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On the Two-level Model in Description of Phonological and Morphophonological Processes in Finnish Dialects

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ABSTRACT

This paper deals with description of word formation processes in the Finnish Savo and south-western dialects with the help of the Two-level analysis. The Two-level analysis is compared with a system in which structural and prosodic properties of word forms are taken into account. The linguistic part of the Two-level model consists of a description of word forms at a partly abstract lexical level and the surface level. As a result of phonological and morpho-phonological processes, in several cases, the number and the structure of syllables are changed. In the Two-level morphological analysis, the variety in linearization processes, such as direct assimilations can be captured. A distinctive part of the processes taking place in word formation in Finnish dialects are based on the prosodic properties of these dialects. These processes can be described, when information on all the structural levels of words: phonemic level, number and phonemic and moraic structure of syllables, and stress and pitch relationships are taken into account. It is shown that, when the number of syllables in a word and the structure of syllables are changed, also the metrical structure of the words is changed.

Keywords: Finnish dialects, word formation, Two-level morphological analysis, prosodic rules, metrical phonology

1. INTRODUCTION

This paper deals with the morphological description of Finnish dialects that was a topic of the project called "Savotta" ('Logging site') in the beginning of the 1990's. The goal of the project was to prepare material for the exhibition of the Finnish Science Centre Heureka that was opened to the public in 1989. Several linguistic programs were prepared under the auspices of Kimmo Koskenniemi for the exhibitions, and one of them was a program which generated sample sentences from the standard Finnish into some Finnish dialects with the Beta program (Karlsson 1985). It was a plan that that program would be adapted to the Two-level rules that Kimmo Koskenniemi had developed for the standard Finnish (Koskenniemi 1983).[1] Section two of this paper deals with some basic issues on

[1] My sincerest thanks go to Kimmo Koskenniemi for innovating and patient supervising in the course of the work. Sincerest thanks go also to Juhani Pallonen and Jorma Rekunen who as specialists of the Ostrobotnian and southwest Finnish dialects collected examples for the work. Some parts of the programs were prepared with the co-operation of Mari Siiroinen: my sincerest

the background of the Finnish dialects and the Finnish literary language. Section three contains a short description of the linguistic part of the Two-level model prepared for the automatic morphological analyzer of Finnish. Some examples of the processes occurring in word formation in Finnish are presented in section four. These processes are described with the help of the Two-level model in section five. Some properties characterizing these processes are discussed in section six which also contains some examples of the analysis of the phonological structure of the words in particular from the point of view of the processes taken place in the Savo and southwest dialects. The final section contains a short summary of the topics discussed in this paper.

2. The Finnish Literary Language and its Relationship to Finnish Dialects

In many literary languages, the standard language form is based on one of the main dialects of that language, or on a dialect which has a strong prestige. The Finnish literary language has a different kind of background: it has its roots in both of the main dialectal groups: the eastern and western dialects. The origin of the Finnish literary language is dated in the 16th century. The ABC book, the first book in Finnish, was published in 1538 or 1543, and it was followed by a praying book and the New Testament. Discussion on the form and structure of the literary language continued, and was most intensive in particular in the 19th century. As a result of these processes, the main outlines of the grammar of the Finnish literary language are based on the western dialects, in most cases on the Häme dialect. Eastern dialects were taken into account in particular in enriching the lexicon. The southwest dialects are spoken in the south-western corner of Finland, and the eastern dialects including the Savo and south-eastern dialects are spoken in the central, eastern, and south-eastern parts of Finland (cf. Kettunen 1969; Wiik 2004). The eastern and western Finnish dialects are not developed directly from the same language form, but the relative distance between the eastern and western dialects, and in particular the south-western and the Savo dialects is remarkable. The south-western dialects are based on the coastal Finnish dialects which are descendants of the North Baltic Finnic, and the eastern dialects which are more mixed are based on western and eastern innovations of Proto Finnic dialects. The Häme dialect, which has given the strongest components in the literary Finnish, and the south-western dialect were separated relatively early in the prehistoric period (Leskinen 1999). Some examples of the differences between the eastern (the Savo dialect (SD)) and western dialects (the southwest dialect (SWD)) with

thanks go to her. I also want to express my thanks to Raimo Anttila who as a native speaker of the southwest Finnish dialect gave his help in testing some word forms for developing the Two-level rules, and Marja Lehtinen (1988) for testing the first version of the Beta program on the South Ostrobotnian dialect.

