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TYPOLOGICAL CHANGE AND THE FINNO-UGRIC PROTO-LANGUAGE

1. Aim and presupposition

The aim of my paper is to show the traces of a typological change in Finno-Ugric proto-language (PFU) by the phonotactic analysis of PFU syllables with special reference to consonant clusters. The presupposition of this paper is that in a series of phonotoctically justifable case the second (C_2) member of PFU medial clusters (C_1C_2) originally did not belong to the stem but must have been an agglutinated suffix, and moreover — in a more earlier, less agglutinative or more isolating state of the proto-language — was a free morpheme perhaps, i.e. PFU #(C)VCV#stem +#CV#suff.>#(C)VCVCV#> #(C)VC_1C_2V#. This presupposition can be falsified by the fact that similar processes are tracable in the development of personmarking paradigms of PFU as well (Radics 1985).

2. On the Finno-Ugric proto-language

It is by now accepted that PFU is an agglutinative language reconstructed on the basis of mainly agglutinative daughter languages, though the agglutinative character is partly due to the methods of reconstruction itself. This agglutinative character is determined by the SOV word order, the vowel harmony, the postposition system, the morphological system and others. At the same time it is clear that in an earlier state PFU must have been more analytic, i.e. isolating, represented by the encliticization and subsequent agglutination of personal and possessive pronouns, the VXS word order prior to SOV, etc. The PFU morpheme structure is fairly simple, mainly #(C)VCV# and #(C)VCCV#. The general structure of PFU morphemes is as follows:

$$\#C_oV\left\{\begin{Bmatrix}CCC\\CC\\C\end{Bmatrix}V\right\}(+CV)\#$$

The optimal morpheme boundary coincides with the syllable boundary (typical of both the agglutinative and isolating types). As it can be seen consonant clusters are not permitted either morpheme initially, or morpheme finally, and morphemes end always in a vowel. Accordingly the last syllable is always open.

3. Methods

The way of justification of the starting presupposition is twofold and concerns the syllable structure of those dysyllabic stems (nominal and verbal as well) in which consonant clusters are in medial position. In these structures the syllabification processes are contradictory and a particular range of clusters are problematic phonetically and phonotactically as well. What the syllabification process concerns, and as it will be demonstrated, it is not clear whether these consonant clusters are to be treated as heterosyllabic or tautosyllabic ones on the one hand. The solution will be attempted by sonority analysis. Consonants will be ordered by their sonority hierarchy value, serving the application of Syllable Contact Law (SCL). On the other hand the members of clusters show a skew distribution, as it will be shown by distribution analysis. Finally, the results of sonority analysis and distribution analysis will be compared and on the basis of their interdependence some light will be shed on syllabification processes. The explanatory value of these processes is involved in the development, i. e. explanation of the development of suffix agglutination. It will be argued as well that the interdependence of sonority properties and distributional properties of the clusters allow the extension of SCL in PFU. The corpus is taken from Rédei (1986—1988), and the number of analysed stem morphemes is 287.

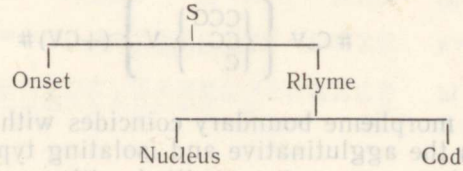
4. Consonant clusters and the PFU syllable structure

The consonant inventory of PFU consists of 20 phonemes (though the status of some of them is debated).

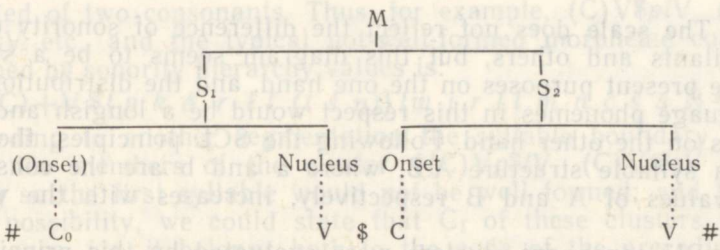
	STOP		AFFR	SYB	SPI	LIQUID		GLIDE
	ORAL	NASAL				LAT	ROLL	
LAB	*p*	*m*						*w*
DENT	*t*	*n*			*δ*			
RET			*č*	*š*				
ALV				*s*		*l*	*r*	
ALVP		*ń*	*ć*	*ś*	*δ́*	*ĺ*		
PAL								*j*
PALV	*k*	*ŋ*			*γ*			

Palatovelar nasal and palatovelar spirant is not permitted in morpheme initial position, and the latter is not permitted as a member of consonant clusters either.

