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MORPHOTACTIC STRUCTURE AND WORD COHESION IN FINNISH

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1

First, I shall present some observations concerning the morphotactic structure of Finnish words. The main focus will be on points where Finnish differs from Swedish and English. In this respect, I shall try to further explicate the old typological criterion which differentiates Finnish as a synthetic language from the more analytic languages Swedish and English.

In synthetic languages the word is a more information-bearing unit than in analytic languages. One could therefore a priori expect that there are a greater number of word-boundary markers in synthetic languages than in analytic ones, and that there is a greater need in synthetic languages to create word-internal cohesion. This is the object of the second question I shall pose, namely, what word boundary markers exist in Finnish? What cohesion devices does Finnish have, i.e. devices that give individual words an identity of their own and separate them from neighboring words?

2

Typologically, Finnish has been considered a rather straightforward synthetic and agglutinative language. The concept 'morphological syntheticity' is normally taken to mean that the language has a considerable number of grammatical morphemes subordinated to the stem as prefixes, infixes or suffixes. The more bound morphemes, and in particular, the more morphotactic position classes there are, the more synthetic the language is.

Let us start with a morphotactic analysis of Finnish simple nouns or, more precisely, nominal words, since adjectives, pronouns, and numerals go with nouns proper. Morphotactically, the Finnish noun has five basic positions, classes of distributionally different bound morphemes, viz. DERIVATIONAL ENDING, NUMBER, CASE, POSSESSIVE, and CLITIC.¹ The or-

¹ In what follows, capital letters refer to morphotactic position classes. Thus, NUMBER refers to a particular morphotactic class, whereas 'number' depending on context refers to a certain morpheme or morph.

der is the one given here (cf. Karlsson 1976).

ROOT	+	DERIV.	+	NUMBER	+	CASE	+	POSS.	+	CLITIC
ky p		y + lö		i		ssä		mme		kö + hän
auto				j		a		ni		pa
lato		mo		n		n				kin

The derivational processes are repeatable and a word therefore can contain one or more derivational suffixes, cf. the topmost example. Morphemes can be drawn only once from the positional classes NUMBER, CASE, and POSSESSIVE. Thus there are no words such as *auto+a+ssä, *auto+lla+n (two case endings), or *auto+mme+ni, *auto+s+ni+a (two possessives).

A word can, however, contain more than one morpheme drawn from the CLITIC position — although clitic combinations in excess of two are very infrequent. Thus pairs such as -ko+hän, -pa+hän, -pa+a, ko+a are quite normal, whereas ??-ku+ko+hän is not far from ungrammatical. Any combination of two clitics is not allowed, however, cf. *-ku+pa, *-pa+ko, *-ko+hän, *-s+hän. For some observations on the nature of these restrictions, cf. Karttunen (1975a,b) and Hakulinen (1976).

A Finnish nominal can thus contain five types of bound morphemes. Due to repeated derivation and cliticization the number of bound morphemes in a word may exceed five. In most English nouns, the corresponding number of overt morpheme classes is two, DERIVATIONAL ENDING + NUMBER or CASE, cf. cää+e+ä+s (gen.sg. and nom.pl.), +cää+e+ä+s+s (gen.pl.). Only "exceptional plurals" such as cää+e+ä+s display both NUMBER and CASE. Swedish noun morphotactics contains four classes of bound morphemes, viz. DERIVATIONAL ENDING, NUMBER, DEFINITENESS, and CASE (also cf. Teleman 1970:87), as in the word dum+höt+e+hä+s. In contrast to Finnish, E. and Sw. adjectives of course are not equivalent to nouns proper.

3

In terms of nominal morphotactic structure, 'nominal syntheticity', Finnish thus differs clearly from English, but less clearly from Swedish. The differences in morphotactic complexity become still more apparent as we turn to an examination of the verbs. Finnish finite verbs contain five

position classes in addition to the root, provided that tense and mood go together "in the same box" (cf. below). The relevant classes are DERIVATIONAL ENDING, PASSIVE, TENSE + MOOD, PERSON, and CLITIC (Karlsson 1976).