respect to the standard literary language (SLL) are presented in Table 1. Examples of the processes occurring in the dialects are presented after the dialectal forms (on specification of the rules, cf. Karlsson 1983: 145–162).[2] Morphological features are inside brackets, and morphological information of the word is glossed after the standard form[3]. As it can be seen in the table, the Savo dialectal forms are tending to be longer than those in the standard language, and the southwest dialectal forms are tending to show opposite structure. The dialect groups are characterized with the help of distinctive features. The more the features characteristic to a certain dialect are found in a language form spoken in an area, the more clearly it belongs to a certain dialectal group. The borders between the eastern and western dialects are not radical, but the main groups and also minor dialect groups are more or less separated by zones.

The Two-level model developed by Koskenniemi (1983) was prepared for the standard language. The rules for standard Finnish also formed the basis of the Two-level rules for the Finnish dialects. Also Koskenniemi's lexicon was used in generating the dialectal forms. Most of the Two-level rules were prepared for the Savo dialect. Some rules were also prepared for the Ostrobotnian dialect. These dialect forms were compared with the southwest dialect. All the examples concerned the most prototypical dialect forms (Turunen 1959).

[2] This work is based on some old descriptive documents on Finnish dialects, and some basic outlines in the complexity of development of these dialects are captured. The notation is coarse, and it does not, e.g., follow the transcription of various phases of the processes taken place in the historical development of these dialects (cf. Ojansuu 1901, 1903).

[3] The capital letters and combinations of letters and numbers in the examples denote morphophonemes, and the small caps grammatical categories. Abbreviations: C = consonant, CLT = clitic, COMP = comparative, COND = conditional, ESS = essive. FUT = future, INF = infinitive, INE = inessive, LF = lexical form, NOM = nominative, P = processes, PAST = imperfect, PL= plural, PRES = present tense, PTV = partitive, SF = surface form, SG = singular, SYLL = syllable, V = vowel, # = word limits, '.' Separates categories in portmanteau morphs, '-' = the limit between syllables, + = the limits between morphemes, '|' denotes alternates, * denotes the main stress in the lexical forms, and a historical form in Table 1, '' = secondary stress. Palatalization is marked by ''after the dentals. Archiphoneme = a phonological unit in which the oppositions of the distinctive features are neutralized", and morphophoneme accounts alternations which are recurrent but not automatic.

Table 1. Examples of the differences between the Standard Finnish, and the Savo and south-western dialects (Ojansuu 1901, 1903; Turunen 1956, 1959; Kettunen 1969)

	Basic form	Gloss & P		Gloss & P		Gloss & P
SLL	*korkea* 'high'	high.SG.NOM	*korkea+a*	high.SG+PTV	*korke+i+ta*	high+PL+PTV
SD	*korkkee*	*a > e /e_#*|C *k > kk /_ VV*	*korkkee+ta*	*a>e /e_#*|C *k>kk /_VV*	*korkke+i+ta*	*k>kk /_VV*
SWD	*korkia*, *korkki*	1. *e > i/_a* 2. *a > 0 /_ #* *kk>k/_V#*	*korkki+jaa*	*e > i/_a* *k>kk /_VV* *0 >j/ V_V*	*korkke+i+t*	*k>kk /_VV* *a>0 /t_#* [PTV]
SLL	*metsä* 'forest'	forest.SG.NOM	*metsä+ä*	forest.SG+PTV	*mets+i+ä*	forest+PL+PTV
SD	*mehtä*	*ts > ht*	*mehtte+e*	*ts > ht* *ä>e /e_#* *t>tt/_VV*	*mehtt+i++i*	*ts>ht* *ä>0/_i+ ä* [PL][PTV] *ä > i / i_#* [PTV] [PL]
SWD	*mettä*	*ts>tt* (=❄❄)	*mettä*	*ts>tt* (=❄❄)	*mett+i*	*ts>tt* (=❄❄) *ä >0 /_i + ä* [PL][PTV] *ä>0 / i_* [PL]
SLL	*luke+a*	read+INF	*luke+e*	read+PRES.3SG	*luk+í*	read+PAST.3SG
SD	*lukke+e*	*k>kk /_VV* *a >e /e_#* [INF]	*lukko+o*	*k>kk /_VV* *ee>oo /_(*p)#* **p>0 / VV_#*	*luk*	*e > 0 /_i* [PAST] *i>0 /_#*
SWD	*lukki*	*k>kk /_VV* *a >0 /_#* *e >i /_#*	*lukke*	*k>kk /_VV* *e>0 / e_(*p)#*	*luk+is'*	*i>0 /s_#*

