

PALATALIZATION IN NORTHERN SOTHO

BY

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DECLARATION

I, the undersigned, hereby declare that the work contained in this assignment is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

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ABSTRACT

This study focuses on the phonological process of Palatalization in Northern Sotho. In view of the fact that most available descriptions of this phenomenon are taxonomic in nature, this study sets out to employ two more recent phonological models in the description and explanation of this process. Description of the core components of, respectively, the classical linear Transformational Generative (TG) model of Chomsky and Halle (1968) and a non-linear Feature Geometry (FG) model (cf. Clements and Hume, 1995) mark the first chapter of this study. This is followed by a detailed TG description in which it is argued that a number of other phonological processes are also involved in the process of Palatalization. It is demonstrated that a Semivocalization process actually serves as the input to a classical rule of palatalization, i.e. the assimilation of a [+ high] feature to a preceding consonant. It is demonstrated that a feeding-bleeding rule ordering is necessary to derive the required output. In this process an optional rule of Semivowel deletion also plays a role, especially in the case of the labio-velar semivowel /w/. This analysis is followed by an FG analysis stressing the fact that this non-linear model does not involve the concept of rule ordering or derivational schemes. The mechanisms of Spreading and Delinking of hierarchically ordered nodes are demonstrated in a systematic fashion. Due to the fact that the phonological representation does not allow for other successive processes to apply, it is shown that the FG model is not able to account for all of the sound changes in a credible manner. The conclusion is eventually drawn that the TG model describes and explains the phenomenon of Palatalization in Northern Sotho more elegantly and comprehensively than the more recent FG model.

OPSOMMING

Hierdie studie fokus op die fonologiese proses van Palatalisasie in Noord Sotho. In die lig van die feit dat die meeste beskrywings van hierdie verskynsel taksonomies van aard is, poog hierdie studie om twee meer resente fonologiese modelle te implementeer in die beskrywing en verklaring van die proses. Die eerste hoofstuk is grotendeels gerig op 'n uiteensetting van die kernkonsepte van respektiewelik, die Transformasioneel Generatiewe fonologiese model (TG) van Chomsky en Halle (1968), en die Kenmerk Geometrie (KG) van Clements en Hume (1995). Dit word opgevolg deur 'n gedetailleerde beskrywing van die verskynsel binne 'n TG model, en daar word geargumenteer dat 'n reeks ander prosesse ook teenwoordig is in hierdie proses van Palatalisasie. Dit word aangedui dat 'n proses van Semivokalisasie noodsaaklik is om die omgewing te skep waarbinne 'n [+ hoog] kenmerk aan voorafgaande konsonante assimileer. Die noodsaaklikheid vir die aanvaarding van 'n bepaalde reëlordening word aangedui ten einde 'n gepaste afvoer te genereer. Die aandag word gevestig op die feit dat 'n opsionele proses van Semivokaaldelesie ook in Noord Sotho aanwesig is, veral mbt die labiovelêre semivokaal /w/. Hierdie analise word opgevolg met 'n KG analise wat nie van afleidingsprosesse gebruik maak nie. Die gebruik van Spreiding en Ontkoppeling word sistematies ondersoek. Agv die feit dat 'n hierargies geordende sisteem van resrepresentasies nie voorsiening maak vir temporaal opeenvolgende prosesse nie, blyk dit dat hierdie model sekere klankveranderinge nie kan verantwoord nie. Daar word uiteindelik tot die gevolgtrekking gekom dat die klassieke TG model die verskynsel van Palatalisasie in Noord Sotho veel beter hanteer as die meer resente KG model.

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PALATALIZATION IN NORTHERN SOTHO

CHAPTER 1 ORIENTATION

1.1 Introduction

Most of the descriptions of Northern Sotho phonological processes are presented within a structuralist (taxonomic) model. Jakobson (1931) and Trubetzkoy (1939) largely developed this 'model'. This pre – generative model was widely used to describe the phonological processes occurring also in Northern Sotho. The model focussed on sound changes occurring in phonological processes, but failed to account for the context or reason responsible for generating such sound changes.

Louwrens and Nokaneng (1995:70) generally list the alternations occurring in various phonological processes, e.g. Palatalization without adequately explaining the environment responsible for generating it. The description of Palatalization only lists alternations such as labials becoming palatals e.g. /β/, /p'/ and /p^h/] respectively changing to [βʒ] , [pʲ] and [pʰh] (cf. also Nokaneng, n.d; Mojapelo and Hoffman, n.d; Phatudi and Mashabela, 1973).

As a result of lack of explanations within the structuralist (taxonomic) model, new linguistic theories were developed and applied to various languages of the world. The Transformational Generative (linear) model of Chomsky and Halle (1968) and Feature Geometry (non – linear) model of Clements (1985); McCarthy (1988); Sagey (1986) were founded in order inter alia to provide explanations regarding sound changes occurring in a specific language.

The Transformational Generative model and Feature Geometry model use features to describe sound changes in a language, unlike the structuralists who worked with the concept of phonemes as basic units. (cf. also Durand 1990: 7; Hyman 1975: 60; Kotze 1991:91). The older basic model of the transformational generative (linear) model was developed as an alternative to the structuralist approach. It regarded distinctive features and phonological rules as central in the description of a language.

McMahon (1994:24) argued that language is rule governed. The assertion made by McMahon implies that feature governed rules within a transformational generative model offered significant explanation of problematic phenomena in a language.

The transformational generative (linear) model is characterised by the following core concepts, viz., distinctive features, underlying representation, phonological rules and phonetic representation. A new model of feature geometry (non – linear) succeeded the transformational generative model. This model is characterised by concepts such as Root nodes, Laryngeal nodes, Place nodes, etc, and does not make use of rule based derivations but focus on the nature of phonological ‘representation’.

The aims of this chapter are to:

- (i) introduce the study,
- (ii) show the inadequacy of the structuralist (taxonomic) model in the explanation of phonological processes occurring in a specific language,
- (iii) present a short overview of the core concepts of transformational generative (linear) and feature geometry (non – linear) theories.

This study project focus on the analysis of PALATALIZATION process in Northern Sotho.

Palatalization refers to a phonological process in which a non-palatal consonant becomes palatal. The context responsible to generate this process is generally regarded as a front or back vowel or palatal glide /j/ or velar glide /w/ (cf. also Katamba 1989:86, Lass:169, Lahiri and Evers, 1991:80).

