

Root vowel changes in Chechen

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NOTE: this is a working paper that has never been published nor submitted for publication. It waits for better times and it particularly waits for an in-depth check with a native speaker.

1 Introduction

In the Chechen language the root vowels of verbs, nouns and several other word-classes can change as a result of suffixes that are attached. Some researchers have regarded changes to the root vowels of the Chechen verb as the results of assimilation: a vowel in the suffix causes the root vowel to assimilate (Услар 1888, Мациев 1961). Nichols noted that the system of root vowel changes – especially for nouns – is more complex, and posits that the changes are triggered by vowels in the suffixes, which subsequently may have dropped out (Nichols 1994, 1997, 2004, 2006). She also noted that there might be different grades of rounding and fronting that depend on dialects.

In this paper I would like to review the root vowel changes that take place in different word-classes. I am presuming that the phonological processes that cause assimilation are the same throughout different word-classes. I will show that in many instances there is no correlation between the root vowel change and the form of the suffix. Restricting myself to a synchronic look at the matter, I will come up with an alternative description for the assimilation. I will suggest that suffixes can have an autosegmental feature attached to it, which is the real trigger for the assimilation to occur. I will also show where there still are difficulties left.

After a brief overview of the Chechen vowel system I will review the places where root vowel assimilation works as one would expect, and then I will show where the assimilation is no longer in correlation with the vowels in the suffix. For several different word-classes I will then review instances where the root vowel changes as a result of adding a suffix to the root. At each instance I will try to describe what happens, note where this contradicts current explanations, offer an explanation using suffixes that have an autosegmental feature attached to it, and point out where my explanation is still insufficient.

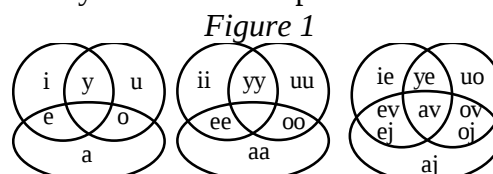
In the discussion at the end I will explain what we have learned about the assimilation processes taking place in the different word-classes so far, and I will point at what still needs to be worked out.

2 The Chechen vowel system

In this section I will give a small overview of the Chechen vowel system based on my own observations (Komen 1996). I will only focus on the matters that will be relevant to the observations about root vowel assimilation further on in this paper.

Throughout this paper I will be using the practical (phonemic) orthography that was devised for the Chechen language in 1994, and which is explained in appendix 12.1.

The Chechen language basically has a symmetric system consisting of 6 vowels /i/, /y/, /e/, /u/, /o/, /a/ that can be either short or long, as is shown graphically in Figure 1 (the vowels here are written in the practical orthography, except when they occur between phonemic slashes, where I will use IPA notation).



Note that in this figure the circles indicate the natural groupings of vowels for the Chechen language: (1) fronted vowels (*i, y, e*), (2) rounded vowels (*y, u, o*) and (3) low vowels (*e, o, a*).

When the short *a* in Chechen occurs unstressed, it usually is realized as a schwa, or signifies just the releasing of a consonant. Long vowels are shortened in closed syllables and sometimes are not discernable from their short counterparts. Chechen also has diphthongs, but not all combinations are possible. Chechen has 3 diphthongs that start with a [+high] vowel: /ie/, /ye/ and /uo/. These diphthongs are short in closed syllables (then they are rising) and long in open syllables (then they are falling). See Nichols (1994, 1997) for an alternative analysis of these diphthongs (Nichols makes a phonemic difference between short and long *ie*, *ye* and *uo*). Chechen also has 6 diphthongs that end in a [+high] vowel: /au/, /ey/, /ou/, /ai/, /ei/, /oi/. In the practical orthography used in this paper these diphthongs are written respectively as follows: *av*, *ev*, *ov*, *ej*, *oj*, *aj*. There are a few places where the practical orthography deviates from what a linguist familiar with the IPA would expect, which is shown in Table 1:

Table 1

Practical orthography	IPA	Phoneme
<i>ev</i>	[øy]	/ey/
<i>aev</i>	[æy]	/ey/
<i>ov</i>	[ou]	/ou/

In the practical orthography a separate symbol ‘*ae*’ for the vowel [æ] is used, even though this vowel actually is an allophone of /ee/ and /e/, depending on the conditioning environment. It is an allophone of the long vowel /ee/ when this vowel occurs in a closed syllable. But it also is an allophone of the short vowel /e/ when this vowel is preceded by /w/ or /hw/. The phoneme /au/ is disputable. Many of the words that were in the past written with the vowel *av* are now written with a vowel *ov*, and I haven’t done an investigation to see whether there is a phonemic difference between /au/ and /ou/. One more comment about the vowel written as *aev* (this is the diphthong [æy]), in words like *dwaevshie*, *nwaevla*, *hwaevda*, *hwaevhwie*, *chwaevrag*. Underlying this diphthong is an allophone of /ey/ occurring in a syllable preceded by a pharyngeal fricative. Note that in the practical orthography used in this paper, the pharyngeal fricative on its own is /hw/, and when it follows after a consonant, it is represented simply as /w/.

The long vowels and the diphthongs can be regarded as being built up by a sequence of two vowels. The vowels in turn can be regarded as having three distinctive features: [front], [round] and [high]. This is shown in Table 2.

Table 2

	<i>i</i>	<i>e</i>	<i>a</i>	<i>o</i>	<i>u</i>	<i>y</i>
Front	+	+	-	-	-	+
Round	-	-	-	+	+	+
High	+	-	-	-	+	+

The presence or the absence of the three distinctive features is indicated by a + or a – in this table. Using this table of distinctive features it becomes clear what happens when for instance the vowel *i* is rounded. Its features were {+, -, +}, but because of the rounding now become {+, +, +}. These features are the characteristics of the vowel *y*. So under the influence of rounding the vowel *i* changes into *y*.

It has been argued that the Chechen vowel system can be divided into two sets (Nichols 1994:6, 1997:945). The first set comprises the vowels that are more basic to the Chechen language in that they are the ones that can occur in unmarked roots (they are also the ones that are consistent throughout different dialects as Nichols observed – 1997:956). These vowels are: *i*, *ii*, *a*, *aa*, *u*, *uu* and the diphthongs *ie*, *uo*. The second set of vowels is reported to only exist as the result of roundness or fronting assimilation processes. These vowels are: *e*, *ee*, *y*, *yy*, *o*, *oo* and the diphthong *ye*.

3 Assimilation basics

Having explained the basics of the Chechen vowel system, we can now take a closer look at some of the more predictable root vowel changes that occur when suffixes are added.

3.1 Predictable behavior

According to several scholars there is (or historically used to be) a correlation between the first vowel in the suffix and the kind of root vowel changes that take place in the root of the verb (Beerle 1986, Nichols 1994, 1997). A front vowel in the suffix causes a root vowel to be fronted, and a rounded vowel in the suffix causes the root vowel to be rounded¹. If there were an unmarked vowel in the suffix, then no root vowel changes would occur. All of these instances are shown in example (1) for the verbs *daaqqa* ‘extract’ (singular object) and *daaxa* ‘extract’ (plural object).

- 1) *daaqq-* + *-i* → *daeqqi*
daax- + *-u* → *dooxu*
daax- + *-hw* → *daaxahw*

The first suffix *-i* is the recent past tense marker. The vowel *i* is a front vowel, which causes the long *aa* to be transformed into a long *ee*. This phoneme is realized as a vowel *ae* in a closed syllable and written as such in the practical orthography. The second suffix *-u* is one of the present tense markers. The vowel *u* is a [+round] vowel, supposedly causing the long *aa* in the root to turn into a long *oo*. The third suffix *-hw* doesn’t have a vowel and therefore wouldn’t cause the root to change. Note that the vowel *a* is inserted between the root ending *x* and the suffix *hw* for phonological reasons.

If all that happens in Chechen looks like example (1), there would be a complete correlation between the roundness or the frontness of the first vowel in the suffix, and the root vowel being rounded or fronted.

3.2 Where it goes wrong

However, correlation between the vowel in the suffix and the resulting root vowel is not always there. A rounded suffix does not always cause the root vowel to become rounded too, as can be seen in example (2).

- 2) *daax-* + *-u* → *dooxu*
daax- + *-uo* → *daaxuo*
muott- + *-u* → *myettu*

The present tense suffix *-u* attached to the verb *daaxa* ‘to extract (plural)’ becomes *dooxu*, so the root vowel is rounded, as expected. But the direct causative² suffix *-uo* when attached to the same verb does not cause any assimilation to happen. The present tense of the verb *muotta* ‘to reckon’ becomes *myettu*. So the root vowel *uo* is fronted (instead of rounded) when the [+round] present tense suffix *-u* is added to it.

A suffix with a [+front] vowel does not always cause the root vowel to become [+front] either, as can be seen in example (3).

- 3) *daax-* + *-i* → *deexi*
daax- + *-iita* → *daaxiita*
ghazh- + *-iin* → *ghozhmiin*

The recent past tense suffix *-i* is a front vowel, and its front feature assimilates the root of the verb *daaxa* ‘to live’ to become a front vowel too. The root of the same verb *daaxa* however does not change under the influence of the [+front] vowel *ii* in the causative suffix *-iita*. And when the noun *ghazh* ‘stick’ is inflected in the genitive plural case, there is a [+front] vowel *ii* in the suffix *-iin*, but the root vowel is rounded into an *o* instead of being fronted.

When a suffix without vowels, or with unmarked vowels (the vowel *a* is usually the unmarked one) is added to a root, the root vowel does not always stay unmarked, but sometimes becomes fronted or rounded, as is shown in example (4).

- 4) *daax-* + *-hw* → *daaxahw*
daax- + *-a* → *deexa*
itt- + *-zza* → *yttazza*

¹ Beerle (1986), looking only at verbs, suggested that the opposite could be true: that a rounded present tense ending of the verbs could be the result of a rounded root vowel.

² The term “direct causative” is from Nichols (1994). The suffix causes an intransitive verb to become transitive.

When the conditional suffix *-hw* is added to the verb *daaxa* ‘to live’, the result is *daaxahw*, so no assimilation occurs to the root vowel, as one would expect. But when the present tense suffix *-a*, which is an unmarked vowel, is added to the same root ‘to live’, then the root vowel is fronted to become an *ee*. And when the suffix *-zza*, which outwardly seems to be unmarked too, is added to the count noun *itt* ‘ten’, then the resulting *yttazza* has a root that is rounded.

A summary of the matches and mismatches is shown in the appendix in Table 17.

3.3 The way forward

Now that we have noted the mismatches between the vowels in the suffixes and the assimilation taking place, we should more systematically review where assimilation due to suffixes occurs in the Chechen language, and we should try to describe what is happening in a better way. There are some questions we should ask ourselves:

- What assimilation takes place?
- What is the source of the assimilation? To what suffix is it attached?
- How can we describe what is going on?
- Is assimilation different in different word-classes?
- Is assimilation different in derivational suffixes than in inflectional suffixes?

In the following sections I would like to review several different occurrences of assimilation, and each section will focus on the occurrences in one particular word-class. I will draw attention both to inflectional as well as derivational suffixes causing assimilation. It is not my intention to treat *all* occurrences of assimilation in the Chechen language in this paper.

4 Assimilation in Count Nouns

The first word-class where I would like to look for assimilation is the count noun. We won’t look at the inflection of the count nouns for cases, because later on we will look at noun case inflection in general. There are two different derivational suffixes that can be attached to count nouns causing roundness assimilation (count nouns can take more derivational suffixes, but these don’t cause frontness assimilation). We will mainly look at one of these – the suffix *-zza*.

4.1 Count noun to adverb

When the suffix *-zza* ‘times’ (e.g. turning ‘two’ into ‘twice’) is attached to a count noun (turning it into an adverb), contrary to expectations roundness spreads backwards to the count noun root (an overview of the roundness assimilation caused by this suffix can be found in the appendix in Table 18). When the original count noun ends in a consonant, an additional vowel *a* is inserted between the root and the suffix³. This is for phonological reasons. If no vowel were inserted between the root and the suffix, there would be a cluster of at least three consonants (the double *zz* preceded by the count noun’s word-final consonant or consonants). Such consonant clusters are not allowed in Chechen. Some examples of the roundness assimilation that follows the regular pattern as given in paragraph 0 are given in (5):

- | | | | |
|----|------------------|-----------------------|----|
| 5) | <i>vorh</i> | - <i>vorhazza</i> | 7 |
| | <i>iss</i> | - <i>yssazza</i> | 9 |
| | <i>jaalxitta</i> | - <i>joolxyttazza</i> | 16 |
| | <i>pxi'</i> | - <i>pxy'azza</i> | 5 |

Note that when the suffix *-zza* is attached to *jaalxitta* ‘16’ roundness affects the **two** preceding syllables, resulting in: *joolxyttazza*. This shows that (at least in count nouns) rounding assimilation can spread through more than one syllable.

Note too, that the roundness spreading taking place is not related to the surface form of the suffix. There is no [+round] vowel in the suffix that could have caused the spreading to occur. Rather than presuming that the suffix has a rounded vowel that drops off after having passed through its [+round] feature, I would

³ Alternatively one could argue, that the suffix is *-azza*, and that the first *a* is deleted when this suffix is attached to a count noun ending on a vowel. This alternative does not change the arguments made about root vowel changes.

like to posit that the suffix has a suprasegmental [+round] feature attached to it. I suggest indicating the presence of such a suprasegmental feature by adding a raised capital R to the suffix. This is in conformity with the notation used to describe suprasegmentally-attached tones to suffixes (Actually I cannot find any reference to this notation).

For numbers whose root ends in a vowel, the suffix *-zza^R* is attached straight forward, not requiring an additional vowel between the root and the suffix. This is shown in (6):

- 6) *tq'a* - *tq'ozza* 20

With some of the count nouns ending on a vowel the roundness assimilation is not completely regular. The vowel *o* that is already [+round] can be heightened⁴ into *u*, the vowels *ee* and *i* can become rounded as *oo* and *o*, losing their [+front] feature. The same is true for some of the numbers ending on a glottal stop. Instead of the glottal stop being treated as a consonant as shown in example (5), the glottal stop is deleted, and the count noun is treated as if it were ending on a vowel. Examples of these inconsistencies are given in (7):

- 7) *shi'* - *shozza* 2
qo' - *quzza* 3
bwee - *bwoozza* 100

Some of these inconsistencies might be explained by arguing that the underlying root of the count nouns is not the same as the nominative singular of the count noun. This will be discussed for nouns in general in section 7. Interestingly the suffix *-lgha* (e.g. changing 2 into 2nd) gives less inconsistent results, as shown in example (8).

- 8) *shi'* - *shoolgha* 2
qo' - *qo'algha* 3
bwee - *bwoolgha* 100

Showing almost the same inconsistencies as with the suffix *-zza* for the numbers 2 and 100, a more regular behavior surfaces when *-lgha* is attached to the number 3. The glottal stop is not deleted, and the rounded mid vowel *o* is not heightened to *u*.

