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ON THE MID AND HIGH NON-LABIAL VOWELS IN LUUDITSA VOTIC*

Abstract. This article investigates two questions concerning the Votic vowel system: (1) Is the contrast between *e* and *ę* vowel phonemes preserved in contexts after *j*; (2) Does contemporary Votic distinguish the vowel *į* used in Russian borrowings from other Votic vowels? The study is based on materials recorded from the last speakers of Votic. The analysis shows that in contexts after *j* the vowel *ę* is phonetically similar but not identical to *e*; therefore, the contrast between the two vowels is not neutralized. The vowel *į* in Russian borrowings did not merge with any Votic vowels, but it had been adopted differently into Jõgõperä and Luuditsa varieties. The Jõgõperä speaker pronounces the vowel similarly to the Russian *į*, so this high non-front vowel becomes a pair to the high front *i*. The Luuditsa speaker, however, pronounces *į* almost as *i*. This fact is unexpected, but it can be explained with the hypothesis of "double borrowing" under the influence of the contacting Ingrian language. Notably, the Luuditsa Votic speaker may have adopted the Ingrian pronunciation of the Russian borrowings where the Russian vowel *į* is pronounced similarly to *i*.

Keywords: Votic, vowels, experimental phonetics, phonology, vowel harmony.

1. Background

This paper continues experimental phonetic research on the Luuditsa variety of Votic. The previous article on this subject (Rozhanskiy 2015) analyzed mostly the quantitative features of Votic vowels. In the current paper, we focus on the qualitative differences. The two questions that will be studied in the article are: (1) if there is a contrast between *e* and *ę* in the context after *j*, and (2) whether the vowel *į* pronounced in Russian borrowings is a separate phoneme in the Votic vocalic system.

The first research question comes from the fact that the quality of the vowel is strongly influenced by the preceding *j*. The sounding of *je* and *ję* is very similar, and it is not clear whether the contrast between the two vowels is preserved.

The answer to this question also influences morphology. Tsvetkov (1995) transcribes the genitive/illative plural marker as *ję* irrespective of vowel harmony: the same marker appears in front-vocalic words (*tüttöję* 'daughter.

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PL.GEN') as well as in back-vocalic words (*kukkojẹ* 'rooster.PL.GEN'). By choosing this interpretation, Tsvetkov, in fact, introduces another back-vocalic marker that does not follow vowel harmony.

In our Votic grammar, based primarily on the Jõgõperä Votic data, we transcribed this marker as *je*: also without harmonic variants but with a front-vocalic vowel (Маркус, Рожанский 2011 : 302). This decision was based on the very similar sounding of the genitive/illative plural marker in back and front-vocalic words. In the current study, we aim to test our perceptive impression with a proper phonetic experiment.

The second research question concerns the vowel *i̯* in Russian borrowings (e.g. *ri̯nkə̂* 'market', *ribakkə̂* 'fisherman', *ti̯kvə̂* 'pumpkin'). In the widely cited Votic grammar (Ariste 1968 : 1), the high central vowel *i̯* is distinguished from other vowels. However, in the dictionary of the Jõgõperä variety (Tsvetkov 1995 : 268—269, 338), Russian borrowings are spelled with *ẹ* or, rarer, with *i*: *rẹbak̄* 'fisherman', *rẹnk* 'market', *tẹkv*(*ə̂*)[1] ~ *tikvə̂* 'pumpkin'. The grammar (Маркус, Рожанский 2011) based on the same variety follows the spelling in Tsvetkov's dictionary and transcribes the borrowings also with *ẹ*: *rẹbakk* 'fisherman'.

In the current paper, we use experimental phonetics methods to test whether the Russian *i̯* is present in the Luuditsa variety as a separate vowel.

2. Data and methods

This research is based on field data recorded in the village of Luuditsa[2] (Kingisepp region, Leningrad oblast, Russia) in 2012—2015. Luuditsa Votic belongs to the group of westernmost subdialects. We managed to record sufficient amount of tokens only from one speaker (as of 2017, there are no more fluent Votic speakers who can work as informants). He was born in the village of Liivtšülä in 1928, and for most of his life, he lived in the village of Luuditsa. As was the case with the other last speakers of Votic, he also knew the Ingrian language (there were many Ingrian inhabitants in Luuditsa in the 20th century), but the interference of Ingrian in his speech was minimal.

We recorded a phonetic questionnaire that contained simple sentences with the test words. All test words were in the phrase final position.

For studying the question about the vowel *i̯* in Russian borrowings (section 4), we also used the data from our earlier field recordings made in 2005—2013. These additional data come from two other Luuditsa speakers (a female born in 1928 and a male born in 1921), and a Jõgõperä speaker (a female born in 1932). For comparing the results with the data from the Ingrian language, we used our field recordings of Soikkola Ingrian from two female speakers born in 1924 and 1933.

Most of the recordings are dated 2011 and later; they were made with an Edirol R-09HR digital recorder and a stereo microphone (Edirol CS-15 or Sony ECM-905MS) at a 16 bit 48000 Hz sampling rate. Earlier recordings were made on a mini disk recorder Sony MZ-RH910 with external

[1] For the final reduced vowels, we use symbols *ə̂* and *ə*. These symbols correspond to *Ẹ* and *E* in (Tsvetkov 1995).

[2] The village of Luuditsa is located next to the Jõgõperä village. The contemporary Luuditsa was combined from two former villages, Liivtšülä and Luuditsa.

dynamic microphone at a 16 bit 22050 Hz sampling rate. Tokens were segmented and analysed in Praat (Boersma, Weenink 2017).