3. On the "Tools" in the Two-level Model

The linguistic part of the Two-level model for Finnish (Koskenniemi 1983) consists of a description of word forms at two levels, the partly abstract lexical level and the surface level, and Two-level rules which connect the segments at the lexical level to those at the surface level. The segments at the lexical level which have a different kind of representation at the surface level are marked with archiphonemes. The archiphonemes which usually are morphophonemes are converted to the surface forms by rules. The lexical forms are given in a dictionary consisting of sub-lexicons. Sub-lexicons comprise the word stems (roots) and derivational and inflectional affixes which can be characterized with morpho-syntactic features. Each rule in the model applies to just one unit in a sequence of units. In principle, the archiphonemes represent the elements at the underlying level, and the distribution of the surface forms with respect to the underlying forms is described by the rules.

The substantial part in the Two-level model consists of Characters (Alphabet and Diacritics), Sets of characters which can occur in the context of the units to be

substituted, Definitions which are special sequences of characters occurring in context conditions of the rules, and some syntactic Operators. In the Alphabet, the characters of the standard literary language will be supplemented with various archiphonemes which are used in defining the status of the units at the lexical level. Diacritics are characters which are used to indicate boundaries in or between words, or other properties in word formation which are not visible at the lexical level. (Character) Sets are usually collections of phonemes belonging to the same natural group of phonemes, such as liquids, stops, back vowels, or labial vowels. The units in Definitions can be single units defined in the Alphabet, or collections of these units, Sets, such as vowels, consonants, syllables, or the definition of the nucleus of a syllable.

The Two-level rules which change the lexical form into the surface form are substitution rules, and the basic structure in which the substitution takes place is: LC_RC (LC = left context, RC = right context (Koskenniemi 1983: 36–41, 69–79). The order of the rules, which has been one of the topics in discussion within the framework of the theory of the generative phonology and also in lexical phonology, does not have any role in the Two-level morphology. Computationally, the rules act simultaneously, so problems about their ordering are avoided. Adjustment of the units at different levels with a rule can be considered an act. The processes defined by the rules are compiled to the finite state automata (or better, transducers in which input symbols consist of pairs of characters), in which selections are made between the different states to be connected. The finite state automata are constructed of nested systems of application of the rules which combine the units.

In the rules, archiphonemes are phonemic units at the lexical level from which the surface level phonemes are derived. The archiphonemes behave like triggers, but their ontology is based on the properties of the (morpho-)phonological processes in word formation. In example (1), three separate rules are needed for describing the processes taking place in describing the phonological and morpho-phonological processes in declining the word *kukka* 'flower': (a) the rule for defining the quantitative gradation of the stop /*k*/: K:*k* with respect to K:0, (b) the rule for expressing the disappearance of the stem final vowel -*a* before the plural ending: a2:*a* with respect to a2:0, and (c) a rule for describing the vowel harmony: A:*a*. The correspondence of 0:* is needed for describing the principal stress as a sequential unit.