For most of the numbers between 10 and 20 the root vowel does not change under the influence of the *-zza^R* suffix. Examples are given in (9):

- 9) *vyrhitta* - *vyrhittazza* 17
ezar - *ezarzza* 1000

The spreading of roundness in these numbers may not take place because the root has already been influenced by frontness assimilation. For instance the number *vyrhitta* '17' is a contraction of *vorh* '7' and *itt* '10', where the *o* in the root is changed to *y* under the influence of the *i* in the number *itt*. On the other hand in the number *jaalxitta* the vowel *aa* has not been influenced by frontness assimilation, and may for that reason be open to the influence of roundness spreading.

Unfortunately this explanation does not answer the question why *ezar* remains unchanged, nor does it explain why the number 17 does not become **vyrhyttazza*.

When the suffix *-lgha* is added to a count noun, this turns into an adjective. For instance the count noun *tq'a* 'twenty' turns into *tq'olgha* 'twentieth' when the suffix *-lgha^R* is added to it. With very few exceptions the suffix *-lgha* 'ieth' (e.g. turning twenty into twentieth), behaves just like the *-zza^R* suffix. A more complete overview is given in the appendix, in Table 18.

4.2 Count noun root vowel changes

We could ask ourselves the question whether the phonological changes to the root vowel when it is assimilated for rounding are the same throughout the word-classes. For that reason I present Table 3, where the root vowel changes due to the suffix *-zza^R* and *-lgha^R* are listed.

⁴ Nichols noted that there are three assimilation processes at work in Chechen: rounding, fronting and raising (Nichols 1997:947). I refer to this last one as heightening.

Table 3

Rounding assimilation in Count Nouns				
Root vowel	Becomes	Example		Meaning
<i>a</i>	<i>o</i>	<i>barh</i>	<i>borhazza</i>	'eight'
<i>aa</i>	<i>oo</i>	<i>jaalx</i>	<i>joolxazza</i>	'six'
<i>ee</i>	<i>oo</i>	<i>bwee</i>	<i>bwoozza</i>	'hundred'
<i>i</i>	<i>y</i>	<i>iss</i>	<i>yssazza</i>	'nine'
<i>ii</i>	<i>yy</i>	<i>shiitta</i>	<i>shyyttazza</i>	'eleven'
<i>o</i>	<i>o</i>	<i>vorh</i>	<i>vorhazza</i>	'seven'
<i>o</i>	<i>u</i>	<i>qo'</i>	<i>quzza</i>	'three'

Most of the changes are what we would have expected when looking at the distinctive feature matrix presented in Table 2. Two notable deviations spring out. First the change from *ee* to *oo*. In this case the vowel *ee* is not only turned into a [+round] vowel, but it also changes from [+front] to [-front], while retaining its [-high] feature. Second the change from *o* to *u*. The *o* is already [+round], but under the influence of rounding assimilation it now changes from [-high] to [+high]. Note that this phonological change does not occur for all count nouns – the root vowel *o* is retained when *vorh* changes to *vorhazza*.

4.3 Summary for count nouns

In summary we can draw the following conclusions for the assimilation observed in count nouns:

- It is the suffix that triggers the root vowel change.
- The form of the suffix is not related to the type of root vowel change (an unmarked suffix still causes assimilation)
- Roundness assimilation can pass through more than 1 syllable.
- Roots that are already influenced by one kind of assimilation are not open to another kind of assimilation.
- Some roots are not rounded as would be expected.
- In some cases a rounded vowel gets heightened when a suffix is added that normally causes rounding.

5 Assimilation in Verbs

I have touched upon the verbs already in section 3, but in this section we will more methodically review the occurrences of assimilation caused by adding a suffix to the verb.

The Chechen verbs form a closed class – there is a finite number of basic verbs⁵. Chechen has verbs with roots of type CV and CVC (Nichols 1997:964). Most of the verbs have CVC roots, but there are a number of verbs with CV root. The infinitive is marked by nasalisation on the root vowel in CV roots and by adding a nasalised *-ã* to the root of CVC verbs. By convention the nasalisation is only shown in the orthography for the verbs with a CV root (Джешериев 1967). The infinitive of a verb with CVC root for instance is *daaxa* ‘to live’, where the last vowel *a* actually is nasalised, but this is not shown. For verbs with a CV root the nasalisation is shown in the orthography by writing a plain *-n*, as for instance in *laan* ‘to bear’.

The Chechen basic verb can be inflected for several different tense forms. There are five different past tenses, but some of the tense suffixes are morphologically built on one another. There is one generic present tense that is marked in different ways depending on the declension category of the verb (which is a lexical feature). There also is one future tense marker. Other present and future tenses are made by using combinations of tenses. A complete description of these tenses and their meaning is beyond the scope of this paper.

⁵ Chechen does use a limited number of verbs that can be preceded by a noun or adjective to form “new” verbs. For instance the verb *dan* ‘to do/make’ can be prefixed by *nis* and the combination *nisdan* then becomes ‘to straighten, make right’.

5.1 Assimilation in verbs triggered by suffixes

In this section we will look at the places where assimilation due to adding a suffix is happening in the Chechen language. We will first look at the recent past tense marker *-i*. When this is added to the verb root, the root vowel becomes fronted, as is shown in example (10).

- 10) *daag-* + *-i* → *deegi* ‘to burn’
duox- + *-i* → *dyexi* ‘to destroy, ruin’
ga- + *-i* → *gi* ‘to see’
die- + *-i* → *dii* ‘to sow’, ‘to kill’

Using the notation introduced in section 4 we can say that the recent past tense suffix is *-i^F*. We should note, however, that the root vowel assimilation that takes place under the influence of the recent past tense suffix is sometimes more than only fronting. Notably the vowel *a* is changed to *i* if the root ends in a glottal stop, and the diphthong *ie* is changed to *i* in a closed syllable or *ii* in an open syllable.

Several other verb forms seem to be built upon this past tense marker, as is shown in example (11) for the verb *daaga* ‘to burn’ and the verb *darsta* ‘to fatten’.

- 11) *deegi-* + *-ra* → *deegira* *dersti-* + *-ra* → *derstira* witnessed past tense
deegi- + *-na* → *daegna* *dersti-* + *-na* → *derstina* general past tense
deegi- + *-cha* → *daegcha* *dersti-* + *-cha* → *dersticha* when-form

Note that the vowel *i* of the recent past tense form *deegi* is deleted when the general past tense marker *-na* or the when marker *-cha* is added. For roots ending on consonant clusters like *darsta* this does not happen⁶. The change from long *ee* to *ae* when the endings *-cha* or *-na* are added to the form *deegi-* is due to the practical orthography I use in this paper – the underlying phoneme stays /*ee*/.

The three forms in example (11) are again used to build other forms, probably leading to a hierarchical system of suffixes. However, tempting as it is, I will not set out to give a full overview of this system, because describing the morphological system is not the main purpose of this paper.

We will now turn our attention to the present tense markers for roots of type CVC⁷. Chechen scholars have traditionally classified the verbs into five classes, depending on the root vowel of the verb in the infinitive form (Дешериев 1967, Джамалханов 1972). More recently other scholars divided the verbs in two or more classes depending on the kind of root vowel assimilation and/or the kind of present tense marker (Beerle 1986, Nichols 1994, 2006). I too would argue that most of the verbs with a CVC root can be divided into three classes that depend on the present tense marker they take (either *-u* or *-a*) and on the kind assimilation that results when the present tense marker is added (either rounding or fronting).

The first class of verbs has the present tense marker *-u*, and when it is added, the root vowel is rounded, as shown in example (12). This shows that adding a suffix triggers a root vowel change. And in this case we see that a [+round] suffix causes the root vowel to become [+round].

- 12) *daag-* + *-u* → *doogu* ‘to burn’
qier- + *-u* → *qyeru* ‘to fear’

Using the notation introduced in section 4 we can say that the present tense suffix for this first class is *-u^R*.

The second class of verbs takes the present tense marker *-a*, and when it is added, the root vowel is fronted, as shown in example (13):

- 13) *daarzh-* + *-a* → *daerzha* ‘to spread’
q’ovq’- + *-a* → *q’evq’a* ‘to thunder’

In this case we see again, that adding a suffix to the root triggers a process of assimilation: the root becomes [+front]. There does not seem to be a phonological source for this fronting since the suffix *-a* is not fronted. One possible explanation for the lack of a source for the fronting would be that the present tense actually was *-i*, but after this present tense marker passes on its [+front] quality to the root vowel, it

⁶ When exactly the *i* drops out is quite complicated, but has been described by Nichols (1997).

⁷ The verbs with CV roots can have a present tense in *-o*, in *-ye*, or in *-e*. But I will not treat them here in this paper, because I don’t expect that looking at them will not add very much to our understanding of the principles that are at work for the assimilation of root vowels.

then becomes the unmarked *-a*. However, this seems to conflict with the recent past tense marker *-i^F* we have just been looking at in example (10).

It seems best to say that the present tense suffix for this second class of verbs should be described as *-a^F*.

As we saw in example (2) there are is a third class of verbs which take the [+round] present tense marker *-u*, but where the root gets fronted, like for instance the verb *muotta* ‘to reckon’. Its present tense form becomes *myettu*. The change from *uo* to *ye* is actually fronting, and not rounding. Instead of treating these verbs as exceptions to the rule, I would suggest to describe the present tense suffix for this third class of verbs as *-u^R*. Verbs in this category (i.e. *xuo’a* ‘to fit in’, *tuola* ‘to win’ and *muotta*) only occur with the root vowel *uo* in the infinitive.

An overview of the three different present tense markers is shown in Table 4.

Table 4

Class	Present tense marker	Assimilation type	Notation	Root Vowels
1	<i>-u</i>	rounding	<i>-u^R</i>	<i>aa, a, i, ie, ii, ov, u, uo, uu</i>
2	<i>-a</i>	fronting	<i>-a^F</i>	<i>a, aa, ii, ov, ie</i>
3	<i>-u</i>	fronting	<i>-u^F</i>	<i>uo</i>

In this table I have added a column to show what kind of root vowel CVC verbs have that take a particular present tense ending.

The actual assimilation caused by the present tense suffixes *-u^R* and *-a^F* and by the recent past tense suffix *-i^F* is not always straight forward. In some instances heightening is added. In particular the diphthong *uo* changes into *u* in closed syllables or *uu* in open syllables when the suffix *-u^R* is added. The equivalent does not hold for the present tense marker *-a^F* – when it is applied to the diphthong *ie* this diphthong does not change (which is what we would expect, since it is already fronted). But there is an equivalent heightening effect when the recent past tense suffix *-i^F* is added to a root with the diphthong *ie* – it gets heightened to *ii*. These effects are illustrated in example (14).

- 14) *tiesh-* + *-a^F* → *tiesha* ‘believe’ (present)
tiesh- + *-i^F* → *tiishi* (recent past)
diest- + *-a^F* → *diesta* ‘swell’ (present)
diest- + *-i^F* → *disti* (recent past)
tuox- + *-u^R* → *tuuxu* ‘to hit’ (present)
duott- + *-u^R* → *duttu* ‘to pour’ (present)

The vowel *a* too can sometimes too receive heightening on top of rounding or fronting. Heightening is added to fronting when the recent past tense suffix *-i^F* is added to CVC stem verb where the second consonant is a glottal stop. Rounding with the present tense marker *-u^R* doesn’t always have the same effect for this same category of verbs. This is illustrated in example (15).

- 15) *xa’-* + *-i^F* → *xi’i* ‘know’ (recent past)
da’- + *-u^R* → *do’u* ‘eat’ (present)
da’- + *-ush^R* → *du’ush* ‘eat’ (present participle)

So for the moment we can only conclude that there are different levels of fronting and rounding (i.e. with or without added heightening). But it remains to be shown when exactly one level is applied and when the other.

The imperfect past tense is formed by adding the suffix *-ra* to the present tense marker, as shown in example (16).

- 16) *doogu* + *-ra* → *doogura* ‘to burn’
daerzha + *-ra* → *daerzhara* ‘to spread’
myettu + *-ra* → *myettura* ‘to reckon’
xae’a + *-ra* → *xae’ara* ‘to know’

Likewise the present subjunctive is formed by deleting the vowel ending of the present tense, and adding *-iila* to the resulting form, as shown in example (17).

- 17) *doogu* + *-iila* → *doogiila* 'to burn'
daerzha + *-iila* → *daerzhiila* 'to spread'
myettu + *-iila* → *myettiila* 'to reckon'
xae'a + *-iila* → *xae'iila* 'to know'

The future tense comes with suffixes *-ur^R*, *-ar^F* or *-ur^F*, depending on the class the verb belongs to. Many of the verbs falling in classes 1 and 2 for the present tense (see Table 4) and having a root ending in a glottal stop, have a future tense with the suffix *-ur^R*. So the verb *xa'a* 'to know' becomes *xu'ur* in the future tense, even though it has a present tense *xae'a*.

Most of the verbs can get a suffix to make them causative. The underlying form of the causative suffix is *-iita*, as for example in the verb 'to believe': *tiesh-* + *-iita* → *tieshiita* (someone causing someone else to believe in something)⁸. For a verb with a CV root, like for instance *gan* 'to see', the vowel *ii* in the suffix *-iita* gets shortened when the suffix is added to the verb root: *ga-* + *-iita* → *gaiita* → *gajta*⁹.

When the causative suffix *-iita* is attached to a verb from any of these three classes, the combination is seen as a new root, which, with respect to the present tense classification as seen in Table 4, belongs to the first class. So the present tense marker then becomes *-u^R*, and rounding is spread backwards through the causative suffix into the verb root. How this works out for some of the verbs from the different present tense classes, is as follows:

- 18) *daarzh-* + *-iita* + *-u^R* → *doorzhyytu*
daag- + *-iita* + *-u^R* → *doogytytu*
muott- + *-iita* + *-u^R* → *muttytytu*
diest- + *-iita* + *-u^R* → *dyestytytu*
xa- + *-iita* + *-u^R* → *xo'yytu*

Note that with the verb *xa'a* 'to know', no heightening is added – the vowel *a* changes regularly to *o*. But with the verb *muotta* 'to reckon' heightening is added – the vowel *uo* changes to *u*.

The effects of adding the causative suffix and the present tense suffix to a verb show that in verbs *rounding* assimilation can spread through more than one syllable. I have not seen *fronting* assimilation spread through more than one syllable. In section 4.1 we saw that roundness spreading can pass through more than one syllable for count nouns (see example5). This confirms that assimilation processes like roundness spreading work the same throughout different word-classes in Chechen.

5.2 Other verb root vowel changes

As we are dealing with verbs we should now briefly review root vowel changes that seem to occur without the influence of suffixes. In that case the root vowel itself becomes an affix¹⁰. Chechen has two types of these affixes. The first type indicates whether the mood of the verb is plain or iterative. The verb *xaatta* 'to ask', for instance, has a counterpart *xietta* 'to ask repetitively'. The second type of affixes indicates whether the object of the verb is singular or plural (since Chechen is ergative, the object of the verb can be the subject of the intransitive sentence or the direct object of the transitive sentence). The verb *dada* 'to run', for instance, has a counterpart *dovda* 'to run.PL'.

In these cases it is difficult to speak of rounding and fronting, because where the basic verb may have a short or long vowel (i.e. *-aa-* or *-a-*) in the verb root, the derived verb may have a diphthong (i.e. *-ie-* or *-ov-*).

⁸ In the literature it is argued that the causative was historically formed by combining a basic verb like *tiesha* with the verb *dita* (or *jita*, *vita*, *bita* – depending on the class of the object) 'to leave' (Джамалханов 1972).

