. Instead, there is some evidence suggesting that the verb itself is the locus of prosodic prominence [40]–[42].

Overall, then, by having word-level stress but relying mainly on phrasal prosody, Georgian finds itself in a typologically unusual middle ground between languages that have strong word-level stress, such as English, and those that have been argued to rely solely on phrasal prosody, such as French [43], [44].

## 4. Conclusion

Georgian has fixed initial stress that is primarily duration-based. Its duration-based nature is easiest to see in di- and trisyllabic words; in longer words, increased duration on the first syllable is obscured by polysyllabic shortening. The penultimate (and, possibly, antepenultimate) syllable is not targeted by stress, but instead is the locus of phrasal pitch targets, such as phrase accent L found on the predicate in questions and focal contexts.

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