Palatalization is an assimilation process in that one segment assumes the features of an adjacent segment. For instance the segment /β/ in Northern Sotho /kolobe/ “pig” becomes [β₃] as in [koloβ₃ana] “piglet” when diminutives are formed. This has the implication that the labial consonant /β₃/ which is non – palatal becomes labio–palatal [β₃] It is argued that the assimilatory nature of palatalization in terms of distinctive features involves the addition of feature values to a consonant. In this regard /β₃/ acquires an additional feature [+high] to become palatal consonant [β₃,] (cf. Lahiri and Evers, 1991: 80).

Palatalization according to Stahlke (1989:75) is viewed as the fusion of two segments. It is argued that certain distinctive articulatory features lacking in the underlying segment are distinguished in the fused unit. Hence the feature [+high] is only distinguished in the palatalized consonant.

The phenomenon of palatalization entails various assimilation processes, which does not seem to be unitary in nature, but shares similarities in terms of palatalising contexts. Firstly it involves the fronting of velar consonants, i.e. in Northern Sotho causative verbs / tlova / “remove” becomes [tloʃa] “cause to remove” whereby the underlying velar consonant / ɣ / becomes [ʃ], a palatal consonant. Secondly, there is a change of place within the coronal consonants i.e. in Northern Sotho / l e r a p ɔ + ana/ bone’ becomes [leʃap’ɔ] whereby the coronal consonants /r/ becomes palatal [ʃ]. Lastly, there is an addition of secondary palatal articulation i.e. / β / becomes [βʃ] (cf. also Chomsky and Halle 1968:421; Lahiri and Evers 1991:80, Lass 1984: 169)

1.1 Exposition of the models

This study project will focus on the analysis of the palatalization process in Northern Sotho in terms of Transformational Generative (Linear) and Feature Geometry (non – linear) models.

1.2.1 The origin of Transformational Generative (linear) model

This model henceforth referred to as TG was developed by Chomsky and Halle (1968) in the work entitled “Sound Pattern of English” (SPE). It appeared as an alternative to the structuralist (taxonomic) approach.

The structuralist model’s aim was to gather facts, observe and describe them. It recognised the phoneme as the central unit in the analysis of a language. Durand (1990:3) pointed out that the phonemes were regarded as the ultimate unit of phonological structure. They serve both a classificatory and distinguishing function in a language (cf. also Hyman 1975:60; Clark and Yallop 1990:333; Clark and Yallop 1975:401).

Durand (1990) and Hyman (1975) single out some of the basic terms employed by the structuralist in the analysis of language specific phenomena. Concepts such as “minimal pairs”, “combinatorial variant”, “free variation” and “phonetic similarities” were used to determine opposition between phonemes. For instance one may use minimal pairs to determine opposition between the phonemes

/k' / and / m/. Consider the use of a minimal pair in Northern Sotho to create differences between the two words / - l o k' a / “to be kind” versus / - l o m a / “bite”. These words are called a minimal pair because they possess the same sequence of sounds except for a single sound that occurs in the same place in the sequence. If the /k' / in - / l o k' a / could be replaced with the /m/ in /- l o m a / this will result in a different word, and it will also be the same for /m/. This test signifies that / k' / and / m / are contrastive sounds i.e. phonemes. The structuralist linguists employed this method to identify phonemes that are different (cf. also Durand, 1990:7; Hyman, 1975: 60; Kotze, 1991:91).

The Transformational Generative (linear) model disputed the assumption that the phoneme is the ultimate unit in the phonological structure. Instead distinctive features were regarded as the basic units of phonology. To transformational generative linguists distinctive features have a distinctive and discriminatory function as well as phonetic properties. However, structuralists view them as having only phonetic properties useful in the grouping of phonemes. The fact that phonemes may be used in distinguishing words within the structuralist perspective became redundant and instead generativists used distinctive features (cf. also Chomsky and Halle 1968:65; Durand 1990:14; Schane 1973:25).

The Transformational Generative (linear) model gathers facts, observe, describe and explain them. It uses feature-bound rules in order to capture generalisations expressed by rules. In order for the model to explain language specific phenomena, it employs concepts such as “distinctive features”, “underlying representation”, phonological rules and phonetic representation (cf. also Hyman 1975:82; Chomsky and Halle 1968:164; Kenstowicz and Kisseberth 1979:32).

1.2.2 Definition of core concepts

1.2.2.1 Distinctive Features

A sound segment is composed of a set of distinctive features. Durand (1990:37) says that the distinctive features should remain the basic units in phonology unlike segments or phonemes (cf. also Chomsky and Halle 1968:64; Hyman 1975:24; Kenstowicz 1994:19).

Segments such as in the syllable /βi/ of Northern Sotho word /βina/ “dance” are not viewed as unitary elements but each consist of bundles of features which are internally unordered, as depicted below:

(1)

	/ β	i /
Consonantal	+	-
Sonorant	-	+
Voiced	+	+
Coronal	-	+
High	-	+
etc.		

The features constituting these two segments as shown in example (1) agree in terms of the feature [voiced] but disagree in all the others. These contrastive features serve to indicate the differences between the two segments.

Gussenhoven and Jacobs (1998:66) pointed out that the choice of distinctive features should meet the following prerequisites:

- (a) Each distinctive feature must have a phonetic correlate. This means that the distinctive features must refer to one or more of the three phases characterising human speech communication act.

It must refer to either articulatory or acoustic or perceptual dimensions, e.g. the feature [consonantal] is able to differentiate between /β/ which is [+ cons] [i], and [- cons] segment, which implies that a [+ cons] segment is produced with some closure in the oral cavity and the [- cons] segment is produced with an open cavity, (i.e. reference is made to the articulatory dimension).