⁹ Alternatively one could argue that the causative suffix has the form *-ita* and that the verb roots are of the type CVCV. In that case the description of suffixing verbs with a CVCV root becomes: *tiesha-* + *-ita* → *tieshaita* → *tieshiita*. So the root final vowel *a* gets deleted and the first vowel *i* of the suffix undergoes compensatory lengthening. Suffixing verbs with a CV root is then straightforward: *ga-* + *-ita* → *gajta*. Either solution would have no effect on the observations and arguments in this paper. However, with the alternative solution it would not be easy to explain why there is no compensatory lengthening when the witnessed past tense suffix *-ira* is added to the root *tiesha-*, resulting in *tiishira*.

¹⁰ This has been noted by several scholars already (Мациев 1961, Дешериев 1965)

Verb root vowels do not necessarily indicate mood or number in Chechen. For instance there is totally no connection between *diesha* ‘to read’ and *daasha* ‘to be impressed’.

In Table 5 there is an overview of the significance that root vowels can (but not necessary will) have in Chechen.

Table 5

Plain mood		Iterative mood	
Singular	Plural	Singular	Plural
<i>aa, a</i>	<i>ov, uo</i>	<i>ie</i>	<i>ii, i</i>
<i>aj</i>			

The change from iterative mood singular *-ie-* to iterative mood plural *-ii-* or *-i-* could be seen as the result of a fronting suffix that is accompanied by heightening – much like we saw *diesta* change to *disti* when the suffix *-i^F* was added for the recent past tense. But this would need more investigation.

5.3 Observed vowel changes in verbs

Continuing to ask ourselves the question whether the phonological changes to the root vowel when it is assimilated for rounding or fronting are the same throughout the word-classes, we should have a look at the root vowel changes that can occur for verbs. I have gathered this data in Table 6:

Table 6

Rounding assimilation in Verbs					Fronting assimilation in verbs				
Root vowel	Becomes	Example		Meaning	Root vowel	Becomes	Example		Meaning
<i>a</i>	<i>o</i>	<i>saca</i>	<i>socu</i>	'stop'	<i>a</i>	<i>e</i>	<i>saca</i>	<i>secira</i>	'to stop'
<i>a</i>	<i>u</i>	<i>la'a</i>	<i>lu'ush</i>	'to want'	<i>a</i>	<i>i</i>	<i>la'a</i>	<i>li'ira</i>	'to want'
<i>aa</i>	<i>oo</i>	<i>daaxa</i>	<i>dooxu</i>	'extract'	<i>a</i>	<i>ae</i>	<i>dahwa</i>	<i>daehwnarg</i>	'carry'
<i>aj</i>	<i>oj</i>	<i>qajqa</i>	<i>qojqu</i>	'to call'	<i>aa</i>	<i>ee</i>	<i>daaxa</i>	<i>deexa</i>	'live'
<i>i</i>	<i>y</i>	<i>diga</i>	<i>dygu</i>	'to lead'	<i>aa</i>	<i>ae</i>	<i>daaqqa</i>	<i>daeqqira</i>	'to extract'
<i>ii</i>	<i>yy</i>	<i>diica</i>	<i>dyycu</i>	'to speak'	<i>aj</i>	<i>aj</i>	<i>qajqa</i>	<i>qajqira</i>	'to call'
<i>ie</i>	<i>ye</i>	<i>diesha</i>	<i>dyeshu</i>	'to read'	<i>i</i>	<i>i</i>	<i>diga</i>	<i>digira</i>	'to lead'
<i>u</i>	<i>u</i>	<i>duza</i>	<i>duzu</i>	'to fill'	<i>ii</i>	<i>ii</i>	<i>miila</i>	<i>miilira</i>	'to drink'
<i>uu</i>	<i>uu</i>	<i>tuusa</i>	<i>tuusu</i>	'to sharpen'	<i>ie</i>	<i>ie</i>	<i>diesha</i>	<i>dieshna</i>	'to read'
<i>uo</i>	<i>uu</i>	<i>duozha</i>	<i>duuzhu</i>	'to fall'	<i>ie</i>	<i>ii</i>	<i>hwiexa</i>	<i>hwiixira</i>	'to teach'
<i>uo</i>	<i>u</i>	<i>muotta</i>	<i>muttyytu</i>	'to reckon'	<i>ie</i>	<i>i</i>	<i>diesta</i>	<i>disti</i>	'to swell'
<i>ov</i>	<i>ov</i>	<i>lovza</i>	<i>lovzu</i>	'to play'	<i>u</i>	<i>y</i>	<i>duza</i>	<i>dyzira</i>	'to fill'
<i>y</i>	<i>y</i>	<i>xylu</i>	<i>xylyytu</i>	'to happen'	<i>uu</i>	<i>yy</i>	<i>xuuda</i>	<i>xyydina</i>	'to suck'
<i>ye</i>	<i>ye</i>	<i>yecu</i>	<i>yecyytu</i>	'to need'	<i>uo</i>	<i>ye</i>	<i>duoxa</i>	<i>dyexna</i>	'to ruin'
					<i>ov</i>	<i>ev</i>	<i>tovzha</i>	<i>tevzhina</i>	'to lean'
					<i>ov</i>	<i>aev</i>	<i>hwovsa</i>	<i>hwaevsina</i>	'to look'

Most of the rounding effects are as would be expected from the distinctive feature matrix in Table 2. Some exceptions stand out: for the change from *uo* into either *uu* for open syllables (i.e. *duuzhu*), or *u* for closed syllables (i.e. *muttyytu*). Unlike for the *ye* diphthong (i.e. *yecu*), the rounding effect seems to add heightening for the *uo* diphthong. Furthermore *a* can be rounded either as would be expected into *o*, or it can become *u*, which means that it is also heightened (its feature [-high] becomes [+high]).

The fronting doesn't offer too many surprises either. Two things stand out: the diphthong *ie* can become *ii* in open syllables (i.e. *hwiixira*) or *i* in closed syllables (i.e. *disti*), and the vowel *a* can become *i* instead of only *e*. Here too the assimilation sometimes adds heightening.

5.4 Summary for verbs

In summary we can draw the following conclusions for the assimilation observed in verbs:

- Root vowel assimilation (fronting or rounding) can be triggered by a suffix.
- Root vowel changes can be an affix themselves.

- Roundness assimilation can pass through more than 1 syllable.
- The kind of assimilation taking place in the root (fronting or rounding) does not necessarily correlate with the suffix that is supposed to trigger it.
- Fronting and rounding assimilation are sometimes accompanied by heightening assimilation

6 Assimilation for noun formation

Having looked at suffixes added to count nouns and verbs, I would now like to show that the frontness and roundness assimilation could also occur in the process of noun formation.

6.1 Noun to abstract noun

The suffix *-alla* can turn a noun into an abstract noun describing the state of something. For instance the noun *naana* ‘mother’ becomes *noonalla* ‘motherhood’ (the state of being a mother) when the suffix *-alla* is attached. Initially we could say that roundness assimilation of the root vowel takes place as a result of attaching the suffix *-alla*. So this suffix could be written as *-alla^R*. A summary of quality nouns derived from normal nouns is given in Table 7 (more examples are given in appendix 12.8 in Table 25).

Table 7

Noun		Derived Noun		Effect
<i>daa</i>	‘father’	<i>doolla</i>	‘fatherhood’	R
<i>luor</i>	‘doctor’	<i>lyeralla</i>	‘doctorhood’	F
<i>maax</i>	‘price’	<i>meexalla</i>	‘value’	F
<i>naana</i>	‘mother’	<i>noonalla</i>	‘motherhood’	R
<i>twamda</i>	‘leader’	<i>twamdalla</i>	‘leadership’	(none)

From Table 7 it becomes clear that the suffix *-alla* triggers frontness assimilation into the root vowel when it is added to the noun *maax* ‘price’, resulting in *meexalla* ‘value’. And for the noun *twamda* no assimilation occurs when the suffix is added. Just as we had present tense suffixes that differed only in the assimilation they triggered, we could suggest that there are in fact three different suffixes that turn a noun into an abstract noun: *-alla^R*, *-alla^F* and *-alla*. The suffix (with the coupled type of assimilation) that a noun takes is then determined in the lexicon. Depending on this suffix then the nouns could be divided into three groups¹¹.

6.2 Adjective to abstract noun

The same suffix *-alla* can also be added to adjectives, transforming the adjective into a noun that describes the state of something. For instance *q’eena* ‘old’ turns into *q’eenalla* ‘oldness’ (the state of being old). In this particular case the suffix *-alla* does not seem to have any effect on the root vowel, because the long *ee* remains a long *ee*. Related to the adjective and to the quality noun there is a root *q’aandan* ‘to make old’. This verb consists of the root *q’aan* attached to the verb *dan* ‘to do/make’. Since this verb obviously isn’t a suffix, and since we have previously always seen that root vowel changes occur as a result of suffixation, the root *q’aan* can be regarded as more “basic” than the adjective, i.e. it can not have been affected by fronting or rounding. So what actually may have happened is that both the adjective *q’eena* and the quality noun *q’eenalla* are derived from the root *q’aan*, even though this root does not occur on its own in the Chechen language. The derivational suffix then was *-alla^F*.

The kind of assimilation taking place as a result of adding the quality noun suffix to the adjective (or to the underlying root) varies widely. This is shown below in Table 8 (a fuller set of data can be found in the appendix in Table 25).

¹¹ These groups don’t coincide with the noun classes in Chechen. Nouns belong to one of six classes depending on the class marker they demand the verb by which they are governed to take.

Table 8

Adjective		Verb		Derived Noun		Effect
<i>q'eena</i>	'old'	<i>q'aandan</i>	'to make old'	<i>q'eenalla</i>	'oldness'	F
<i>meca</i>	'hungry'	<i>macdan</i>	'to make hungry'	<i>macalla</i>	'famine'	
<i>deza</i>	'valuable'	<i>dazdan</i>	'to make valuable'	<i>dozalla</i>	'valuableness'	R
<i>moozha</i>	'yellow'	<i>maazhdan</i>	'to make yellow'	<i>moozhalla</i>	'yellowness'	R
		<i>hwaga</i>	'to thirst'	<i>hwogalla</i>	'thirst'	R
<i>q'uona</i>	'young'	<i>q'uondan</i>	'to make young'	<i>q'uonalla</i>	'youth'	
<i>shyyra</i>	'wide'	<i>shoordan</i>	'to widen'	<i>shooralla</i>	'width'	
<i>xaza</i>	'beautiful'	<i>xazdan</i>	'to beautify'	<i>xazalla</i>	'beauty'	

If we take the roots pre-attached to *-dan* as unmarked¹², we can note that the derived adjectives are sometimes fronted, sometimes rounded, sometimes don't change at all (e.g. *xazdan*, *xaza*). The derived nouns similarly were sometimes fronted, sometimes rounded, and sometimes don't change. But the correspondence between the root vowel assimilation taking place in the formation of the adjectives does not completely correspond to the assimilation that takes place to form the quality nouns. For instance, the root *daz* occurring in the verb *dazdan* 'to make valuable' becomes fronted *deza* as adjective, but rounded *dozalla* as noun.

We need to ask ourselves what the basic root vowel is from which adjective, verb and abstract noun are derived through assimilation. If the adjective root vowel is "basic", then the root vowel in the verb is derived by neutralization (e.g. *meca* → *macdan*), and the root vowel in the abstract noun is derived by rounding (e.g. *deza* → *dozalla*), neutralizing (e.g. *meca* → *macalla*) or no assimilation (e.g. *xaza* → *xazalla*). In this case there are the following three derivational suffixes that turn an adjective into an abstract noun: *-lla*^R, *-lla*^N and *-lla* (where the raised capital N symbolizes neutralization).

Alternatively the root vowel in the verb is "basic". In that case the root vowel of the adjective can be derived by fronting (e.g. *q'aandan* → *q'eena*), rounding (e.g. *maazhdan* → *moozha*) or there would be no assimilation (e.g. *xazdan* → *xaza*). The root vowel of the derived noun would then be derived by the same three processes: fronting (e.g. *q'aandan* → *q'eenalla*), rounding (e.g. *dazdan* → *dozalla*) or no assimilation (e.g. *xazdan* → *xazalla*). In that case there would be the following three derivational suffixes that turn a verb root (not the adjective) into an abstract noun: *-alla*^R, *-alla*^F and *-alla*.

6.3 Summary for abstract noun derivation

In summary we can draw the following conclusions for the assimilation observed for the noun derivation suffix *-alla*:

- Root vowel changes are triggered by a suffix.
- The form of the suffix is not related to the type of root vowel change:
 - o an unmarked suffix can lead to the root vowel being fronted (e.g. *q'eenalla*)
 - o an unmarked suffix can lead to the root vowel being rounded (e.g. *moozhalla*)
 - o an unmarked suffix can lead to the root vowel staying the same (e.g. *q'uonalla*)

7 Assimilation in nouns

We will now look at one more word-class, the nouns, to see what root vowel changes take place and to find out whether that gives us more insight in the process of root vowel changes in the Chechen language.

7.1 The noun

All nouns can be inflected for case (genitive, dative, ergative, instrumental, material, comparison, allative and several directional and locational suffixes, that can be combined). Some nouns are inflected for number, and some nouns have a class prefix. Nouns can be part of 6 classes, but that does not seem to influence the way they are inflected. An overview of a typical noun with its case inflection is given in Table 9.

¹² Alternatively they could be seen as neutralized to some extent. This is not clear yet.

Table 9

Declension of 'pomegranate'			
Singular		Plural	
Nom	<i>naar</i>	Nom	<i>naar-a-sh</i>
Erg	<i>naar-uo</i>	Gen	<i>naar-ii-n</i>
Gen	<i>naar-a-n</i>	Mat	<i>naar-ie-x</i>
Dat	<i>naar-na</i>	Cmp	<i>naar-ie-l</i>
Ins	<i>naar-ca</i>	Dat	<i>naar-a-sh-na</i>
Mat	<i>naar-a-x</i>	Erg	<i>naar-a-sh-a</i>
Cmp	<i>naar-a-l</i>	Ins	<i>naar-a-sh-ca</i>
All	<i>naar-ie</i>	All	<i>naar-a-sh-ka</i>

As this paradigm shows, the case endings for the genitive (*-n*), dative (*-na*), instrumental (*-ca*), material (*-x*) and comparative (*-l*) are the same for singular and plural. Depending on the case the plurality of the noun is indicated by the suffix *-ii*, *-ie*, *-sh* that comes after the noun stem and before the case ending.

Beside these cases the noun can be inflected in other ways. After the allative suffix there can be more directional suffixes. There is a “short” variant of the dative that is used before certain postpositions. Finally the accumulative suffix *-ii* can be added onto the nominative or after a case suffix.

In appendix 12.5 the changes that occur in the root vowels of nouns can be seen in paradigms of several typical nouns. These paradigms don’t show all the directional cases that can be built upon the allative, because these derivations don’t have a different influence on root vowels.