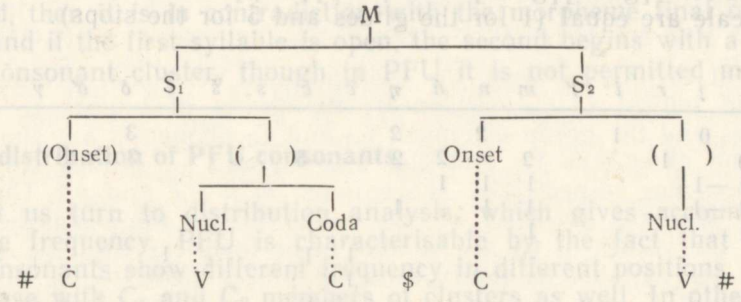
In the course of my paper I shall use some pretheoretical notions. The first concerns the general structure of syllables, namely the hierarchical structure of the syllable stands of an onset and a rhyme, the rhyme is divided into a nucleus and a coda, and the nucleus contains one phoneme, a vowel in PFU — this is the peak of the syllable. The onset, as it is preceding the peak, and the coda, as it is following it, are margin elements. Hence the general structure of PFU syllable is:



In the most usual PFU #C_oVCV # structure the syllable boundary is after the first vowel, consequently both of the syllables are open:



In the case of the similarly usual, but relatively less frequent #$C_0VC_1C_2V$# structure the tricky problem of syllable boundary is not solved. According to the most general segmentation its place would be between the members of the clusters (C_1\$$C_2$):



In this case we have open syllable in final, and closed syllable in non-final position, but the solution itself is not justified either phonetically or phonologically — what PFU concerns.

A special way of justification — introduced into diachronic descriptions by Murray and Vennemann (1983), and Vennemann (1988) — is attempted here by SCL, which is based on the notion of consonantal strength. The principles of consonantal strength and sonority hierarchy are considered here as pretheoretical ones as well, and it is accepted that sonority hierarchy is a phonological construction in fact. But as in protolanguage-reconstruction only phonological constructs, i. e. phonemes can be involved, proto-language phoneme postulates can be classified according to their relative position on a hierarchy scale. According to SCL in an optimal syllable the onset is stronger (i. e. less sonorant) than the coda, consequently if the margin elements of two, consecutive syllables form a consonant cluster in a morpheme — where the C_1 is the coda and C_2 is the onset —, than C_1, i. e. the coda of the previous syllable must be weaker (i. e. most sonorant) than C_2, i. e. the onset of the following syllable. In such an optimal case the syllable boundary is between the elements of the cluster:

$$\varnothing \rightarrow \$ \;/\; [-\text{syll}]_o[+\text{syll}] \begin{bmatrix} -\text{syll} \\ +\text{son} \end{bmatrix} \_\_\_\_ \begin{bmatrix} -\text{syll} \\ -\text{son} \end{bmatrix} [+\text{syll}]$$

5. The sonority hierarchy of PFU consonants

Glides	1	*w j*
Liquids	2	*r l ľ*
Nasals	3	*m n ń ŋ*
Fricatives	4	*č ć š s ś δ δ́ γ*
Stops	5	*p t k*

The most sonorant ones with the less consonantal strength are the glides, and the least sonorants with the highest consonantal strength are

the stops. The scale does not reflect the difference of sonority of affricates, sybilants and others, but this diagram seems to be a sufficient one for the present purposes on the one hand, and the distribution of the proto-language phonemes in this respect would be a longish and dreadful process on the other hand. Following the SCL principles: the preference for a syllable structure A.B, where a and b are the consonantal strength values of A and B respectively, increases with the value of b minus a.