(1)	Word forms for the TWOL	GLOSS	SLL	Savo dialect	Translation
LF SF	k u 0 k K a2 k u * k k a	flower.SG.NOM	*kukka*	*kukka*	'flower'
LF SF	k u 0 k K a2 + I + s s A k u * k 0 0 + i + s s a	flower+PL+INE	*kukissa*	*kukissa*	'in flowers'

The lexicon consists of various sub-lexicons which consist of the word stems and the inventory of different morphological elements existing in a language. The (sub-)lexicons are combined with the help of continuation classes which collect together the elements which can be combined in the same sequence (i.e. a word form including stems or inflectional units), and also show which of the sub-lexicons can be connected in a certain sequence. Technically, continuation classes can be defined as pointers. In the Two-level programs of Finnish and the Finnish dialects, the possible stem variation has been indicated by separate sub-lexicons which are added to the shortened stems. Each continuation class includes information about the order of the endings to be connected in the sequences.

4. On the Phonological and Morpho-phonological Processes in Word Formation

Word formation has been a topic of discussion in morphological theories in linguistics in particular since the 60's, and in several phonological and morphological theories, a focus of these discussions has concerned the position and theoretical value of rules occurring in word formation. In the generative theory, special word formation rules play a primary role in word-based process (on the word formation in the generative grammar, cf. Aronoff 1985; cf. also Kiparsky 1983). Phonological and morpho-phonological processes which have an important role in word formation in Finnish can be classified into various groups with respect to their effect on speech production or word formation (combination and accommodation of different elements in a word). In word formation in Finnish, the following basic groups can be found (Karlsson 1983: 143–192):

(1) Articulatory reduction rules: various assimilations and losses are the basic types in this group.
(2) Prosodic rules which have an effect on the pitch accent and stress relationships in a word, duration of phonemes, and syllabification of words.
(3) Dissimilations and epenthesis.
(4) Phonological adjustment rules which affect production of different surface allomorphs.

These rules can be realized in different positions of a word. On the basis of the prerequisites of the alternations taking place in word formation, the alternations can be classified to automatic and morpho-phonological alternations (cf. Hasplemath 2002: 183–185).

The word formation rules in the Two-level model follow the principles presented in the generative phonology, but they are more concrete, and the changes in the word forms are presented as relations between the lexical and surface forms. In the following section, I will utilize the basis of some of the examples of the Two-level rules created for standard Finnish and the Finnish dial-

ects with the help of description of lexical forms and corresponding surface forms. Finnish (including its dialects) is considered to be a synthetic, agglutinative language, but there are many morpho-phonological processes which can be characterized as having a fusion affect. Complexity of the inflectional system in Finnish is evident in the classification of the declensional and conjugational types of Finnish words, which number is 82 and 45 respectively. Consonant and vowel alternations in stems are complex, and the rules concerning the combination of suffixes with word stems are very strict and specific. Variety in these processes is, of course, much greater in the Finnish dialects than in the standard Finnish, and attention has to be paid to the rules which must be split to several sub-rules in order to be able to take care of this variety.

5. Examples of the Two-level Relationships Describing Savo Dialects of Finnish

In Finnish, many of the morpho-phonological processes are bound to the position of the stress in a word. The location of the main and the secondary stress is fixed, and information on the structure of a word must be included in the conditions of word formation processes. In the programs of the Finnish dialects, information on the possible structures of syllables is given in the Definitions. In the Two-level rules, the prosodic properties of a language including the stress relations are transformed to segmental ones. Data on the stress concerns the phonological (prosodic), and on the syllable also the structural conditions of a word. The stress is defined in the lexical form by zero (0) which, in the rule will be substituted by '*' (main stress) and by ‘`’ (secondary stress) at the surface level. In the example below, the lexical form of the comparative adjective *kaunis* ‘beautiful’ in the Finnish Savo dialect contains the following elements which have different kinds of surface forms: W represents long vowels occurring in word stems; its surface form is a loss (= 0) or a vowel, M is an element in the comparative suffix, P participates in consonant gradation, A1 is an element in that suffix participating in stem formation, it participates in the vowel harmony rules and will disappear before the plural suffix, A is involved in the vowel harmony rules, and the diphthong *-au-* in the first syllable is opened to *-ao-*. In the word form *selviän* ‘I manage’, the number of syllables is increased, because the anaptyctic vowel *-e-* between the consonant cluster (*lv*) in the eastern (cf. Karlsson 1983: 157–158).