For several paradigms additional vowels and/or consonants – called stem extenders in the literature – are used between the noun stem and the case endings (Nichols 2004). The noun *dig* ‘axe’ for instance becomes inflected as *dag-ar-uo* in the ergative and as *dag-ar-sh* in the plural. So it gets the stem extender *-r* both in singular and in plural. An overview of the stem extenders that I found in my own dictionary where there are about 1600 nouns is shown in Table 10. Note that I have indicated the frequency of occurrence in this dictionary.

Table 10

Singular		Plural	
Code	Freq	Code	Freq
p	60,8%	p	62,3%
n	26,0%	n	26,3%
pi	6,3%	r	3,1%
r	2,6%	ie	2,5%
pin	1,7%	pp	1,7%
pn	1,0%	rch	1,0%
pnn	0,9%	o	0,8%
pp	0,2%	no	0,6%
ch	0,2%	m	0,5%
m	0,1%	ii	0,3%
		j	0,3%
		ar	0,2%
		nn	0,1%
		aluo	0,1%
		ch	0,1%

Most of the letters in the table signify the letters that are used in the actual extender. For instance the letter “m” indicates, that the suffix *-m* is added to the root of the noun. The following codes diverge from this scheme:

- p* Indicates that there is **no** extender
- pp* Indicates doubling of the last root consonant
- pn* Indicates that the consonant *-n* is inserted before the ergative case
- pnn* Indicates that the consonant *-n* is inserted before the ergative and the allative case.

- pi* Indicates that the vowel *-i* is inserted before all cases in the singular except for the ergative.
- pin* Indicates that the vowel *-i* is inserted before the genitive, the dative and the instrumental. For the other cases in the singular the consonant *-n* is inserted.

The status for the vowel *i* as a stem extender should be a bit questioned. Many nouns taking this extender end in a derivational suffix, i.e. *-cha* and *-alla*. Other nouns in this group are loans. It could be argued that the derivational suffixes form a barrier for assimilation to occur, and that in this class of nouns the underlying vowel that normally causes fronting has surfaced as an *i*. None of these nouns suffers roundness assimilation in its paradigm.

7.2 Assimilation in nouns

Classifying when exactly fronting or rounding of the root vowel for a noun takes place is a bit complex. A summary of the most frequent¹³ possibilities found in my own dictionary will be shown later on in this section in Table 12, but we will go through some typical cases first.

For the vast majority (approximately three quarters) of the nouns no fronting or rounding takes place when case suffixes are attached.

Then there are several nouns where the oblique cases in the singular get rounded, as shown in example (19) for the genitive singular of the noun *ch'azh* 'cliff'.

- 19) *ch'azh* + *-n* → *ch'ozhan*

The same rounding occurs too in the other singular cases (e.g. *ch'ozhuo*, *ch'ozhana* etc.), but it does not occur in the plural (e.g. *ch'azhash*, *ch'azhiin*).

With another group of nouns the oblique cases in the singular get fronted, as shown in example (20) for the ergative case of the noun *bat* 'mouth'. This is also a good example of a rounded suffix triggering assimilation in frontness.

- 20) *bat* + *-uo* → *betuo*

For this noun fronting occurs in all the other oblique cases in the singular, but not in the plural (e.g. *batosh*, *batoshna* etc). Note that this noun has a stem extender *-o* in the plural.

Fronting or rounding for some verbs occurs both in the singular oblique cases as well as in all the plural cases. The possibilities for assimilation in nouns as discussed so far can be summarized as in Table 11. Note that "plain" indicates that no assimilation of the root vowel takes place.

Table 11

Singular		Plural
Nominative	Oblique	All cases
plain	plain	plain
plain	[+round]	plain
plain	[+front]	plain
plain	[+round]	[+round]
plain	[+front]	[+front]

But we are not there yet – there are much more possibilities for nouns! There are some paradigms where the nominative is rounded, whereas fronting or rounding does not influence the singular oblique cases and all the plural cases¹⁴. In example (21) the genitive singular and the genitive plural is given for the noun *shok* 'whistle'.

- 21) *shok* + *-n* → *shakaran*
shok + *-ii* + *-n* → *shakariin*

In the oblique singular and in all plural cases this noun receives a stem extender *-r* (which is typical for this kind of conjugation), but the root vowel is not rounded and not fronted. However, the nominative singular is rounded. What is the source of this rounding?

¹³ Only possibilities that occur more than two times are shown here.

¹⁴ Alternatively one could say that the rounded vowel in the nominative is in fact the basic vowel of the root, and that this vowel gets neutralized in the oblique singular cases and in the plural.

Besides fronting and rounding, neutralization sometimes seems to occur. For instance the noun *vir* ‘donkey’, which in the singular consistently keeps its root vowel *i*, in the plural changes into *varrash*. The final root consonant *r* is doubled into *rr* (which is categorized as one of the stem extender types, see Table 10) and the root vowel is neutralized into an *a*. Alternatively the root vowel *a* could be classified as “plain” in the plural cases. In that case the nominative singular is fronted into *i* instead of *e*. In the verbs we have seen that this is possible when a root ends in a glottal stop (e.g. *la'a* to *li'i* ‘to desire’).

If we accept that words like *shok* and *vir* are “marked” with rounding or fronting in the nominative singular case, then the question arises whether there is one case where the root vowels for all nouns are unmarked (i.e. not influenced by assimilation). There doesn’t seem to be one! For any of the cases a noun can be found that is probably influenced by rounding or fronting assimilation in that case.

Having covered several of the typical cases, I would now like to show a summary in Table 12 of the most frequent possibilities that occur in my own dictionary.

Table 12

When does fronting or rounding take place for a Noun?										
Noun	Gloss	Singular					Plural	Declension example	Label	Frequency
		Nom	Oblique							
			Erg	Other	Dat	Gen				
<i>naar</i>	pomegranate	-	-	-	-	-	-	<i>naaran</i>	pppppp	72,6%
<i>baarz</i>	hill/heap	-	-	-	-	-	F	<i>baerznash</i>	pppppF	0,8%
<i>kit</i>	wineskin	-	-	-	-	-	N	<i>kattash</i>	pppppN	0,6%
<i>naax</i>	people	-	-	-	-	F	-	<i>neexan</i>	ppppFp	0,2%
<i>bart</i>	agreement	-	-	-	-	F	F	<i>bertash</i>	ppppFF	0,4%
<i>aalapa</i>	salary	-	-	-	F	F	-	<i>aalapina</i>	pppFFp	4,1%
<i>naana</i>	mother	-	-	F	-	F	-	<i>neenie</i>	ppFpFp	0,3%
<i>aattalla</i>	easyness	-	-	F	F	F	-	<i>aattallica</i>	ppFFFp	4,1%
<i>vasha</i>	brother	-	-	F	F	F	F	<i>veshiga</i>	ppFFFF	0,3%
<i>de</i>	day	-	F	F	-	F	-	<i>diinuo</i>	pFFpFp	0,3%
<i>aan</i>	rheumatism	-	F	F	-	F	F	<i>eenuo</i>	pFFpFF	0,4%
<i>aaxk</i>	ravin	-	F	F	F	F	-	<i>aexkan</i>	pFFFFp	1,4%
<i>pwaar</i>	craftsman	-	F	F	F	F	F	<i>pweerana</i>	pFFFFFF	4,2%
<i>duq'</i>	yoke	-	F	F	F	F	N	<i>daqq'ash</i>	pFFFFN	1,0%
<i>ch'ug</i>	ring	-	N	N	N	N	N	<i>ch'agaruo</i>	pNNNNN	0,4%
<i>ch'azh</i>	cliff	-	R	R	R	R	-	<i>ch'ozhan</i>	pRRRRp	1,1%
<i>aarz</i>	complaint	-	R	R	R	R	F	<i>oorzan, aerznash</i>	pRRRRF	2,6%
<i>beq'a</i>	camel young	-	R	R	R	R	R	<i>boq'uo</i>	pRRRRR	0,3%
<i>beepig</i>	bread	F	F	F	F	F	F	<i>baepkan</i>	FFFFFF	1,5%
<i>ch'uu</i>	spoke	R	-	-	-	-	-	<i>ch'uoran</i>	Rppppp	0,9%
<i>bos</i>	colour	R	-	-	-	F	F	<i>basuo, besnash</i>	RpppFF	1,2%
<i>boh</i> <i>w</i>	summit	R	R	R	R	R	p	<i>bahhwash</i>	RRRRRp	1,1%
<i>pop</i>	beech	R	R	R	R	R	F	<i>pepnash</i>	RRRRRF	0,3%

This table shows a summary of the possible noun paradigms in terms of assimilation effects. These effects are indicated by the letters R, F and N, where R is rounding, F is fronting and N is Neutralization of rounding and fronting. This assumes that we can figure out what the unmarked form of the root is, although that is not completely clear for all paradigms. In the singular we make a distinction between the Nominative and other cases. In this table the following six combinations of number and case are used in the columns:

1. Nominative singular
2. Ergative singular
3. Other singular cases, i.e.: Instrumental, Material, Comparison, Allative, and all cases built on the allative
4. Dative singular

5. Genitive singular
6. All plural cases

Looking at the kind of assimilation (or lack of it) in each of these six combinations yields a label for each of the paradigms. For instance the paradigm of the noun *naana* is labeled as ppFpFp. The p's in this label indicate where there is no root vowel assimilation. So in the case of this noun, there is no root vowel assimilation for (1) the nominative singular, (2) the ergative singular, (4) the dative singular, and (6) all plural cases. The F's indicate where there is fronting. So in this case there is fronting for (3) the instrumental, material, comparison and allative cases, as well as (5) the genitive singular.

7.3 Assimilation origin

A good question to ask ourselves is where the rounding or fronting of the root vowels in the nouns actually originates. Would it be possible that the fronting or rounding originates in the roots themselves? That this is not true can be seen from the fact that there are nouns with the same nominal form and different meaning that only differ in declension. For instance when *waazh* has the meaning “apple”, the ergative is *weezhuo*, but when it has the meaning “apple-tree”, the ergative becomes *woozhuo*.

Would the assimilation source then be attached to the case suffixes? Should we consider the case suffixes to come in varieties that have a source for rounding or fronting? That would lead us to have four varieties for each case suffix, as shown in example (22).

- 22) *mas* + *-n* → *mesan* (Fronting)
baw + *-n* → *bawan* (No effect)
laam + *-n* → *looman* (Rounding)
dig + *-n* → *dagaran* (Neutralizing)

But we can show that the fronting or rounding does not originate from the case ending. Look for instance at the noun *ghazh* ‘stick’. In the genitive plural it becomes *ghozh-m-ii-n*, where *-m* is a stem extender, *-ii* is one of the plural suffixes¹⁵, and *-n* is the genitive suffix. If the rounding of *ghazh-* to *ghozh-* would have originated in the genitive suffix *-n*, then the plural suffix *-ii* would have become rounded as *-yy*. Since this is not the case, we can conclude that the source of assimilation is not to be found in the genitive suffix.

The source for the fronting or rounding is not attached to the number ending either. There are several nouns where some forms in the singular are rounded, while others are fronted or neither rounded nor fronted. For instance the noun for ‘color’ is rounded as *bos* in the nominative singular, it is plain *bas-uo* in the ergative singular, and it is fronted *bes-an* in the genitive singular. So neither roundness nor frontness could be attached to the number suffix here.

Would it be possible that the assimilation is a stem extender in itself or that it is attached to some stem extenders? That seems more likely. Some nouns have two possible methods of declining. E.g. *laam* can be declined in the singular as *looman*, *loomuo* etc, or as *laamanan*, *laamanuo* etc. This suggests that the speakers of the language choose between two kinds of stem extenders for the noun *laam*.

Are there actually stem extenders that can confirm the hypothesis, which says that the assimilation source could be attached to a stem extender? Usually there is no connection between the assimilation to the noun roots and the stem extenders as given in Table 10. However, there are a few stem extender types where there does seem to be a connection. The stem extender indicating doubling in the plural in almost all cases coincides with nouns where the root vowel is neutralized in the plural, like for instance *kit* ‘wineskin’. Its root vowel gets neutralized in the plural, yielding *kattash*. The stem extender suffix in the plural could be written as *-O^{DN}*, where the raised D indicates doubling of the last root consonant, and the raised N indicates neutralization of the root vowel. The *-O* indicates that there is no surface vowel or consonant attached to this suffix. Among the 30 nouns in my dictionary where the final root consonant is doubled in the future (stem extender p-pp and pp-pp), the only two don't have a neutralized vowel in the plural: *shad* (which becomes *sheddash* in the plural) and *kuol* (which becomes *kyellash* in the plural).

¹⁵ For the genitive, material and comparative cases the plural suffix is the vowel *-ii*, *-ie* or *-j*. There also is a singular suffix *-a* for nouns in these cases, but it only surfaces when the preceding syllable is stressed, like in *qietuor-a-x* where the stress is on *uo*.

For all the nouns that take the stem extender suffix *-m* in the plural the root vowel gets rounded in the plural. So this stem extender should be written as *-m^R*. For example *ghazh* ‘stick’ in the plural becomes *ghazh-* + *-m^R* + *-sh* → *ghozhmash*.

One more observation should be made at this point. Most of the stem extenders shown in Table 10 are attached to the noun root in the singular oblique cases or in the plural for all the cases of the noun. The suprasegmental stem extender seems to be more flexible. Rounding can also be attached to the singular nominative. Fronting can be attached to a variety of cases, but the grouping of these cases is not always the same as for instance for stem extenders like *-n* and the *-i* (as explained in section 7.1).

7.4 Observed root vowel changes for nouns

As was done for the count nouns and verbs, we should look at the particular kinds of rounding, fronting and neutralization that occur in noun roots. This is shown in Table 13.

Table 13

Rounding assimilation in noun declension					Fronting assimilation in noun declension				
Root vowel	Becomes	Example		Meaning	Root vowel	Becomes	Example		Meaning
<i>a</i>	<i>o</i>	<i>daq</i>	<i>doqan</i>	'birch tree'	<i>a</i>	<i>e</i>	<i>bart</i>	<i>bertan</i>	'agreement'
<i>a</i>	<i>o</i>	<i>ma'</i>	<i>mo'an</i>	'alder tree'	<i>a</i>	<i>ae</i>	<i>baw</i>	<i>baewash</i>	'burner'
<i>aa</i>	<i>oo</i>	<i>laam</i>	<i>looman</i>	'mountain'	<i>aa</i>	<i>ee</i>	<i>naana</i>	<i>neenan</i>	'mother'
<i>i</i>	<i>y</i>	<i>ishar</i>	<i>ysharsh</i>	'sign'	<i>aa</i>	<i>ae</i>	<i>laam</i>	<i>laemnash</i>	'mountain'
<i>uo</i>	<i>u</i>	<i>kuol</i>	<i>kullash</i>	'bush'	<i>aj</i>	<i>ie</i>	<i>baj</i>	<i>biesh</i>	'meadow'
<i>uo</i>	<i>uu</i>	<i>kuoch</i>	<i>kuuchamuo</i>	'dress'	<i>u</i>	<i>y</i>	<i>duq'</i>	<i>dyq'uo</i>	'yoke'
Neutralisation in noun declension					<i>uo</i>	<i>ye</i>	<i>zhuop</i>	<i>zhyepan</i>	'answer'
<i>u</i>	<i>a</i>	<i>duq'</i>	<i>daqq'ash</i>	'yoke'	<i>ov</i>	<i>ev</i>	<i>dov</i>	<i>devnash</i>	'quarrel'
<i>i</i>	<i>a</i>	<i>dig</i>	<i>dagarsh</i>	'axe'					
<i>ie</i>	<i>a</i>	<i>c'ienosh</i>	<i>c'a</i>	'house'					
<i>uo</i>	<i>aj</i>	<i>buo</i>	<i>baj</i>	'orphan'					
<i>y</i>	<i>a</i>	<i>jyhw</i>	<i>jahhwash</i>	'begin'					

Besides the assimilations that are in accordance with what one would expect from the distinctive feature matrix in Table 2, the following changes should be noted. As we have seen in other word-classes, the diphthong *uo* can turn into *uu* due to rounding assimilation in certain circumstances.