In order to verify whether the difference between the formant levels for different vowels is statistically significant, we performed a single-factor ANOVA testing the effect of the context (4 or 5 levels depending on the research question) on the vowel quality. In cases where significant difference was observed, we used post-hoc tests (Tukey HSD) to point out pairwise combinations that demonstrate the difference. The confidence level was set at 95%.

Throughout the paper, the formant values are given in Hertz; however, for plotting the vowels in the space of F1 and F2, the formant values were converted to Bark using the formula from Traunmueller (1990). The Bark scale was used in order to normalize the data in Hertz, as human perception of the frequencies is not linear.

3. Vowels *e* and *ɐ* in context after *j*

3.1. Experiment and results

In this experiment we analyzed several groups of pronunciations:
(a) forms with (*j*)*jɐ* in non-initial syllables (e.g. *ajɐtti* 'drive.IMPF.3PL', *ajjɐd* 'fence.PL'); this group is further referred to as "*jɐ*";
(b) forms with (*j*)*je* in non-initial syllables (e.g. *äjjed* 'grandfather.PL', *mejje* 'we.GEN'); this group is further referred to as "*je*";
(c) forms with the illative plural marker *jɐ* (*je*?) in non-initial syllables of back-vocalic words (e.g. *kottijɐ* 'bag.PL.ILL', *kɐjkɐʌajsijɐ* 'all.PL.ILL'); this group is further referred to as "*jɐ* (ILL)".[3]

In order to test the effect of *j* on the vowel quality, we compared the (a)—(c) groups with forms where *ɐ* and *e* were not preceded by *j*:
(d) forms with *ɐ* in non-initial syllables (e.g. *botškɐD* 'cask.PL'); this group is further referred to as "pure *ɐ*";
(e) forms with *e* in non-initial syllables (e.g. *tšiveD* 'stone.PL', *paperi* 'paper'); this group is further referred to as "pure *e*".

We expect that the influence of *j* on the following vowel is stronger in the initial part of the vowel and weaker in the final part. For this reason, we measured vowel formants in three points: one third of the vowel duration, the center of the vowel, and two thirds of the vowel duration. Three measurements help us to see the dynamics of the change in the vowel quality.

Table 1 gives the averages and standard deviation for three formants (F1, F2 and F3) in five groups of words. The table shows two measurement points: the center of a vowel (1/2) and the two thirds of the vowel duration (2/3).[4] The number of tokens is shown as N.

[3] Presumably, the group "*jɐ* (ILL)" should not be different from the group "*jɐ*". We cannot properly measure the influence of the morphological context, as we do not have enough examples with the plural illative forms of front-vocalic words, and for that reason the group "*je* (ILL)" is not examined. A minor difference in the phonological context is that "*jɐ* (ILL)" is always word-final, while "*jɐ*" is not. For this reason, we decided to include "*jɐ* (ILL)" as a separate context, and check if it is indeed similar to "*jɐ*".

[4] The "one third" measurement point is excluded not to overburden the table. This point has the strongest influence from the preceding consonant *j*, and therefore, it is less important for differentiating the vowels. The averages of F2 and F3 in 1/3 point are given in Figures 1 and 3 below.

Table 1

The average values and standard deviations (Hz) of F1, F2, and F3 measured in two points (1/2 and 2/3 of vowel duration)

Vowel type		*ɐ*		*jɐ*		*jɐ* (ILL)		*je*		*e*	
Measurement point		1/2	2/3	1/2	2/3	1/2	2/3	1/2	2/3	1/2	2/3
F1	Average	**422**	**425**	**464**	**458**	**407**	**428**	**448**	**448**	**409**	**420**
	StDev	45	44	53	52	86	95	54	62	34	48
F2	Average	**1549**	**1522**	**1773**	**1728**	**1840**	**1794**	**1818**	**1791**	**1859**	**1833**
	StDev	113	77	74	87	94	123	79	103	90	86
F3	Average	**2325**	**2303**	**2421**	**2401**	**2408**	**2363**	**2572**	**2474**	**2554**	**2510**
	StDev	154	151	116	121	165	151	106	124	112	114
N		**19**		**16**		**21**		**29**		**23**	

The first formant is the least significant for studying the difference between *ɐ* and *e*. As follows from Table 1, the average of F1 in all measurements varies in the narrow range between 407 and 464 Hz. The difference between any two averages of F1 is not statistically significant,[5] with the exception of the pairs "*jɐ*" vs "pure *ɐ*" and "*jɐ*" vs "*jɐ* (ILL)" that both demonstrate a possibly significant difference at p = 0.03 at the 1/2 measurement point.

The levels of F1 merely confirm that both *e* and *ɐ* are mid vowels. Compare, for example, with the data based on the recordings from the same native speaker in Rozhanskiy 2015: the averages of F1 are 302 for high vowel *i*, 471 for mid vowel *o*, 507 for mid-low *ə*, 628 for low *a* (all vowels were measured in non-initial syllables).

The second formant is the most important as it correlates with the vowel backness, which is the feature primarily affected by the neighbouring *j*.

Figure 1 plots the averages of F2 in three positions (1/3, 1/2 and 2/3) for five groups of vowels. It is clearly seen that the measurements are divided into two groups. The first group is represented only by the words with "pure *ɐ*". The second group covers all other words. An ANOVA showed a highly significant difference in F2 between the five groups ($p < 1*10^{-15}$). The difference between the "pure *ɐ*" and all other vowels including those in groups "*jɐ*" and "*jɐ* (ILL)" is always highly significant statistically ($p < 1*10^{-7}$). This indicates that only the pure *ɐ* is a back vowel; all other vowels including *ɐ* in context after *j* are front.