(2)	Word forms for the TWOL	GLOSS	SLL	Savo dialect	Translation
LF SF	ka0un0iW+MPA10+nA ka*onn i i +m p a `+ na	beautiful+ COMP.SG+ESS	*kauniimpana*	*kaonn’iimpana*	‘as more beautiful’
LF SF	s e 0 l 0 v 0 i + Wn s e * l e v v i + i n	manage+ PRES.1SG	*selviän*	*selevviin*	‘I manage’

Also the rules concerning the processes affecting the changes in duration of consonants in the Finnish dialects, **general gemination** and **special gemination** are bound with the prosodic features. The unified condition for description of these phenomena in the Savo dialect is that gemination takes place before a long vowel or a contracted diphthong. A rule that shortens a long vowel or a diphthong (depicted with two vowel segments) to a single vowel segment prevents the realization of the gemination rule. As a consequence of the rule of the general gemination, the syllabic structure of the word is changed: the second and the third syllables have become closed. In this case, the W is realized as a vowel preceding it which in this case is /*i*/.

Epenthesis (inserting consonants) and **anaptyxis** (inserting inter-consonantal vowels) signify phonological rules usually occurring to facilitate pronunciation. In some Finnish dialects an anaptyctic vowel can come between certain consonant combinations in a word. With a few exceptions, the quality of the anaptyctic vowel is the same as the vowel preceding the consonant combination. In the examples (the last example in (2) and the first example in (3)), the zero (0) in the Lexical Form is replaced by the anaptyctic vowel in the Surface Form (a2 = morpho-phoneme having two surface forms: *-a* in singular and *-o* in plural form, A! = morphophoneme of a partitive ending).

(3)		GLOSS	SLL	Savo dialect	Translation
LF SF	i 0 l 0 m a2 i * l i m a	*air*.SG.NOM	*ilma*	*il'ima*	'air, weather'
LF SF	i 0 l 0 m a2 + A! i * l i m o + o	*air*.SG+PTV	*ilmaa*	*il'imoo*	'air weather'
LF SF	p u 0 n a i4 s + t!A! p u * n a 0 s' + t a	red.SG+PTV	*punaista*	*punas'ta*	'red'
LF SF	k u 0 l 0 k + i s I1 k u * l u k + i s' 0	go+COND+3SG	*kulkisi*	*kulukis*'	's/he/it would go'

Palatalization of dental consonants, owing to the assimilation processes, is common in the eastern Finnish dialects. In spite of the high frequency of the process, the rules are very complex, because, for example, palatalization is an example of a process which is partly lexicalized in the Savo dialects. The example above (*kulukis'*) also illustrates the **apocope rule** occurring in the Savo dialects. The vowel participating in apocope is usually *-i* but also *-a* and *-ä* can disappear and, particularly in the south-western dialects, also the other vowels (i4 palatalizes the following dental consonants, I1 is the last vowel of the conditional suffix, and t! denotes the partitive suffix (*-ta*, *-tä*) which is connected to certain stems). **Vowel harmony** is one of the common processes in phonological adjustments. The type existing in Finnish is progressive palatal harmony, in which the quality of the vowel in the first syllable of a word influences the quality of the vowels in the other syllables. The basic rule for vowel harmony in standard Finnish (and the Finnish dialects) is that the front vowels (*ä*, *ö*, *y*) or back vowels (*a*, *o*, *u*) in the

first syllable predetermine the quality of the vowels in the other syllables. The vowels *e* and *i* behave in this respect exceptionally and are neutral. The rules act over the junctures of derivative and inflectional suffixes. The vowel harmony rules do not work over the juncture between the separate words in compounds.