As for the neutralization we see that a diphthong like *ie* can be changed back into the single short unmarked vowel *a*.

As for fronting we once again note that the short phoneme *e* is written and pronounced as *ae* before several pharyngeal consonants (we write *baewash*, whereas underlying it is */bewash/*), and the long phoneme *ee* is realized as *ae* in closed syllables (so we write *laemnash*, though underlying this is */leemnash/*). Interesting is the change from *aj* to *ie* under the influence of fronting. That this is probably due to fronting can be seen from the fact that there are nouns ending on *-aj* where this root vowel does not change when case suffixes are added. An even clearer example is the noun *jaj*, *which* comes in two varieties. One with the meaning ‘pan’, where the root changes to *jie-* and the other with the meaning ‘carper-fish’, where the root stays *-jaj-*.

7.5 Summary for nouns

Having reviewed the assimilation processes occurring when nouns are inflected, we can summarize the following conclusions:

- Root vowel changes can be an affix themselves (e.g. in *bos* the rounded root vowel indicates nominative).
- The form of the case suffixes is not related to the type of root vowel change.
- One surface form of a case suffix may have different effects as to root vowel change.
- Besides frontness or roundness assimilation there can be neutralization of frontness and roundness when a case suffix is added.

- The source of root vowel changes in nouns could be from a stem extender which sometimes is attached to a surface form (like *-m^R*), but which usually is not attached to a surface form.

8 Assimilation processes observed

In order to see where there are gaps in our understanding, I would now like to take a more detailed look at the regularities and irregularities due to the frontness and roundness assimilation taking place when suffixes initiate root vowel changes in the different word-classes we reviewed.

One general observation is that rounding can spread through more than one syllable (as we have seen with count nouns and verbs), but frontness assimilation seems to only affect the directly preceding syllable. Most of the rounding and fronting assimilations adhere to what we would expect, when looking at the distinctive feature matrix in Table 2. But there are some exceptions, which we need to explore a bit further.

The vowels *e*, *i*, *y* and their long counterparts *ee*, *ii*, *yy* never change due to frontness assimilation, because they are already [+front].

Likewise the vowels *o*, *u*, *y* and their long counterparts *oo*, *uu*, *yy* never change due to roundness assimilation, because they are already [+round]

The vowel *u* always changes into *y* due to frontness assimilation. Likewise the vowel *i* always changes into *y* due to roundness assimilation.

Fronting of the vowel *o* or rounding of the vowel *e* is not usually observed, because these vowels themselves are in general the result of roundness or frontness assimilation of the vowel *a*. However, there are some exceptions – but these may be due to our lack of recognizing the correct root forms. The vowel *ee* is changed into *oo* in one instance (i.e. the count noun *bwee* becoming *bwoolgha* due to roundness assimilation caused by the suffix *-lgha^R*). The vowel thus not only becomes [+round], but its frontness feature changes from [+front] to [-front]. The vowel *e* is changed to *o* when the suffix *-lla^R* is added to the adjective *deza* ‘valuable’, yielding *dozalla* ‘valuebleness’. But in this case it could be that the underlying root is actually *daz-* as surfacing in the verb *dazdan* ‘to make valuable’. So then it is not the *e* changing to *o*, but it is a regular change from *a* to *o*.

Sometimes the vowel *o* changes to *u* under the influence of rounding

The vowel *a* and its long counterpart *aa* are [-front, -round]. Under the influence of Frontness assimilation they generally become *e* and *ee* respectively. However, in some cases *a* changes to *i*, not only becoming fronted, but also becoming [+high]. This only seems to happen with verb roots that end on a glottal stop, e.g. *la'a*, ‘desire’, becomes *li'i* in the recent past tense. However, these same verb roots assimilate to frontness as expected for the present tense and forms derived from that, i.e. *la'a* becomes *lae'a* (where the *ae* underlying is a short vowel *e*). The vowels *a* and *aa* generally change into *o* and *oo* respectively under the influence of roundness assimilation. Again the verbs show an exception. The vowel *a* changes to *u* in verb roots ending on a glottal stop, e.g. *xa'a* ‘to know’ becomes *xu'ush* in the present participle form. However, these same verb roots assimilate to roundness as expected for other verb forms, like for instance the causative present tense, i.e. *xa'a* becomes *xo'yytu*. So the root final glottal stop cannot be a conditioning environment, nor is it likely that a following [+high] vowel stimulates the assimilation in height.

When the diphthong *uo* is fronted, it becomes *ye*, which is the [+front, +round] diphthong we would expect it to become. But when it is rounded, it also becomes [+high], yielding *uu* in an open syllable or *u* in a closed syllable. This is observed both in verbs (e.g. *duoza* ‘to fill’ becoming *duuzu* in the present) as well as in nouns (e.g. *kuoch* ‘dress’ becoming *kuuchan* in the genitive singular).

When the diphthong *ie* is fronted, it should stay *ie* since it is already [+front]. There are nouns with a root vowel *ie*, and we have not observed this root vowel changing under the influence of frontness assimilation¹⁶. However, with the verbs we see that *ie* changes into *ii* in open syllables (*hwiexa* becoming *hwiixi*) and into *i* in closed syllables (*diesta* becoming *disti*). So here we see that frontness assimilation is

¹⁶ There are nouns with the root vowel *ie* (e.g.: *nieq* ‘road’, *mieq* ‘moustache’, *diegh* ‘body’, *chietar* ‘tent’) but their root vowels either stay the same or are rounded to *o* in oblique cases or in the plural (e.g. *diegh* becomes *doghmash* in the plural).

accompanied by heightening (the resulting vowel gets the feature [+high]). When the diphthong *ie* is rounded, it always becomes *ye*, independent of the type of syllable or the word-class.

The diphthong *ye* is not normally found in an unmarked root. Where it is found (e.g. as in the noun *byella* ‘difference’), no assimilation is observed to change it further.

The diphthong *ov* only changes to *ev* under the influence of fronting.

The diphthong *aj* changes into *oj* when rounded. Usually it does not change due to fronting, but in some instances it seems that it changes to the diphthong *ie* (e.g. *baj* ‘meadow’ changing to *bien-* in the oblique cases).

Having looked deeper into the assimilation processes at work across word-classes we can draw the following conclusions:

- Rounding can spread through more syllables, but fronting only affects the preceding syllable.
- Most of the frontness and roundness assimilations observed are in accordance with what is expected when looking at the distinctive features of the vowels.
- Rounding of the diphthong *uo* is always accompanied by heightening (yielding *u* in closed syllables and *uu* in open syllables). Fronting of the diphthong *ie* is sometimes accompanied by heightening (yielding *i* in closed syllables and *ii* in open syllables). This is observed throughout word-classes.
- The vowels *a* (and its long counterpart *aa*) seem to allow two different levels of rounding and fronting. The first level occurs throughout word-classes, where the regular rounding to *o* and fronting to *e* is observed. The second level is observed for some verb declensions only, where heightening is added, yielding *u* and *i* respectively.

9 Discussion

In this final discussion I would like to see what we have learned about the assimilation processes taking place in the different word-classes, and what we still need to learn.

We started out in this paper by noticing that assimilation in Chechen is the result of suffixation, but that the surface form of the suffix (rounded, fronted or unmarked) is not correlated to the resulting root vowel changes.

We then looked further into the count nouns, and we have seen that the assimilation starts in the suffix and can spread back through more than one syllable to the root of a word. The roundness assimilation is not related to the surface form of the suffix. I suggested that the source for the roundness assimilation is a suprasegmental rounding attached to the suffix, and I suggested indicating this at the suffix with a raised R, i.e.: *-zza^R*. While looking at the count nouns it also became obvious that there are places where assimilation is blocked. This needs further investigation. It would be good to check the behavior of the count nouns for all the suffixes that can be attached to them.

When we went to the verbs, we saw, that a suffix having one surface form (e.g. *-u*) may cause roundness assimilation for some words, but frontness assimilation for other words. I concluded that there are actually two different suffixes, written as *-u^R* and *-u^F*, where the raised R and raised F indicate that these suffixes cause roundness and frontness assimilation respectively. Which particular suffix a verb takes is fixed in the lexicon. We saw that there seemed to be two levels of rounding and fronting. The second level is accompanied with heightening. This needs further investigation. We also saw that root vowels in themselves can be an affix signifying number or mood. But for the moment it does not look like this could be the result of frontness or roundness assimilation.

We also looked at one particular suffix that forms an abstract noun from a noun or an adjective. This one suffix *-alla* now seemed to have no effect on some roots, causing roundness assimilation on others, and frontness assimilation on a third group. I suggested that there are actually three suffixes: *-alla^F*, *-alla^R* and *-alla*. Which suffix a noun or adjective takes is fixed in the lexicon.

As we then looked at the nouns, we saw that some suffixes seem to cause neutralization of frontness and roundness in root vowels. Besides, the number of possible combinations seemed to make it highly unlikely

that the cause for roundness and frontness assimilation is really incorporated in a specific number or case suffix. I suggested that the roundness and frontness assimilation sometimes is attached to a stem extender, and sometimes is a kind of stem extender in itself.

Looking at the overall of assimilation processes we can now venture to answer the questions posed in section 3.3.

- **What assimilation types take place?**

We have seen that fronting and rounding take place. Sometimes these are accompanied by heightening. Should we distinguish between two kinds of fronting and rounding or can we explain why heightening is sometimes added? In several cases it seems that neutralization of rounding and fronting takes place, but this needs more investigation.

- **What is the source of the assimilation? To what suffix is it attached?**

Assimilation seems to be caused by a suprasegmental element attached to a suffix. The specific suffix to which it is attached differs per word-sort, e.g. tense suffix for the verbs and stem extender for the nouns. The suffix may consist only of a suprasegmental element.

- **How can we describe what is going on?**

We can describe it by suggesting that a suprasegmental element is attached to the suffix. We can write it with a raised R, F or N attached to the suffix indicating roundness, frontness or neutralization assimilation.

- **Is assimilation different in different word-classes?**

The assimilation observed in different word-classes does not seem to differ fundamentally.

- **Is assimilation different in derivational suffixes than in inflectional suffixes?**

We have not seen a difference in the assimilation types found in derivational suffixes as opposed to inflectional suffixes.

I would like to close this paper by summarizing where we still have questions, and what still needs to be investigated:

- Find out when exactly heightening is added to fronting and rounding
- Find out whether we can speak of neutralization or whether we need to redefine what is a root
- Check the behavior of other suffixes throughout the word-classes against the theory presented here
- Go through the morphological system of the Chechen language, clearly define what suffixes are built hierarchically on what others, and how these suffixes should be described when we add the suprasegmental rounding or fronting to them.

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11 References

- Beerle W, *A contribution to the morphology of the simple verb in Chechen*. In: F.Thordarson ed., *Studia Caucasologica I*, pp 9-37, Norwegian University Press, 1986.
- Джамалханов З.Д., Мачигов М.Ю. *Нохчийн Мотт, 1-ра дакъа, "Лексикологи, фонетика, морфологи"*, Педучилищан студенташна учебник, Нохч-ГалгӀайн книжни издательство, 1972
- Дешериев Ю.Д., *Чеченский язык*, pp 190-209 in: *Языки народов СССР, Том 4: Иберийско-кавказские языки*, Москва, 1967
- Komen E.R., *Interaction between phonology, orthography and literacy in the Chechen vowel system*, unpublished paper, 8th Caucasian Colloquium, Leiden, 1996
- Мациев А.Г., *Нохчийн-Оьрсийн словарь*, Москва, 1961
- Nichols J., *The Chechen language*, chapter 1 in: *The indigenous languages of the Caucasus*, vol.4: *The Nakh-languages and the six minor Lezgian languages*, by Caravan Books, Delmar,USA, 1994
- Nichols J., *Chechen phonology*, chapter 47, pp 941-971 in: *Phonologies of Asia and Africa (Including the Caucasus)*, vol.2, ed. Kaye A.S., by Eisenbrauns, Winona Lake, 1997
- Nichols J., *Chechen noun cases*, internet: http://socrates.berkeley.edu/~chechen/Ch_cases.htm, 2004.
- Nichols J., *Chechen Verb conjugation*, internet: http://socrates.berkeley.edu/~Echechen/Ch_verb_conj.htm, 2006
- Услар П.К., *Этнография Кавказа. Языкознание. Чеченский язык*. Тифлис, 1888.

12 Appendixes

12.1 Chechen orthography

In the practical orthography the Chechen consonant phonemes are mapped as follows:

Table 14

Consonants									
		labial	dental	alveolar	palatal	velar	uvular	pharyngeal	glottal
Plosive	voiceless	<i>p</i>	<i>t</i>	<i>c</i>	<i>ch</i>	<i>k</i>	<i>q</i>	<i>w</i>	'
	ejective	<i>p'</i>	<i>t'</i>	<i>c'</i>	<i>ch'</i>	<i>k'</i>	<i>q'</i>		
	voiced	<i>b</i>	<i>d</i>			<i>g</i>			
fricative	voiceless	<i>(f)</i>		<i>s</i>	<i>sh</i>	<i>x</i>		<i>hw</i>	<i>h</i>
	voiced	<i>v</i>		<i>z</i>	<i>zh</i>	<i>gh</i>			
nasal		<i>m</i>		<i>n</i>					
lateral				<i>l</i>					
trill	voiced			<i>r</i>					
	voiceless			<i>rh</i>					
semivowel				<i>j</i>					

The vowel phonemes according to the practical orthography used here are mapped as in Vowels (I) and the vowels according to the orthography used by Nichols are mapped as in Vowels (II):

Table 15

Vowels (I)						
	front		central		back	
	short	long	short	long	short	long
high	<i>i</i>	<i>ii</i>	<i>y</i>	<i>yy</i>	<i>u</i>	<i>uu</i>
mid	<i>e</i>	<i>ee</i>			<i>o</i>	<i>oo</i>
	<i>ie</i>		<i>ye</i>		<i>uo</i>	
			<i>a</i>			
low	<i>ae</i>		<i>aa</i>			
	<i>ej</i>		<i>aj</i>		<i>oj</i>	
	<i>ev</i>				<i>ov</i>	

Vowels (II)						
	front		central		back	
	short	long	short	long	short	long
high	<i>i</i>	<i>ii</i>	<i>y</i>	<i>yy</i>	<i>u</i>	<i>uu</i>
mid	<i>e</i>	<i>ee</i>			<i>o</i>	<i>oo</i>
	<i>ia</i>	<i>ie</i>	<i>oe</i>	<i>oe</i>	<i>o</i>	<i>uo</i>
			<i>a</i>			
low	<i>ae</i>		<i>aa</i>	<i>aa</i>		
	<i>ei</i>		<i>ai</i>	<i>aa</i>	<i>oi</i>	
	<i>eu</i>				<i>ou</i>	

The following additional rules are observed for the practical orthography:

- If a consonant is followed by the pharyngeal fricative *hw*, the latter is written as *w*, e.g.: *d+hw* = *dw*, *p+hw* = *pw*.
- When a consonant is doubled and it is written by a digraph, then only the first character is repeated, e.g.: *cch'*, *hhw*, *ggh*, *zzh* etc.