[5] We would like to make a note on the interpretation of the p-value, which is the key value in statistical analysis. Traditionally, two p-values, namely 0.05 and 0.01, are considered as "levels of significance" (e.g. Levshina 2015 : 11—12). A p-value of 0.05 indicates that we can be 95% confident that the observed difference really exists (although that still does not mean that the difference is perceivable or in other way important). Basing on our experience with Votic phonetic data, we refer to the p-values ranging between 0.05 and 0.01 as corresponding to a possibly significant difference (the difference between the subsets is not certain), p-values between 0.01 and 0.001 as corresponding to significant, and only p-values less than 0.001 as corresponding to a highly significant difference. Such interpretation allows us to reduce the number of statistical errors of Type 1 (a false rejection of the null hypothesis).

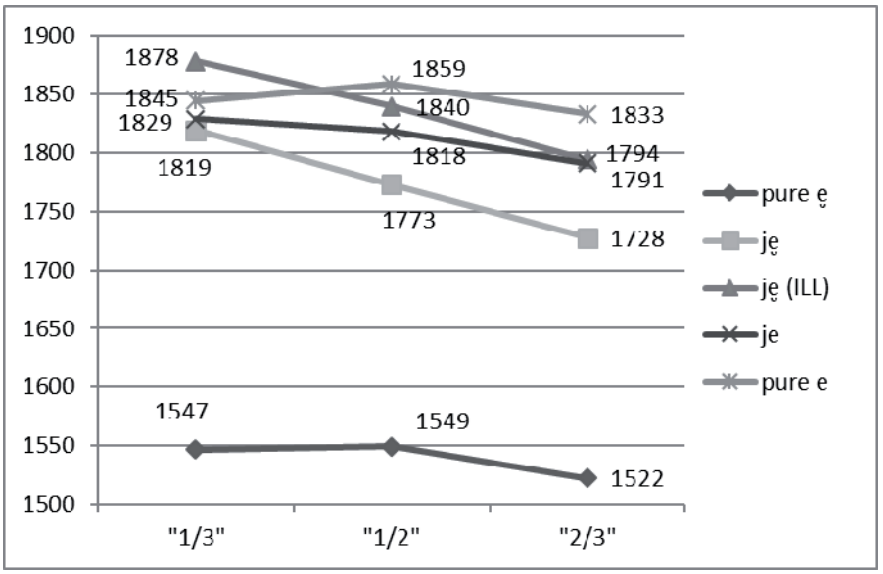

Figure 1. **The average values (Hz) of F2 measured in three points (1/3, 1/2, and 2/3 of vowel duration).**

As post-hoc testing showed, there is no statistically significant difference between the four types of vowels in the "front group" (i.e. all analyzed vowels except "pure *ę*"). The only exception is "pure *e*" vs "*ję*". For these two groups, the difference in F2 values grows from non-significant ($p = 0.80$) at the 1/3 measurement point to possibly significant at the 1/2 and 2/3 measurement points (at $p = 0.03$ and $p = 0.01$ correspondingly).

For the groups "*ję*" and "*ję* (ILL)" a tendency is visible from Figure 1: the more distant from *j* is the measurement, the more back is the vowel. For the "*ję*" group, ANOVA indicated a significant difference in F2 values between different measurement points at $p = 0.003$. Post-hoc testing showed that the difference is statistically significant only between the first (1/3) and last (2/3) measurement points (at $p = 0.002$). For the "*ję* (ILL)" group, the difference is on the border of significance: $p = 0.04$ between the first (1/3) and last (2/3) measurement points. This result is probably due to the great amount of variation between the formant measurements of the "*ję* (ILL)" group. The vowels in both groups still remain front ($F2 > 1700$ Hz) and far from the "pure *ę*" ($F2 < 1550$ Hz).

Figure 2 visualizes the location of the five vowel types in the space of F1 and F2. The ellipses outline 75% of data points.

The measurements of the third formant (see Figure 3) are the most intriguing because they distinguish *ę*-like sounds (the groups "pure *ę*", "*ję*" and "*ję* (ILL)") from *e*-like sounds (the groups "pure *e*" and "*je*") better than the second formant. The difference between *ę*-like and *e*-like vowels is always significant (or even highly significant) in the second measurement point (1/2 of the sound duration); highly significant between "pure *ę*" vs "pure *e*" and "pure *ę*" vs "*je*" ($p < 0.001$) in the first measurement point (1/3), significant between "*ję*" vs "*je*" at $p = 0.008$ in the first measurement point (1/3), and significant between "pure *ę*" vs "pure *e*" at $p < 0.001$, between "pure *ę*" vs "*je*" at $p < 0.001$, and between "*ję* (ILL)" vs "pure *e*" at