Articulatory reduction rules concern various types of reductions in speech production. Phonological adjustments signify the simplification of consonant combinations at the beginning of a word, or the replacement of consonants not belonging to the consonant system of the language with a native consonant. For instance, the voiced stops [*b*] and [*g*] which are not native to standard Finnish, do not exist in some Finnish dialects. Also the voiced stop [*d*] does not usually exist in native words in many Finnish dialects. **Replacing of a voiced stop with a voiceless one** in foreign loan words is a rule, but, because voiced stops do not belong to the phoneme system in these dialects, the replacement can be given in the Alphabets: *b*:*p d*:*t g*:*k*. Exceptions to this process must be included in the Alphabet and rules. Also the rule on simplification of word-initial consonant combinations which occur in loanwords (SL: *presidentti* 'president', Savo dialect: *resitentti*) belong to this group.

Morpho-phonological rules concern the processes which are morphologically conditioned. **Consonant gradation** which in Finnish is qualitative and quantitative and occurs in the stem and suffixal elements belongs to this group of rules. The basic condition for consonant gradation in Finnish is that the weak grade of a stop occurs before a closed syllable. Because the conditions of realization of the consonant gradation are based on the structure of the syllables, information about certain morphological restrictions and the structure of the syllable are required. There are fewer gradation variants at the surface level in the standard language than in the dialects. Example (4) contains an example of the gradation in which [*t*], when combined with the [*n*] and is assimilated in the weak grade, and the combination is realized as [*nn*] (examples on consonant gradation can also be found in examples (1) and (2)).

(4)	Word forms for the TWOL	GLOSS	SLL	Savo dialect	Translation
LF SF	p i 0 n T 0 a2 p i * n t 0 a	surface.SG.NOM	*pinta*	*pinta*	'surface'
LF SF	p i 0 n T 0 a2 + n p i * n n 0 a + n	surface.SG+GEN	*pinnan*	*pinnan*	'of the surface'
LF SF	p i 0 n T 0 a2 + A! p i * n t t o + o	surface.SG+PTV	*pintaa*	*pinttoo*	'surface (PTV)'

A group of rules in the programs made for the Finnish dialects concerns the selections of the combinations of different suffixes with the word stems. Owing to the narrow scope which many suffix variants have, an exact description of the context in which they occur was required. The rules have to define the conditions of how different kinds of stems will adapt these endings. The examples in Tables

(4) (*pintaa* ‘surface (PTV)’) and (5) (*maata* ‘land (PTV)’, *maita* ‘lands (PTV)’) represent variants that can be found in the partitive endings. The combination -t!A is the lexical form of the partitive ending *-ta* (*-tä*), and I7 is the plural suffixes combined with different stem types. The monophtong *-aa-* is differentiated to *-ua-* and the diphthong *-ai-* (comes from -WI7- at the lexical level) is opened to *-ae-*.

(5)	Word forms for the TWOL	GLOSS	SLL	Savo dialect	Translation
LF SF	m a 0 W + t! A m u * a + t a	land.SG+PTV	*maata*	*muata*	‘land (PTV)’
LF SF	m a 0 W + I7 + t! A m a * 0 + e + t a	land+ PL+PTV	*maita*	*maeta*	‘lands (PTV)’

In principle, all the processes occurring in word formation can be defined with the help of Two-level rules which combine the lexical and surface forms. Problems may arise, when the processes have restrictions, and a rule has a low frequency. In these circumstances the tools from the other parts of the model must be considered. Processes which can be determined as occurring in only a few words are lexicalized and these words should be given in the lexicon. In the programs for the Savo and Ostrobotnian dialects, a distinctive part of this variation was given in the specific Alphabet and Sets in which various groups of the units in the Alphabet were combined. Also the lexicon was much more complex than the lexicon in the standard Finnish. The base of the lexicon used in the programs for the dialects is the one made for the standard Finnish. The lexical forms of words in the dialects when compared to each other and standard Finnish are so different that it was not possible to account the differences between the dialects or the dialects and the standard language with the help of rules or diacritics, but in several cases, the lexicons had to be modified. Technically, the most serious problems arise in situations in which the identical context is suitable for many processes determined by various rules. The more complicated the rules become, the more the rule-maker must consider adding the phenomenon to the lexicon: for example the change *ts>ht* occurs only in some words, and for that reason, the word form *mehtä* ‘forest’ in the Savo dialect was added in the lexicon (cf. Table 1). Another interesting phenomenon found in development of dialects is that some form classes fall together. The use of triggers provides an artificial solution to problems occurring in the defining of word formation processes and morpho-phonological variation. The main lexicon can be defined as constructed from the stem variants, and the sub-lexicons are collections of derivational and inflectional affixes (here, suffixes).