Note that in the orthography used by Nichols (Vowels-II) more distinction is made in the vowels, and some of them are therefore written a bit different. Besides orthographical differences (*oe* is used instead of our *ye*, diphthongs ending on high vowels are written with the vowels *i* and *u* instead of us writing them with the consonants *j* and *v*) this orthography makes a few more distinctions. The diphthong *ie* is written as *ia* when it is short. We have considered these two to be in complementary distribution (see Komen 1996). The same is true for the diphthongs *uo* and *ai*, which are divided into short and long variants as *o*, *uo* and *ai*, *aa*. For the discussions in this paper these differences should not be of influence.

12.2 Abbreviations used

The abbreviations used to describe Noun inflection are summarized in Table 16:

Table 16

Full name	Abbreviation
Nominative	Nom
Ergative	Erg
Genitive	Gen
Dative (Full)	Dat
Dative (Short)	DatShort

Instrumental	Ins
Material	Mat
Comparative	Cmp
Allative (Full)	All
Allative (Short)	AllShort
Source	Src
Locative	Loc
Through	Thr
Singular	Sg
Plural	Pl

12.3 Assimilation caused by suffixes

In Table 17 an overview is given of the kinds of assimilation that are caused by suffixes that are rounded, fronted or unmarked. This is described in detail in section 3.2.

Table 17

Suffix	Root change	Example	Root	Suffix
[+round]	[+round]	<i>daax-</i> + <i>-u</i> → <i>dooxu</i>	to extract (pl)	present tense
[+round]	unmarked	<i>daax-</i> + <i>-uo</i> → <i>daaxuo</i>	to live	direct causative
[+round]	[+front]	<i>muott-</i> + <i>-u</i> → <i>myettu</i>	to reckon	present tense
[+front]	[+round]	<i>ghazh-</i> + <i>-iin</i> → <i>ghozhmiin</i>	a stick	genitive plural
[+front]	unmarked	<i>daax-</i> + <i>-iita</i> → <i>daaxiita</i>	to live	causative
[+front]	[+front]	<i>daax-</i> + <i>-i</i> → <i>deexi</i>	to live	recent past tense
unmarked	[+round]	<i>itt</i> + <i>-zza</i> → <i>yttazza</i>	ten	times
unmarked	unmarked	<i>daax-</i> + <i>-hw</i> → <i>daaxahw</i>	to live	conditional
unmarked	[+front]	<i>daax-</i> + <i>-a</i> → <i>deexa</i>	to live	present tense

12.4 Count nouns

In Table 18 an overview is given of the count nouns and how they change under the influence of the two different suffixes described in section 6.

Table 18

Meaning	Count noun	Suffixed		Assimilation
		-times	-ieth	
2	<i>shi'</i>	<i>shozza</i>	<i>shoolgha</i>	R
3	<i>qo'</i>	<i>quzza</i>	<i>qo'algha</i>	R
4	<i>di'</i>	<i>dy'azza</i>	<i>dy'algha</i>	R
5	<i>pxi'</i>	<i>pxy'azza</i>	<i>pxy'algha</i>	R
6	<i>jaalx</i>	<i>joolxazza</i>	<i>joolxalgha</i>	R
7	<i>vorh</i>	<i>vorhazza</i>	<i>vorhalgha</i>	R to R
8	<i>barh</i>	<i>borhazza</i>	<i>borhalgha</i>	R
9	<i>iss</i>	<i>yssazza</i>	<i>yssalgha</i>	R
10	<i>itt</i>	<i>yttazza</i>	<i>yttalgha</i>	R
11	<i>cwajtta</i>	<i>cwajttazza</i>	<i>cwajttalgha</i>	none
12	<i>shiitta</i>	<i>shyyttazza</i>	<i>shyyttalgha</i>	R
13	<i>qojtta</i>	<i>qojttazza</i>	<i>qojttalgha</i>	R to R
14	<i>dejtta</i>	<i>dejttaazza</i>	<i>dejttaalgha</i>	none
15	<i>pxiita</i>	<i>pxyyttazza</i>	<i>pxyyttalgha</i>	R
16	<i>jaalxitta</i>	<i>joolxyttazza</i>	<i>joolxyttalgha</i>	R
17	<i>vyrhitta</i>	<i>vyrhittazza</i>	<i>vyrhittalgha</i>	R to R
18	<i>berhitta</i>	<i>berhittazza</i>	<i>berhittalgha</i>	none
19	<i>tq'ajyesna</i>	<i>tq'ajyesnazza</i>	<i>tq'ajyesnalgha</i>	R to R
20	<i>tq'a</i>	<i>tq'ozza</i>	<i>tq'olgha</i>	R
40	<i>shovztq'a</i>	<i>shovztq'azza</i>	<i>shovztq'algha</i>	R to R
60	<i>quztq'a</i>	<i>quztq'azza</i>	<i>quztq'algha</i>	R to R
80	<i>deztq'a</i>	<i>deztq'azza</i>	<i>deztq'algha</i>	none
100	<i>bwee</i>	<i>bwoozza</i>	<i>bwoolgha</i>	R
1000	<i>ezar</i>	<i>ezarzza</i>		none
how many?	<i>mas</i>	<i>mosazza</i>	<i>mosalgha</i>	R

12.5 Paradigms for nouns

All of the paradigms mentioned in the previous part of this paper, together with some additional ones, are listed in the table below.

Color has been used to distinguish between Fronting (light yellow), Rounding (light green) and Neutralization (light blue).

Table 19

Meaning		'pomegranate'	'human'	'burner'	'orphan'	'guard'	'agreement'	'handful'
Assimilation		pppppp	pppppp	pppppF	pppppN	ppppFp	ppppFF	pppFFp
Extender		p-p	p-p	p-p	pn-j	pnn-p	p-p	p-p
Singular	Nom	<i>naar</i>	<i>adam</i>	<i>baw</i>	<i>buo</i>	<i>xa</i>	<i>bart</i>	<i>kaana</i>
	Erg	<i>naar-uo</i>	<i>adam-uo</i>	<i>baw-uo</i>	<i>buo-n-uo</i>	<i>xa-n-uo</i>	<i>bart-uo</i>	<i>kaan-uo</i>
	Gen	<i>naar-a-n</i>	<i>adam-an</i>	<i>baw-an</i>	<i>buo-n</i>	<i>xe-n</i>	<i>bert-an</i>	<i>kaan-i-n</i>
	Dat	<i>naar-na</i>	<i>adam-na</i>	<i>baw-ana</i>	<i>buo-na</i>	<i>xa-na</i>	<i>bart-ana</i>	<i>kaan-i-na</i>
	Ins	<i>naar-ca</i>	<i>adam-ca</i>	<i>baw-aca</i>	<i>buo-ca</i>	<i>xa-ca</i>	<i>bart-aca</i>	<i>kaan-a-ca</i>
	Mat	<i>naar-a-x</i>	<i>adam-ax</i>	<i>baw-ax</i>	<i>buo-x</i>	<i>xa-x</i>	<i>bart-ax</i>	<i>kaan-a-x</i>
	Cmp	<i>naar-a-l</i>	<i>adam-al</i>	<i>baw-al</i>	<i>buo-l</i>	<i>xa-l</i>	<i>bart-al</i>	<i>kaan-a-l</i>
	All	<i>naar-ie</i>	<i>adam-ie</i>	<i>baw-ie</i>	<i>buo-ga</i>	<i>xa-n-ie</i>	<i>bart-ie</i>	<i>kaan-ie</i>
Plural	Nom	<i>naar-a-sh</i>	<i>adam-ash</i>	<i>baew-a-sh</i>	<i>baj</i>	<i>xa-sh</i>	<i>bert-ash</i>	<i>kaan-a-sh</i>
	Gen	<i>naar-ii-n</i>	<i>adam-ii-n</i>	<i>baew-ii-n</i>	<i>baj-n</i>	<i>xa-j-n</i>	<i>bert-ii-n</i>	<i>kaan-ii-n</i>
	Mat	<i>naar-ie-x</i>	<i>adam-ie-x</i>	<i>baew-ie-x</i>	<i>baj-x</i>	<i>xa-j-x</i>	<i>bert-ie-x</i>	<i>kaan-ie-x</i>
	Cmp	<i>naar-ie-l</i>	<i>adam-ie-l</i>	<i>baew-ie-l</i>	<i>baj-l</i>	<i>xa-j-l</i>	<i>bert-ie-l</i>	<i>kaan-ie-l</i>
	Dat	<i>naar-a-sh-na</i>	<i>adam-ash-na</i>	<i>baew-a-sh-na</i>	<i>baj-sh-na</i>	<i>xa-sh-na</i>	<i>bert-ash-na</i>	<i>kaan-ash-na</i>
	Erg	<i>naar-a-sh-a</i>	<i>adam-ash-a</i>	<i>baew-a-sh-a</i>	<i>baj-sh-a</i>	<i>xa-sh-a</i>	<i>bert-ash-a</i>	<i>kaan-ash-a</i>
	Ins	<i>naar-a-sh-ca</i>	<i>adam-ash-ca</i>	<i>baew-a-sh-ca</i>	<i>baj-sh-ca</i>	<i>xa-sh-ca</i>	<i>bert-ash-ca</i>	<i>kaan-ash-ca</i>
	All	<i>naar-a-sh-ka</i>	<i>adam-ash-ka</i>	<i>baew-a-sh-ka</i>	<i>baj-sh-ka</i>	<i>xa-sh-ka</i>	<i>bert-ash-ka</i>	<i>kaan-ash-ka</i>

Table 20

Meaning		'mother'	'height'	'city'	'father'	'brother'	'day'	'rheumatism'
Assimilation		ppFpFp	ppFFFp	ppFFFp	ppFFFp	ppFFFF	pFFpFp	pFFpFF
Extender		p-o	pi-p	pin-n	p-j	p-r	n-no	p-p
Singular	Nom	<i>naana</i>	<i>laq-all-a</i>	<i>ghaal-a</i>	<i>daa</i>	<i>vasha</i>	<i>de</i>	<i>aan</i>
	Erg	<i>naan-a-s</i>	<i>laq-all-uo</i>	<i>ghaal-an-uo</i>	<i>daa-s</i>	<i>vasha-s</i>	<i>dii-n-uo</i>	<i>een-uo</i>
	Gen	<i>neen-a-n</i>	<i>laq-all-i-n</i>	<i>ghaal-i-n</i>	<i>dee-n</i>	<i>vesh-i-n</i>	<i>dii-n-a-n</i>	<i>een-an</i>
	Dat	<i>naan-na</i>	<i>laq-all-i-na</i>	<i>ghaal-i-na</i>	<i>dee-na</i>	<i>vesh-i-na</i>	<i>die-n-na</i>	<i>aan-na</i>
	Ins	<i>neen-a-ca</i>	<i>laq-all-i-ca</i>	<i>ghaal-i-ca</i>	<i>dee-ca</i>	<i>vesh-i-ca</i>	<i>dii-n-a-ca</i>	<i>een-aca</i>
	Mat	<i>neen-a-x</i>	<i>laq-all-a-x</i>	<i>ghaal-an-ax</i>	<i>dee-x</i>	<i>vesh-i-x</i>	<i>dii-n-a-x</i>	<i>een-ax</i>
	Cmp	<i>neen-a-l</i>	<i>laq-all-a-l</i>	<i>ghaal-an-al</i>	<i>dee-l</i>	<i>vesh-i-l</i>	<i>dii-n-a-l</i>	<i>een-al</i>
	All	<i>neen-ie</i>	<i>laq-all-ie</i>	<i>ghaal-an-ie</i>	<i>dee-ga</i>	<i>vesh-ie</i>	<i>dii-n-ie</i>	<i>een-ie</i>
Plural	Nom	<i>naan-o-j</i>	<i>laq-all-ash</i>	<i>ghaala-n-ash</i>	<i>daj</i>	<i>vezh-ar-ii</i>	<i>die-no-sh</i>	<i>een-ash</i>
	Gen	<i>naan-o-j-n</i>	<i>laq-all-ii-n</i>	<i>ghaala-n-ii-n</i>	<i>daj-n</i>	<i>vezh-ar-ii-n</i>	<i>die-no-j-n</i>	<i>een-ii-n</i>
	Mat	<i>naan-o-j-x</i>	<i>laq-all-ie-x</i>	<i>ghaala-n-ie-x</i>	<i>daj-x</i>	<i>vezh-ar-ie-x</i>	<i>die-no-j-x</i>	<i>een-ie-x</i>
	Cmp	<i>naan-o-j-l</i>	<i>laq-all-ie-l</i>	<i>ghaala-n-ie-l</i>	<i>daj-l</i>	<i>vezh-ar-ie-l</i>	<i>die-no-j-l</i>	<i>een-ie-l</i>
	Dat	<i>naan-o-sh-na</i>	<i>laq-all-ash-na</i>	<i>ghaala-n-ash-na</i>	<i>daj-sh-na</i>	<i>vezh-ar-sh-na</i>	<i>die-no-sh-na</i>	<i>een-ash-na</i>
	Erg	<i>naan-o-sh-a</i>	<i>laq-all-ash-a</i>	<i>ghaala-n-ash-a</i>	<i>daj-sh-a</i>	<i>vezh-ar-sh-a</i>	<i>die-no-sh-a</i>	<i>een-ash-a</i>
	Ins	<i>naan-o-sh-ca</i>	<i>laq-all-ash-ca</i>	<i>ghaala-n-ash-ca</i>	<i>daj-sh-ca</i>	<i>vezh-ar-sh-ca</i>	<i>die-no-sh-ca</i>	<i>een-ash-ca</i>
	All	<i>naan-o-sh-ka</i>	<i>laq-all-ash-ka</i>	<i>ghaala-n-ash-ka</i>	<i>daj-sh-ka</i>	<i>vezh-ar-sh-ka</i>	<i>die-no-sh-ka</i>	<i>een-ash-ka</i>