ROOT	+	DERIV.	+	PASS.	+	TENSE/MOOD	+	PERSON	+	CLITIC
Iue		skel		ta				tsi		in
Iue		skel		t				i		in
Iu								i		mme
Iue										n

There is one basic argument for regarding tense and mood as morphotactically equivalent, i.e. as belonging to the same position class.² Since the present tense and the indicative mood materialize as zero morphs, there are no word forms containing non-zero morphs of both tense and mood, and therefore the mutual morphotactic order of tense and mood cannot be empirically determined. Both of the following orders (1,2) would therefore be potentially possible, but there seem to be no data which could solve the selection problem.

	(1)	TENSE + MOOD	(2)	MOOD + TENSE
present	-	-	-	-
indicative	-	-	-	-
preterite	i	-	-	i
indicative	-	-	-	-
present	-	tsi	tsi	-
conditional	-	-	-	-
present	-	ne	ne	-
potential	-	-	-	-
present	-	kaa	kaa	-
imperative	-	-	-	-
(II p.pl.)	-	-	-	-

² It is also worth pointing out the close semantic interrelationship between tense and mood. Grammatical tenses may have modal uses and grammatical moods temporal uses.

very reason that it is not a communicatively central unit.

Matters are somewhat different in a synthetic language such as Finnish. Due to their higher concentration of information, word units are communicatively more important than in analytic languages. Therefore one might expect there to be a stronger need in Finnish than in, say, Swedish for words to be separated from their neighbor words by boundary signals, and for words to have a more clearly marked internal cohesion which supports the boundary markers.

There are at least three boundary marking and cohesion devices in Finnish, viz. (i) the fixed word stress system, (ii) some pervasive phonotactic restrictions, in particular vowel harmony and the nondissolvable medial consonant clusters, and (iii) the morphophonemic alternations. These phenomena will be treated one by one.

6

The Finnish word stress system is fixed; the primary stress is always on the first syllable and the secondary stresses are distributed over all odd-numbered syllables except the last one, which is always unstressed. In other words, each primary stress is a positive phonetic boundary signal in the sense of Trubetzkoy (1958). A primary stress always conveys the information "this syllable starts a new word". Secondary stresses and unstressed syllables give the opposite information.

This main rule for word stress holds for the primary lexical word classes, i.e. nouns, adjectives, and verbs. The rule does not always hold for free grammatical morphemes, in particular conjunctions, which often are unstressed. Many pronouns, too, are frequently weakly stressed or unstressed.

In typological perspective, fixed word stress systems are mostly of the Finnish type: the primary stress is on the first syllable (Trubetzkoy 1958). In addition to many Finno-Ugric languages, this typological group includes Czech, Icelandic, Mongolian, Samoyedic (some dialects), and Welsh. But it is also common for the primary stress to be fixed on the last syllable, as in Armenian and many Turkish languages. Finally, there are some languages such as Bantu (several dialects) and Polish where the fixed primary stress is on the penultima.

A striking feature about this list of languages is that quite a few of them are considered more or less synthetic. Of course, there are ex-

ceptions from this generalization such as Icelandic and Polish, but there is at least a weak correlation between synthetic word structure and fixed word stress.

7

Finnish primary stress is a boundary signal which cuts the utterance into word-size chunks. Vowel harmony, on the other hand, creates word cohesion as it stipulates that the vowels in a non-compound word have to be similar in specific ways. The function of vowel harmony can thus be properly evaluated only if one considers that it serves the morphological principles of syntheticity and agglutination (cf. Groundstroem 1971 also): vowel harmony glues together the morphs of a word. Due to progressive assimilation the suffixal vowels are determined by the vowel structure of the root. Vowel harmony thus has a cohesive and the word stress a delimitative function, but both devices still serve the same general purpose: they conspire to enhance the prominence of individual words.