- (b) Each distinctive feature must have a function to distinguish between segments.
- (c) Each distinctive feature must be useable in phonological rules i.e. each feature must be used in the formulation of phonological rules in order to provide the required explanation, e.g.

$$(2) [+ \text{ cons}] \rightarrow [+ \text{ high}] \quad / \quad \text{---} \quad \left[\begin{array}{l} + \text{ high} \\ - \text{ back} \end{array} \right]$$

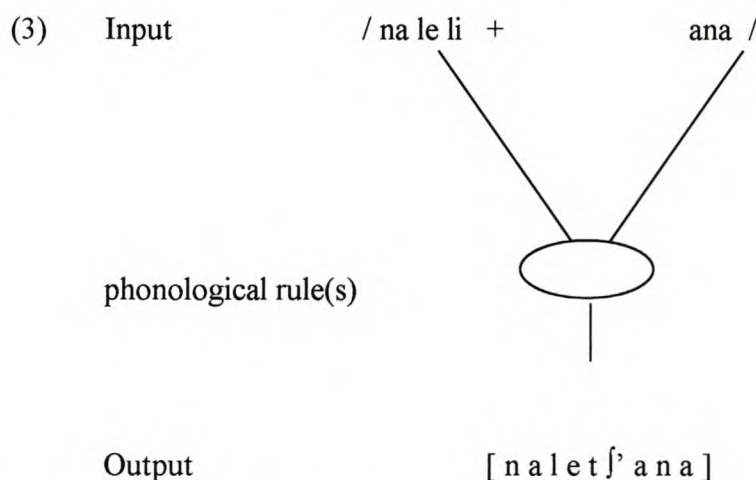
These four features serve to provide an explicit explanation of the palatalisation rule in which a consonant acquires the feature [+high] when it is followed by a segment that has the features. [+high –back].

1.2.2.2 Underlying representation

This is a representation of the unpredictable elements in an utterance. It contains idiosyncratic information pertaining to the pronunciation of all the morphemes constituting an utterance. For instance the surface or phonetic representation of Northern Sotho word [naletʃ'ana] ‘little star’ will be derived from the underlying representation /naleli+ana/ This representation may be viewed as synonymous with a morphemic representation of an utterance (cf. also Chomsky and Halle 1968:164; Kenstowics and Kisseberth 1979:32; Kenstowicz 1994:60).

1.2.2.3 Phonological Rules

The phonological rules are applied to the underlying representation to change it into a surface structure (phonetic representation) The phonological rules assign predictable phonetic properties on the underlying representation, thus converting the UR of an utterance such as / naleli + ana / into its corresponding phonetic representation [naletʃ'ana]. This can be viewed as an Input – Output process



The phonological rule or sets of rules are responsible for the changes taking place in the circle above. (See also 1.2.2.5).

1.2.2.4 Phonetic representation

This is regarded as the output of the underlying representation. It consists of a string of phonetic elements, containing idiosyncratic and predictable information signifying the pronunciation of an utterance. Thus, [nalets'ana] is the final output of the phonological component and it is derived by phonological rules applied on the underlying representation / naleli + ana / (cf. also Clark and Yallop 1990:178; Kenstowicz and Kisseberth 1979:32; Kenstowicz 1994:60).

1.2.2.5. Rules and derivations

The transformational generative (linear) model maintains the assumption that language is rule governed and these rules apply in a sequence. This implies that the first rule is applied on the underlying representation, and the rule that follows operates on the information generated by the preceding rule.

It may be argued that the native speaker of Northern Sotho goes through the following process in an attempt to utter a word such as [nalet^hana]

(4)	Input	/ na le	l	i + ana /
	rule 1			j
	rule 2		t ^h	
	rule 3			ɬ
	Output	[n a l e t ^h a n a]		

(cf. also Kenstowicz and Kisseberth 1979:32; Chomsky and Halle 1968: 342; Gussenhoven and Jacobs 1998:87).

1.2.3. The Feature Geometry (non – linear) model

The Feature Geometry (non – linear) model (henceforth referred to as FG) was developed by Clements 1985, Sagey 1986, and McCarthy 1998. This model was established as an alternative to the Transformational Generative (linear) approach.

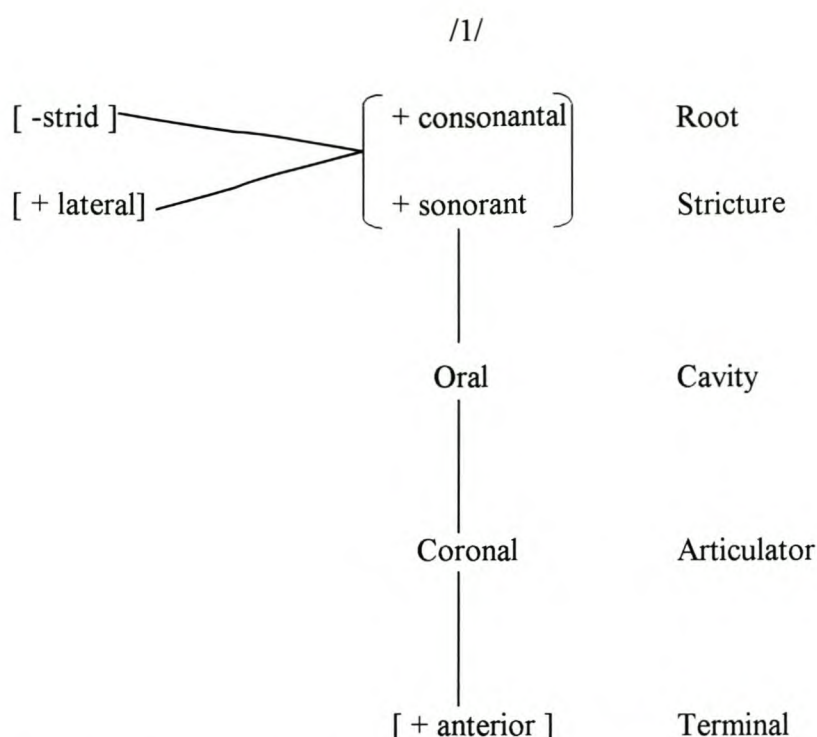
The FG model holds the assumption that features characterizing a segment are hierarchically organized. This internal organisation of features within a segment could be represented hierarchically in a tree graph. The FG model stands in opposition to the TG model which assumes that a segment is constituted by unordered bundle of features. The view that lexical items consist of a sequence of speech sounds which could be represented as feature matrix is refuted by the FG model (cf. also Clements and Hume 1995: 245; Kenstowicz 1994:145; Broe 1992:149).

Kenstowicz (1994:145) argued that hierarchical organisation of features in describing a segment makes it possible to generate the submission within the category stipulated. This implies that the appearance of the feature node “dorsal” in the tree structure will serve to introduce all the dependents or daughters of the node, i.e. high, low and back.

The FG theory argues that hierarchical organization of features make it possible to group features in terms of natural classes or sets. According to Clements 1986, Sagey 1986, and Hayes 1986 natural classes are referred to as constituents. These constituents involve features that operate as a unit in phonological rules. And this has the implication that any rule which affects the feature coronal in the feature tree structure will also affect its dependents i.e. [anterior] and [distributed] (cf. also Clements and Hume 1995:246; Kenstowicz 1994:150; Lahiri and Evers 1991:83).