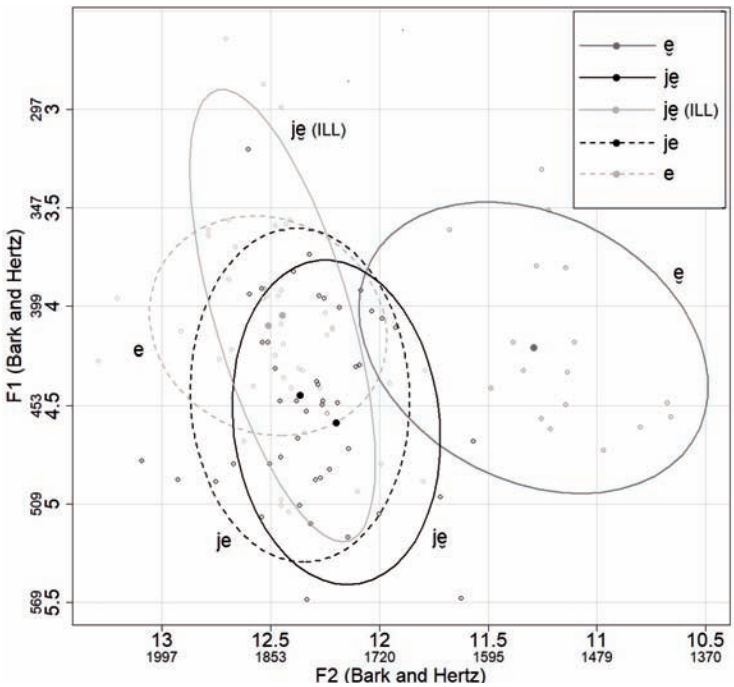

Figure 2. **The analyzed vowels in the space of F1 and F2.**

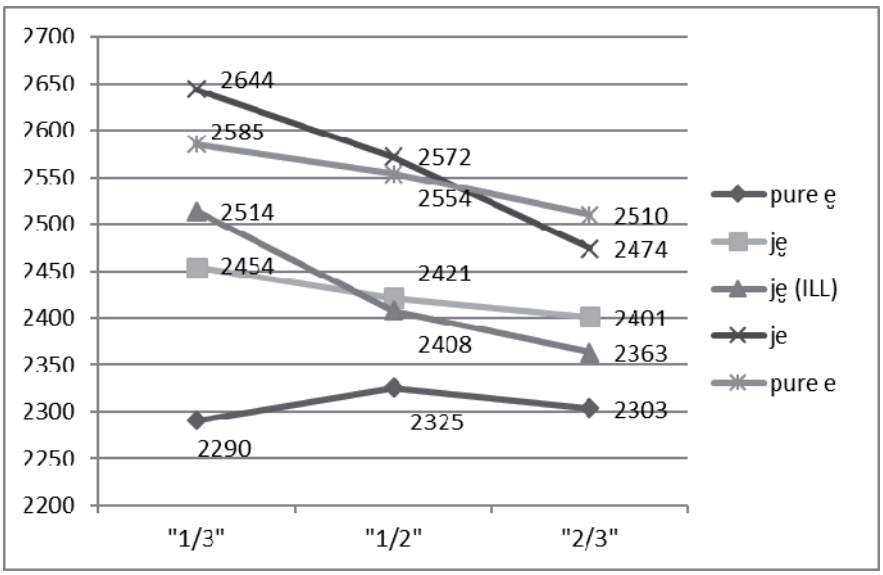

Figure 3. **The average values (Hz) of F3 measured in three points (1/3, 1/2, and 2/3 of vowel duration).**

p = 0.014 in the third measurement point (2/3). The "pure *ę*" is the most distinctive from the "pure *e*" and "*je*" groups (at p < 0.001 in all measurement points).

The only statistically significant difference between F3 of *ę*-like sounds is observed for the groups "*ję*" vs "*ję* (ILL)" at p = 0.001 in the first meas-

urement point (1/3). In the second and third measurement points (1/2 and 2/3), there are no significant differences.

Although these results show that the articulation of "*jɐ̨*" and "*jɐ̨* (ILL)" is different from the articulation of "*je*", the observed differences in F3 do not exceed 1 Bark, so it is not clear whether or not they are perceivable. The only way to properly check this would be to conduct a perception test, but this is unfortunately not possible for Votic, as there are no speakers who could work as consultants.

To sum up, the qualitative distinctions between the five analyzed vowel groups are the following:

F1: no significant distinctions;

F2: pure *ɐ̨* is a back vowel that is clearly opposed to the front vowels: the groups "pure *e*", "*je*", "*jɐ̨*" and "*jɐ̨* (ILL)".

F3: vowels in the "pure *ɐ̨*", "*jɐ̨*" and "*jɐ̨* (ILL)" groups are opposed to vowels in "pure *e*", and "*je*" groups, but this opposition is really strong only for pure *ɐ̨*.

The formant analysis has shown that the contexts "*jɐ̨*" and "*jɐ̨* (ILL)" are not opposed (the minor observed differences are too small to be perceivable). We can therefore exclude the effect of the morphological context and the position within a word and assume that the front-vocalic variant of the illative marker "*je* (ILL)" should not be different from simply "*je*" in non-first syllables.

3.2. Phonological interpretation of the experimental results

There are three possible options for how the combination of *j* with *e*/*ɐ̨* can be interpreted:

a) the position after *j* is distinctive; *e* and *ɐ̨* are treated as separate phonemes;
b) the position after *j* is not distinctive and only *ɐ̨* can follow *j*;
c) the position after *j* is not distinctive and only *e* can follow *j*;

The disadvantage of option (a) is that it ignores the phonetic similarity of *je* and *jɐ̨*.

Option (b) that was chosen by Tsvetkov (1995) least of all corresponds to the phonetic realization because in back-vocalic words, *jɐ̨* is articulated almost as *je*. Still, this approach seems reasonable from the point of view of morphophonology. It introduces two back-vocalic suffixes (genitive plural and illative plural *jɐ̨*) that do not follow vowel harmony. Votic has a number of such back-vocalic suffixes, e.g. *-sto*, *-ikko*, *-kkɐ̨in*, *-kɐ̨z*, *-skɐ̨lɐ̨*, see Ariste (1968 : 115—119), Маркус, Рожанский (2011 : 207—218). Usually they contain the vowels *o* or *ɐ̨* but never *e*.[6] However, all these suffixes are derivational, whereas *jɐ̨* is inflectional. When added to a front-vocalic stem, these derivational suffixes cause the whole stem to be analyzed as back-vocalic, which means that it further adds back-vocalic inflectional markers (cf. *tütö-**llə*** 'girl-ADALL' and *tütö+kkɐ̨jzɐ̨-**lʌlə*** '(little) girl-ADALL'). In case of the genitive/illative marker *jɐ̨*, one cannot check if it changes the stem into back-vocalic, as no suffixes can come after the case markers.