Vowel harmony is never delimitative when both of two successive words contain only front or only back vowels ("front" and "back" in the sense of vowel harmonic restrictions) as in *tämä pöytä*, *tämä mies*, *kuo mies*, *kuo nainen*. In such strings one cannot tell the location of the word boundary only by referring to the vowels in the chain. In a secondary fashion, however, vowel harmony is delimitative any time two successive words are opposite in root harmony, as in *tämä nainen* and *kuo pöytä*. Here, the word-phonotactic impossibility of *-ä(n)a-* and *-o(p)ö-* informs us that there is an intervening word boundary.

8

Another set of phonotactic constraints which increase word cohesion is the structure of the medial consonant clusters, or more precisely, the relations of these clusters to word-initial and word-final phonotactics. The basic vocabulary, apart from interjections, descriptive words and loans, contains only items that end in vowels or simple dentals, i.e. *-t*, *-h*, *-s*, *-l*, *-r*. Final simple velars and labials are forbidden, as are all consonant clusters. Neither are there any initial clusters, but there are more simple initial than final consonants since all labials and all velars except /ŋ/ -- occur.

The restrictions on medial consonant structure are looser, since one finds clusters containing two (-CC-) as well as three (-CCC-) members. There are some 20 medial -CCC- and 60 -CC- clusters in Finnish (Karlsson 1971).

One of the consequences of these discrepancies between medial and initial final consonant structure is that many medial clusters act as direct phonotactic cues of mediality, they create cohesion by informing "the word continues". All -CCC- clusters have this property, since they cannot be split up in parts both of which would be acceptable as final and initial consonants. For example, -fʌʔ- cannot be divided into *ʔ-ʌʔ- (initial clusters unacceptable) or *ʌʔ-ʔ- (final clusters unacceptable).

A similar cue is provided by all those -CC- clusters whose first segment is not dental. Such clusters cannot be dissolved into acceptable word ends and word beginnings, cf. *k-ʌ-, *m-p-, *p-ʌ- (only dentals allowed in final position). The number of nondissolvable -CC- clusters is 21 out of 60, more precisely all those whose first segment is k-, k-, p-, m-, ɲ- (cf. Karlsson 1971). One can thus conclude that roughly 40 or 40% of the medial consonant clusters are nondissolvable. All these clusters create word cohesion by knitting the next syllable to the same word as the directly preceding syllable(s), the beginning of the pertinent word being determined by the location of the primary stress.

This is a phonotactic feature which distinguishes Finnish from English and Swedish, almost all of whose medial clusters are dissolvable in the sense that their parts can occur on both sides of a word boundary (Trnka 1935, Haugen 1956, Sigurd 1965). In this respect, English and Swedish represent what is typologically normal, cf. Saporta (1966), who proposes the following tentative phonotactic universal: "In languages with both dissolvable and nondissolvable medial clusters, the former will be significantly more frequent than the latter." Finnish is an exception to this tendency since half of the medial clusters are in fact nondissolvable.

Basically, this special feature of Finnish is due to the fact that syllable phonotactics deviates from word phonotactics. Medial syllable-ends are structurally richer than final syllable-ends. This incongruence can be given a functional interpretation: it is a device for creating word cohesion.

We have thus seen that the two most characteristic features of Finn-

ish phonotactics, vowel harmony and the high proportion of nondissolvable medial clusters, both can be analyzed as instantiations of the same central morphological need to establish the identity of individual words.

9

I shall now briefly touch upon some other relevant details pertaining to segment distribution. The phonemes /d/ and /ɲ/ have a defective distribution since they only occur medially. Occurrences of these two phonemes are thus markers of word-medial position; in Trubetzkoy's (1958) conceptual system they would be negative phonemic boundary signals. But /d/ and /ɲ/ are of course infrequent phonemes and their significance as boundary markers should not therefore be exaggerated.

A more significant boundary signal is the aphonematic glottal stop [ʔ] (cf. Itkonen 1964), which has alternative weaker manifestations such as mere glottal constriction and glottalization. This segment occurs at the beginning of a word with an initial vowel, in particular when this word is preceded by a word ending in -C (Karlsson-Lehtonen 1976). The glottal stop might also occur in absolute utterance-initial position, [ʔV-].

The glottal stop is functionally similar to the fixed primary stress: it is delimitative and signals the beginning of vowel-initial words.