The hierarchical organisation of features characterising a segment such as /l/ in Northern Sotho will be represented in the tree structure below:

(5)



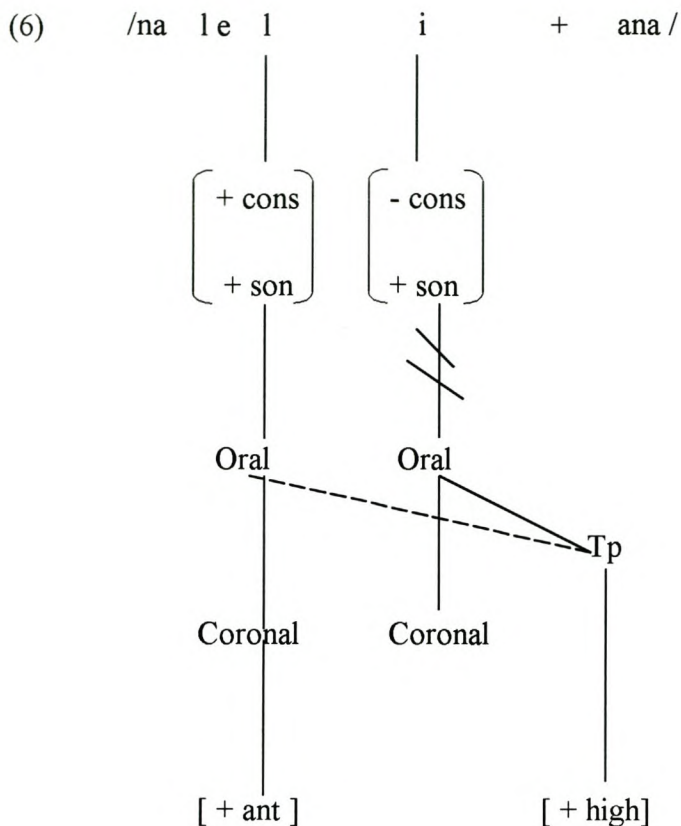
This tree structure is based on the Halle 1992 feature tree theory. It explains that the segment /l/ is characterised by the root node features [+ consonantal + sonorant] which implies that in its articulation there is a constriction in the oral cavity and spontaneous voicing hence consonantal and sonorant respectively. It is articulated through the oral cavity by coronal articulation i.e. produced when the blade of the tongue make a constriction on the prepalatal region. It is also [-strident] because it is not /t/. This segment /l/ is [+ anterior] in that the location of the obstruction of airflow is in front of the palato – alveolar region of the oral cavity.

The proponents of the TG model argues that rules apply in a linear order, while FG maintains that rules may operate simultaneously. The FG model assumes that assimilation processes of Spreading and Delinking will be clearly formalised since hierarchy creates interaction between tiers. Assimilation is also made possible due to the articulator – bound features.

Broe 1991:158 expresses the view that an assimilation rule affecting the one place node will spread immediately together with its dependents without affecting other place nodes.

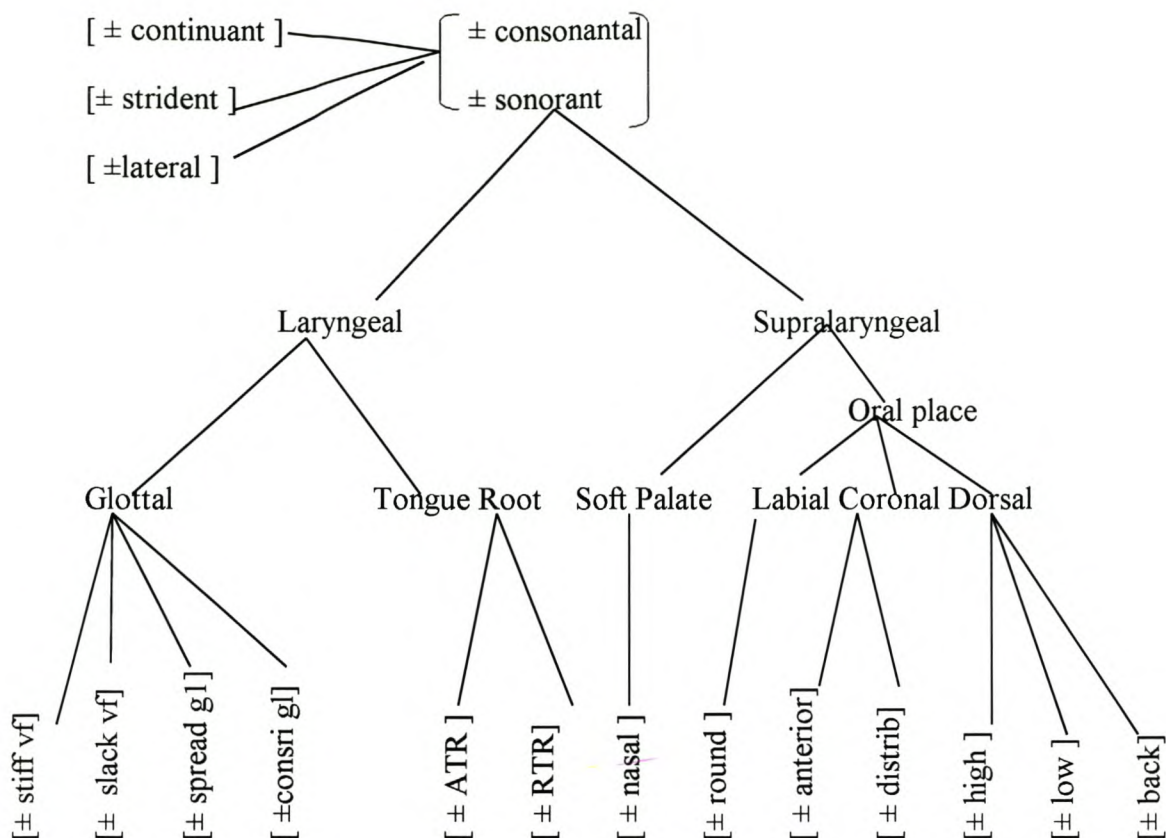
The above paragraph explains that the spreading of the place node coronal will do so independently without interfering with other place nodes (cf. also Kenstowicz 1994:150; Lahiri and Evers 1991:91; Newman 1997:7).