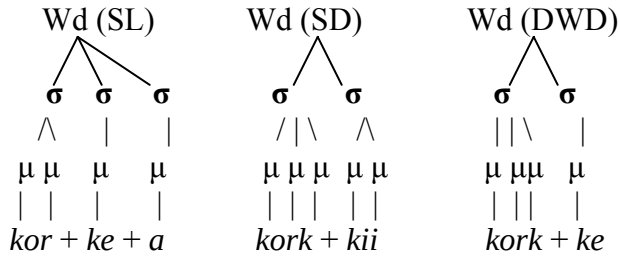
6. On the Alternations in the Word Forms in the Savo Dialect

The phonological and morpho-phonological rules (section 4) cover the changes in linearization of the meaningful units in word formation, but many of the reasons causing these changes remain unsolved, because they are based on the prosodic properties which form an additional level on the basic linear one. For understanding the differences between the dialects one would need to probe deeper into these processes and structure and position of a syllable in a word.

The prosodic level in phonology which was not taken into account as a separate level in the Two-level rules is of great importance in the processes, many of which are bound to the stress relationships in a word. **Anaptyxis** and **gemination** are processes which are tightly involved in the properties of syllables and word structure. Anaptyxis increases the number of syllables in a word with a concomitant decrease in the number of consonant combinations, and naturally the number of short syllables of the form CV increases. Also gemination which influences the length and structure of consonant combinations in words is involved in reforming the structure of the syllables in the words. In the Savo dialect, **diphthongization** (*aa* > *ua*, *ää* > *iä*) and reduction or even **monophthongization** of diphthongs whose last component is a high round vowel (*au* > *ao* > *aa*: *kaula* > *kaola* > *kaala* 'neck, *äy*> *ää* > *äö*: *räyhätä* > *rääh*ätä > *rääöhätä* 'make a noice; brawl') are the processes which are conditioned by the presence of the stress in a syllable. Information of the stress conditions are also needed in the rules for gemination (*kauniimpana* > *kaonn'iimpana* 'as the more beautiful', etc.) and anaptyxis (*ilma* > *il'ima* 'weather'). In the gemination rules, in addition to the location of the stress, also information on the length of the vowel followed the consonant to be geminated is needed. Also the basic prerequisites of the **consonant gradation** in Finnish are based on the structure and the position of syllables. There are two basic types in consonant gradation: the radical and suffixal gradation. Roughly, according to the basic rule of the radical consonant gradation, the strong grade of consonants (stops) occurs in the beginning of open syllables, and the weak grade in the beginning of closed syllables, and in the suffixal gradation, the strong grade is located after the vowel in the stressed syllables, and the weak grade after the vowel in the unstressed syllable (Hakulinen 1968: 51–52, 56, 72, fn; in the modern standard Finnish, several of the basic conditions of consonant gradation are changed). In Finnish, the location of the primary and secondary stress of words is predictable. The modification of stems takes place when combining derivational and inflectional affixes with word stems. In agglutinative languages, word formation can be defined as combinations of various lexicons. The more fused a language is, the more it evinces morpho-phonological variation. Changes in the structure of a syllable are typologically distinctive, because they change the word structure. Also the problems in definition of word formation processes which concern segmentation and the combination of the formatives accumulate in this area.