10

Why do morphemes sometimes have several allomorphs, or in other words, why are there sometimes morphophonemic alternations (henceforth MP-alternations) in morphemes? Why is *veä* inflected *veden*, *veceen*, *vec-ä*, *veät?* One can of course often give a historical explanation: there are MP-alternations since sound changes have interfered with morphological paradigms. Having become unproductive, sound changes leave their traces in paradigms in the form of MP-alternations. Thus the presumed Proto-Finnic morpheme **veke* (nom.sg.) takes on different phonemic forms in different morphological contexts in present-day Finnish, such as *veden* (due to historical consonant gradation), *veä* (due to raising of the re-constructed final *-e and assimilation of *-t-), and *veätä* (due to deletion of *-e before suffixes with a certain structure).

What, then, is the synchronic status of MP-alternations? If one only considers the symbolic function of language and tries to answer the

question from the internal viewpoint of a single morpheme, NP-alternations might be labelled redundant. They do not have any symbolic task. On the contrary, they are uneconomical and needless since they violate the principle of morpheme invariance. The most economical paradigmatic state for a morpheme is to have a single invariant phonemic shape. Thus, *veä* with five allomorphs is clearly more complicated than *lää* with two allomorphs. This difference in allomorphic complexity is reflected in relative productivity. Morphemes with few allomorphs are more productive as inflectional and derivational models than morphemes with many allomorphs; the paradigm *lää* is much more productive than *veä*, which can be seen if one studies the morphological adaptation of loanwords and neologisms (e.g. *Massä* : *Massu*, not *Maä* : **Maäen*).

But syntagmatically NP-alternations are not redundant in the way just sketched. The alternations and the mutually differing allomorphs they produce such as *veä* : *vede* : *vet* : *ved* introduce redundancy into morph chains (cf. Anttila 1974), and redundancy is of course vitally important for facilitating and ensuring message decoding. Allomorphs often refer beyond their boundaries to larger sketches, normally words, and thereby have an indexical function (Anttila 1974): they increase word cohesion by gluing together morphs — usually two neighboring morphs — belonging to the same word.

Let us now return to the *veä*-morpheme and its five allomorphs, and ponder how those word forms which contain this root combined with the morphemes of number and case are decoded. There are some thirty word forms with this morphological structure, 2 number categories x 15 cases (all combinations are not morphologically and/or phonologically distinct, e.g. nom.pl. and acc.pl.). Upon hearing the segment *veä-*, the potential number of subsequent suffix chains has been reduced to two. These word forms are ill.sg. *vetäen* and ess.sg. *vetäniä*; all the other combinations of number and case are based on other root allomorphs. If one hears the segments *vede-*, less than ten possible configurations of number + case remain, i.e. those singular forms where the case morph either consists of a single consonant or has two initial consonants: *veden*, *vedet*, *vedessä*, *vedestä*, *vedellä*, *vedellä*, *vedellä*. The starting segments *veä*, *vede*, *vedellä*, also constrain the selection of suffixes, albeit less than in the first two examples. In addition to nom.sg. *veä* the whole plural oblique inflection is based on these four segments: *vestä*, *vestissä*, *vestien*, and so forth.

11

We shall now reconsider the morphotactic model given above for nouns, according to which the order of the morpheme classes is ROOT + DERIVATIONAL ENDING + NUMBER + CASE + POSSESSIVE + CLITIC, and ask in what morphotactic position we find the greatest number of morpho-phonemic alternations.

The answer is obvious: in the ROOT. Such alternations are for example consonant gradation, *-ä* : *e*, *-a* : *o*, *-a* : *ø*, *-e* : *ø*, *-nen* : *äe*, and *-t* : *s* in examples such as *takki* : *takin*, *kielä* : *kielen*, *mela* : *meloissa*, *koira* : *koirilla*, *kielen* : *kielptä*, *toinen* : *toisen*, and *veeten* : *veisi*. Many of these alternations, but not all, also concern DERIVATIONAL ENDINGS, e.g. *kiivikko* : *kiivikon*, *kahvila* : *kahvilöissa*, and *kalanen* : *kalasen*, where the derivational morphemes *-ikko*, *-la*, and *-nen* have undergone alternations.