The representation below will show how assimilation processes of spreading and delinking operates during the palatalization phenomenon, i.e. the formation of diminutive in Northern Sotho noun / n a l e l i + ana /



The feature tree structures explains that the vowel /i/ spreads its Tongue Position (TP) which is [+ high] to the preceding consonant which has a [- high] tongue position, after which it delinks itself, i.e. /i/ is deleted. This means that a consonant with a [+ high] feature remains. Obviously some more changes also take place to convert the /l/ with its acquired [+ high] feature to a palatalized form [tʃ]. Below is an illustration of the Halle and Sagey FG model in (7).

(7) **Feature Geometrical model by Halle and Sagey**



1.2.3.1 Definition of concepts

1.2.3.1.1 Root node

The highest node in the hierarchy is the root node and it stands equivalent to the segment itself. The root node is characterised by the features consonantal and sonorant. All the features in the tree are dominated by it. Laryngeal and Supralaryngeal nodes are dominated by the root node. The manner features [continuant, strident and lateral] are attached to it.

If a rule of assimilation affect the root node it automatically affect all other features dominated by it, e.g laryngeal and supralaryngeal nodes together with their dependents.

1.2.3.1.2 Laryngeal Node

This node occupies the second level in the hierarchy. It dominates the glottal and Tongue Root nodes. If a rule affects the laryngeal node it will also affect the Glottal node and Tongue Root node as well as their dependents.

1.2.3.1.3. Supralaryngeal node

The supralaryngeal node is also on the second level in the hierarchy. It dominates the soft palate node with its dependents, i.e [nasal], and Oral place node with its dependents i.e [labial, coronal and dorsal]. A rule of assimilation affecting the Supralaryngeal node will also affect all its dependents

1.2.3.1.4 The Articulator Nodes.

This model according to Kenstowicz 1994: 452 recognizes six articulators. The oral place node dominates the articulator nodes, labial, coronal and dorsal. There is also the soft palate node, which is the articulator node directly attached to the supralaryngeal node (cf. also Clements and Hume 1995: 268; Gussenhoven and Jacobs 1998: 175; Kenstowicz 1994:452).

CHAPTER 2

PALATALIZATION IN NORTHERN SOTHO: A LINEAR PHONOLOGICAL ANALYSIS

2.1 Introduction

This chapter focuses on the description and explanation of the palatalization phenomenon in Northern Sotho. The palatalization process in this language in terms of a TG model is characterized by the interaction of three processes, viz, semivocalization (glide formation), palatalization and semivowel deletion.

Aims of chapter

This chapter aims to:

- apply the linear phonological model to the palatalization process of Northern Sotho.
- ascertain the effectiveness of this model in the analysis of palatalization in this language.

2.2 The analysis of Northern Sotho syllable structure

An overview of the canonical forms of the syllable structures in Northern Sotho are presented as follows:

- (8) (a) / V / - / e / ma
 (b) / CV / - e / ma /
 (c) / C w V / - / nwa /
 (d) / NCV / - / nt^h /
 (e) / NCWV / - / nt^h wa / na

In the Northern Sotho language the preferred syllable structure is /CV/ i.e sequences of a consonant plus a vowel. It is also claimed by linguists that this /CV/ syllable structure is found in many languages of the world (cf. also Endemann 1964:6; Hyman 1975: 161; Schane 1973:52).

The /CV/ syllable structure is violated in Northern Sotho when the diminutive suffix /- ana/ is added onto the final syllable of nouns, resulting in a /CVV/ syllable structure, i.e sequences of a consonant followed by two adjacent vowels. This /CV + V/ syllable structure is perceived to be an

unimpressive syllable structure of Northern Sotho, because it violates the /CV / pattern. Endemann (1964:4) pointed out that the / CV + V / syllable structure is the "critical syllable" structure in Northern Sotho, because it provides context for sound changes to take place. It is the / CVV/ syllable structure which serve as input for different phonological processes, such as Vowel Deletion; Semivocalization; Palatalization, etc, to operate in an attempt to restore the preferred syllable structure of / CV/.

The Vowel Deletion process is applied on the /CV+ V/ syllable pattern in order to break up vowel sequences. The rule of First Vowel Deletion is applied to delete the initial vowel in the sequence. Thus, /CV1 + V 2/ yield to /CV2/. This rule of First Vowel Deletion will be discussed in the next section.

The Semivocalization process also acts on the /CV + V/ syllable pattern in order to convert the first vowel into either palatal glide [j] or labio-velar glide [w]. The application of Semivocalization process result into /C j V/ and /CwV/ syllable structures i.e sequences of consonant, glide and vowel.

The /C j V/ syllable structure is regarded as intermediate in that the [j] glide is normally fused with the preceding consonant and result in /CV/ while the /CwV/ can appear as intermediate when the preceding consonant is labial or as a final syllable in certain consonant combinations (cf. also Endemann 1964:7).

The Palatalization process acts on the sequences of a consonant followed by a glide, i.e /C j V/ or /CwV/. This implies that a post-consonantal glide causes the preceding consonant to palatalize.

2.3 The occurrence of First Vowel Deletion and Semivocalization processes in Northern Sotho

The phonological processes of first vowel deletion and semivocalization do take place in Northern Sotho. It is observed that the diminutive suffix / - ana / when added onto the final syllable of nouns result into / CV+ V / syllable structure. It is this "critical syllable" structure which triggers these phonological processes to occur in this language.

2.3.1 Summary of sound changes taking place in the creation of "critical syllables"

The /CV + V/ syllable structure has been analyzed in different contexts and that has led to the result obtained in Appendix A.

This appendix focuses on vowel deletion and semivocalization in nouns as intermediate (demonstrated by *) and / or final forms.