The 81 PU consonant clusters were evaluated by this principle and it was found that most of them can be considered as well formed from syllabic point of view. The clusters, arranged in the chart, are marked by their values: positive numbers characterise the so-called well-formed clusters, negative numbers the less or not-well-formed ones. 0 (giving the virtual R) stands for [glide][glide] and [stop][stop] clusters, as their values on the scale are equal (1 for the glides and 5 for the stops).

C_1 \ C_2	*w*	*j*	*r*	*l*	*l'*	*m*	*n*	*ń*	*ŋ*	*č*	*ć*	*s*	*š*	*ś*	*δ*	*δ'*	*γ*	*p*	*t*	*k*
w		0		1			2		2						3					4
j	0		1			2		2	2		3				3				4	4
r	−1	−1				1	1	1										3	3	3
l	−1	−1				1	1		1										3	3
l'	−1					1														3
m										1	1			1				2	2	
n										1									2	
ń											1									
ŋ				−1							1	1			1				2	2
č																				1
ć					−2		−1	−1												1
s																				1
š																				1
ś							−1													1
δ																		1		1
δ'	−3					−1													1	1
γ																				
p			−3							−1	−1	−1	−1					0	0	
t		−3																	0	0
k		−3	−3	−3						−1	−1	−1	−1						0	0

As according to SCL in optimal cases the place of syllable boundary is between the members of the clusters, the segmentation is, e. g. (C)V*j*\$*m*V, (C)V*ŋ*\$CV, etc. 60.3 percent of the clusters are well-formed. On the basis of the chart the typical construction of these well-formed PFU morphemes is as follows:

$$\#(C)+V+\{w\ j\ r\ l\ m\ n\ \eta\ \delta\ \delta'(l'\ \acute{n}\ \check{c}\ \acute{c}\ \check{s}\ s\ \acute{s})\}\ \$$$
$$\{p\ t\ k\ \acute{c}\ \delta\ m\ n\ \eta(\check{c}\ s\ \acute{s}\ \acute{n}\ r\ l)\}V\#$$

Concerning the 0 value clusters (6.5 percents of the material) the syllable boundary cannot be determined by sonority values. Voiceless stop clusters are the prototypes of segmentation problem. Nevertheless, language specific constraints can be helpful, namely the fact that in these cases the segmentation of the Finnish and Hungarian for example would be (C)V*t*\$*t*V, (C)V*p*\$*t*V, (C)V*w*\$*j*V and so on. Thus, the suggestion for the syllabification is as follows:

$$\#C+V+\{p\ \ t\ \ k(w\ j)\}\ \$\ \{p\ \ t\ \ k(w\ j)\}+V\#$$

The third group of clusters (20.3 percents of the material) is represented by negative values in the chart. If the cluster has increasing sonority, it can be syllabificated with the following peak; consequently, the syllable boundary is after the peak of the previous syllable and before the consonant cluster. The margin of the second syllable is

constituted of two consonants. Thus, for example, (C)V$*pl*V, (C)V$*tr*V, (C)V$*ks*V etc., and the typical not-well-formed morpheme construction determined by sonority hierarchy values is:

#(C)+V$\{*p k δ́ r l ĺ (t ś η)*\}\{*w j r l ĺ m n ć š s ś*\}+V#

According to another segmentation the syllable boundary would be between the members of the cluster ((C)V*p*$*l*V, (C)V*t*$*r*V etc.), but in doing so the first syllable would not be well formed; and finally, as a third possibility, we could state that C_1 of these clusters are ambisyllabic ones, i .e. it belongs both to the coda of the preceding and to the onset of the following syllable. The ambisyllabicity is not very characteristic of agglutinative languages at the same time.

At this point no conclusion will be drawn yet, but one remark at least must be made, namely: either type of segmentation is in contradiction with the PFU morpheme structure, because if the first syllable is closed, then it is in contradiction with the morpheme final open syllables, and if the first syllable is open, the second begins with a syllable initial consonant cluster, though in PFU it is not permitted morpheme initially.

6. The distribution of PFU consonants

Now let us turn to distribution analysis, which gives account of the phoneme frequency. PFU is characterisable by the fact that most of their consonants show different frequency in different positions, and this is the case with C_1 and C_2 members of clusters as well. In other words, it means that one group of consonants seems to be typical of C_1 and another group of C_2, though not without any exception.