We also find alternations in the position for NUMBER since the plural oblique *-ä* is realized as *j* when occurring between vowels, cf. *kalöissa* : *kalöjen*, *talöihin* : *talöja*. Here one should also keep in mind the suppletive alternation between the oblique *-ä* and nom.pl. *-t*. In the position for CASE there is just one alternation involving segmental change; the translative *-ä* becomes *e* when followed by a possessive, as in *vaimoksi* : *vaimokseni*. The translative *-e* thus provides a cue for a subsequent possessive. The other case morphemes do not partake in segmental alternations governed by the morphotactic class of the following morpheme, cf. case + possessive *talöisni*, case + clitic *talöisäkin*, case + possessive + clitic *talöisäkin*, and case + zero *talöissa*. There is, however, one instance of deletion. Case morphemes ending in a consonant undergo consonant deletion when followed by a possessive (cf. Witk 1967). We thus have *talöni* 'my house', *talon* 'of my house', *talöit* 'houses', and in particular get *talöni* 'of my house' / 'my houses' with deletion of genitive *-ni* and nom.pl. *-t* before the possessive *-ni*. A form like *talöni* is threeways ambiguous, 'my house' (nom.sg.), 'of my house' (gen.sg.), and 'my houses' (nom.pl.), but it should be observed that the deletions do not give any syntagmatic information of what is to follow, they just create ambiguity. One can note, in passing, that these morphological ambiguities are often resolved by syntactic information such as concord in *talöni* or 'my house is' vs. *talöni ovat* 'my houses are'.

In the POSSESSIVE position of word structure there are no morpho-phonemic alternations at all, if we disregard the facultative idiolectal initial doubling sometimes occurring after the third person possessive -nsä, e.g. *kalonsakin* [talonsakin] or [talonsak:in]. At any rate, the initial doubling is not a strictly morphotactic phenomenon since it also concerns the initial consonant of a following word, e.g. *kalonsä katto* [talonsak:to] or [talonsak:atio]. In the final morphotactic position, that of the CLITICS, there are of course no MP-alternations which could give syntagmatic pre-information of word-structure since the word ends.

These data seem to suggest the following generalization: there are more MP-alternations at the beginning of the word than at the end. Morphemes belonging to "early", left-hand morphotactic positions undergo more morpho-phonemic alternations than morphemes belonging to "later", right-hand positions. In other words, morpho-phonemic alternations in Finnish words decrease in number from left to right, as one moves from one morphotactic position class to another.

This phenomenon could be interpreted in the framework of general information theory. The need for redundancy is greatest at the beginning of the word where there is most uncertainty about what is to follow in the information chain. Early morpho-phonemics is good because it gives hints of the subsequent morphological structure of the word being processed. The need for anticipatory morphological information decreases towards the end of the word, since the number of potential ensuing morpheme classes is less and because particular individual suffixes can be more easily predicted than at the beginning of the word.

12

In connection with the preceding argumentation it should be pointed out that the morpho-phonemic alternations of the root and the derivational ending do not give information only about the phonological structure of the following suffix. Often the alternation gives precise information about the morphotactic class of the following morpheme.

Suppose we are talking about fish. If we then hear the segments *ka-* *ko-*, we automatically know that the following suffix is drawn from the position class NUMBER and is plural, cf. *kalotissa* (ROOT + NUMBER), *kalassa* (ROOT + CASE), *kalani* (ROOT + POSSESSIVE), and *kalakin* (ROOT + CLITIC). Another case in point is the *vesi-* paradigm discussed above; the four seg-

ments *vesi* are either nom.sg. which can be followed by CLITIC to give *veäkin*, or then it is a plural stem to be followed by CASE to give e.g. *veäkkä*. On the other hand, *vede-* always informs us of a following CASE (cf. **vedemme* 'our water' and **vedekin* 'water, too') whereas *vetä-* in addition to CASE also leaves open the option for POSSESSIVE as in *veteni* (CASE) and *vetemme* (POSSESSIVE), but rules out CLITIC, cf. **vetekin* 'even water'.