Option (c) reflects the phonetic similarity of *je* and *jɐ̨* but introduces front-vocalic case markers that do not follow vowel harmony. This is not

[6] The suffix of the indefinite pronouns *-le* should not count because it originates from the grammaticalized verb *lee-* 'to be (referring to future)'.

typical in Votic (the unpaired translative marker *-ssi* contains a front vowel, but this vowel is neutral if considering vowel harmony).

4. Vowel *ɨ*

If a vowel that occurs in borrowings does not have a counterpart in the recipient language, two ways of adaptation are hypothetically possible. The first option is that the borrowed vowel is reanalyzed into the most similar vowel from the recipient language. The second option is to imitate the original vowel (in this case, the speaker should know the donor language well enough to pronounce its sounds).

The Russian *ɨ* is a high central vowel.[7] Among the Votic non-labial vowels, those closest to *ɨ* are the vowel *ɐ* (a non-front[8] mid vowel), and the vowel *i* (a high front vowel). Since Votic has vowel harmony, the backness of the vowel is a key feature for its vocalic system. Thus, in case of reanalysis, the non-front vowel *ɐ* is the most plausible candidate for replacing *ɨ* in Russian borrowings.

4.1. Jõgõperä variety

We start with an analysis of data from the Jõgõperä speaker.

In this experiment, we compared first syllable vowels in four types of words:
(a) old Russian borrowings with *ɨ*, e.g. *rɨnkə̂* 'market', *rɨbakkə̂* 'fisherman';
(b) words with *ɐ*, e.g. *лɐnkə̂* 'wool', *ɐpɐn* 'horse', *sɐta* 'war';
(c) words with *i*, e.g. *viro* 'Estonia', *pikari* 'shot glass';
(d) words with *e*, e.g. *elo* 'life', *pere* 'family'.

As there are no reasons to expect that the quality of these vowels can be seriously influenced by the neighbouring consonants, we measured the formants only in the middle of the vowel duration.

The results of the comparison are given in Table 2 and Figure 4. The number of tokens is shown as N in Table 2. In Figure 4, the ellipses outline 75% of data points.

Table 2

The average values and standard deviations (Hz) of F1, F2, and F3 measured in 1/2 of vowel duration (Jõgõperä speaker)

	Vowel	*ɨ*	*ɐ*	*i*	*e*
F1	Average	**395**	**492**	**373**	**479**
	StDev	35	53	27	40
F2	Average	**1485**	**1491**	**2284**	**2329**
	StDev	165	130	253	133
F3	Average	**2530**	**2655**	**2930**	**2938**
	StDev	176	226	146	132
N		**10**	**22**	**22**	**20**

[7] Phonologically, Russian vocalism distinguishes front, central, and back vowels, while Votic (as a language with vowel harmony) has a vocalic system based on binary opposition: front vs back vowels.

[8] Phonetically, *ɐ*, like *ɨ*, is rather a central vowel, but from the phonological point of view, it is a back vowel.

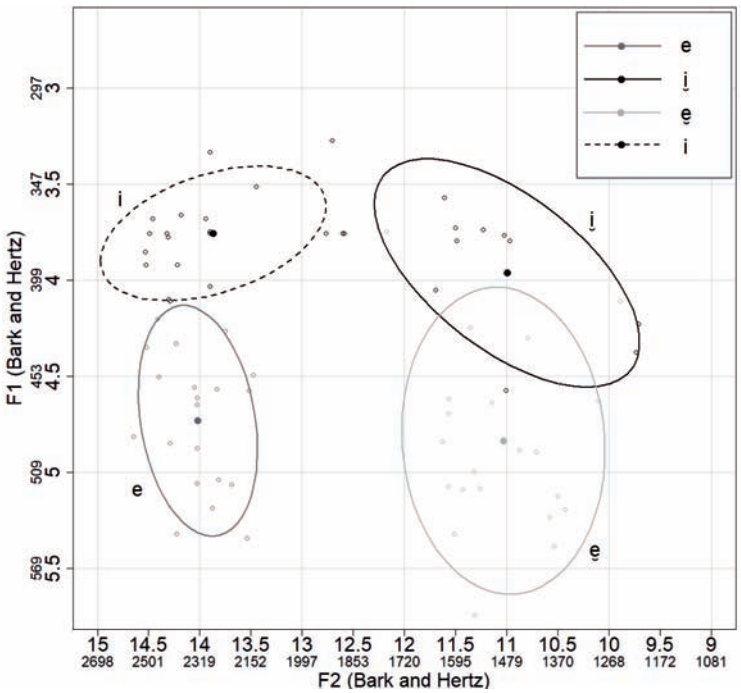

Figure 4. **The vowels *ị*, *ẹ*, *i* and *e* in the space of F1 and F2 (Jõgõperä).**

It is clearly seen that in the data from the Jõgõperä speaker, vowel *ị* is a high vowel. As is the case with *ẹ*, it is not a front vowel (there is no statistically significant difference between the values of F2 for *ị* vs *ẹ*), but the difference between the average F1 values (395 vs 492 Hz) is highly significant ($p = 1 * 10^6$). Judging by these results, there is no doubt that *ị* is a separate vowel in this idiolect.

