

# Monosyllabic Circumflexion in Lithuanian

– with an investigation of some dialectal forms –

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## 1 Introduction

Lithuanian distinguishes two kinds of tones on a bimoraic nucleus: acute (falling) or circumflex (rising) tone. De Saussure (1984: 492ff.), Stang (1957), and others contributed to proving that the Proto-Balto-Slavic long vowels corresponding to the long vowels in other IE languages are supposed to obtain “acute tone” (Lith. *nósis* ‘nose’ ~ Skt. *nāsā* ‘(a pair of) nostrils’; Lith. *stóti* ‘to stand’ ~ Skt. *sthā-* ‘id.’; Lith. *mėnuo* ‘month, moon’ ~ Goth. *mēna* ‘moon’). However, a considerable number of forms that do not follow this principle are found among monosyllabic forms (e.g., Lith. *tiẽ* ‘those [m.pl.nom.]’ cf. *gerieji* ‘the good..’ [def. m. pl. nom.]). If the monosyllabic environment can be considered as the word-final position, they would be also expected to be shortened by Leskien’s Law (as in *bùs* ‘will be’ < *\*būs-t*). Nevertheless, many monosyllabic forms are found with long circumflex vowels that are etymologically (or morphophonologically) not expected.

In this talk, I will provide a summary of the various interpretation of this phenomenon in previous studies, and a perspective based on some dialectal data.

## 2 Backgrounds

### 2.1 Lithuanian Tones

- Lithuanian distinguishes the following three kinds of accents (the description below is following Blevins (1993)):

– an accent on monomoraic vowels:

(i) grave  $\langle \check{V} \rangle = / \acute{V} /$

$$\begin{array}{c} [u]_{\sigma} \\ | \\ H \end{array}$$

- two tonal accents on a long vowel, a diphthong, or mixed diphthong (a tautosyllabic sequence of a vowel and resonant):

(ii) acute (falling)  $\langle \acute{V} \rangle = /V\acute{V}/$  (iii) circumflex (rising)  $\langle \tilde{V} \rangle = /V\acute{V}/$

$$\begin{array}{c} [\mu \ \mu]_{\sigma} \\ | \\ \text{H} \end{array}$$

$$\begin{array}{c} [\mu \ \mu]_{\sigma} \\ | \\ \text{H} \end{array}$$

- the tone-bearing unit in Lithuanian is considered a mora.
- although the contrast of **acute** and **non-acute** is completely replaced by that of tones in Modern Standard Lithuanian, this contrast is considered to have been that of syllable nuclei (Stang 1966: 137; Jasanoff 2004: 251<sup>11</sup>); in this handout, the acuteness is marked with underline following the convention in Jasanoff (2004).

## 2.2 Leskien's Law

The long vowels with an acute nucleus were shortened to short vowels in the word-final position (12c. (?) ~ 14c.).

- (1) a. masc. pl. nom. *gerì* 'good' ~ *geríe-ji*
- b. m. du. nom./acc. *gerù* ~ *gerú-ju*
- c. f. sg. nom. *gerà* ~ *geró-ji*
- d. 1sg. pres. *sukù* 'I turn' (non-refl.) ~ < *sukúos(i)* (refl.)
- e. 1pl. pres. *sùkame* 'we turn' ~ *sùkamés* (< \**sùkamè-si*)
- f. m. *i*-stem du. nom./acc. *akì* 'a pair of eyes' ~ OCS *oči* (< PBS \* $\bar{i}$  < \* $i_h$ )

(Leskien 1881: 189 (some of the spellings are changed following the current orthography); Stang 1966: 115–116)

Note that diphthongs (except for the so-called “non-homogeneous long vowels,” *ie* and *uo*) were unable to be shortened and the acute feature changed to non-acute. The original acuteness is preserved in both the reflexive forms in Standard Lithuanian and the dialectal forms from Žemaitian dialects.