This table depicts a combination of a consonant, vowel and another vowel in a / CVV / syllable structure. In proper nouns the "critical syllable" structure is (CV1 + V2) while in deverbative nouns it appears as (C + V1 + V2). When the first vowel (C V1) is deleted in both nouns the (CV2) syllable structure is acquired. And when the process of Semivocalization takes place in similar context, i.e sequences of / CV 1 + V 2 / and / C + V 1 + V 2 /, either of the two structures are obtained, namely, * / C j V / or / CwV /

Consider the following data:

Nouns + diminutive suffix /- ana/

- (8')
- | | | | | | |
|-----|--------------------|---|---------------------------|------------|-------------------------|
| (a) | /masa + ana/ | → | [masana] | masana | “dawn” |
| (b) | /nosi + ana/ | → | [nosana] | nosana | “small bee” |
| (c) | /mo + se + ana/ | → | [mosana] | mosana | “small skin apron” |
| (d) | /ma + taese + ana/ | → | [mataesana] | mataesana | “small dice” |
| (e) | /le + bat’i + ana/ | → | [lebat]’ana] | lebat]ana | “small door” |
| (f) | /leβet’ε + ana/ | → | [leβet]’ana] | lebetšana | “small pancrease” |
| (g) | /seβet’e + ana/ | → | [seβet]’ana] | sebetšana | “small liver” |
| (h) | /diphas ɔ + ana/ | → | [lip ^h aswana] | diphaswana | “ancestral appeasement” |
| (i) | /leβat’ ɔ + ana/ | → | [leβat’wana] | lebatwana | “floor” |
| (j) | /lerap’ ɔ + ana/ | → | [lerap]’ana] | lerapšana | “small bone” |

In example (8'a - g) the front vowels /i, e, ε/ are deleted in combination with certain consonants while in others they become the palatal glide [j]. In (8'h - j) the back vowel /ɔ/ becomes the velar glide [w].

The data presented in example (8') show the inconsistency of Northern Sotho in dealing with both the processes of First Vowel Deletion and Semivocalization, i.e. in some combinations of the consonant, vowel and another vowel (CV+V) the front vowels are deleted while in others they turn into the palatal glide [j]. Therefore, it is necessary that rules be formulated to account for the occurrence of the processes in the language.

2.3.2 Phonological rules

A rule of **First Vowel Deletion** will be formulated with reference to the data presented in example (8' a - g).

Rule 1: (First Vowel Deletion – FVD)

$$V \rightarrow \emptyset / C (+) _____ + V$$

Rule 1 states that the First Vowel is deleted when it appears between a consonant followed by an optional morpheme boundary and a compulsory morpheme boundary plus another vowel.

The following rule of **Semivocalization** will be formulated based on the data presented in example (8' h - j):

Rule 2: (Semivocalization – SV)

$$\begin{bmatrix} - \text{cons} \\ + \text{vowel} \\ \alpha \text{ back} \\ < - \text{high} > \\ < - \text{mid} > \end{bmatrix} \rightarrow \begin{bmatrix} - \text{vowel} \\ + \text{high} \\ \alpha \text{ back} \end{bmatrix} / C (+) _____ + \begin{bmatrix} + - \text{high} \\ + \text{vowel} \end{bmatrix}$$

Rule 2 says that a vowel which is [α back - high - mid] becomes a glide when it appears between a consonant and/or morpheme boundary and morpheme boundary plus another [- high] vowel (α indicates a plus or minus value which is to correspond with the following α value). It is observed that rule 1 and 2 appear to be triggered by the same context, in that they may undergo First Vowel

Deletion process or Semivocalization. An attempt was made to constrain the application of both rules through detailed specification of their elements in terms of distinctive features. However, it seems that the linear phonological model appears to be unable to constrain the application of these rules in Northern Sotho. Therefore, it is necessary that conditions be specified for the application of these rules in this language. The rule order hypothesis below will serve the purpose of setting conditions for the application of Rules 1 and 2.

2.3.3 Rule Ordering

Hypothesis

It is hypothesized that the application of Rule 1 prevents Rule 2 to apply on front vowels / i, e, ε/ and the converse is also applicable. This means that Rule 1 and 2 represent a counterbleeding order of application - the application of one rule destroys the environment of the other rule to apply and vice-versa. This implies that linear rule ordering does not apply between these rules - what counts is the rule which applies first. They serve a complementary function (cf. also Gussenhoven and Jacobs 1998 : 99; Kenstowicz and Kisseberth 1977 : 158).

2.4 Semivocalization process

The semivocalization phenomenon occurs in Northern Sotho when the "critical syllable" structure of a /CV+ V/ becomes */C j V/ or */CwV/. The function of it in this language is to restore the preferred syllable structure of /CV/ or /CwV/. The combination /VV/ → /wV/ or /jV/ where /w/ and /j/ function as a /C/. This Semivocalization process triggers palatalization in the language. This has the implication that when certain consonants are followed by a glide [j] or [w] the glide causes the preceding consonants to palatalize. But in others a combination of consonant and glide does not result in palatalization of the preceding consonant as it happens in some cases when the velar glide [w] is involved.

(9) Nouns with diminutive suffix:

(a)	/se + l a βi + ana/	→ [selaβ3ana]	selabjana	“small fly”
(b)	/m o + γo βe + ana/	→ [moγoβ3 ana]	mogobjana	“pool”
(c)	/βo + γo β ε + ana/	→ [βoγoβ3 ana]	bogôbjana	“small porridge”
(d)	/letl'ɔ tl'ɔ βɔ + ana/	→ [letl'ɔtl'ɔβ3 ana]	letlôtlôbjana	“small snake”
(e)	/k'ɔ β ɔ + ana/	→ [k'ɔβ3 ana]	kôbjana	“small blanket”
(f)	/k'u βu + ana/	→ [kuβ3 ana]	kubjana	“small hippopotamus”

(cf. also Appendix B)

(10) Deverbative Nouns with diminutive suffix:

/m o + a β + i + ana/	→ [moa β3 ana]	moabjana	“small divider”
/tl a β + ɔ + ana/	→ [tl ^h aβ3 ana]	tlhabjana	“small stab”

(cf. also Appendix C)

(11) Formation of Absolute Pronouns

/u + εna/	→ [wεna]	wêna	“you”
/ε + εna/	→ [j ε na]	yêna	“he/she”
/ɔ + ɔ na/	→ [w ɔna]	wôna	“it”
/ε + ɔ na/	→ [j ɔ na]	yôna	“them”

(12) Formation of Demonstrative Pronouns

/ε + o/	→ [j o]	yo	“this one”
/o + o/	→ [wo]	wo	“this one”
/ε + ε/	→ [j ε]	ye	“this one”

(13) Formation of Possessive Pronouns

/ɔ + ɔ na/	→ [wɔna]	wôna	“of it “
/ε + ɔ na/	→ [jɛna]	yêna	“of him”

(14) Formation of Quantitative Pronouns

/ε + ɔɫ ε/	→ [j ɔɫ ε]	yôhle	“all”
/ɔ + ɫ ε/	→ [w ɔɫ ε]	wôhle	“altogether”

(cf. also Appendix D)

(15) Formation of Possessive Concorde

/o + a/	→ [wa]	wa
/e + a/	→ [j a]	ya

(cf. also Appendix E)

The data presented in examples (9) and (10) shows the formation of glides after the diminutive suffix / - ana / has been added on the final syllable of proper and deverbative nouns. The "critical syllable" structure of / CVV/ becomes / CV/, although the / C / had changed its place of articulation as well (cf. also example 8).