Table 21

Meaning		'mouth'	'hair'	'yoke'	'axe'	'trace'	'birch'	'mountain'
Assimilation		pFFFFp	pFFFFF	pFFFFN	pNNNNN	pRRRRp	pRpRRF	pRRRRF
Extender		p-o	p-p	p-pp	r-r	p-p	p-n	p-p
Singular	Nom	<i>bat</i>	<i>mas</i>	<i>duq'</i>	<i>dig</i>	<i>lar</i>	<i>daq</i>	<i>laam</i>
	Erg	<i>bet-uo</i>	<i>mes-uo</i>	<i>dyq'-uo</i>	<i>dag-ar-a-uo</i>	<i>lor-uo</i>	<i>doq-uo</i>	<i>loom-uo</i>
	Gen	<i>bet-an</i>	<i>mes-a-n</i>	<i>dyq'-a-n</i>	<i>dag-ar-a-n</i>	<i>lor-a-n</i>	<i>doq-a-n</i>	<i>loom-a-n</i>
	Dat	<i>bet-ana</i>	<i>mes-a-na</i>	<i>dyq'-a-na</i>	<i>dag-ar-na</i>	<i>lor-a-na</i>	<i>doq-a-na</i>	<i>loom-a-na</i>
	Ins	<i>bet-aca</i>	<i>mes-a-ca</i>	<i>dyq'-a-ca</i>	<i>dag-ar-ca</i>	<i>lor-a-ca</i>	<i>doq-a-ca</i>	<i>loom-a-ca</i>
	Mat	<i>bet-ax</i>	<i>mes-a-x</i>	<i>dyq'-a-x</i>	<i>dag-ar-x</i>	<i>lor-a-x</i>	<i>daq-a-x</i>	<i>loom-a-x</i>
	Cmp	<i>bet-al</i>	<i>mes-a-l</i>	<i>dyq'-a-l</i>	<i>dag-ar-a-l</i>	<i>lor-a-l</i>	<i>daq-a-l</i>	<i>loom-a-l</i>
	All	<i>bet-ie</i>	<i>mes-ie</i>	<i>dyq'-ie</i>	<i>dag-ar-ie</i>	<i>lor-ie</i>	<i>daq-ie</i>	<i>loom-ie</i>
Plural	Nom	<i>bat-o-sh</i>	<i>mes-a-sh</i>	<i>daqq'-a-sh</i>	<i>dag-ar-sh</i>	<i>lar-a-sh</i>	<i>deq-n-ash</i>	<i>laem-n-ash</i>
	Gen	<i>bat-o-j-n</i>	<i>mes-ii-n</i>	<i>daqq'-ii-n</i>	<i>dag-ar-ii-n</i>	<i>lar-ii-n</i>	<i>deq-n-ii-n</i>	<i>laem-n-ii-n</i>
	Mat	<i>bat-o-j-x</i>	<i>mes-ie-x</i>	<i>daqq'-ie-x</i>	<i>dag-ar-ie-x</i>	<i>lar-ie-x</i>	<i>deq-n-ie-x</i>	<i>laem-n-ie-x</i>
	Cmp	<i>bat-o-j-l</i>	<i>mes-ie-l</i>	<i>daqq'-ie-l</i>	<i>dag-ar-ie-l</i>	<i>lar-ie-l</i>	<i>deq-n-ie-l</i>	<i>laem-n-ie-l</i>
	Dat	<i>bat-o-sh-na</i>	<i>mes-a-sh-na</i>	<i>daqq'-a-sh-na</i>	<i>dag-ar-sh-na</i>	<i>lar-a-sh-na</i>	<i>deq-n-ash-na</i>	<i>laem-n-ash-na</i>
	Erg	<i>bat-o-sh-a</i>	<i>mes-a-sh-a</i>	<i>daqq'-a-sh-a</i>	<i>dag-ar-sh-a</i>	<i>lar-a-sh-a</i>	<i>deq-n-ash-a</i>	<i>laem-n-ash-a</i>
	Ins	<i>bat-o-sh-ca</i>	<i>mes-a-sh-ca</i>	<i>daqq'-a-sh-ca</i>	<i>dag-ar-sh-ca</i>	<i>lar-a-sh-ca</i>	<i>deq-n-ash-ca</i>	<i>laem-n-ash-ca</i>
	All	<i>bat-o-sh-ka</i>	<i>mes-a-sh-ka</i>	<i>daqq'-a-sh-ka</i>	<i>dag-ar-sh-ka</i>	<i>lar-a-sh-ka</i>	<i>deq-n-ash-ka</i>	<i>laem-n-ash-ka</i>

Table 22

Meaning		'stick'	'God'	'moth'	'silver'	'camel.young'	'whistle'	'colour'
Assimilation		pRRRRR	FpFpFF	FFFFFF	FFFFFF	FRRRRR	Rppppp	RpppFF
Extender		p-m	p-n	p-p	p-p	p-p	r-r	p-p
Singular	Nom	<i>ghazh</i>	<i>deel-a</i>	<i>neca</i>	<i>deti</i>	<i>beq'a</i>	<i>shok</i>	<i>bos</i>
	Erg	<i>ghozh-uo</i>	<i>daal-a</i>	<i>nec-uo</i>	<i>deti-n-uo</i>	<i>boq'-uo</i>	<i>shak-ar-uo</i>	<i>bas-uo</i>
	Gen	<i>ghozh-a-n</i>	<i>deel-a-n</i>	<i>neca-n</i>	<i>deti-n</i>	<i>boq'-a-n</i>	<i>shak-ar-a-n</i>	<i>bes-an</i>
	Dat	<i>ghozh-a-na</i>	<i>daal-la</i>	<i>neca-na</i>	<i>deti-na</i>	<i>boq'-a-na</i>	<i>shak-ar-a-na</i>	<i>bas-na</i>
	Ins	<i>ghozh-a-ca</i>	<i>deel-a-ca</i>	<i>neca-ca</i>	<i>deti-ca</i>	<i>boq'-a-ca</i>	<i>shak-ar-a-ca</i>	<i>bas-aca</i>
	Mat	<i>ghozh-a-x</i>	<i>deel-a-x</i>	<i>neca-x</i>	<i>deti-x</i>	<i>boq'-a-x</i>	<i>shak-ar-a-x</i>	<i>bas-ax</i>
	Cmp	<i>ghozh-a-l</i>	<i>deel-a-l</i>	<i>neca-l</i>	<i>deti-l</i>	<i>boq'-a-l</i>	<i>shak-ar-a-l</i>	<i>bas-al</i>
	All	<i>ghozh-ie</i>	<i>deel-ie</i>	<i>nec-ie</i>	<i>deti-ga</i>	<i>boq'-ie</i>	<i>shak-ar-ie</i>	<i>bas-ie</i>
Plural	Nom	<i>ghozh-m-ash</i>	<i>deel-an-a-sh</i>	<i>nec-ii</i>	<i>det-ie-sh</i>	<i>boq'-ii</i>	<i>shak-ar-sh</i>	<i>bes-na-sh</i>
	Gen	<i>ghozh-m-ii-n</i>	<i>deel-an-ii-n</i>	<i>nec-ii-n</i>	<i>det-ii-n</i>	<i>boq'-ii-n</i>	<i>shak-ar-ii-n</i>	<i>bes-n-ii-n</i>
	Mat	<i>ghozh-m-ie-x</i>	<i>deel-an-ie-x</i>	<i>nec-ie-x</i>	<i>det-ie-x</i>	<i>boq'-ie-x</i>	<i>shak-ar-ie-x</i>	<i>bes-n-ie-x</i>
	Cmp	<i>ghozh-m-ie-l</i>	<i>deel-an-ie-l</i>	<i>nec-ie-l</i>	<i>det-ie-l</i>	<i>boq'-ie-l</i>	<i>shak-ar-ie-l</i>	<i>bes-n-ie-l</i>
	Dat	<i>ghozh-m-ash-na</i>	<i>deel-an-a-sh-na</i>	<i>nec-a-sh-na</i>	<i>det-ie-sh-na</i>	<i>boq'-a-sh-na</i>	<i>shak-ar-sh-na</i>	<i>bes-na-sh-na</i>
	Erg	<i>ghozh-m-ash-a</i>	<i>deel-an-a-sh-a</i>	<i>nec-a-sh-a</i>	<i>det-ie-sh-a</i>	<i>boq'-a-sh-a</i>	<i>shak-ar-sh-a</i>	<i>bes-na-sh-a</i>
	Ins	<i>ghozh-m-ash-ca</i>	<i>deel-an-a-sh-ca</i>	<i>nec-a-sh-ca</i>	<i>det-ie-sh-ca</i>	<i>boq'-a-sh-ca</i>	<i>shak-ar-sh-ca</i>	<i>bes-na-sh-ca</i>
	All	<i>ghozh-m-ash-ka</i>	<i>deel-an-a-sh-ka</i>	<i>nec-a-sh-ka</i>	<i>det-ie-sh-ka</i>	<i>boq'-a-sh-ka</i>	<i>shak-ar-sh-ka</i>	<i>bes-na-sh-ka</i>

Table 23

Meaning		'country'	'load'	'year'	'dispute'	'dough'	'summit'	'wind'
Assimilation		RpppFF	RFFFFp	RFFpFF	RFFFFF	RFFFFF	RRRRRp	RRRRRF
Extender		p-p	p-pp	r-r	n-n	p-p	p-p	p-p
Singular	Nom	<i>muoxk</i>	<i>mohw</i>	<i>sho</i>	<i>dov</i>	<i>bod</i>	<i>bohwh</i>	<i>mox</i>
	Erg	<i>maxk-uo</i>	<i>maehw-uo</i>	<i>sher-uo</i>	<i>dev-n-uo</i>	<i>bed-uo</i>	<i>bohwh-uo</i>	<i>mox-uo</i>
	Gen	<i>mexk-an</i>	<i>maehw-a-n</i>	<i>she-r-an</i>	<i>dev-n-a-n</i>	<i>bed-a-n</i>	<i>bohwh-an</i>	<i>mox-a-n</i>
	Dat	<i>maxk-ana</i>	<i>maehw-a-na</i>	<i>sha-r-na</i>	<i>dev-n-na</i>	<i>bed-a-na</i>	<i>bohwh-ana</i>	<i>mox-a-na</i>
	Ins	<i>maxk-aca</i>	<i>maehw-a-ca</i>	<i>she-r-ca</i>	<i>dev-n-a-ca</i>	<i>bed-a-ca</i>	<i>bohwh-aca</i>	<i>mox-a-ca</i>
	Mat	<i>maxk-ax</i>	<i>maehw-a-x</i>	<i>she-r-ax</i>	<i>dev-n-a-x</i>	<i>bed-a-x</i>	<i>bohwh-ax</i>	<i>mox-a-x</i>
	Cmp	<i>maxk-al</i>	<i>maehw-a-l</i>	<i>she-r-al</i>	<i>dev-n-a-l</i>	<i>bed-a-l</i>	<i>bohwh-al</i>	<i>mox-a-l</i>
	All	<i>maxk-ie</i>	<i>maehw-ie</i>	<i>she-r-ie</i>	<i>dev-n-ie</i>	<i>bed-ie</i>	<i>bohwh-ie</i>	<i>mox-ie</i>
Plural	Nom	<i>mexk-ash</i>	<i>mahhw-a-sh</i>	<i>she-r-a-sh</i>	<i>dev-n-a-sh</i>	<i>bed-a-sh</i>	<i>bahhw-ash</i>	<i>mex-a-sh</i>
	Gen	<i>mexk-ii-n</i>	<i>mahhw-ii-n</i>	<i>she-r-ii-n</i>	<i>dev-n-ii-n</i>	<i>bed-ii-n</i>	<i>bahhw-ii-n</i>	<i>mex-ii-n</i>
	Mat	<i>mexk-ie-x</i>	<i>mahhw-ie-x</i>	<i>she-r-ie-x</i>	<i>dev-n-ie-x</i>	<i>bed-ie-x</i>	<i>bahhw-ie-x</i>	<i>mex-ie-x</i>
	Cmp	<i>mexk-ie-l</i>	<i>mahhw-ie-l</i>	<i>she-r-ie-l</i>	<i>dev-n-ie-l</i>	<i>bed-ie-l</i>	<i>bahhw-ie-l</i>	<i>mex-ie-l</i>
	Dat	<i>mexk-ash-na</i>	<i>mahhw-a-sh-na</i>	<i>she-r-a-sh-na</i>	<i>dev-n-a-sh-na</i>	<i>bed-a-sh-na</i>	<i>bahhw-ash-na</i>	<i>mex-a-sh-na</i>
	Erg	<i>mexk-ash-a</i>	<i>mahhw-a-sh-a</i>	<i>she-r-a-sh-a</i>	<i>dev-n-a-sh-a</i>	<i>bed-a-sh-a</i>	<i>bahhw-ash-a</i>	<i>mex-a-sh-a</i>
	Ins	<i>mexk-ash-ca</i>	<i>mahhw-a-sh-ca</i>	<i>she-r-a-sh-ca</i>	<i>dev-n-a-sh-ca</i>	<i>bed-a-sh-ca</i>	<i>bahhw-ash-ca</i>	<i>mex-a-sh-ca</i>
	All	<i>mexk-ash-ka</i>	<i>mahhw-a-sh-ka</i>	<i>she-r-a-sh-ka</i>	<i>dev-n-a-sh-ka</i>	<i>bed-a-sh-ka</i>	<i>bahhw-ash-ka</i>	<i>mex-a-sh-ka</i>

12.6 Noun categories

The 6-letter labels used to differentiate the nouns with respect to Rounding, Fronting and Neutralization seem to divide the nouns up into categories that can be described as follows.