- (2) *sukaũ* 'I turned' (1sg. pret.), *sukaĩ* (2sg. pret.) ~ *sukáu-si*, *sukái-si* (refl.); Žem. *sokâu*, *sokâ*

### 2.3 Monosyllabic Circumflexion (MC)

Hanssen (1885: 616) pointed out a few monosyllabic forms exhibiting the unexpected circumflex tone:

- (3) a. m.nom.pl. *tiẽ* < \**tíe* ‘those’ cf. *geríeji* ‘the good ...’ (def.: Lithuanian has the definite forms of adjectives: “inflectional form of an adjective + inflectional form of *jìs/jì* ‘he/she’,” e.g., \**geríe* + \**jíe* [m.nom.pl.])
- b. m.nom.pl. *jiẽ* < \**jíe* ‘they’
- c. *šuõ* < \**šúo* ‘dog’ (< \**kuõ* < \**kuón-s*; etymologically an acute ending could be expected)
- d. *žmuõ* < \**žmúo* ‘man’ (< \**d<sup>h</sup>ĝ<sup>h</sup>-m-õ* < \**d<sup>h</sup>ĝ<sup>h</sup>-m-on-s* ← loc. sg. \**d<sup>h</sup>ĝ<sup>h</sup>-m-én* ‘on earth’) [etymologically an acute ending could be expected; for the derivation of the word for ‘man,’ see Nussbaum (1986: 187f.).]
- he further suggested their possible analogical influence on polysyllabic forms sharing the same ending (e.g., *aníe* → *aniẽ* [under the influence of *tiẽ*])
  - in monosyllabic forms with an etymological long vowel, the environment of Leskien’s Law can be provided if the monosyllabic environment can be interpreted as the word-final position ( $[\underline{\underline{u}}]_{word}$ )

#### Alleged Examples

- Examples listed in Zinkevičius (1980–81: II, 161):
 

(4) a. 2pl. nom. *jūs* < \**jús* ‘you’. cf. 2pl. gen. *jūsų*, Latv. *jūs*

b. m. nom. pl. *tiẽ* < \**tíe* ‘those’. cf. *geríeji* ‘the good ...’ (def.), Latv. *tiẽ*

c. acc. pl. m. *tuõs* < \**túos* ‘those’. cf. *gerúosius* ‘the good ...’ (def.)

d. 3rd. fut. *duõs* ‘will give’, *dẽs* ‘will put’ < \**dúos*, \**dés*. cf. 1sg. *dúosiu*, *désiu*

e. prepositions: *ĩ* ‘into’, *nuõ* ‘from’, *põ* ‘under’, *priẽ* ‘by, near’, *prõ* ‘through’, *peĩ* ‘through’ < \**ĩ*, \**núo*, \**pã*, \**príe*, \**prã*, \**pér*. cf. *ĩ-noris* ‘whim’, *núo-taka* ‘bride’, *pó-traukis* ‘inclination’, *príe-témis* ‘dusk’, *pró-tėvis* ‘ancestor’, *pér-lipo* ‘climbed over’
- Some examples of MC are also included in Būga’s (1923/24: 95ff.) list of *métatonie douce* (a change of tones from acute to circumflex) :
 

(5) a. Lith. *daũg* ‘a lot (of...)’ ~ Latv. *daũdz*, Lith. *dáuginti* ‘to multiply’

- b. Lith. *jaũ*, Latv. *jàu* ‘already’ ~ Latv. dial. *jaû*
- c. Lith. *vėl* ‘again’ (< \**vėli*/\**vėlia*) ~ Latv. *vėl*, PB \**vėli*
- d. Lith. *kuĩ* ‘where’ ~ \**kùr* (cf. *kùrnekur* ‘here and there’)
- e. Lith. *nuõ*, Latv. *nùo* ‘from’ ~ Lith. *núobara*, Latv. *nuõ-bara* ‘lamb’s wool (gathered in spring)’
- f. Lith. *peĩ* ‘through’ ~ Latv. *pãr*, Lith. *pér-nešti* ‘to carry across’
- g. Lith. *priẽ* ‘by, near’ ~ Lith. *príe-puolis* ‘coincidence’
- h. ELith. *ẽ* ‘but, and’ ~ *égi* ‘id.’
- i. Lith. *ĩr* ‘and’ ~ Lith. dial. *ìr*, Latv. *ĩr*
- j. Lith. *laĩ* ‘let somebody do...’ ~ Lith. *léisti* ‘let,’ Latv. *laî*, 2sg. impr. *leîst*

- Some other examples from Fraenkel (1962–65), Derksen (2008), Stang (1966: 116):

- (6) a. Lith. *nũn* ‘now, today’ ~ Lith. *nūnaiĩ* ‘now, today,’ OCS *nyně* ‘now,’ PBS \**nūnoi*, Skt. *nú, nũ* ‘now,’ Gk. *νῦν, νυν* ‘now,’ PIE \**nũ-*
- b. Lith. *võs* ‘hardly’ ~ OCS *jedъva*, Čak. *jedvã*, PBS \*(*ed-*)*vãs* ‘hardly’; Dunkel (2009: 49) reconstructs PIE \**ua* + \**és*.
- c. Lith. *tuõ* ‘those (m.sg.instr.),’ cf. *gerúoju* ‘the good...’ (def.)

