LINGUISTICA URALICA XLIII 2007 4

NIINA AASMÄE (Tartu)

RHYTHM RELATED EFFECTS IN ERZYA*

Abstract. This article focuses on some of the findings from a cross-dialect study of stress and quantity in Erzya that provide support for the idea of rhythmic variability in the language. Four idiolect groups compared with respect to a set of prosodic and segmental features have been found to display diverging characteristics, which allows differentiating them along the continuum of language rhythm classes defined as syllable- versus stress-timed. Considering the phonetics-phonology interface of these characteristics the author argues that a phonological shift — tendency to distinguish the root of the agglutinative word — can have evolved in the language. The divergence of features related to rhythm in the idiolect groups implies that the shift can have developed at different pace, contributing to the development of stress-timed rhythm in a part of the dialects.

Keywords: Erzya, rhythm, stress timed, syllable timed, duration, reduction.

1. Introduction: language rhythm classes

In the research of rhythm related phenomena, many studies have recently concentrated on the development and application of measures differentiating between language rhythm classes. A number of scalar models of rhythm have been shown to compare languages in a way which appears to confirm empirically the traditional syllable-, stress- and mora-timed rhythm classes. The rationale behind these measures lies in the analysis of the total effect created by the interaction of such factors as manifestations of stress, prosodic timing and phonotactic syllable complexity. Rhythm classes have been regarded as a continuum of features rather than a categorical distinction between stress- and syllable-timing (Dauer 1983; 1987; Ramus, Nespor, Mehler 1999; Low, Grabe, Nolan 1999; 2000). The validity of the correlates of stress-timed and syllable-timed languages used to analyze rhythm has been verified in several latest studies. Experiments have been conducted by using data of different languages and some of their varieties; the findings of production and perception studies (for example: Barry, Andreeva, Russo, Dimitrova, Kostadinova 2003; Gibbon 2003; Gut 2003;

* The present research was partly supported by the Estonian Science Foundation grant No. 6983.

Asu, Nolan 2006; Wagner 2007; White, Mattys, Series, Gage 2007) generally agree with the previous results.

In this article, empirical data available from our recent study of stress and quantity in Erzya (Aasmäe 2005; 2006a; 2006b; Aasmäe, Ross 2005; 2007) are used to describe the rhythm related effects in the language. In the earlier publications, statistics have been presented in a detail; here, part of the data relevant for the treatment of rhythm is used. Cross-dialect material is compared to define whether the idiolect groups under consideration can be differentiated with respect to a set of features commonly used in the treatment of rhythm classes. Analyses include the evaluation of data on the manifestations of stress, vowel quality (full versus reduced) and the temporal characteristics of syllable nuclei, which are the carrier components of speech rhythm production.

2. Empirical data: materials and method

In the study, idiolects from different locations in the Republic of Mordovia and diaspora were used to obtain data of spoken and read speech. One-word responses of thirty-three male and female speakers (aged 18—25) recorded in a casual talk with the author (a native Erzya) were used for the analysis of stress assignment and for the measurement of vowel durations. In the responses, the following words occurred: *veľe* 'a village', *veľeś* 'the village', *veľeńť* '(of) the village', *veľese* '(is) in the village', *ošso* '(is) in a city', *ošoś* 'the city', *araś* 'no, not', *araśeľ* 'was not', *araśeľiń* 'I was not', *apak* 'not', *uľi* '(there) is', *uľiť* '(there) are', *uľńiń* 'I was', *kudo* 'a house', *kudoso*, *kudosot* '(is/are) at home'. The test words contained from 2 to 4 syllables. To obtain re-occurrences of a same word in each speaker's responses, the questions were re-asked, for example: *Kosot ťeť at-avat*? 'Where are your father and mother?' — *Kudosot* 'At home'; *Kosot*? 'Where?' — *Kudosot* 'At home'.

Words read by seven male and female speakers (aged 25—37) within a carrier sentence ("*Valoś ... erźań*" 'The word … is Erzyan.') were used to measure the temporal characteristics of di- and trisyllabic words in controlled conditions. The word list included nouns in the nominative case, singular, e.g. *jarmak* 'money' and verbs in the form of the infinitive with the ending *-ms*, e.g. *lovnoms* 'to read'.

The test material allowed the observation of interaction between stress and vowel duration as well as between prosody and the segmental, syllabic, and morphological features of the words. An account of the quality of vowel segments in all the speakers' productions was made; they were categorized as full-formation (*i*, *e*, *a*, *o*, *e*) and reduced (weakened *ă*, *ŏ*, *ĕ*, schwa *ə*) vowels.

Acoustic data were analyzed by using the computer programme PRAAT.

2.1. Manifestations of stress

The observation that Erzya dialects somewhat differ from the point of view of stress manifestations was made in the early studies of the language (Paasonen 1898; 1903; Шахматов 1910). The authors noted that in some

of them, stress is not discernible, in others there is movable stress that is dominantly on the initial syllable of a word. The tendency to place stress on the initial syllable was also mentioned in later studies dealing with dialects that display unstressed vowel reduction (for example, Объедкин 1961; 1963; Якушкин 1961; Биушкин 1968; Цыганкин 1968; 1979). The idea of stress variation in previous research was not extended.

Analysis of stress assignment data in the material that comprised words repeatedly produced by thirty-three speakers revealed remarkable dialect-specific tendencies. Stress occurrences marked as initial, e.g. *ve·l'e* 'a village', non-initial, e.g. *vel'e·*, and double, e.g. *ve·l'e·* (like in English: *re-turn*, *maintain*) varied in the speakers' productions.