In PFU the total number of consonant clusters mounts to 287, and the frequency lists of C_1 and C_2 phonemes are as follows (see the left two columns):

in clusters

	C_1		C_2
l	12.2%		2.4%
r	11.8		1.4
n	9.1		2.8
η	8.7		1.0
p	8.4	>	5.2
j	5.2		2.4
ń	4.9		0.7
ś	2.1		1.7
δ́	2.1		0
ĺ	1.7		0.3
k	15.3		35.2
t	8.4		16.4
m	3.8		5.9
ć	3.8		6.6
w	2.8	<	5.2
s	2.8		3.5
č	2.4		6.3
š	1.4		1.7
δ	0.7		1.0

in initial (C_I) and medial (C_M) position

	C_I		C_M
k	22.7%		5.3%
p	15.8		2.7
w	8.2		4.0
ś	8.0		1.5
t	6.2	>	3.4
ń	4.8		1.7
s	5.5		2.5
š	1.6		0.4
j	6.6		9.5
w	5.9		6.1
l	3.8		12.0
ć	3.2		6.5
č	2.7		8.4
n	2.7	<	5.5
r	1.2		15.3
ĺ	0.7		1.7
δ́	0.5		2.3
η	0		6.9
δ	0		2.9
γ	0		1.5

These lists make clear that no one shows equal frequency values in both of the positions, but there are consonants whose value is higher than C_1 and lower than C_2 and vice versa. (Note the difference of *l r*, and *k t* respectively.) These differencies are represented by the parallel presentation of the lists.

With special respect to the most frequent phonemes the typical PFU cluster constructions can be characterised by laterals, nasals and *j* as

C_1, and mostly by stops and affricates and *w* as C_2, i. e. the typical consonant structure of PFU #$C_oVC_1C_2V$# morphemes determined by relative frequency values is:

$$\#(C)+V+\{l\ r\ n\ \eta\ p\ j\ ń(s\ \delta'\ l')\}\{k\ t\ ć\ č\ m\ w\ s(š\ \delta)\}+V\#$$

The above distribution of consonants is not helpful in syllabification, but it will be if it is compared to the distribution of morpheme initial and medial phonemes,i. e. to the consonant frequency of #CVCV# morpheme constructions. For the sake of simplicity the C_I and C_M lists are confronted immediately (see the right two columns above).

It follows that in C_I position stops, sybilants and also *w* and *ń* are more characteristic than in C_M position, and at the same time mainly laterals, *j* and *n* are more frequent in C_M position. Consequently, the typical consonant structure of PFU #C_oVCV# morphemes determined by the relative frequency values is:

$$\#\{k\ p\ w\ ś\ t\ ń\ s(š)\}+V+\{r\ l\ j\ č\ \eta\ ć\ m\ n(\delta\ \delta'\ l'\ \gamma)\}+V\#$$

Now it is time to show the distributional relations between typical C_1C_2 and typical $C_I \cdot C_M$ sequences: the group of typical C_1 and C_M phonemes and the group of typical C_2 and C_I phonemes are similar, i. e. with some exceptions C_1 and C_M, and C_2 and C_I groups contain the same phonemes respectively. (Exceptions: *m ń č ć* and *p*.) This distributional property gives us the means to define the syllabification in PFU: if the values of C_2 are similar to or identical with the values of C_I, then the syllable boundary must be placed prior to C_2, and if the properties of C_1 are similar to or identical with the properties of C_M, then the syllable boundary must follow C_1. Thus, the syllabication of these morphemes will be the following:

$$\#C_oVC\ \$\ CV\#$$

(It is remarkable that this way of syllabification does not concern cases, where the consonant cluster shows the above mentioned, "exceptional" phonemes.) Consequently, the typical well formed consonant structure of PFU #$C_oVC_1C_2V$# morphemes determined by the relative frequency values is:

$$\#(C)+V+\{l\ n\ \eta\ p\ j\ ń(ś\ \delta'\ l')\}\ \$\ \{k\ t\ ć\ č\ m\ w\ s(š\ \delta)\}+V\#$$