However, the monosyllabic forms with a diphthong (except for *uo ad ie*) should be excluded, since the acute diphthongs exhibit *métatonie douce* even in the ending of polysyllabic forms [described in (2)].

### 3 Previous Studies and the Problems

#### 3.1 Pedersen (1933)

Pedersen (1933: 14–15) suggested that MC can be interpreted as a result of an analogical process.

sg. 1. <i>dúosiu</i>	pl. 1. <i>dúosime</i>	sg. 1. <i>dúosiu</i>	pl. 1. <i>dúosime</i>
2. <i>dúosi</i>	2. <i>dúosite</i>	2. <i>dúosi</i>	2. <i>dúosite</i>
3. (* <i>dúos</i> >) * <i>dùs</i>	—	3. <i>duõs</i>	—

#### Problems

- while the length of the monosyllabic 3rd person future forms can be explained by means of analogical process, their circumflex tone is still left unexplained. (→ §4.1)

- there are some examples like (5c), (6b), which do not have possible sources of analogical processes through which they could obtain a circumflex tone

### 3.2 Petit (2002)

Petit (2002) conducted a thorough survey on monosyllabic 3rd person future forms (which are most representative examples of MC), and seeks for an explanation which does not need the assumption of MC.

Observations:

- the shortening is observed mostly with the monosyllabic verbal roots having a structure [Cí] or [Cú] (*bùs* ~ *búti* ‘to be’; *gìs* ~ *gýti* ‘to get better’ **but** *trūks* ~ *trūkti* ‘to lack’; *dýgs* ~ *dýgti* ‘to spring, sprout’)
- 3rd future forms in dialects (p. 253ff.):
  - Žemaitian dialects have eliminated all the variations, restoring systematically the acute tone to the 3rd person future forms (cf. *būs* ~ *búti*; *gýs* ~ *gýti*)
  - West Aukštaitian dialects present the shortening in the monosyllabic roots of the structure [Cú(C)-] or [Cí(C)-], MC elsewhere (*bùs* ~ *búti* ‘to be,’ *pùs* ~ *púti* ‘to rot,’ *lis* ~ *lýti* ‘to rain’)
  - Std. Lithuanian (based on S.-W. Aukš. dialect) presents the shortening in the monosyllabic roots of the structure [Cú-] or [Cí-], MC elsewhere
  - East Aukštaitian and partially South Aukštaitian dialects present generally the shortening with the lack of MC (*bùs* ~ *búti*; some analogical cases: *pùs* ~ *pūsti* ‘to blow,’ *pìks* ~ *pýkti* ‘to be in a bad temper’)
  - North-West Aukštaitian dialects present generally MC with the lack of shortening (*pūs* ~ *púti* ‘to rot,’ *lỹs* ~ *lýti* ‘to rain’)
- the non-homogeneous monophthongs, *uo* and *ie*, behave just as diphthongs in the 3rd person future forms of monosyllabic roots, i.e., they exhibit MC (e.g., *dúoti* ~ *duōs*, *liēs* ~ *líesti* ‘to touch’)

His Proposals:

- 1. Leskien’s Law did not affect the so-called non-homogeneous monophthongs *úo* and *íe*
- 2. the shortening of *uo* and *ie* [in the cases such as (1a)] and (1d) can be attributed to the influence of the shortening of those diphthongs in E. Aukštaitian dialects, e.g., *dòk* (2sg. impr.), *dòs* (3rd fut.) ~ Std. Lith. *dúok*, *duōs* (< *\*dúoki*, *\*dúost*)

- ▶ 3. Leskien's Law shortened also the acute long diphthongs in the word-final positions, and eventually changed their tone to circumflex (*métatonie douce*); Osthoff's Law (shortening of the long diphthongs  $*\bar{V}R$ ) took place in word-internal syllables after Leskien's Law.

