**Non-local vowel harmony in Nganasan?**

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Vowel harmony is usually viewed as a feature agreement between the vowels of neighboring syllables. Vowels next to each other form a harmonic domain. Neutral vowels, which do not undergo alternation due to vowel harmony, may be transparent or obscure. Transparent neutral vowels do not interrupt harmonic domains. Obscure neutral vowels start a new harmonic domain according to their phonetic value. E.g. in a language with front/back vowel harmony, a (phonetically) back neutral vowel following front vowels can start a new harmonic domain of back vowels. However, despite its neutrality, the same (phonetically) back neutral vowel cannot start a new domain of front vowels when it follows back vowels. (C.f. e.g. Kiparsky – Pajusalu 2003.)

Nganasan, a moribund Samoyedic language spoken on the Taymir peninsula seems to contradict these principles. Nganasan is the only living Samoyedic language with vowel harmony. It has a rich morphophonology with plenty of alternations, including alternations caused by vowel harmony.

According to the literature on Nganasan phonology (Helimski 1997, Várnai 2002), earlier Nganasan had front/back (palatovelar) vowel harmony, but as a result of changes of vowel quality the original process was obscured. Today the harmony class of stems is lexicalized: based on the phonological composition of stems it is unpredictable which harmony class they belong to. However, my recent research based on the lexicon of the morphological analyzer of Nganasan (http://www.morphologic.hu/urali/index.php?lang=english) shows that the harmonic class of a stem is quite reliably predictable based in the vowels of the stem. Stems containing labial vowels, the diphthong $^{u}a$ and *a* (marked blue in the chart bellow) usually belong to one class (U stems), stems containing illabial vowels (including the diphthong i a but except for illabial velar mid vowel *ə*, (marked red in the chart bellow) belong to the other class (I stems). If we analyze a as a phonologically labial vowel (although phonetically illabial), we can speak about roundness harmony in Nganasan. (In addition, Nganasan has also palatovelar harmony, playing a peripherial role, not discussed here.)

| | **Front** | | **Back** | |
|---|---|---|---|---|
| | **labial** | **illabial** | **illabial** | **labial** |
| **high** | *ü* | *i* | *ı* | *u* |
| **mid** | | *e* | *ə* | *o* |
| **low** | | | *a* | |
| **diphthongs** | | $^{i}a$ | $^{u}a$ | |

Harmony classes of vowels in Nganasan

Stems containing exclusively *ə* may belong either of the classes, just as stems containing vowels of both harmony classes. In these cases roughly half of the stems belongs to the U class and half of them to the I class, and it seems to be impossible to predict to which class a given stem belongs to.

Although vowel harmony in Nganasan is not without exceptions, 95% of the internally harmonic stems (namely those which contain vowels exclusively belonging to one or the other harmonic class) are also externally harmonic (that is they must be followed by that allomorph of a suffix alternating due to vowel harmony which contains a vowel belonging to the same harmonic class as the vowels of the stem). In suffixes alternating according to vowel harmony, high vowels may alternate with each other, low vowel *a* may alternate with high vowels or the dipthong $^{i}a$. Vowels taking part in alternations due to vowel harmony also occur in suffixes which do not undergo vowel

harmony. However, mid vowels never undergo vowel harmony. Since *e* and *o* usually do not occur in non-first syllables (most of exceptions are fresh loanwords) and they never occur in suffixes, *ə* is the only vowel which should be considered as neutral.

The ratio of externally harmonic stems are lower if the stem also contains a neutral vowel. Only 90% of stems are U stems if they – beside *u, ü, o, a* or $^{u}a$ – also contain *ə*. Since *ə* is an unrounded vowel, we would expect that stems containing exclusively *i, ı, e* or $^{i}a$ and *ə* will be I stems in the same proportion as among stems containing exclusively *i, ı, e* or $^{i}a$. However, these are harmonic just in the 81% of the cases instead of 95%. The (phonetically) unrounded neutral vowels spoils vowel harmony of stems with unrounded vowels than that of stems with rounded vowels.

Moreover, if we compare bisyllabic stems in which an unrounded vowel is followed by *ə* with bisyllabic stems in which *ə* is followed by an unrounded vowel, we find that in the first case the rate of antiharmonic stems is lower (18%) than in the second one (25%), although in the latter case the neutral vowel does not interrupt the (potentially) harmonic domain consisting of the last vowel of the stem and the first vowel of the suffix (and probably more), therefore we would expect no effect at all. In bisyllabic stems with a rounded and a neutral vowel, the difference between the two types is minimal: while 15% of the stems is antiharmonic when *ə* is in the first syllable, 13% is antiharmonic when *ə* is in the second one.

We would also expect that bisyllabic stems containing a two vowels belonging to different harmonic classes, the second will play a more important role in deciding to which harmonic class the stem will belong to. However, just 47% of the stems are I stems when there is an unrounded vowel in the second syllable and just 48% of the stems are U stems when the second vowel of a bisyllabic stem is rounded. The ratio of harmonic and antiharmonic stems are so balanced that we have to acknowledge that the order of the vowels plays no role in these cases.

We have to conclude that the presence of neutral *ə* spoils predictability of the harmony class independently of its position and the harmonic class of the other vowels in the stem. Moreover, the order of the vowels belonging to different harmonic classes plays neither role in determining the harmonic class of the stem. Although the basic tendency is that the vowels of the suffixes undergoing vowel harmony must belong to the same class as the vowels of the stem, there is no observable tendency according to which the vowels of the suffixes undergoing vowel harmony must belong to the same class as the last harmonic vowels of the stem. This means that Nganasan has vowel harmony, but has no harmonic domains, neighboring vowels play no more significant roles than the others.

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