In examples (11) to (15) the semivowels or glides are formed in pronouns, when the subjectival concord becomes either [j] or [w] respectively. During the formation of absolute, demonstrative, possessive and quantitative pronouns the back vowel /u / or / ɔ / becomes velar glide [w] while front vowel /ε/ becomes palatal glide [j], and hence restores the /CV/ syllable structure (cf. also Endemann 1964: 8; Lombard 1985 : 86; Nokaneng n.d : 68).

2.4.1 Derivation

It must be noted that Rules 3 and 4 used in the first derivation (example 16) will be discussed in the next section.

(16) Input	/le	βa	t	i + ana /		“door”
Rule 2 (SV)				j		
Rule 3 (PAL)			tʃ			
Rule 4 (SV del)			j			
Output	[le	βa	tʃ	ana]		“small door”
(17) Input	/le	βa	tʰ	ɔ + ana/		“floors”
Rule 2 (SV)				w		
Output	[le	βa	tʰ	w	ana]	“small floor”

It can be observed that in the first example in the derivation (example 16) the palatal glide [j] causes the preceding consonant to palatalize i.e. non-palatal consonant / tʰ / becomes palatal [tʃʰ]. However, the glide [w] does not induce palatalization of the same consonant in the word shown in example 17.

It may be argued that while a glide (semivowel) induces palatalization in some of the consonants plus glide combination, in others it fails to do the same function in Northern Sotho.

The semivocalization process is responsible to cause palatalization to take place in Northern Sotho. The premier palatalizers being the glides.

In order to arrive at some explanation, it is necessary to observe the distinctive features of Northern Sotho vowels and semivowels in the following matrix.

2.5 The distinctive feature matrix of Northern Sotho vowels and semivowels

	a	i	e	ɛ	u	o	ɔ	j	w
vowel	+	+	+	+	+	+	+	-	-
high	-	+	+	-	+	+	-	+	+
mid	-	-	+	+	-	+	+	-	-
low	+	-	-	-	-	-	-	-	-
back	-	-	-	-	+	+	+	-	+

In this distinctive feature matrix the semivowels [j] and [w] both possess the feature [+ high]. This feature indicates their raised tongue body position when articulated (cf. also Katamba 1989:45; Chomsky and Halle 1968 : 304; Kenstowicz 1994 : 20).

It is this tongue body height articulation displayed by both glides which is responsible for non-palatal consonant preceding a glide to palatalize. This tongue body height articulation exhibited by the glides is also supported by x-ray experiments conducted by linguists.

Consider this diagram from Roux 1979 : 34

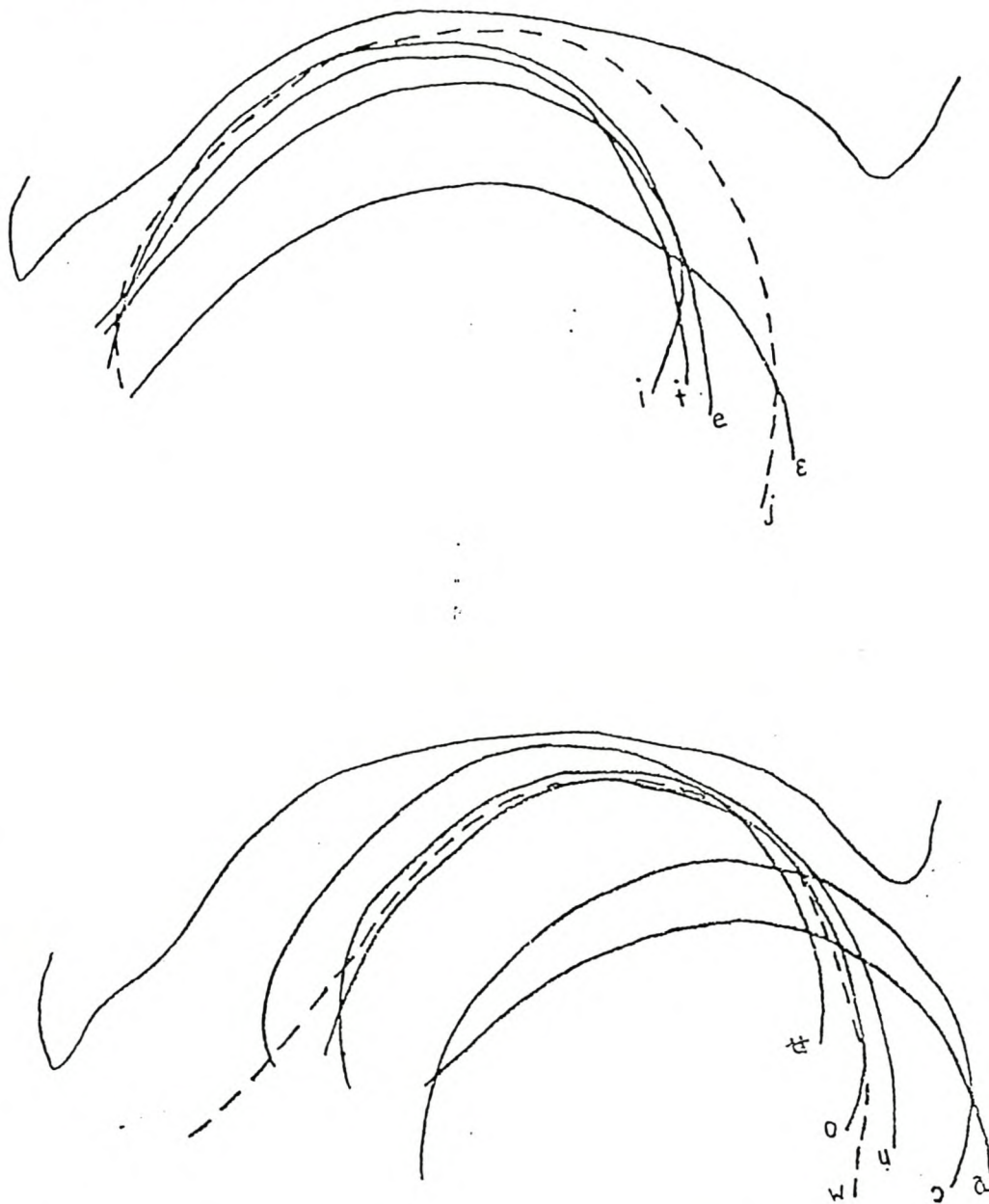


Figure 7. Contour of the body of the tongue during vowel and semivowel articulations in Sesotho.