It is hard to tell precisely why the borrowings like *rẹbaǩ* 'fisherman' or *rẹnǩ* 'market' are spelled with *ẹ* in the dictionary by Tsvetkov (1995). Possibly, in the beginning of the 20th century the speakers did not know Russian well enough and were indeed reanalyzing *ị* into *ẹ*. It might also be that Tsvetkov decided to ignore some differences in pronunciation (the same was later done in our grammar (Маркус, Рожанский 2011)).

Anyways, introducing the Russian *ị* into the Votic phonology looks very natural: *ị* fits nicely as a back counterpart for the high front vowel *i*, and the vocalic system becomes fully symmetrical (see Table 3).

Table 3

Vocalism of Jõgõperä Votic

	Front		Back	
	unrounded	rounded	unrounded	rounded
High	i	ü	ị	u
Mid	e	ö	ẹ	o
Low	ä		a	

4.2. Luuditsa variety

The same phonetic experiment comparing words with four different vowels in the first syllable was conducted with the data from the Luuditsa speaker. The results are presented in Table 4 and Figure 5.[9]

Table 4

The average values and standard deviations (Hz) of F1, F2, and F3 measured in 1/2 of vowel duration (Luuditsa speaker)

	Vowel	*i̯*	*e̯*	*i*	*e*
F1	Average	**364**	**447**	**334**	**461**
	StDev	36	38	27	33
F2	Average	**1784**	**1425**	**1922**	**1734**
	StDev	161	136	114	122
F3	Average	**2334**	**2435**	**2465**	**2564**
	StDev	144	112	172	122
N		**30**	**31**	**34**	**41**

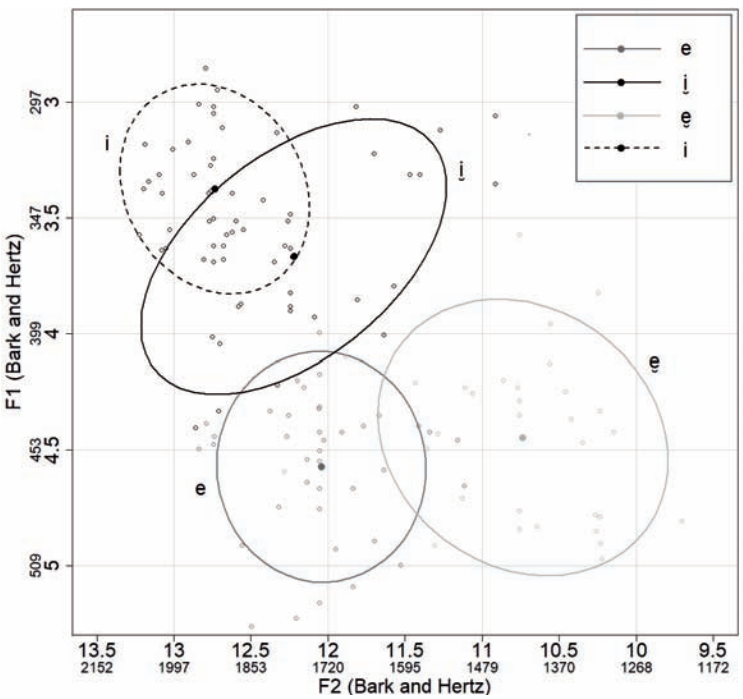

Figure 5. **The vowels *i̯*, *e̯*, *i* and *e* in the space of F1 and F2 (Luuditsa).**

The first formant indicates that *i̯* and *i* are high vowels, while *e̯* and *e* are mid vowels. The difference in F1 values between any high

[9] Note the difference in the formant values for the first syllable vowel *e* as compared with Table 1 that gives the measurements for the second syllable *e*. In the first syllable, *e* is more open and slightly less front.

vowel and any mid vowel is highly significant ($p < 1*10^{-11}$). There is no statistically significant difference between F1 of *ɐ̟* vs *e* ($p > 0.05$), but *i̟* is slightly more open than *i* (364 vs 334 Hz) and this difference is statistically significant ($p = 0.003$). At the same time, it is less than 1 Bark, so the difference is probably not perceivable.

The second formant gives results different from those that we had for the Jõgõperä speaker. The values of F2 show that for the Luuditsa speaker, the only vowel, which is not front, is *ɐ̟* (F2 = 1425 Hz). The vowel *ɐ̟* is crucially different by F2 from other vowels (at $p < 11*10^{-11}$). The most front vowel is *i* (F2 = 1922 Hz). The vowels *i̟* and *e* are slightly less front (there is no significant difference between their F2). The vowel *i* is different from *i̟* (at $p = 0.00005$).

The third formant is less informative for the current study. The difference in F3 values was only observed for the pairs *i̟* vs *e* (at $p < 0.001$) and *ɐ̟* vs *e* (at $p = 0.02$).

Thus, the Luuditsa speaker articulates the vowel *i̟* differently from the other three vowels, but the biggest difference is between *i̟* and *ɐ̟*, and the vowel most similar to *i̟* is *i*.

This result is unexpected, for we assumed that *i̟* either merges with *ɐ̟* or remains similar to the original Russian *i̟* (which is not a front vowel and its F2 is approximately 1500 Hz, cf. with the values in Table 2 from the Jõgõperä speaker).

Looking for an explanation for these unexpected results, we turned our attention to the Russian pronunciation of the same Luuditsa speaker. One of the possible reasons why a speaker cannot preserve the characteristics of the original vowel in borrowed words is when (s)he is not able to pronounce the vowel of the donor language correctly. We measured formant values in 19 Russian words with *i̟* in the first syllable: forms of the verb *bi̟tʹ* 'to be' and verbal forms with the prefix *vi̟-* (e.g. *vi̟vozitʹ* 'to take away').[10] The averages of the formants and standard deviations were the following: F1 = 394 Hz (StDev = 42), F2 = 1303 Hz (StDev = 139), F3 = 2370 Hz (StDev = 170).