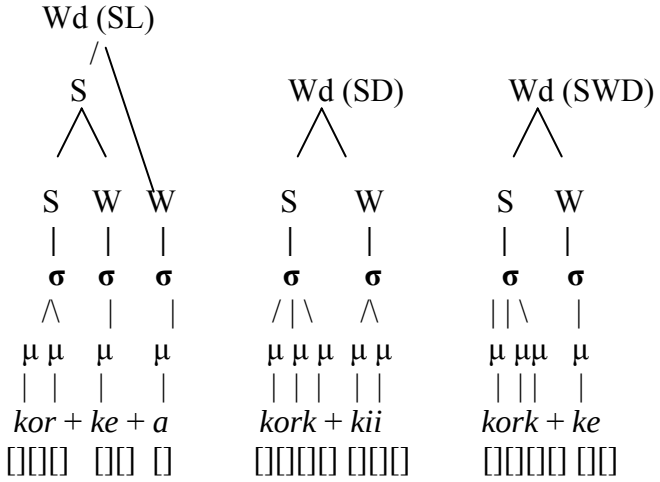
Within the framework of non-linear phonological theories, the prosodic features can be described as interaction between the processes occurring in a multi-tiered word structures. In metrical phonology, the stress relationships form the basis for description of word structures. Also for describing the word forms of Finnish and Finnish dialects, we need e.g. information on the number and structure of the syllables and the stress relationships. The structure of the syllable can partly be described taking into account the moraic structure of a word, but the qualitative properties of the phonemes can only be described with the substantial features the phonemes have. When all these levels: word as a string of phonemes, syllables including information of the stress relations, and moraic structure including information of the syllabic structure are taken into account, the processes discussed above can be described more accurately (cf. Karlsson 1983: 134; cf. also Kenstovicz 1994: 291–298; on adapting the optimality theory in description of germination, cf. Harrikari 1998: 119–133).

Figure 1.



It can be seen in Figure 1 that, when the word structures in the standard language and the south-western and Savo dialects are compared, the number of syllables is reduced in both dialects, but, when the length of words is examined with respect to their moraic structure, the number of morae has increased in the Savo dialect, and stayed as the same in the southwest dialect (σ = syllable, μ = mora). The analysis can be widened to concern the stress relationships. In Figure 2, the strong (stressed) and weak (unstressed) syllables are separated (Wd = prosodic word, S = stressed syllable, W = unstressed syllable; [] refers to the matrix of phonological features).

Figure 2.



When the syllabic structure is changed, also the metrical structure of the words is changed. An important and interesting question that has arisen in this work is the relationships between dialects. There are absolutely opposite processes in eastern and western dialects, such as anaptyxis or losses in word forms (standard Finnish: *kylmä* 'cold'; Savo dialect: *kylymä*; the southwest dialect: *kylm*), and these processes draw the development of these dialects to different directions. The pitch accent and word melody are remarkably different in these dialects. It is claimed in this paper that the prosodic properties at the word level belong to the most distinctive reasons, drifts (Sapir 1949), why the eastern and western dialects have developed into different directions. It forms a separate level that should also be taken into account in the analysis.

7. SUMMARY

The two-level description forms an efficient tool that can be used in localizing the elements participating in various processes. It can be used in isolating the elements which are in the nuclear point of these processes, and even more, it can be used in isolating combined effects of various processes. Description of the processes taking place in linearization, such as direct assimilations can be described with the help of the two-level description. One of the greatest benefits of the Two-level model in description of the differences between the phonological and morphological properties of Finnish dialects is that, because in the model, the elements participating in the processes taking place in word formation are presented at the lexical and surface level, it is possible to compare the correspondences between two different stages, and the variety in the linearization processes can be captured. The two-level structure is not useful in investigating the processes based on the prosodic properties of language. A distinctive part of the

processes taking place in word formation in Finnish dialects are based on the prosodic properties of these dialects. It must also be noted that the reasons behind the differences between dialects are partly based on the background of these dialects: the Finnish literary language which is mainly based on the western dialects cannot be the basis of the morphological analysis of all the dialects. The Two-level programs of the Savo and Ostrobotnian dialects were never finished, because the work turned to be much more complex than it was supposed in the original plan. The goal of the project was to adapt the ready-made rules to the Finnish dialects, not to investigate the issues which were behind these basic rules. This paper deals with these issues.

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