Results shown in Figure 1 differentiate between four idiolect groups. The mobility of stress characteristic of all the language varieties was found to be higher in the idiolects lacking vowel reduction (Group 1), which correspond to the standards of literary Erzya, than in the idiolects exhibiting the occurrence of reduced vowels (Groups 3, 4). Results for the idiolects of Group 2, in which regular reduction is lacking, were closer to those for Group 1.

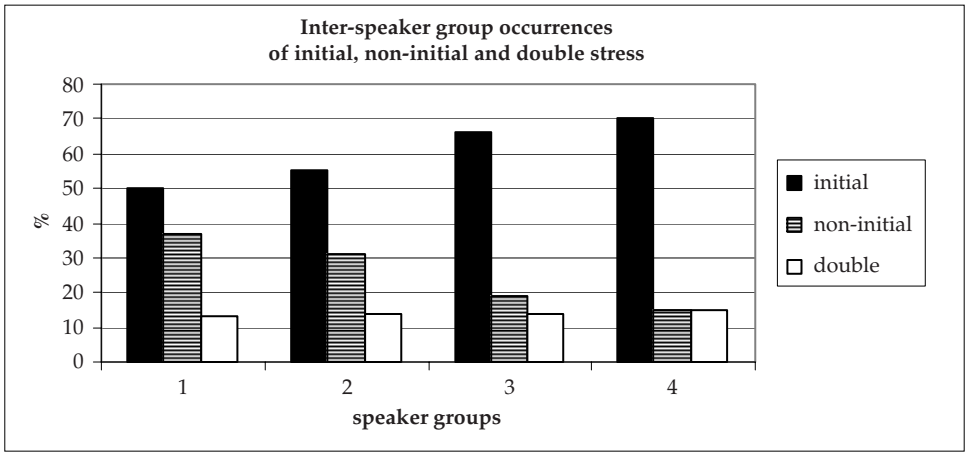

Figure 1. **Idiolect-related occurrences of initial, non-initial and double stress (Group 1: # speakers = 13, # tokens = 367; Group 2: # speakers = 9, # tokens = 251; Group 3: # speakers = 6, # tokens = 149; Group 4: # speakers = 5, # tokens = 130).**

As the mobility of stress was observed in repeated responses it is plausible to suggest that stress alternation serves to convey changes in the emotional or attitudinal aspect of the speakers' answers. In a part of the idiolect groups, lower stress mobility, or a tendency to place stress on the initial syllable of a word, proved to be associated with unstressed vowel reduction. This means that the head syllable of the word — the root — in these idiolects tends to be more or less regularly marked by stress. The manifestations of stress and vocalism in the varieties of Erzya thus do not overlap. The data on the dialect variability of stress assignment, together with the temporal characteristics of stressed and unstressed syllable nuclei, appear to be essential for the treatment of the complex vocalism in the dialects.

2.2. Temporal relationship between the stressed and unstressed syllable nuclei

Durational characteristics of vowels in the stressed initial and unstressed non-initial syllable also showed differentiation between the four groups of idiolects. The measurements of both spontaneous speech and script reading produced analogous results.

Table 1 shows levels of the statistical significance of differences between the duration of stressed and unstressed syllable nuclei in spontaneous speech and reading data. The duration of the syllable nuclei tended to be equal in the idiolects of Group 1, which displayed highly mobile stress. The analysis of variance showed that differences between the duration of stressed and unstressed syllable nuclei were statistically not significant. In the idiolects of Groups 2, 3 and 4, vowels in the stressed syllable were found to be longer than in the unstressed syllable. There were statistically significant differences between the duration of the stressed and unstressed syllable nuclei.

Table 1

Levels of statistical significance of variance (p-value) in the duration of stressed and unstressed syllable nuclei (V1, V2) for spontaneous speech and script reading

	Spontaneous speech			Script reading		
Idiolects	**# speakers**	**# tokens**	**p-value**	**# speakers**	**# tokens**	**p-value**
Group 1	13	112	0.6	3	149	0.5
Group 2	9	93	< 0.0001	1	50	< 0.0001
Group 3	6	54	0.01	1	51	0.004
Group 4	5	56	< 0.0001	2	100	< 0.0001
Total	**33**	**315**		**7**	**350**	

Table 2

Mean durations for the syllable nuclei (V1, V2) and mean duration ratios (V1/V2) with standard deviations in disyllabic words. Significant differences between the durations for stressed and unstressed syllable nuclei (V1, V2) are starred: *(p < 0.05), **(p < 0.005), *(p < 0.0005), ****(p < 0.0001)**

Idiolects	**# tokens**	**V1(ms)**	**V2(ms)**	**V1/V2**
Group 1	107	108.67	109.31	1.01
		15.86	15.60	0.16
Group 2	93	107.86	97.37	****1.13
		18.85	16.66	0.22
Group 3	54	121.91	110.61	**1.15
		21.08	27.44	0.28
Group 4	56	111.55	94.73	****1.21
		22.49	17.02	0.28

Average duration ratios (V1/V2) for the four groups were in the range of 1.0—1.2, as seen from Table 2, in which data of spontaneous speech are presented. Inter-group vowel duration ratios show that in the idiolects of group 1 that displayed a higher mobility of stress than in idiolect groups

2, 3 and 4, the duration of the syllable nuclei was not affected by stress. Noteworthy is that there were also differences between the statistics of the groups having reduction. The ratio V1/V2 for group 2 was lower than in the results for groups 3 and 4.

An important finding is that in the dialects exhibiting reduction, low mobility of stress — its assignment dominantly on the first syllable — conditions a pattern of vowel distribution dependent on stress, in addition to that governed by vowel harmony, which in the dialects with full vowels is the major factor of vocalism. In the dialects with reduction, the vocalism of initial versus non-initial syllables is coupled with patterns of full and reduced vowels in stressed and unstressed syllables, respectively.

2.3. Cross-dialect patterns of vocalism

In Erzya, there are 5 phonologically distinct vowel qualities (*i*, *e*, *a*, *o*, *u*). In the initial syllable of a word this vowel inventory is used in all the dialects (in some of them also a low open vowel *ä* occurs). The actual dialect variability is manifested in non-initial syllables (Itkonen 1971; Цыганкин 1979; Ермушкин 1984; Feoktistow 1990). In the dialects lacking reduction, the vocalism of initial and non-initial syllables is governed by vowel harmony. Either front or back vowels surface in non-first syllables, e.g. *moro* 'a song', *čemeń* 'rust', if not interrupted by palatalized consonants, e.g. *mol'i* 'goes'. The inventory of non-initial syllable vowels is restricted (*e*, *a*, *o*, in suffixes also *i*).

Dialects exhibiting vowel reduction have complex and unstable vocalism in non-initial syllables — the quality of reduced vowels and patterns of distribution vary. Both full and reduced vowels occur in same morphological forms of different words, for example: *sazər* 'a sister' — *sazərəm* 'my sister' — *sazərəzə* 'his sister', but: *kopoŕ* 'a back' — *kopoŕem* 'my back' — *kopoŕeze* 'his back'. Or, both full and reduced vowels occur in different forms of a same word, e.g.: *morǎ/-ə* 'a song', but: *morom* 'my song'.

Since the mobility of stress has not been cancelled in the varieties with unstressed vowel reduction, a syllable with a schwa-vowel can become stressed; the schwa-vowel in the stressed syllable develops into a full vowel, e.g. *sa·zər*, *sazə·r* 'a sister'. Vowels fail to reduce in certain consonant environments: *o* preserves its quality before *v* and *m*, e.g. *todov* 'a pillow' (in separate idiolects a change like in *todov* > *todu* occurs); *e* resists in certain word forms, e.g. *t'el'eń* 'of the winter', *mel'eń* 'of last year' (Цыганкин 1979 : 51).

A formant analysis of vowels in the stressed and unstressed syllables provided in "Erzya Prosody" (Lehiste, Aasmäe, Meister, Pajusalu, Teras, Viitso 2003), which did not aim at the analysis of inter-dialect differences, has shown centralization of vowels in unstressed syllables. The mid vowels *e* and *o* tended to centralize more than the other vowels; *a* appeared to be the most resistant to centralization. Vowel reduction in Erzya can, apparently, be referred to a type (Crosswhite 2004), in which *a* has a special durational status.

Examples

G r o u p 1 (basis for literary Erzya): *ava* 'a woman', *kudo* 'a house, home', *velʹe* 'a village', *ošoś* 'the city', *mastor* 'earth', *piťńej* 'expensive'.
G r o u p 2: *ava*, *kudŏ*/*kudu*, *velʹĕ*, *ošoś*/*ošŏś*, *mastŏr*, *piťńej*/*piťńij*. Unstressed second-syllable vowels *e* and *o*, in some positions also *a*, are weakened (*ĕ*, *ŏ*, *ă*) or *e* and *o* tend to change into *i*, *u*, respectively; in a limited number of word forms a schwa vowel appears, e.g. *kudəsă* 'at home', which is pronounced as a full vowel once the syllable with *ə* receives stress, e.g. *kudə·să*.
G r o u p 3: *ava*, *kudă*/*-u*, *väľä*, *ošoś*, *mastər*, *piťńij*. Characteristic is the use of *ä* both in initial and non-initial syllables; schwa occurs in non-initial syllables in certain environments (for example, before *r*).
G r o u p 4: *avă*, *kudă*/*-ə*, *väľä*/*-ə*, *ošŏś*/*ošəś*, *mastər*, *piťńi*(*j*). The dialects are characterized by extensive reduction; *ə* also occurs in the initial syllable (before *r* or *k*, e.g. *pərda·ms*/*pə·rdams* 'to turn').

Overall results of analysis based on the data of stress mobility, durational relationship between the stressed and unstressed syllable nuclei, and initial versus non-initial vocalism in the four idiolect groups are summarized in Table 3.

Table 3

Variability of vocalism, manifestations of stress and temporal relationship between stressed/unstressed syllable nuclei in idiolect groups

Idiolects	Patterns of vocalism	Stress mobility	V1/V2 ratio
Group 1	*i*, *e*, *a*, *o*, *u* / *e*, *a*, *o*, (*i*)	high	V1 = V2
Group 2	*i*, *e*, *a*, *o*, *u* / *ĕ*, *a*, *ŏ*, (*i*), (*ə*)	fairly high	V1 > V2
Group 3	*i*, *e*, *a*, *o*, *u* / (*e*), *a*, (*o*), *u*, *i*, *ə*	restricted	V1 > V2
Group 4	*i*, *e*, *a*, *o*, *u* / (*e*), *a*, (*o*), (*u*), (*i*), *ə*	low	V1 > V2

The results systematically differentiate between the four groups of idiolects. On the one hand, the idiolects of group 1 differ from those of groups 2, 3 and 4. They show a relatively high mobility of stress and low vowel duration variability, the latter being a feature characteristic of syllable-timed rhythm. Idiolect groups 2, 3 and 4 show vowel duration variability and reduction caused by the effect of stress, i.e. features characteristic of stress-timed rhythm. On the other hand, the idiolects revealing different types of unstressed vowel reduction have been found to show statistically significant differences in the duration of stressed and unstressed syllable nuclei (Aasmäe 2005).

With regard to the range of mean duration ratios between stressed and unstressed syllable nuclei (1.0—1.2, as shown in Table 2), it should be emphasized that the prototypical stress timed languages with a strong tendency to reduce unstressed syllables (English and German) display a much higher average duration ratio between stressed and unstressed syllable nuclei, for example 1.87 in German (Gut 2003 : 2439). Our data allow stating that idiolect groups 2, 3 and 4 display a tendency towards stress-timed rhythm; however, the effect of prosodic timing is expressed in a much lower duration ratio between the stressed and unstressed vowels

than in typical stress-timed languages. Idiolect group 4, in this respect, can be said to be the most distant from idiolect group 1 that gravitates to syllable-timed rhythmic structure.

2.4. The effect of syllable structure upon the duration of syllable nuclei

High phonotactic complexity allows qualifying a language as stress timed (Dauer 1983). Along with this, it has been admitted that syllable-related segment duration patterns are not explicitly encoded (Redford 2003 : 2261).

Concerning the syllable template of Erzya no empirical data have been available hitherto. In literature, types of word structure have been shown to contain consonant combinations at the boundary of the stem and a suffix or of two suffixes (Деваев, Цыганкин 1970 : 72—75; Rédei 1984 : 209—230). The question of syllabification has been raised in our study, where the conundrum of syllable division in structures with internal consonant combinations (CVCCVC) was encountered (Aasmäe 2006a).

To find out whether the openness or closedness of a syllable in Erzya is a source of variability for the duration ratios between adjacent syllable nuclei, data obtained on words with a relatively transparent syllable division will be considered here. Commentary will be provided on the measurement results of reading, which is less variable than spontaneous speech (for example, Bolotova 2003; Engstrand, Krull 2003). For comparison, spontaneous speech data will be illustrated.

In Table 4 showing data on reading, vowel duration ratios and values of standard deviation were obtained on series of words with four types of syllable structure, in which an open syllable is followed by an open syllable — CV.CV (e.g. *paťa* 'elder sister, aunt'), and by a closed syllable — CV.CVC (e.g. *vakan* 'plate'), CV.CVCC (e.g. *kozoms* 'to cough'). One of the series had the CVCCV structure (e.g. *pakśa* 'field') with ambiguous syllable division (CVC.CV or CV.CCV). Tokens were chosen to contain a same vowel in both syllables.

The data of idiolects without reduction (VD, PA, VL), that were referred to the same type as group 1 in the spontaneous speech experiment, showed statistically significant differences between vowel durations in stressed and unstressed syllables in the series CV.CVC and CV.CVCC produced by speaker VL. Hence, in the productions of this speaker, the effect of 'closed syllable vowel shortening' (Maddieson 1985; Redford 2003) can have occurred. In the productions of speakers VD and PA, the openness/closedness of the syllables did not produce statistically significant differences — in the words with varied structure, vowel durations in adjacent syllables tended to be equal. An insignificant shortening of vowels in the second closed syllable of the CV.CVC and CV.CVCC series was, though, observable.

The data of idiolects with reduction (VR, NP, AB, NA), that were referred to the same types as groups 2, 3 and 4 in the spontaneous speech experiment, showed statistically significant differences between the duration of stressed and unstressed syllable nuclei in the CV.CVCC series produced by all the four speakers, in the productions of the CV.CVC series produced by speakers VR and NP, and the CVCCV series produced by

speakers VR, NP, NA. The effect of vowel shortening in the unstressed second syllable primarily attributable to the effect of stress did not occur in the CV.CV series (except the productions of speaker VR). In this series, the idiolects lacking reduction (VD, PA, VL) displayed an insignificant vowel lengthening in the final open syllable, which is a feature of syllable-timed class, while in the idiolects with reduction (except speaker VR), competing tendencies towards lengthening and shortening were found to co-occur. Vowel durations tended to be equal due to the concurrent effects of initial stress and final vowel lengthening.

Table 4

Mean duration ratios (V1/V2) and values of standard deviation for four types of word structure. Significant differences in the values of duration for stressed and unstressed syllable nuclei are starred: *($p < 0.05$), **($p < 0.005$), *($p < 0.0005$), ****($p < 0.0001$)**

Speaker	Value	CVCV # = 47	CVCCV # = 52	CVCVC # = 42	CVCVCC # = 59
VD	M	0.90	0.99	0.99	1.07
	S.D.	0.05	0.05	0.10	0.07
PA	M	0.94	0.98	1.09	1.13
	S.D.	0.06	0.08	0.11	0.14
VL	M	0.95	1.00	*1.13	***1.28
	S.D.	0.09	0.08	0.14	0.13
VR	M	**1.05	*1.08	**1.29	****1.39
	S.D.	0.12	0.07	0.11	0.13
NP	M	0.97	*1.06	*1.06	***1.16
	S.D.	0.04	0.05	0.11	0.06
AB	M	1.03	1.11	1.17	**1.26
	S.D.	0.11	0.11	0.20	0.14
NA	M	1.08	*1.08	1.06	*1.20
	S.D.	0.06	0.06	0.08	0.18

Spontaneous speech data shown in Table 5 were obtained on a (C)V.CV series (*velʹe*/*välʹä* 'a village', *kudo*/*kudă* 'a house', *ulʹi*/*ulʹe* 'is, there is') and a V.CVC series of tokens (*araś*, *apak* 'no, not', *ulʹitʹ* 'are, there are), in which same or comparable vowel segments in the adjacent syllables occurred. The data are analogous to those of reading in that the idiolect group having no reduction displayed no significant differences between vowel durations in words of varied syllable structure. In the data of the idiolect groups having reduction, a significant vowel shortening in the closed syllable of the V.CVC series occurred in the idiolects of group 4, which are characterized by radical vowel reduction.

Thus, in the idiolects with reduction, the temporal relationship between the syllable nuclei can be more affected by the syllable type than in the idiolects lacking reduction. The idiolects having no reduction thus can be classified as syllable timed, since they showed a tendency towards vowel lengthening and no significant variability of vowel duration dependent either on stress or the openness/closedness of the syllable.

Table 5

Mean values of duration for stressed and unstressed syllable nuclei (V1, V2) and mean duration ratios (V1/V2) with values of standard deviation in spontaneous speech.
Significant differences between the values of duration for stressed and unstressed syllable nuclei (V1, V2) are starred: *($p < 0.05$), **($p < 0.005$), *($p < 0.0005$), ****($p < 0.0001$)**

Series:	CVCV				VCVC			
Idiolects	#tokens	V1(*ms*)	V2(*ms*)	V1/V2	#tokens	V1(*ms*)	V2(*ms*)	V1/V2
Group 1	48	111.44	113.79	0.99	24	100.96	106.96	0.96
		15.65	16.43	0.17		18.00	17.82	0.21
Group 2	33	105.48	99.58	1.08	17	105.88	99.44	1.09
		17.84	17.37	0.22		23.53	20.46	0.25
Group 3	21	123.90	116.76	1.10	18	116.17	108.61	1.13
		22.26	26.58	0.27		18.77	32.06	0.28
Group 4	21	110.86	107.19	1.04	17	109.47	87.24	**1.28
		26.74	13.32	0.26		20.03	15.96	0.24

2.5. Hierarchy of rhythm in Erzya

Rhythm is defined as a hierarchical phenomenon that manifests itself on different levels of the prosodic hierarchy (Cummins, Port 1998; Gibbon 2003). For example, rhythm in French, a language referred to the syllable timed class, has been explained relative to the stress group while in English and German, foot internal timing relations have been found relevant for the description of rhythm (Wagner 2007).

The idea that Erzya stress is primarily dependent on the rhythm of an utterance has been suggested in the works of Anatolij Rjabov (1932) and Ernst Lewy (1937). Comparing the patterns of stress alternation in the examples provided by A. A. Šachmatov (Шахматов 1910), Ernst Lewy noticed regular successions of initial or non-initial stress in a phrase, for example: *o·mbоćä či·sta ta·ga mo·l'enek* 'next day we went there again'; *vädi·ś ul'ńi·s´l'iśma·sa* 'the water was in a well' (Lewy 1937 : 236). It is important to note that A. A. Šachmatov collected the materials from dialects with vowel reduction, as it can be seen from the transcribed texts.

In an earlier work of the present author (Аасмяэ 1982) describing stress in field work materials, it has been claimed that stress alternations — either odd- or even-numbered syllables are stressed, e.g. *ve·l'ese·ńek/vel'e·seńe·k* 'in our village' — are largely analyzable as sequences of disyllabic feet. In the first systemic research into Erzya prosody (Lehiste, Aasmäe, Meister, Pajusalu, Teras, Viitso 2003), the authors confirmed the validity of this observation. It has been stated that the domain over which stress patterns are manifested in Erzya is the prosodic foot.

In a recent study (Aasmäe 2006a; 2006b) temporal relationship between the syllable nuclei in disyllabic and trisyllabic words was compared to see the effect of stress on vowel durations within the dual foot in di- and trisyllabic words in the target idiolect groups.

Data of spontaneous speech presented in Table 6 show that the increase of the number of syllables in a word (a trisyllabic word compared to a disyllabic one) was associated with the increase of the duration ratio

between the stressed first and unstressed second syllable nuclei in all the idiolect groups. In group 1, however, the differences between the duration of the two syllable nuclei were statistically not significant. Vowel durations were relatively independent of stress.

Figure 2 displays the relationship between vowel durations in disyllabic and trisyllabic words (*a* and *b*, respectively) across the inter-group data. The mean value V1/V2 marked as a dot on the vertical lines showing the range of V1/V2 values in the productions of di- and trisyllabic words is very close to 1.0 in both word series produced by speaker group 1. In the idiolects of groups 2, 3 and 4, mean V1/V2 for disyllabic words is higher than 1.0; in trisyllabic words it is significantly higher than in disyllabic words.

In the idiolect group lacking reduction, vowel durations displayed relative independence of stress in trisyllabic words, as well. Insignificant contraction of the second syllable vowels does not lead to a change in their quality. In the idiolects of groups 2, 3, and 4 that exhibit vowel reduction, there is even greater contraction of second-syllable vowels in trisyllabic words compared to disyllabic ones; first stressed and second unstressed syllables thus form a duration-based foot. Vowel contraction gives rise to changes in the quality of the unstressed vowels. Hence, idiolect groups 2, 3 and 4 exhibit a temporal relationship between syllable nuclei, which is characteristic of a disyllabic foot in a stress timed structure.

Table 6

Mean values of duration for the syllable nuclei (V1, V2, V3) and mean duration ratios (V1/V2) with standard deviations in di- and trisyllabic words. Significant differences between the values of duration for stressed and unstressed syllable nuclei (V1, V2) are starred: *($p < 0.05$), **($p < 0.005$), *($p < 0.0005$), ****($p < 0.0001$)**

	Serie:	disyllabic			Serie:	trisyllabic			
Idiolects	**# tokens**	**V1(*ms*)**	**V2(*ms*)**	**V1/V2**	**# tokens**	**V1(*ms*)**	**V2(*ms*)**	**V3(*ms*)**	**V1/V2**
Group 1	107	108.67	109.31	1.01	57	89.79	86.53	90.88	1.06
		15.86	15.60	0.16		17.14	13.27	16.94	0.27
Group 2	93	107.86	97.37	****1.13	38	97.45	76.82	83.11	****1.30
		18.85	16.66	0.22		21.82	12.70	22.98	0.34
Group 3	54	121.91	110.61	**1.15	40	91.68	75.63	88.40	**1.26
		21.08	27.44	0.28		22.41	19.13	25.74	0.34
Group 4	56	111.55	94.73	****1.21	30	93.74	70.33	82.33	****1.38
		22.49	17.02	0.28		20.69	13.72	23.14	0.37

As to the duration of third syllable vowels, it can be seen from Table 6 that it is comparable to that of first syllable vowels in all the idiolect groups. However, there is little difference between the duration of the three vowels in idiolect group 1, while in groups 2, 3 and 4 there is a more or less salient difference between the duration of second syllable vowels and that of first and third syllable vowels.

The third syllable can be regarded as a degenerate foot; in case it is not final in an utterance, it will form a normal foot with the consecutive syllable, for example: *ku·doso· son a·raś* 'at home s/he is missing'.

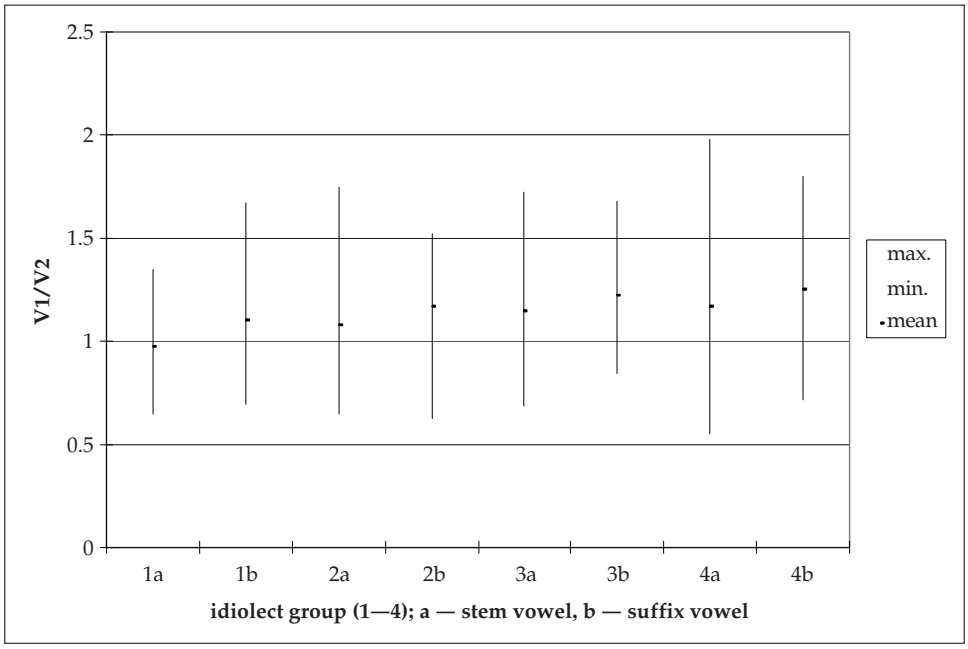

Figure 2. **Mean duration ratios between the stressed and unstressed syllable nuclei (V1/V2) in the duple foot of disyllabic and trisyllabic words.**

2.6. The phonetics-phonology interface of rhythm related effects

Analyses in this study tested the possibility of morphological conditioning for vowel durations in the four varieties of Erzya. Duration-dependent 'undershoot' has been assigned a causal role in the formation of patterns of phonological vowel reduction (Lindblom 1963; Bybee, Chakraborti, Jung, Scheibman 1998; Flemming 2001; Crosswhite 2004; Barnes 2006). In the treatment of the issue of vowel reduction not only the effect of stress, but also that of environment and morphological dependence have been accounted for.

To test the assumption of morphology dependent vowel reduction in Erzya, the duration of stressed first-syllable and unstressed second-syllable vowels in disyllabic word stems and forms with suffixes were compared. The 'stem' tokens (number of observations = 159) were: *velʹe* 'a village', *araś* 'no, not', *apak* 'no, not', *kudo/-ă* 'a house, home'. Forms with suffixes (number of observations = 152) included the following words: *velʹeś* 'the village', *ošoś* 'the town', *ulʹi* '(there) is', *ulʹitʹ* '(there) are' (n=152). The tokens were selected to contain both (C)V.CV and (C)V.CVC syllable structure; thus second-syllable vowels occurred in both syllable templates. The quality of the first- and second-syllable vowels was comparable across the dialect forms — no clear cases of a schwa-vowel occurred in the speakers' productions (with the exception of some tokens from Group 4). Consonantal environment in the words differed.

Table 7 shows vowel duration data on the two categories of words. No statistically significant differences between V1 and V2 were observed in the stem words produced by idiolect groups 1, 2, and 3. The ratio V1/V2

for groups 2 and 3 was higher than for group 1. Differences between the duration of V1 and V2 in group 4 were statistically significant. Vowels outside the root showed the tendency towards shortening in all the idiolect groups. Thus, with the exception of data for Group 4, the results show a general tendency towards equal vowel durations within the stem. Vowel compression at the boundary of the root and a suffix (or in the suffix) was manifest in all the idiolects.

The durational asymmetry observed in the production of word forms with suffixes across the idiolects is a manifestation of the dependence of vowel duration upon the relationship between the morphological constituents of a word. It is conditioned by the tendency to underline by means of duration the importance of the root.

Table 7

Mean durations (*ms*) with values of standard deviation for stressed first and unstressed second syllable vowels (V1, V2) and duration ratios (V1/V2) for the stem and forms with suffixes. Significant differences between the duration of V1 and s are starred: *($p < 0.05$), **($p < 0.005$), *($p < 0.0005$), ****($p < 0.0001$). Number of speakers: 13 (Group 1), 9 (Group 2), 6 (Group 3), 5 (Group 4)**

Series:	stem				form with a suffix			
Idiolects	# tokens	V1	V2	V1/V2	# tokens	V1	V2	V1/V2
Group1	60	107.62	112.31	0.97	52	111.85	103.60	*1.10
		17.67	16.60	0.16		15.99	14.60	0.20
Group2	40	106.05	100.18	1.08	53	109.23	95.25	****1.17
		19.66	18.33	0.22		18.28	15.12	0.22
Group3	30	121.26	111.00	1.14	20	124.85	105.75	**1.22
		20.21	29.15	0.26		20.91	23.19	0.28
Group4	29	112.17	98.66	*1.16	27	110.89	90.52	****1.25
		25.24	18.78	0.28		19.56	14.03	0.28

3. Implications

The results suggest that there is a causal relationship between the mobility of stress, unstressed vowel reduction, and the domain of morphology manifest in Erzya. Given this, vowel reduction appears to be a product of a phonological change unevenly evolving in the language varieties — a tendency towards word-initial stress and reduction of unstressed vowels outside the root. In some dialects it fails to apply radically; full vowels preserve their main quality in an unstressed syllable outside the root. In the dialects with dominantly initial stress, vowel reduction is involved not only at the boundary of the root and a suffix but also within the root, including the head syllable. In the dialects with extensive reduction, a schwa vowel appears in certain environments, for example before *r*: *pərnams* 'to collect'; under stress, the schwa becomes a full vowel. Thus extra vowels (a schwa and a full vowel resembling *ə*) add to the vocalism of the initial syllable. Lack of stability in the neutralizaation of unstressed vowel contrasts in the dialects — only certain vowel contrasts have been given up to neutralization by speakers — can be ascribed, firstly, to the func-

tioning of unbounded stress, secondly — to the effects of environment. Morphologically conditioned vowel shortening might be a factor that contributes to the development of a duration-based foot manifest in spoken varieties with less mobile stress. The core dialects represented in our materials by idiolect group 1 displayed, at the level of production, insignificant vowel lengthening in the head syllable of trisyllabic words. The quality of vowels in these language varieties largely remains intact and analysis of stress distribution is problematic, since the acoustic effect of stress is weak for perception.

With respect to the manifestations of stress, vocalism, and prosodic timing, Erzya dialects thus can be differentiated as two major types, one displaying a syllable-timed structure, the other — exhibiting features of the stress-timed class.

Address:
Niina Aasmäe
University of Tartu
E-mail: niina.aasmae@ut.ee
Phone: +372 7375221

REFERENCES

Aasmäe, N. 2005, Durational Variability in Erzya: Stressed and Unstressed Syllable Nuclei in Idiolects. — LU XLI, 264—278.

—— 2006a, Sources of Variability in the Duration of Stressed and Unstressed Syllable Nuclei in Erzya: Inter-Idiolect Data of Spontaneous Speech. — LU XVII, 81—93.

—— 2006b, Stress and Quantity in Erzya, Tartu (Dissertationes Philologiae Uralicae Universitatis Tartuensis 6).

Aasmäe, N., Ross, J. 2005, How Free is Alternating Stress in Erzya? — LU XLI, 134—143.

—— 2007, The Phonetics-Phonology Interface of Erzya Stress. Morphological Conditioning of Vowel Reduction. — Proceedings of the 16th International Congress of Phonetic Sciences, Saarbrücken, 1213—1216.

Asu, E. L., Nolan, F. 2006, Estonian and English rhythm. A Two-Dimentional Quantification Based on Syllables and Feet. — Speech Prosody, 3rd International Conference, Dresden, May 2—5, 249—253.

Barnes, J. 2006, Strength and Weakness at the Interface. Positional Neutralization in Phonetics and Phonology, Berlin—New York.

Barry, W. J., Andreeva, B., Russo, M., Dimitrova, S., Kostadinova, T. 2003, Do Rhythm Measures Tell us Anything about Language Type? — Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, 2693—2696.

Bolotova, O. 2003, On Some Acoustic Features of Spontaneous Speech and Reading in Russian (Quantitative and Qualitative Comparison Methods). — Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, 913—916.

Bybee, J., Chakraborti, P., Jung, D., Scheibman, J. 1998, Prosody and Segmental Effect. Some Paths of Evolution for Word Stress. — Studies in Language 22: 2, 267—314.

Crosswhite, K. 2004, Vowel Reduction. — Phonetically-Based Phonology, Cambridge, 1—51.

Cummins, F., Port, R. 1998, Rhythmic Constraints on Stress Timing in English. — Journal of Phonetics 26, 145—171.

Dauer, R. 1983, Stress Timing and Syllable Timing Reanalyzed. — Journal of Phonetics 11, 51—62.

—— 1987, Phonetic and Phonological Components of Language Rhythm. — Proceedings of the 11th International Congress of Phonetic Sciences 5, Tallinn, 447–450.

Engstrand, O., Krull, D. 2003, Rhythmic Intentions or Rhythmic Consequences? Cross-Language Observations of Casual Speech. — Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, 2789—2792.

Feoktistow, A. P. 1990, Die Dialekte der mordwinischen Sprachen. — H. Paasonens Mordwinisches Wörterbuch, Helsinki (LSFU XXIII), XXXI—CV.

Flemming, E. 2001, Scalar and Categorical Phenomena in a Unified Model of Phonetics and Phonology. — Phonology 18, 7—44.

Gut, U. 2003, Non-Native Speech Rhythm in German. — Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, 2437—2440.

Gibbon, D. 2003, Computational Modelling of Rhythm as Alternation, Iteration and Hierarchy. — Proceedings of the 15th ICPhS, Barcelona, 2489—2492.

Itkonen, E. 1971, Zum Ursprung und Wesen der reduzierten Vokale im Mordwinischen. — FUF XXXIX, 41—79.

Lehiste, I., Aasmäe, N., Meister, E., Pajusalu, K., Teras, P., Viitso, T.-R. 2003, Erzya Prosody, Helsinki (MSFOu 245).

Lewy, E. 1937, Zur Betonung des Erzämordwinischen im Satze. — FUF XXIV, 232—245.

Lindblom B. 1963, Spectrographic Study of Vowel Reduction. — Journal of the Acoustical Society of America 35, 1773—1781.

Low, E. L, Grabe, E., Nolan, F. 1999, A Contrastive Study of Prosody and Lexical Stress Placement in Singapore English and British English. — Language and Speech 42, 39—56.

—— 2000, Quantitative Characterizations of Speech Rhythm. Syllable Timing in Singapore English. — Language and Speech, 43, 377—401.

Maddieson, J. 1985, Phonetic Cues to Syllabification. — Phonetic Linguistics, Orlando, 203—221.

Paasonen, H. 1893, Mordvinische Lautlehre. Helsingfors.

—— 1903, Mordvinische Lautlehre, Helsingfors (MSFOu 22).

Ramus, F., Nespor, M., Mehler, J. 1999, Correlates of Linguistic Rhythm in the Speech Signal. — Cognition 73, 265—292.

Rédei, K. 1984, Phonologische Analyse des Erza-Mordwinischen. Studien zur phonologischen Beschreibung uralischer Sprachen, Budapest, 209—230.

Redford, M. A. 2003, Cognitive Template for a Phonetic Correlate of Syllable Structure. — Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, 2261—2264.

Wagner, P. 2007, Visualizing Levels of Rhythmic Organization. — Proceedings 16th International Congress of Phonetic Sciences, Saarbrücken, 1113—1116.

White, L., Mattys, S. L., Series, L., Gage, S. 2007, Rhythm Metrics Predict Rhythmic Discrimination. — Proceedings of the 16th International Congress of Phonetic Sciences, Saarbrücken, 1009—1012

Аасмяэ, Н. 1982, Ритмическое ударение в эрзянском языке. — Filoloogiateadused Tartu Ülikoolis. Konverentsi teesid. Tartu, 15—17.

Биушкин М. С. 1968, Звуковая система федоровского диалекта эрзя-мордовского языка на территории Башкирской АССР. — Очерки мордовских диалектов 5, Саранск, 199—317.

Деваев, С. З., Цыганкин, Д. В. 1970, Фонетика мордовских (мокшанского и эрзянского) литературных языков, Саранск.

Ермушкин Г. 1984, Ареальные исследования по восточным финно-угорским языкам (эрзя-мордовский язык), Москва.

Объедкин В. Д. 1961, Старо-турдаковский диалект эрзя-мордовского языка. — Очерки мордовских диалектов 1, Саранск, 100—196.

—— 1963, Сабаевско-кочелаевский говор эрзя-мордовского языка. — Очерки мордовских диалектов 3, Саранск, 3—26.

Рябов А. П. 1932, Об ударении в эрзя-мордовском языке. — Революция и письменность, Москва.

Шахматов А. А. 1910, Мордовский этнографический сборник, С.-Петербург.

Цыганкин Д. В. 1968, Опыт классификации эрзянских говоров Мордовского Присурья. — Очерки мордовских диалектов 5, Саранск, 383—394.
—— 1979, Фонетика эрзянских диалектов, Саранск.
Якушкин А. В. 1961, Дракинский диалект эрзя-мордовского языка. — Очерки мордовских диалектов 1, Саранск, 197—293.

НИНА ААСМЯЭ (Тарту)

РИТМИЧЕСКИЕ ТЕНДЕНЦИИ В ЭРЗЯНСКОМ ЯЗЫКЕ

В статье рассмотрена совокупность данных, позволяющих охарактеризовать различия, которые проявляются в ритмообразующих характеристиках речи в основных группах диалектов. В качестве факторов ритма исследованы проявления ударения, вокализма и количественное соотношение между гласными в начальном ударном и неначальном безударном слогах. Анализ данных включает сравнение количественного соотношения между гласными в двух- и трехсложных словах, слогах открытого и закрытого типа, а также в корневых и не-корневых морфемах. Фонетико-фонологический анализ данных показывает, что ритмообразующие характеристики проявляются в диалектах нередуцирующего типа в пределах слога, а в диалектах редуцирующего типа — в пределах стопы. Эмпирические данные можно рассматривать как свидетельство того, что в языке происходит фонологический сдвиг в сторону выделения корня слова посредством просодии — ударения и количества. В диалектах этот сдвиг происходит неравномерно, о чем можно судить по различиям в степени редуцирования гласных и подвижности ударения.