Judging by the formant values, the vowel *i̟* in the Russian speech of the Luuditsa Votic speaker is a high non-front vowel. Thus, there are no evident reasons why *i̟* in the Votic speech of the same speaker is a front vowel similar to *i*. It could have remained similar to the original Russian vowel, or it could have been reanalyzed into *ɐ̟*, but none of these took place.

Next, we tested a hypothesis putting forth that the front *i̟* is an individual feature of only this particular speaker. We measured the formant values of *i̟* in Russian borrowings recorded from two other speakers of Luuditsa Votic.

Table 5 presents the average formant values and standard deviations of *i̟* in Russian borrowings from all three Luuditsa speakers. The two right-

[10] The original set of test words included also several derivatives of the Russian verb *žitʹ* [*ži̟tʹ*] 'to live'. However, we later excluded the measurements of these forms because we discovered that the speaker pronounces the first vowel in *žitʹ* as *i*. This curious finding means that the Russian pronunciation of this speaker is based on the official orthography rather than on the spoken language (these Russian forms are spelled with *i* but pronounced with *i̟*).

most columns show the distance from the corresponding average F1 and F2 values of the Votic vowel *ɐ* measured from the same speakers.

Table 5

The average values and standard deviations (Hz) of F1, F2, and F3 for the vowel *i̯*, and the distance from *ɐ* (Luuditsa speakers)

Speaker			N	Vowel	*i̯*			*ɐ* vs *i̯*	
	(gender)	born in			F1	F2	F3	ΔF1	ΔF2
1	(m)	1928	30	Average	**364**	**1784**	**2334**	83	359
				StDev	36	161	144		
2	(f)	1928	18	Average	**457**	**1769**	**2471**	91	217
				StDev	27	117	253		
3	(m)	1921	8	Average	**441**	**1718**	**2193**	127	477
				StDev	29	119	144		

As Table 5 shows, the articulation of *i̯* is not exactly the same for all speakers. In particular, in the words pronounced by the first speaker, *i̯* is more close (F1 = 364 Hz) compared to the other speakers. Still, all the speakers have a clear contrast in F1 between *i̯* and *ɐ* (cf. ΔF1). There are also differences in F3 values that are possibly significant statistically ($0.01 < p < 0.05$).

At the same time, there is no significant difference in F2 of *i̯* between the speakers. Although the first speaker has some individual features (for example, in his articulation, the front vowels *e* and *i* are shifted backwards compared to other speakers), for all the speakers, the vowel *i̯* is considerably more front than *ɐ* (cf. ΔF2). Thus, the hypothesis that the front-shifted *i̯* is a specific feature of the first speaker was not confirmed.

The only hypothesis that could explain the "*i*-like" articulation of *i̯* by the Luuditsa Votic speaker is that he pronounces the Russian borrowings in Ingrian style.

The Ingrian language (a northern Finnic language) has had direct contact with Votic for centuries, as the area of distribution was very compact. In the 20th century, all westernmost Votic villages (including Jõgõperä and Luuditsa) also had some Ingrian population. The degree of contact-induced influence was different in each village. In particular, Jõgõperä Votic demonstrates considerably less Ingrian influence than Luuditsa Votic (see a detailed comparison in Rozhanskiy, Markus 2015).

The main difference of the Ingrian vocalic system (see Table 6) from Votic is that it does not have the vowel *ɐ* (consequently, Ingrian has two neutral vowels if considering vowel harmony: *i* and *e*). In the Ingrian system, the nearest vowel to the Russian high non-front *i̯* is the high front vowel *i* because the non-front *a* is too low, and the non-front *u* is rounded.

Table 6

Vocalism of Soikkola Ingrian

	Front		Back	
	unrounded	rounded	unrounded	rounded
High	i	ü		u
Mid	e	ö		o
Low	ä		a	

The dictionary by Nirvi (1971 : 476, 478, 585) spells the Russian borrowings originally containing *į* with the vowel *i* (*riʙakka* 'fisherman', *rinᴅka* 'market', *tikva* 'pumpkin'), which suggests that Ingrian speakers replace the Russian *į* with *i*. In order to test this, we measured the corresponding vowel in the same Russian borrowings recorded from two speakers of Soikkola Ingrian (northern varieties).

Table 7 presents the formant values for the vowel corresponding to the Russian *į* in the pronunciation of two Ingrian speakers parallel with the values from our main Votic speaker.

Table 7

The average values (Hz) and standard deviations of F1, F2, and F3 for the vowel corresponding to the Russian *į* (Luuditsa Votic and Soikkola Ingrian speakers)

Speaker (gender), born in	N		F1	F2	F3
Votic (m) 1928	30	Average	**364**	**1784**	**2334**
		StDev	36	161	144
Ingrian (f) 1924	26	Average	**349**	**2249**	**2872**
		StDev	37	130	217
Ingrian (f) 1933	22	Average	**398**	**1812**	**2451**
		StDev	34	132	196

The formant values suggest that the first Ingrian speaker pronounces the vowel corresponding to the Russian *į* as a usual *i* (cf. for example with the formant values for *i* from Jõgõperä Votic speaker in Table 2: F1 = 373, F2 = 2284, F3 = 2930).

The second Ingrian speaker articulates the corresponding vowel very similarly to the Luuditsa Votic speakers (cf. formant values in Table 5). This finding supports the hypothesis of contact-induced influence.