pppppF	Mostly words of type CVC where V can be <i>aa, a, uo</i> (e.g.: <i>daw</i> ‘swear’). Also type CV where V can be <i>aa, a</i> (e.g.: <i>t’aa</i> ‘forefoot’). Some CVCV where the first V is <i>aa, a</i> (e.g.: <i>qaqa</i> ‘sheepskin’). Stem extender types vary: p-p, p-n, n-p, n-n, n-r.
pppppN	Mostly CVC where V can be <i>u, i</i> (e.g.: <i>vir</i> ‘donkey’). Stem extender types usually p-pp.
ppppFp	The word <i>naax</i> ‘people’ goes in here, but that is only in the singular (having a plural meaning). Furthermore only the word <i>xa</i> ‘guard’ goes in here.
ppppFF	Words of type CVC, CVrC, CVj where the V can only be short <i>a</i> (e.g.: <i>t’aj</i> ‘bridge’).
pppFFp	All words ending on <i>-cha</i> go in here (that is a word formation suffix), like for instance the word <i>urxalcha</i> ‘ruler’. Almost the complete rest fits in the patters ...CVC <i>a</i> (stem extender type p-n) and ...CVCC <i>a</i> (stem extender type pn-n or p-p), like for instance the word <i>xazna</i> ‘treasure’. The V can be: <i>a, aa, ae, i, ye, u, o, uo</i> . For the words in this group the fronting only surfaces as <i>i</i> in the case endings (so they could be seen as stem extenders).
ppFpFp	Only the word <i>naana</i> ‘mother’ and combinations with it.
ppFFFp	All words ending on the word formation suffix <i>-alla</i> , as well as the word <i>ghaala</i> ‘city’. Furthermore all words with <i>daa</i> ‘father/owner’. For the words ending on <i>-alla</i> and for <i>ghaala</i> only the genitive, dative and instrumental endings (not the root vowel) are fronted (so this could be classified as a stem extender <i>i</i> instead of assimilation). For the combinations with <i>daa</i> the fronting is in the root vowel, and includes the material, comparison and allative cases.
ppFFFF	Only the word <i>vasha</i> ‘brother’ and combinations with it.
pFFpFp	Only derivations of <i>de</i> ‘day’.
pFFpFF	Words like <i>aan</i> ‘rheumatism’, <i>xaan</i> ‘time’.
pFFFFp	A wide mixture: words of type CV where V is <i>a</i> or <i>u</i> (e.g.: <i>hu</i> ‘seed’), words of type CVC where V can be <i>a, aa, u</i> (e.g. <i>hwazh</i> ‘forehead’), words of type CVCV where the root vowel can be <i>a, aa, uo</i> (e.g.: <i>kuorta</i> ‘head’). Stem extender types vary widely.
pFFFFF	A large group: words of type CV or CCV where V is usually <i>a</i> (e.g.: <i>pwa</i> ‘blood revenge’), words of type VC, CVC, CCVC and CVrC where V can be <i>a, aa, u, uo</i> (e.g.: <i>pwaars</i> ‘arm’). Furthermore words of type CVCV where the root vowel can be <i>a, aa, u</i> (e.g.: <i>saara</i> ‘whip’).
pFFFFN	Only CurC (stem extender type p-p, e.g.: <i>jurt</i> ‘village’) and CuC (stem extender type p-pp, e.g.: <i>hwun</i> ‘forest’). One exception is the word <i>u</i> ‘plank’.
pNNNNN	Only CuC and CiC with stem extender type r-r (e.g.: <i>muq</i> ‘sheath’).
pRRRRp	Mostly CVC, where V can be <i>a, aa, u, ie, e</i> with extender types p-p, p-o, p-n and p-pp (e.g.: <i>mazh</i> ‘beard’). Also some CaxC and CaarC with stem extender type p-p (e.g.: <i>q’axk</i> ‘tooth’).
pRRRRF	Mostly the patterns CaarC, CaaC and CaC (usually stem extender type p-n, e.g.: <i>ragh</i> ‘queue’). Also CCuoC and CuoC, where the <i>uo</i> is raised to <i>uu</i> or <i>u</i> in the singular, which becomes <i>ye</i> in the plural (e.g.: <i>chq’uor</i> ‘skin’). Finally <i>pxa</i> ‘plane tree’ with stem extender type n-n.
pRRRRR	Mostly CVC where V can be <i>a, aa, uo</i> and with stem extender type p-m (e.g.: <i>ghazh</i> ‘stick’). One exception is <i>beq’a</i> ‘camel young’.
FFFFFF	All (C)VCVC words ending on <i>-ig</i> where the first V is <i>ee</i> (e.g.: <i>eexig</i> ‘half’). Also the words <i>naert</i> ‘giant’ (where the <i>ae</i> really is a long <i>ee</i> too) and <i>qyeba</i> . Further many words of the CVCCV pattern that end on <i>-i</i> (e.g.: <i>qelli</i> ‘dung’). Also some words of CVCV pattern that end on <i>-i</i> (e.g.: <i>deshi, deti, gheeli</i> , but most other words fall into the category pppppp).
Rppppp	Mostly CVC with stem extender type r-r, where V can be <i>o</i> or <i>uo</i> (which become <i>a</i> in cases), like for instance <i>shak</i> ‘whistle’. Also Cuj and Cuu (the vowels becoming <i>uo</i> in cases), like for instance <i>nuij</i> ‘broom’. Further some CVCC (<i>duoxk</i> ‘fog’, <i>nost</i> ‘underleg’) and CVC(C)V (<i>moxa</i> ‘stripe’, <i>notq’a</i> ‘boil’).
RpppFF	Words of type CVC and CVCC where V can be <i>o, u, uo</i> (e.g.: <i>moz</i> ‘honey’). If the type is CVCC, then the last CC can be <i>tt, xk</i> (e.g.: <i>muoxk</i> ‘country’) or the penultimate C can be <i>l, r</i> (e.g.: <i>wolf</i> ‘wolf’). The stem extender type usually is p-p or p-n.
RFFFFFF	First of all CVC and CCVC where the VC is <i>ov</i> and having stem extender type n-n or p-n (e.g.: <i>txov</i> ‘roof’). But these could be mapped as pFFFFF too, because the vowel <i>ov</i> could be seen as rounded or plain. Further CVC where V is <i>uo</i> or <i>o</i> and the stem extender type is p-p (e.g.: <i>muohw</i> ‘cry, shout’).

RRRRRp Actually only one sample: *boh*w ‘summit, top’. This category may be very close to pppppN, except that *o* is not generally seen as an unmarked vowel.

12.7 Paradigms for verbs

Here is an overview of verbs divided up in declension types. As with the noun paradigms, color is used to indicate rounding (light green) and fronting (light yellow).

Table 24

Category	'to burn' u-type	'to reckon' ua-type	'to know' a-type	'to be satisfied' a-type	'to satisfy' a-type	'to see' o-type	'to kill' ie-type
Infinitive	<i>daaga</i>	<i>muotta</i>	<i>xa'a</i>	<i>waaba</i>	<i>waabuo</i>	<i>gan</i>	<i>dien</i>
Conditional	<i>daagahw</i>	<i>muottahw</i>	<i>xa'ahw</i>	<i>waabahw</i>	<i>waabadahw</i>	<i>gahw</i>	<i>diehw</i>
Polite Sg	<i>daagahwa</i>	<i>muottahwa</i>		<i>waabahwa</i>	<i>waabadiehwa</i>		
Polite Pl	<i>daagiisha</i>	<i>muottiisha</i>	<i>xa'iisha</i>	<i>waabiisha</i>	<i>waabadiisha</i>		
Imperative	<i>daagal</i>	<i>muottal</i>	<i>xa'al</i>	<i>waabal</i>	<i>waabadiel</i>		
Imperative Sg	<i>daagalahw</i>	<i>muottalahw</i>	<i>xa'alahw</i>	<i>waabalahw</i>	<i>waabadielahw</i>		
Imperative Pl	<i>daagalash</i>	<i>muottalash</i>	<i>xa'alash</i>	<i>waabalash</i>	<i>waabadielash</i>		
Verbal noun	<i>daagar</i>	<i>muottar</i>	<i>xa'ar</i>	<i>waabar</i>	<i>waabuor</i>	<i>gar</i>	<i>dier</i>
Purpose	<i>daagarhwam a</i>	<i>muottarhwam a</i>	<i>xa'arhwam a</i>	<i>waabarhwam a</i>	<i>waabuorhwama</i>	<i>garhwam a</i>	<i>dierhwama</i>
Before	<i>daagalie</i>	<i>muottalie</i>	<i>xa'alie</i>	<i>waabalie</i>	<i>waabadalie</i>	<i>galie</i>	<i>dielie</i>
As much as	<i>daaggal</i>	<i>muottal</i>	<i>xa'al</i>	<i>waabbal</i>	<i>waabadallal</i>	<i>gallal</i>	<i>diellal</i>
Until	<i>daaggalc</i>	<i>muottalc</i>	<i>xa'alc</i>	<i>waabbalc</i>	<i>waabadallalc</i>	<i>gallalc</i>	<i>diellalc</i>
Causative infinitive	<i>daagiita</i>	<i>muottiita</i>	<i>xa'iita</i>	<i>waabiita</i>	<i>waabadajta</i>	<i>gajta</i>	<i>diejta</i>
Present	<i>doogu</i>	<i>myettu</i>	<i>xae'a</i>	<i>weeba</i>	<i>waabado</i>	<i>go</i>	<i>dye</i>
Future	<i>doogur</i>	<i>myettur</i>	<i>xu'ur</i>	<i>weebar</i>	<i>waabadiir</i>	<i>gur</i>	<i>dyyr</i>
Imperfect past	<i>doogura</i>	<i>myettura</i>	<i>xae'ara</i>	<i>weebara</i>	<i>waabaduora</i>	<i>gura</i>	<i>dyyra</i>
Present participle	<i>doogush</i>	<i>myettush</i>	<i>xu'ush</i>	<i>weebash</i>	<i>waabuosh</i>	<i>gush</i>	<i>dyysh</i>
Present noun	<i>doogurg</i>	<i>myetturg</i>	<i>xu'urg</i>	<i>weebarg</i>	<i>waabuorig</i>	<i>gurg</i>	<i>dyyrig</i>
Though	<i>dooggushieh w</i>	<i>myettushiehw</i>	<i>xu'ushiehw</i>	<i>waebbashiehw</i>	<i>waabadiesshiehw</i>	<i>gushsiehw</i>	<i>dyysshiehw</i>
Present subjunctive	<i>doogiila</i>	<i>myettiila</i>	<i>xo'yyila</i>	<i>weebiila</i>	<i>waabadojla</i>	<i>gojla</i>	<i>dyejla</i>
Present causative	<i>doogyitu</i>	<i>muttyitu</i>	<i>xo'yyitu</i>	<i>woobyitu</i>	<i>waabadojtu</i>	<i>gojtu</i>	<i>dyejtu</i>
General past caus.	<i>daagiitina</i>	<i>muottiitina</i>	<i>xa'iitina</i>	<i>waabiitina</i>	<i>waabadajtina</i>	<i>gajtina</i>	<i>diejtina</i>
Recent past	<i>deegi</i>	<i>myetti</i>	<i>xi'i</i>	<i>weebi</i>	<i>waabii</i>	<i>gi</i>	<i>dii</i>
General past	<i>daegna</i>	<i>myettina</i>	<i>xi'na</i>	<i>waebna</i>	<i>waabiina</i>	<i>gina</i>	<i>diina</i>
Past noun	<i>daegnarg</i>	<i>myettinarg</i>	<i>xi'narg</i>	<i>waebnarg</i>	<i>waabiinarg</i>	<i>ginarg</i>	<i>diinarg</i>
Past subjunctive	<i>daegniila</i>	<i>myettiniila</i>	<i>xi'niila</i>	<i>waebniila</i>	<i>waabiiniila</i>	<i>giniila</i>	<i>diiniila</i>
Witnessed past	<i>deegira</i>	<i>myettira</i>	<i>xi'ira</i>	<i>weebira</i>	<i>waabiira</i>	<i>gira</i>	<i>diira</i>
Past question marker	<i>deegirii</i>	<i>myettirii</i>	<i>xi'irii</i>	<i>weebirii</i>	<i>waabiirii</i>	<i>girii</i>	<i>diirii</i>
When	<i>daegcha</i>	<i>myetticha</i>	<i>xi'cha</i>	<i>waebcha</i>	<i>waabiicha</i>	<i>gicha</i>	<i>diicha</i>
Remote past	<i>daegniera</i>	<i>myettiniera</i>	<i>xi'niera</i>	<i>waebniera</i>	<i>waabiiniera</i>	<i>giniera</i>	<i>diiniera</i>

12.8 Derivations

Here is an overview of several nouns with the suffix *-alla* that are derived from other nouns and from adjectives.

Table 25

Adjective		Noun		Verb		Adverb		Derived Noun		Effect
		<i>daa</i>	'father'					<i>doolla</i>	'fatherhood'	R
		<i>duog</i>	'heart'			<i>dagahw</i>	'in heart'	<i>degalla</i>	'haughtiness'	F
		<i>ghaam</i>	'witch'					<i>ghoomalla</i>	'witchcraft'	R
		<i>kyg</i>	'hand'					<i>kyygalla</i>	'rule'	
		<i>laj</i>	'slave'					<i>lolla</i>	'slavery'	R
		<i>luor</i>	'doctor'					<i>lyeralla</i>	'doctorhood'	F
		<i>maax</i>	'price'					<i>meexalla</i>	'value'	F
		<i>naana</i>	'mother'					<i>noonalla</i>	'motherhood'	R
		<i>pwaar</i>	'craftsman'					<i>pwooralla</i>	'craftmanship'	R
		<i>twamda</i>	'leader'					<i>twamdalla</i>	'leadership'	
<i>dyq'a</i>	'thick'			<i>duq'dan</i>	'to thicken'			<i>dyq'alla</i>	'thickness'	F
<i>dyra</i>	'salty'			<i>durdan</i>	'to salten'			<i>dyralla</i>	'saltiness'	F
<i>k'eeda</i>	'soft'			<i>k'aadvan</i>	'to tire/wear out'			<i>k'eedalla</i>	'softness'	F
<i>leqa</i>	'high'					<i>laqa</i>	'up'	<i>leqalla</i>	'height'	F
<i>meeda</i>	'overripe'			<i>maaddala</i>	'to be overripe'			<i>meedalla</i>	'overripeness'	F
<i>q'eena</i>	'old'			<i>q'aandan</i>	'to make old'			<i>q'eenalla</i>	'oldness'	F
<i>sheera</i>	'flat'			<i>shaardan</i>	'to make flat'			<i>sheeralla</i>	'flatness'	F
<i>waerzha</i>	'black'			<i>waarzhdan</i>	'to blacken'			<i>waerzhalla</i>	'blackness'	F
<i>merza</i>	'sweet'			<i>marzdan</i>	'to sweeten'			<i>marzalla/morzalla</i>	'sweetness'	N
<i>meca</i>	'hungry'			<i>macdan</i>	'to make hungry'			<i>macalla</i>	'famine'	N
<i>deeq'aza</i>	'unblessed'			<i>daaq'azadaaqqa</i>	'to make unhappy'			<i>dooq'azalla</i>	'unhappiness'	R
<i>deexa</i>	'long'			<i>daaxdan</i>	'to lengthen'			<i>dooxalla</i>	'length'	R
<i>deza</i>	'valuable'			<i>dazdan</i>	'to celebrate'			<i>dozalla</i>	'valuableness'	R
<i>dooca</i>	'short'			<i>daacdan</i>	'to shorten'			<i>doocalla</i>	'shortness'	R
<i>ira</i>	'sharp'			<i>irdan</i>	'to sharpen'			<i>yralla</i>	'sharpness'	R
<i>k'orga</i>	'deep'			<i>k'argdan</i>	'to deepen'			<i>k'orgalla</i>	'depth'	R
<i>loxa</i>	'lowly'			<i>laxdan</i>	'to make low'	<i>laxa</i>	'down'	<i>loxalla</i>	'being small'	R
<i>moozha</i>	'yellow'			<i>maazhdan</i>	'to make yellow'			<i>moozhalla</i>	'yellowness'	R
<i>ooza</i>	'thin'			<i>aazdan</i>	'to make thin'			<i>oozalla</i>	'thinness'	R
<i>teza</i>	'saltless'			<i>tazdan</i>	'to salten'			<i>tozalla/tezalla</i>	'saltlessness'	R
<i>uonda</i>	'strong'			<i>anddan</i>	'to strengthen'			<i>uondalla</i>	'strength'	R
				<i>hwaga</i>	'to thirst'			<i>hwogalla</i>	'thirst'	R
				<i>aala</i>	'to say'			<i>oolalla</i>	'rule'	R
				<i>tiesha</i>	'to believe'			<i>tyeshalla/tieshalla</i>	'testimony'	R
<i>govza</i>	'skilled'							<i>govzalla</i>	'skill'	
<i>kura</i>	'proud'							<i>kuralla</i>	'pride'	
<i>lyra</i>	'crude'							<i>lyralla</i>	'violence'	
<i>q'uona</i>	'young'			<i>q'uondan</i>	'to make young'			<i>q'uonalla</i>	'youth'	
<i>shyyra</i>	'wide'			<i>shoordan</i>	'to widen'			<i>shooralla</i>	'width'	
<i>xaza</i>	'beautiful'			<i>xazdan</i>	'to beautify'			<i>xazalla</i>	'beauty'	
<i>yezda</i>	'neat'							<i>yezdalla</i>	'well raisedness'	
								<i>wuozhalla</i>	'death'	