7. Comparison of hierarchy values and frequency values

At this point it is worthwhile to come back to the results of hierarchy analysis, and in doing so typical morpheme construction based on hierarchy values and typical morpheme construction based on distributional values are to be compared. It will be found that there is an overlap between them. For the time being leaving aside the less typical phonemes and with the exception of *w s š p* as C_1 and *w n η p* as C_2 the same phonemes are to be found prior to *(j r l η ń n δ')* and following *(t k č ć s δ m)* the syllable boundary. Thus, with the exception of less typical phonemes and *w s š p* as C_1 and *w n η p* as C_2 the typical PFU #$C_oVC_1C_2V$# morpheme construction, determined both by sonority hierarchy and relative frequency values, is as follows

$$\#(C)+V+\{j\ r\ l\ n\ \eta\ ń\ \delta'\}\ \$\ \{t\ k\ č\ ć\ s\ \delta\ m\}+V\#$$

By this fact we are permitted to extend the definition of SCL — at least what the PFU concerns: The preference for a syllable structure A.B, where a and b are the consonantal strength and relative frequency values of A and B respectively, increases with the value of b minus a. It means that consonants are to be placed on a scale according to their relative frequency values as well. This kind of extension of SCL expresses

the interdependence of hierarchy properties and frequency properties of PFU consonants, and at the same time enables us to solve the problem of closed syllables, and it will be helpful if one gets into the problem of not-well-formed PFU syllables.

8. Conclusion

First let us turn to the well-formed, closed syllables: according to the starting presupposition their closedness is the result of a resyllabification, a process which followed the syncopation of the original stem-final vowel. Consequently, these morphemes were — in a certain period of the PFU — threesyllabic, and the third syllable was a suffix previously. But how do we know that it was a suffix? On the basis of the distributional property of its consonant. Remember that the frequency of C_2 consonants is similar to or identical with the frequency value of the stem-initial consonants. This suggestion can be supported by the fact that in certain cases we have parallel proto-language stems with a single intervocalic consonant and with a consonant cluster, in which the intervocalic consonant and C_1 is the same, and the reconstructed meaning is similar too (cf. Bakró 1986). According to the starting presupposition the suffix must have been a free morpheme in an earlier state of the PFU. The argumentation is rather simple because the same principle applies to it: the distributional value of the consonants of these suffixes is similar to the values of the stem initial consonants, and not to the values of the intervocalic, syllable initial consonants.

As to, the not-well-formed cases, the SCL says that when C_1 (coda) in a syllable contact is less sonorous than C_2 (the onset of the following syllable) the sequence is likely to be in the process of changing. The syllable contact changes are of different kind, e.g. the weakening of the coda, or the strengthening of the onset is possible. I suppose that in these cases the clarification of phonological changes must be the first and promising step in the PFU as well.

REFERENCES

Bakró-Nagy, M. 1986, On the Use of Phonotactics, **k*V*r*V-Type Proto-Forms in PU/PFU. — UAJb. 6, 1—10.

Murray, R. W., Vennemann, T, 1983, Sound Change and Syllable Structure in Germanic Phonology. — Language 59, 514—528.

Radics, K. 1985, Typology and Historical Linguistics. Affixed Person-Marking Paradigms, Szeged (Studia Uralo-Altaica 24).

Rédei, K. 1986—1988, Uralisches etymologisches Wörterbuch I—II, Budapest.

Vennemann, T. 1988, Preference Laws for Syllable Structure and the Explanation of Sound Change, Berlin—New York—Amsterdam.

МАРИАННЕ БАКРО-НАДЬ (Будапешт)

ТИПОЛОГИЧЕСКОЕ ИЗМЕНЕНИЕ И ФИННО-УГОРСКИЙ ЯЗЫК-ОСНОВА

Цель данной статьи — попытаться с помощью фонотактических методов установить слоговую границу в морфемах #(C)VCCV# языка-основы и тем самым представить косвенное доказательство того, что в реконструируемых консонантных отношениях, по крайней мере частично, второй согласный исконно не принадлежит к корню, а представляет собой продолжение агглютинирующего элемента. При определении слоговой границы использованы, с одной стороны, закон силлабической связи (Syllable Contact Law) Маррей-Веннеманна и, с другой, анализ дистрибуции фонем.