### Problems

- ▶ 1. & 2.) these cannot explain the alternation of the accentuation and length in the personal endings of non-reflexive and reflexive forms (e.g., 1sg. pres.  $-\bar{u} \sim -\acute{u}os(i)$ ); it may be worth considering that the shortening of  $\acute{u}$  and  $\acute{y}$  in monosyllables (rather than the that of *uo* and *ie* in the ending of polysyllabic forms) could be dialectal influence.
- ▶ 3.) Osthoff's Law is usually considered to have taken place in the Proto-Balto-Slavic stage [neither Slavic or Baltic forms reflect a long diphthong directly; e.g., PIE  $*\underline{u}lHneh_2$  'wool' > PBS  $*\underline{u}l̄nā > *ūl̄nā > PS *v̄lna > SCr. v̄na$ ; PB  $*\underline{u}l̄nā > Lith. v̄lna, Latv. v̄l̄nā$ ; cf. Jasanoff (2004: 251)]
  - his observation of dialectal data is insightful (→ §5)

### 3.3 Senn (1966)

Senn (1966: 231) considered that if the accented final syllable has an acute intonation, it turned to circumflex in the 3rd person future forms, including monosyllabic ones, but this did not take place in the cases where the final accented acute vowels were  $\acute{u}$  or  $\acute{y}$ , e.g., *būs* (*būti* 'to be'), *gīs* (*gýti* 'to get better'), *dīgs* (*dýgti* 'to spring'), etc.

The exceptions of this formulation are:

- (7) a. *v̄ys* ( $\sim$  *výti* 'to chase (away)')
- b. *v̄ys* ( $\sim$  *výsti* 'to fade, droop')
- c. *l̄ys* ( $\sim$  *lýsti* 'to become thin')
- d. *sul̄ys* ( $\sim$  *sulýsti* 'to become meagre')
- e. *(at)l̄yš* ( $\sim$  *(at)lýžti* 'to slacken')
- f. *siūs* ( $\sim$  *siúti* 'to sew')

He also pointed out that this tonal change (*métatonie douce*, including MC) did not take place in Žemaitian dialects.

### **Problem**

- this observation may arise a question as to why MC did not take place in the case of *ũ* and *ý* (the same question arises also for the polysyllabic cases)

### **3.4 Zinkevičius (1980–81)**

Zinkevičius (1980–81: II, 161ff) discusses that Leskien's Law was regular for acute endings of polysyllabic words, while it did not operated on monosyllabic words, which resulted in the forms exhibiting MC.

He explained some exceptions of MC in the following way:

- (8) analogy from polysyllabic variant (such as a negative form): *\*nebūs* > *nebūs* ... → (analogical influence to *\*būs*) → ... *būs*

### **Problem**

- this neither explains why the exceptions of MC are found mostly in the roots having *ũ* and *ý*

### **3.5 Summary of §3**

- MC is necessary to explain the circumflex tone appearing only in the monosyllabic variant (cf. 3.1) and the tonal alternation in some sets of the etymologically identical endings in polysyllabic and monosyllabic forms (cf. *tuõ* ~ *gerù* (m.instr.sg.))
- the question as to why exceptions of MC are mostly found with *ũ* and *ý* needs to be answered (cf. §§3.3, 3.4)  
[the answer can be sought in the fact that closed vowels like *i* and *u* tend to be pronounced phonetically shorter; this will be discussed at another time]
- the relative chronology of MC has not been closely examined

## **4 Relative Chronology**

Although Rasmussen (1999: 481ff.) suggests that MC could be traced back to Proto-Balto-Slavic stage based on some Slavic data exhibiting a phenomenon similar to MC, I will limit my discussion here within the Lithuanian stage.

## 4.1 Monosyllables Resulted by Apocope

The monosyllables resulted by the relatively recent syncope and apocope do not exhibit the result of MC.