13

Vowel harmony seems to be an exception to the directional left-right decrease in number of morpho-phonemic alternations since it concerns all morphemes regardless of morphotactic class, compare *talossamme* and *kyllässämme*. One should, however, take into consideration that vowel harmony is global in another sense than the rest of the MP-alternations. The vowel structure of each root unequivocally determines the vocalism of all subsequent suffixes, and the vowels of each particular suffix thus do not provide any additional information about the vowels of its subsequent suffixes but only reinforce the restrictions set by the root.

The other MP-alternations give more or less specific particular syntagmatic information about the morphological class and phonological structure of the next suffix. Vowel harmony is thus global because it knits together all the morphs of the word (more precisely, those morphs that contain vowels), whereas the other alternations connect two adjacent morphs. In other words, the cohesive scope of vowel harmony is larger.

14

A few summarizing and concluding notes are in order. The word is a unit delivering more semantic information in Finnish than in English and Swedish, since the number of morphotactic position classes is greater. At least in this sense, words are more important in synthetic languages than in analytic ones. Finnish has both delimitative and cohesive means which give prominence to individual words. The delimitative devices are in particular the fixed word stress system and the glottal stop occurring in front of words beginning with a phonemic vowel. These devices point out word boundaries and split the utterance up into word-size chunks.

The cohesive means knit together the morphs belonging to a word.

Particularly important are the two outstanding phonotactic characteristics of Finnish, vowel harmony and the nondissolvability of many medial consonant clusters. One can also attribute a cohesive function to morphophonemic alternations. The selection of a particular allomorph at a given position in the morphotactic chain constrains the selection of subsequent morphemes, i.e. gives syntagmatic information of what is to come later in the word.

What has been said above is not meant to imply that there would be no delimitative or cohesive means for establishing word identity in languages such as English and Swedish. On the contrary there certainly are phonotactic constraints, morphophonemic alternations and other phenomena (e.g. the tonal Accent 2 of Swedish spoken in Sweden, cf. Elert 1970:45) which can be interpreted as delimitative or cohesive means in the same way as proposed above for Finnish (Accent 2 could thus be seen as a cohesive device reporting "the word continues"). But these phenomena do not seem to be as systematic, numerous, and pervasive as the corresponding Finnish phenomena. The differences are particularly obvious as regards the effectiveness of fixed stress and vowel harmony, which mark off almost every Finnish word. But we are of course dealing with gradient and not with dichotomous phenomena: Finnish is "more" synthetic than English and Swedish and therefore needs "more" devices for establishing the identity of individual words.

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SIGNALLING OF MORPHOPHONOLOGICAL BOUNDARIES BY
 FINNISH SPEAKERS OF ENGLISH: PRELIMINARY FINDINGS

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1

This report deals with sporadic observations on the glottal stop in the English spoken by Finns collected in connection with two separate studies. An attempt will be made to give a description of the factors which may explain the occurrence of glottalization, and to outline the method by which the phenomenon will be approached in greater detail in the future. The data available at present seem to indicate that

- at word boundaries in front of words beginning with a vowel, glottalization is far more frequent in the pronunciation of English by Finns than in standard English pronunciation;
- glottalization is even more frequent in English utterances produced by Finns than in their mother tongue utterances at boundaries of similar structure;
- in English utterances Finns use linking more often in the early part of the utterance than towards its end where glottalization or pauses assume the place which linking would have taken in normal pronunciation;
- variation in the assignment of linking, glottalization and pauses in the pronunciation of English test sentences by Finns does not correlate with the constituent structure of English in such a way that a phonetic break, i.e. glottalization or pauses, would be more common or more probable at strong syntactic boundaries and linking more usual at immediate constituent boundaries as is normally the case in English;
- glottalization can be explained by means of sentence stress in the way that the signalling of word boundaries by glottalization takes place somewhat more often in front of stressed than unstressed syntactic elements;!
- the choice made by Finns between glottalization and linking can be explained in part by observing the phonetic structure of the word string: