

INDO-URALIC CONSONANT GRADATION

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Koivulehto and Vennemann have recently (1996) revived Posti's theory (1953) which attributed Finnic consonant gradation to Germanic influence, in particular to the influence of Verner's law. This theory disregards the major differences between Finnic and Saami gradation (cf. Sammallahti 1998: 3) and ignores the similar gradation in Nganasan and Selkup (cf. Kallio 2000: 92). Janhunen recognizes that the Proto-Uralic stress pattern "divided the word in two-syllable sections with initial stress, with the main stress on the first section of the word": (C)É(C)-CE(C)-CÈ(C)-CE(C) and asserts that this phenomenon "has convergently led to important phonotactic and morphophonemic developments", especially the consonant gradation (1981: 27). I rather agree with Helimski, who maintains that "we are left with only two options: to believe in wonders capable of producing most incredible coincidences in related or unrelated languages – or to regard the consonant gradation found in Finnic-Lapp and in Nganasan, both in its rhythmic and syllabic forms, as a PUr. phenomenon" (1995: 28 = 2000: 176).

On the basis of Janhunen's Proto-Uralic stress pattern cited above, we may call odd syllables "strong" and even syllables "weak", counting from the beginning of a word form. Helimski's "rhythmic" and "syllabic" gradations can now be defined as follows (cf. 1995: 24-26 = 2000: 172-174):

- I. A consonant which follows the vocalic nucleus of a weak syllable is weakened.
- II. A consonant which precedes the vocalic nucleus of a closed weak syllable is weakened.

These two rules are ordered because a closed weak syllable which becomes open by losing its coda as a result of I is no longer subject to II. Helimski shows that intervocalically the first rule yielded voiced fricatives and the second voiced stops both in Nganasan and in Finnic (1995: 31-33 = 2000: 178-179). It appears that the original situation is best preserved in North Saami, where non-weak consonants were strengthened (cf. Sammallahti 1998: 47-50). Note that the rules I and II yielded a subphonemic alternation between strong and weak consonants which was dependent on the stress pattern and could be either phonemized or lost as a result of later developments.

Elsewhere I have argued that the Indo-European verbal system can be understood in terms of its Indo-Uralic origins because the reconstructed Indo-European endings can be derived from combinations of Indo-Uralic morphemes by a series of well-motivated phonetic and analogic developments (2002). In the same vein I claim that the Proto-Uralic consonant gradation accounts for the peculiar correlations between Indo-European root structure and accentuation discovered by Lubotsky (1988). The facts to be explained are the following:

- (1) Proto-Indo-European had three series of stops, which are traditionally considered to be voiceless, voiced, and voiced aspirated. There is reason to assume that the plain voiced stops were actually preglottalized (cf. Kortlandt 1985) while the voiced aspirates may not have been aspirated. In order to avoid confusion I shall write $*T$, $*D$, $*D'$ for the three series and call them fortes, glottalics and aspirates, respectively.
- (2) Proto-Indo-European roots with two stops could not contain two glottalics, so that $**DE(R)'D-$ is an impossible root structure. Moreover, fortes and aspirates could not co-occur in the same root, so that $**TE(R)D'$ - and $**D'E(R)T-$ are also excluded. It follows that the distinction between fortes and aspirates was a prosodic feature of the root as a whole, which may be called “strong” if it contained $*T$ and “weak” if it contained $*D'$.
- (3) Dybo has shown (1968) that Baltic and Slavic morphemes can be divided into two prosodic classes, viz. “strong” morphemes which attract the accent and “weak” morphemes which repel the accent, and that the stress falls on the first strong morpheme of a word form. If a word form contains weak morphemes only, it has initial stress unless it can be cliticized as a whole to the preceding word form (cf. Lubotsky 1988: 3). This rule was probably inherited from Proto-Indo-European. It raises the question if the “strong” and “weak” consonants and morphemes of Indo-European can be related to the “strong” and “weak” consonants and syllables of Proto-Uralic. I think that this is indeed the case.

Lubotsky divides the Indo-European roots into four categories, viz. roots without stops, roots with a single stop and no initial laryngeal, roots with a single stop and an initial laryngeal, and roots with two stops (1988: 14). It turns out that derivatives of roots without stops and derivatives of roots with an initial laryngeal and a stop which is contiguous to the syllabic nucleus are either barytones with full grade in the root or oxytones with zero grade in the root, which points to an ancient correlation between ablaut and accentuation. However, in the case of derivatives of roots with a stop which is contiguous to the syllabic nucleus but without an initial laryngeal, it becomes apparent that *o*-stems are

barytone if the root contains $*T$ and oxytone if the root contains $*'D$ or $*D'$ whereas i - and u -stems are oxytone if the root contains $*T$ and barytone if the root contains $*'D$ or $*D'$, regardless of the ablaut grade of the root (Lubotsky 1988: 169-170). This highly peculiar distribution requires an explanation.

Elsewhere I have proposed the following relative chronology for the Indo-European branch of Indo-Uralic on the basis of the internal evidence (2002: 221):

- A. Indo-European vowel reduction, giving rise to full grade $*e$ under the stress and zero grade elsewhere;
- B. phonetic lowering of $*u$ (= syllabic $*w$) to $*o$, giving rise to a full grade (= non-high) vowel in unstressed syllables;
- C. analogical introduction of a full grade vowel in unstressed syllables (e.g. in compounds), which automatically yielded new $*o$;
- D. introduction of $*o$ in stressed syllables (e.g. by decomposing), resulting in a phonemic opposition between /e/ and /o/ under the stress;
- E. analogical introduction of full grade $*e$ in unstressed syllables, generalizing the opposition between /e/ and /o/;
- F. rise of lengthened grade vowels $*\bar{e}$ and $*\bar{o}$, yielding the conventional Proto-Indo-European vowel system.

The remaining problems are the original place of the stress, the rise of new consonant clusters, and the distribution of the stops. These problems can be solved by the following rule, which must be inserted after I and II but before A-F and thereby separates Indo-European from the Indo-Uralic proto-language:

- III. An open strong syllable becomes weak and loses its (primary or secondary) stress to the following syllable, which becomes strong if it is closed (but not if it is open).

As a result, rule A yields full grade $*e$ under the stress, which falls on the first strong syllable of a word form, *shwa secundum* in unstressed closed syllables, and zero in unstressed open syllables. The loss of initial and medial open syllables gave rise to new consonant clusters while full vowels in open syllables could only be preserved word-finally.

The expected distribution of fortes and aspirates can now be specified as follows. The two types of Uralic weak stops (before and after the vocalic nucleus of a weak syllable) apparently merged into the Indo-European aspirates while the Uralic strong stops (before the vocalic nucleus of an open syllable) became the Indo-European fortes. Initial stops adopted the same pattern, which resulted in a consonant alternation in roots with fortes before zero grade suffixes and aspirates before full grade suffixes, e.g. $*tekm$, $*d'g'em$ - 'earth'. After the analogi-

cal introduction of **o* in unstressed syllables at stage C, we obtain paradigms like the following (cf. Beekes 1995: 178):

nom.	* <i>g'eiom</i> 'winter'	* <i>nepot</i> 'grandson'
acc.	* <i>g'iem(m)</i>	* <i>nepot(m)</i>
loc.	* <i>g'iem(i)</i>	* <i>nepot(i)</i>
abl.	* <i>g'imes</i>	* <i>neptos</i>
inst.	* <i>g'imet</i>	* <i>neptot</i>

In the nominative **g'eiom*, which replaced **keim*, the full grade suffix was apparently introduced from the oblique form at this stage, while nom. **nepot* and obl. **nepot-* may represent an earlier paradigm **nept*, **nb'ed'*, with generalization of fixed stress on the initial syllable. These examples show how fortes and aspirates could become associated with fixed and mobile stress patterns, respectively.

As a result of developments in the verbal system, the nominative had now been replaced by the ablative of animate nouns and the instrumental of inanimate nouns occupying the subject position of transitive verbs, so as to yield an ergative system (cf. Kortlandt 2002, with references). After the analogical introduction of stressed **o* at stage D, the ergative in **-os*, with generalized *o*-grade replacing *e*-grade in paradigms with mobile stress, developed its own paradigm, which resulted in the thematic flexion (cf. Beekes 1985: 191-195). This paradigm had zero grade vocalism in the root. Since fortes and aspirates were now associated with barytone and oxytone stress, respectively, we find a discrepancy between the ablaut grade (which was determined by the derivation) and the accentuation (which was determined by the root structure). The Indo-European proto-language developed an opposition between agent nouns with final stress (reflecting the original ergative) and action nouns with radical stress (representing earlier root nouns), both with *o*-grade in the root. We can assume that this development started before unstressed **e*-grade was introduced at stage E. In the historical material, the ablaut grade is evenly distributed over barytones and oxytones while the accentuation is still closely linked to the consonantal root structure. Counting the certain examples of *o*-stem derivatives with a single contiguous stop and no initial laryngeal in Greek, we find 4 instances of *e*-grade in the root, all of them oxytones with **'D* or **D'* and therefore clearly secondary, 11 instances with *o*-grade, 10 instances with zero grade, and 3 oxytones with an *a*-diphthong in the root (cf. Lubotsky 1988: 138). Thus, we clearly have to assume original zero grade in this formation, regardless of the root structure.

The situation with the *i*- and *u*-stems was different because the oblique form of the suffix **-ey*, **-ew* was evidently strong at the outset, so that the analogical introduction of unstressed **o* at stage C yielded paradigms like the following:

nom.	*b'eḡ'u 'arm'	*tenḡu 'thin'
acc.	*b'ḡeu(m)	*tenḡou(m)
loc.	*b'ḡew(i)	*tenḡow(i)
abl.	*b'ḡeus	*tenḡous
inst.	*b'ḡeut	*tenḡout

These paradigms may have replaced earlier *peḡku, *b'ḡew- and *tenḡu, *d'nḡew-, respectively. The differentiation between an ergative in *-s and an ablative in *-os in paradigms with fixed stress after stage C now gave rise to a new ablative *tenḡuos beside the ergative *tenḡous whereas paradigms with mobile stress created a new ergative in *-is, *-us beside the ablative in *-eis, *-eus, later also a new accusative in *-im, *-um. After stage D, accentual mobility with radical ablaut could be restored in paradigms with fortes in the root, yielding stressed *-oi-, *-ou- in the accusative and the ergative and zero grade *-i-, *-u- before the stressed ending of the ablative *-os (cf. Beekes 1995: 181). There was no differentiation between ergative and ablative (nor between nominative and accusative) in the neuter gender, where the instrumental was used instead of the ergative with transitive verbs.

We have now arrived at the paradoxical stage where original paradigms with fixed stress have developed full accentual mobility through the creation of a new ablative in *-os beside the ergative in *-s after a full grade suffix while original paradigms with mobile stress tend to become barytones through the creation of a new ergative in *-s and an analogical accusative in *-m on the basis of the root-stressed nominative beside the original ablative in *-s after a stressed suffix. This explains Lubotsky's remarkable discovery that *i*- and *u*-stems are oxytone if the root contains *T and barytone if the root contains *D or *D'. It is an indirect consequence of the Indo-Uralic consonant gradation. Lubotsky states that 12 of the 14 *i*- and *u*-stems with *T in the root have radical zero grade in Sanskrit (1988: 174). In fact, all 26 certain examples of *i*- and *u*-stem derivatives of triconsonantal roots with a single contiguous stop and no initial laryngeal in Sanskrit have radical zero grade except 2× *harṣ*- beside *hrṣ*- 'rejoice' (cf. Lubotsky 1988: 55). The 16 instances with biconsonantal roots also have zero grade except 2× *tan*- 'spread' and *carú*-, *hári*-, *hánu*-, *jásu*-, *sáhyu*-, *mádhu*-, *váhni*-, and *yájyu*- beside *íṣṭi*- 'sacrifice'. All of these formations would be morphologically awkward if they had radical zero grade, so that we can safely assume analogical restoration of full grade in the root in these instances. There was no such reason to introduce an analogical full grade of the root in *bhṛtí*-, *dṛtí*-, *ghṛṇi*-, *jíti*-, *gáti*- or derivatives of triconsonantal roots. It follows that all of these *i*- and *u*-stem derivatives may have had original zero grade in the root, regardless of the root structure, as was the case with the *o*-stem derivatives. This supports the view expressed above that the case forms in *-is, *-us, *-im, *-um

replaced earlier ergatives and accusatives with full grade suffixes on the analogy of an earlier root-stressed nominative.

Thus far I have left the rise of the glottalic consonants out of consideration because this problem requires a separate treatment. I suspect that the root-final glottalics reflect original consonant stems (cf. in this connection Helimski 1995: 31 = 2000: 178). This is in accordance with the word-final neutralization of the Indo-European stops into glottalics, e.g. Latin *quod*, Old High German *hwaz* ‘what’, and would explain the virtual absence of the glottalics in Indo-European word formation. For the root-initial glottalics I think of prefixes which may have left a trace in the glottalization (cf. in this connection Rousseau 1990). The matter cannot be pursued here.

The theory of Indo-Uralic consonant gradation proposed here offers an explanation for several other sets of data which remain to be explored. An obvious example is the alternation between fortis and aspirates in Indo-European word formation, e.g. **-tro-*, **-tlo-* beside **-d'ro-*, **-d'lo-*. A less obvious example is the alternation between the suffixes *-ok-* and *-k-* in Russian *vysókij* ‘high’, *širókij* ‘broad’, *glubókij* ‘deep’, *dalěkij* ‘distant’ and *nízkiy* ‘low’, *úzkij* ‘narrow’, *mélkiy* ‘shallow’, *blízkiy* ‘near’, which are accentually strong and weak, respectively (cf. Dybo 1968: 155-158 on the latter). The difference between original **-o(k)-* and **-u(k)-* can be derived from an Indo-Uralic alternation between anticonsonantal (IE strong) **-w-* which was syllabified to **-u-* at stage A and lowered to **-o-* at stage B and antevocalic (IE weak) **-w-* which remained consonantal at stage A and was syllabified to **-u-* at a later stage. The semantic differentiation is secondary, as is clear from Lithuanian *platùs* ‘broad’, *gilùs* ‘deep’ versus *si-aùras* ‘narrow’, *žėmas* ‘low’. The corresponding front vowel suffix **-ik-* (Russian *-c-*) is strong in Slavic (cf. Dybo 1968: 174-181), evidently because **-i-* was not lowered to **-e-* at stage B and the strong variant was generalized. The suffixes **-in-* and **-isk-* were weak in Baltic and Slavic (ibidem: 152-155 and 214-216).

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