### 4.1.1 PRONOUNS, PARTICLES

- (9) a. *tóms* ‘to those (f. dat. pl.)’ < OLith. *tómus*  
 b. *tíems* ‘to those (m. dat. pl.)’ < OLith. *tíemus*  
 c. *jíems* ‘to them (m. dat. pl.)’ < OLith. *jíemus*  
 d. *kíek* ‘how many’ < OLith. *kíeka(s)*  
 e. *jóg* ‘because’ < OLith. *jógi*  
 f. *dvíem* ‘two (m./f.dat.du.)’ (< PBS *\*dvĕmā*)

[Bjarnadóttir (2003: 7, 13) shows that the loss of the vowels in final syllables started to take place around 16c. first in the category of pronouns]

### 4.1.2 2SG. IMPERATIVE FORMS

2sg. imperative: infinitive stem (of a verb) + *k(i)*

e.g., *dirbk* ‘work!’ ~ *dirbti* ‘to work,’ *dúok* ‘give!’ ~ *dúoti* ‘to give.’

This suffix *-k(i)*- underwent apocope in 2nd sg. imperative forms:

- (10) *vβmuschki* ‘kill!’ (p.19, l. 8; Mod.Lith. inf. *užmùšti*), *Buki* ‘may (your will) be...’ (p.23, l. 9; *búti*) *Mažvydas Catechism* (Ford 1971: 30, 36)

## 4.2 The Relative Chronology of Leskien’s Law and MC

Leskien’s Law ► MC

	<i>*vās</i> ‘hardly’	<i>*būs</i> ‘will be’	<i>*siūs</i> ‘will sew’	<i>*tāmus</i> ‘to them’
Leskien’s Law	<i>*vàs</i>	<i>bùs</i>	<i>*siùs</i>	—
MC	—	—	—	—
$\bar{a} > o$	—	—	—	<i>tómus</i>
Syncope	—	—	—	<i>tóms</i>
	<del><i>Xvàs</i></del>	<i>bùs</i>	<del><i>Xsiùs</i></del>	<i>tóms</i>



MC ► Leskien's Law

	<i>*vās</i>	<i>*būs</i>	<i>*siūs</i>	<i>*tāmus</i>
MC	<i>*vās</i>	<i>*būs</i>	<i>siūs</i>	—
Leskien's Law	—	—	—	—
$\bar{a} > o$	<i>vōs</i>	—	—	<i>tōmus</i>
Syncope	—	—	—	<i>toms</i>
	<i>vōs</i>	<del><i>būs</i></del>	<i>siūs</i>	<i>toms</i>

Considering *vō* (6b) does not have a possible model of analogy, the latter chronology could be better. In that case, the shortened monosyllabic forms should be a result of some kind of secondary development.

## 5 Dialectal Data

Lithuanian has numerous dialects, which can be classified in to two main groups: Žemaitian (north-west area of Lithuania; about a quarter of the whole country) and Aukštaitian (the remaining part). Žemaitian and Aukštaitian dialects have different accentual features as described in Senn (1966: 41ff.), Balode and Holvoet (2001) and others.

Among them, two sub-dialects will be focused on: North Žemaitian and East Aukštaitian dialects.

### 5.1 North Žemaitian Dialects

#### 5.1.1 LESKIEN'S LAW IN ŽEMAITIAN DIALECTS

Some Žemaitian forms suggest that Leskien's Law many not have taken place in this dialectal group. The long vowelstd. Lith. in S in the ending are shortened, irrelevant to whether they are acute or non-acute (Balode et al. 2001: 76ff.):

- (11) a. Std. Lith. *ākys* ~ Žem. *ākis* 'eye' (nom. pl.)  
 b. Std. Lith. *žėmė* ~ Žem. *žėmę* 'earth' (nom. sg.)  
 c. Std. Lith. *akìs* ~ Žem. *àkìs* 'eye' (acc.pl.; < *\*akĩs*)  
 d. Std. Lith. *dúona* ~ N. Žem. *dōuna*, S. Žem. *dūna* 'bread' (nom. sg.; < *\*dúonā*)

- (12) The correspondence observed in (11c) in the ending:

Std. Lith. *-i-* : Žem. *-i-* (< *\*-ĩ-*)

However, the nominative singular forms of the word for ‘eye’ in Standard Lithuanian and Žemaitian dialects exhibit a different correspondence as follows:

(13) Std. Lith. *-i-* : Žem. *-ę-* (< *\*-i-*); cf. Std. Lith. *akis* ~ N. Žem. *àkèš* (< *\*akis*)

Considering the acute vowels shortened by Leskien’s Law typically merged to their short counterpart and that the Žemaitian shortening affected not only acute but also non-acute endings, the Žemaitian shortening is a different phonological process.