Apparently, the front-shifted *į* of the Luuditsa Votic speaker is the result of "double borrowing": the discussed Russian words were not taken directly from Russian, but borrowed from Ingrian. It does not mean that these words were not borrowed from Russian into Votic at all. Rather, we observe a "modern layer": an old borrowed word has been replaced with the same word (more precisely, with another variant of pronunciation of the same word) borrowed from another language.[11]

5. Conclusions

This research shows that although in Luuditsa Votic the phonetic realization of *e* and *ę* after *j* is similar, it is still not identical. Therefore, a spelling based on phonological transcription should distinguish *e* and *ę* after *j*. An interpretation that considers the position after *j* as not distinctive and spells only *ę* after *j*, is morphophonologically oriented but rather far from real articulation. An interpretation that spells only *e* after *j* is phonetically oriented but levels out the distinction that is still visible, at least in Luuditsa Votic.

[11] Compare for example with the word *kejf* "high, thrill" borrowed into Russian from Arabic (possibly through Turkish) that was later replaced with the word *kaif*: the same word but this time borrowed through Central Asian Turkic languages.

The case study of the vowel *i̯* shows that Votic has borrowed a vowel from the Russian language. Typologically, this process is much less common than borrowing of consonants, cf. Matras (2007 : 37). Jõgõperä Votic has adopted the vowel directly from Russian and fitted it nicely into the Votic vocalic system. In Luuditsa Votic, a "double borrowing" has taken place: the Russian words were borrowed through Ingrian, so the vowel *i̯* was transformed into an *i*-like sound.

These findings bring more evidence showing that in the area of active language contacts, the phonology of a language can undergo unexpected changes. In contemporary research, attention is mostly focused on contacts between two languages, but a situation involving three or more languages is more complex.

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Abbreviations

ADALL — adessive-allative, GEN — genitive, ILL — illative, IMPF — imperfect, PL — plural.

REFERENCES

A r i s t e, P. 1968, A Grammar of the Votic Language, Bloomington—The Hague (UAS 68).

B o e r s m a, P., D. W e e n i n k, D. 2017, Praat: doing phonetics by computer [Computer program]. Version 6.0.30, retrieved 22 July 2017 from http://www.praat.org.

L e v s h i n a, N. 2015, How to Do Linguistics with R. Data Exploration and Statistical Analysis, Amsterdam—Philadelphia.

M a t r a s, Y. 2007, The Borrowability of Structural Categories. — Grammatical Borrowing in Cross-Linguistic Perspective, Berlin—New York, 31—73.

N i r v i, R. E. 1971, Inkeroismurteiden sanakirja, Helsinki (LSFU XVIII).

R o z h a n s k i y, F. 2015, The Length of Final Vowels with Respect to Case Syncretism in Luuditsa Votic. — LU LI, 100—133.

R o z h a n s k i y, F., M a r k u s, E. 2015, Dialectal Variation in Votic: Jõgõperä vs. Luuditsa. — ESUKA 6 (1), 23—39.

T r a u n m u e l l e r, H. 1990, Analytical Expressions for the Tonotopic Sensory Scale. — The Journal of the Acoustical Society of America, Vol. 88 (1), 97—100.

T s v e t k o v, D. 1995, Vatjan kielen Joenperän murteen sanasto. Toimittanut, käänteissanaston ja hakemiston laatinut J. Laakso, Helsinki (LSFU XXV. Kotimaisten kielten tutkimuskeskuksen julkaisuja 79).

М а р к у с Е. Б., Р о ж а н с к и й Ф. И. 2011, Современный водский язык. Тексты и грамматический очерк. Том II. Грамматический очерк и библиография, Санкт-Петербург.

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НЕОГУБЛЕННЫЕ ГЛАСНЫЕ СРЕДНЕГО И ВЕРХНЕГО ПОДЪЕМА В ЛУЖИЦКОМ ДИАЛЕКТЕ ВОДСКОГО ЯЗЫКА

Статья посвящена двум вопросам, касающимся структуры водского вокализма, а именно:
(1) происходит ли нейтрализация оппозиции гласных *e* и *ɐ* в позиции после *j*;
(2) сохранился ли в современном водском языке заимствованный из русского гласный *ɨ* или он слился с одним из водских гласных (предположительно *ɐ*).
В качестве материала использованы записи, сделанные авторами статьи в процессе полевой работы в водских деревнях Лужицы и Краколье. При помощи методов фонетического анализа в статье сравнивается качество исследуемых гласных.

Проведенный анализ показывает, что *ɐ* в позиции после *j* фонетически очень близок к *e*, но все же не идентичен ему (прежде всего, за счет отличия F3). Таким образом, полной нейтрализации гласных *e* и *ɐ* в позиции после *j* не наблюдается.

Для исследования гласного *ɨ* сопоставляются данные, полученные от двух носителей разных говоров водского языка: кракольского и лужицкого. В обоих случаях гласный *ɨ* в русских заимствованиях не слился полностью с каким-либо водским гласным. У носителя кракольского говора гласный *ɨ* сохранил свои фонетические характеристики и занял «свободное» место в водском вокализме, став непередним гласным верхнего подъема и составив условную пару по ряду верхнему переднему гласному *i*. У носителя же лужицого говора гласный *ɨ* приблизился к *i*. Единственной гипотезой, объясняющей такую странную адаптацию русского гласного при заимствовании, становится предположение о «двойном заимствовании». В деревне Лужицы в XX веке проживало немало ижор. Ижорский вокализм отличается от водского, прежде всего, отсутствием гласного *ɐ* (сингармонически парного *e*), что делает гласный *i* наиболее близким к русскому *ɨ*. В речь водского носителя проникло произношение русских заимствований, характерное для ижор, трансформировавших русский гласный *ɨ* в *i*-образный звук.