This point is already made by Stang (1966: 127–8), who discussed it with nom.sg. *akis* (Std.) ~ *àkèš* (N. Žem.) and instr.pl. *akimìs* (Std.) ~ *akimìs* (< *\*akimìs*).

### 5.1.2 MONOSYLLABIC FORMS IN NORTH ŽEMAITIAN DIALECTS

This time, I checked only the Telšiškiai sub-dialect.

Materials: dialectal texts from Bacevičiūtė, Rima, Audra Ivanauskienė, and et al. (2004: 248–54).

(14) a. *v<sup>s</sup>iel* / *viēl* : Std. Lith. *vėl*

[the superscript (<sup>s</sup>) denotes the so-called *middle tone*]

b. *tɔ<sup>u</sup>* (not found in an accented position) : Std. Lith. *tuõ* (m.instr.sg.)

c. *tēi* : Std. Lith. *tiẽ* (m.nom.pl.)

d. *jōu* : Std. Lith. *juõ* (m.instr.sg.)

It seems monosyllabic particles tend to exhibit long circumflex tone, while 3rd person future forms of monosyllables have long acute accent (e.g., *bū<sup>s</sup>* [the sign (^) denotes the Žemaitian variant of the acute tone, the so-called *broken tone*, and the dot (·) denotes that the vowel is pronounced long in Lithuanian dialectology; the standardized transcription can be *būs*]). This means that Petit (2002) is right in assuming that the acute tone is secondarily restored to 3rd person future forms. This also may suggest that MC could be traced considerably far back to a common Lithuanian stage before it split to Žemaitian and Aukštaitian dialects.

## 5.2 East Aukštaitian Dialects

- (as Petit (2002) points out) the monosyllabic 3rd person future forms are generally shortened by Leskien’s Law without MC

- the accented short vowels *u* and *i* are shorter than  $\bar{u}$  and *y*, but considerably longer than unaccented *u* and *i*; however, in the word-final position and monosyllables, they remain short (Zinkevičius 1978: 53)

**Uteniškiai** Materials: dialectal texts from Bacevičiūtė, Rima et al. (2004: 123–40).

- (15) a. *tuõs* ~ Std. Lith. *tuõs* (m.acc.pl.)  
 [the middle tone here means that the tone on a vowel is hard to determine;  
 cf. Bacevičiūtė et al. 2004: 17ff.]
- b. *júos* ~ Std. Lith. *juõs* (m.acc.pl.)
- c. *jũ's* : Std. Lith. *jũs*
- d. *tó'* : Std. Lith. *tà* (f.nom.sg.; < \* $t\acute{a}$  < \* $teh_2$ )  
 [cf. *kàs* 'what' : Std. Lith. *kàs*]

**Panevėžiškiai** Materials: dialectal texts from Bacevičiūtė, Rima et al. (2004: 173–93).

- (16) a. *tiē* : Std. Lith. *tiē*
- b. *vĕ.l* : Std. Lith. *vĕl*  
 [the period (.) means the vowel has a "half-long" length (between short and long); a middle tone also appear on a short vowel lengthened under prominence]
- c. *tuõ* : Std. Lith. *tuõ*
- d. *túos* / *tõ.s* : Std. Lith. *tuõs*

*Júos* and *túos* suggest that the original acute accent may have been restored after Leskien's Law, while *vĕ.l* does not have any analogical source to restore the original acute long vowel (probably that is why it exhibits half-long length).

This may suggest that the original acute accent may have been restored after Leskien's Law to some pronominal forms. However, a question arises as to why the original acute long vowel would have been restored at different times to pronominal forms (after Leskien's Law) and to 3rd future forms (before Leskien's Law).

## 6 Summary

- although some researchers express a doubt about the existence of the process of Monosyllabic Circumflexion, the existence of this process needs to be assumed in order to explain the alternation of tones of the same morpheme in poly- and monosyllabic forms, and some unexpected circumflex tones without possible models of analogy.
- the Žemaitian data surveyed so far (although quite limited) may suggest that MC can be traced back to an old stage of common Lithuanian (before it was split into dialects).
- the Aukštaitian data need a further analysis with more data; also, the monosyllabic forms with shortening in Std. Lithuanian need to be explained.

## References

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