This diagram is based on the X-ray films of the mouth cavity during individual articulations of vowels and semivowels in Sesotho. A hierarchy of vowels and semivowels was drawn depicting the contour of the body of the tongue during the articulation of each segment.

The diagram shows the height the body of the tongue assumes for each segment. It may be argued that both semivowels are articulated with the body of the tongue raised. Roux 1979:38 pointed out that the semivowel [j] is capable to trigger palatalization because it appears to be physically higher in terms of tongue body articulation than any of the front vowels i.e. [i, e, ε]. This semivowel is regarded as palatal enough to generate a palatalization process. It is further argued that the velar glide [w] is also physical high to can induce palatalization.

The element of [+ high] feature specification of semivowels, (glides) is necessary to trigger palatalization process in Northern Sotho.

2.5.1 The palatalization process

The palatalization phenomenon in Northern Sotho depends on the semivocalization process. It may be argued that this language does not tolerate sequences of post-consonantal glide [j], i.e. / t + j / becomes [tʃ'] which means that [j] glide causes the non-palatal consonant to become palatal. Again the occurrence of the velar glide post consonantally may induce palatalization of labial consonants in this language, i.e. sequences of / p + w / yield to [pʃ'] a palatalized consonant.

There are different views held by linguists with regard to the phenomenon palatalization. Some of the views expressed by these linguists will be discussed in the following section.

2.5.2 Different views on palatalization

Lahiri and Evers (1991:79) view palatalization as an embracing term constituted by various processes. These linguists distinguish three different phonological processes related to the term "Palatalization".

The following processes are identified:

- **Fronting of velars**, i.e. velar consonants shift their point of articulation to become palatal.
- **Alteration of place of articulation** within coronal consonants, i.e. alveolar consonants change their point of articulation to become prepalatal, hence / t' / become [tʃ'].
- **Addition of secondary palatal articulation**, i.e. non-palatal consonant acquire secondary palatal articulation, hence / β / becomes [βʒ].

Lass (1984:169) pointed out that palatalization involves the superimposition of [i] - colour as well as the change of a non-palatal consonant to become palatal. Stahlke 1989:75 perceives palatalization as fusion of two segments. According to him the fused unit acquires certain articulatory features absent in the underlying segments. This assumption pointed out by Stahlke implies that the distinctive articulatory features [+ high - back] are acquired by the fused unit (output) after palatalization has taken place. Chomsky and Halle (1968:308) expressed the view that palatalization is concerned with the preservation of the palatal point of articulation. This implies that a non-palatal consonant is made to assume palatal point of articulation, i.e. a change of velars to palatals constitutes a change in the point of articulation.

2.5.3 Highlights from the sources

It may be argued that the linguists agree on the general perception that palatalization involves primary point of articulation change as well as addition of secondary point of articulation. The assimilatory nature of palatalization also seems to receive general approval, in that, a non-palatal consonant followed by a [+ high] glide acquires the [+ high] feature of the glide. The feature [+ high] possessed by the glides in Northern Sotho is assimilated by the preceding [- high] consonant in order for the latter to become [+ high]. The distinctive articulatory property of [+ high - back] characterizing palatalized consonants will be observed on the distinctive feature matrix of Northern Sotho consonants below.

2.5.4 Distinctive features of Northern Sotho consonants and semivowels

	β	p'	f	p ^h	t'	t ^h	l	r	ɺ	n	ʒ	βʒ	fʃ	ʃ	tʃ'	tʃ ^h	pʃ ^h	pʃ'	ɲ	ŋ	ɣ	j	w
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
Sonorant	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	+	+	-	+	+
Anterior	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	+	+	-	-	-	-	-
Coronal	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	+	-	-	+	-	-	-	-
Distributed	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Continuant	+	-	+	-	-	-	+	+	-	+	+	+	+	+	-	-	-	-	+	+	+	+	+
Vocalic	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strident	+	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	-	-	-
Delayed Release	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	+	+	-	-	-	-	-
Nasal	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	-	-
Lateral	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Voiced	+	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+	+
High	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+
Back	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+

The segments presented on the feature matrix do not constitute all the consonants of this language. These segments as well as their corresponding distinctive features were selected because they seem to be relevant for the process under discussion i.e. palatalization.

The palatalization context of non-palatal consonants followed by a glide may be observed in the following data:

(18) Diminutive formation of nouns by suffixation of – ana:

Underlying representation	Phonetic representation	Orthographic representation	Gloss
(a) /moɣoβe+ana/	[moɣoβʒana]	mogobe	“pool”
(b) /kχ ^h areβe+ana/	[kχ ^h areβʒana]	kgarebê	“young woman”
(c) /selaβi+ana/	[selaβʒana]	selabi	“little thing in the eye”
(d) /letl'ɔtl'ɔβɔ+ana/	[letlɔ'tlɔβʒana]	letlôtlôbô	“snake skin”
(e) /kχ ^h aβɔ+ana/	[kχ ^h aβʒana]	kgabô	“monkey”
(f) /k'uβu+ana/	[k'uβʒana]	kubu	“hippopotamus”
(g) /morafe+ana/	[morafʃana]	morafe	“race”
(h) /lefifi+ana/	[lefifʃana]	lefifi	“darkness”
(i) /sefɔ+ana/	[sefʃana]	sefô	“sieve”
(j) /sefu+ana/	[sefʃana]	sefu	“trap”
(k) /lerop'e+ana/	[leropʃ'ana]	lerope	“ruin”
(l) /selep'e+ana/	[selepʃ'ana]	selêpê	“axe”

(m) /ʌp'i+ana/	[ʌpʃ'ana]	hlapi	“fish”
(n) /leɣop'o+ana/	[leɣopʃ'ana]	legopo	“through”
(o) /leɣap'u+ana/	[leɣapʃ'ana]	legapu	“watermelon”
(p) /tsʰepʰe+ana/	[tsʰepʃʰana]	tshêphê	“springbok”
(q) /pʰɔpʰɔ+ana/	[pʰɔpʃʰana]	phôphô	“pawpaw”
(r) /pʰapʰi+ana/	[pʰapʃʰana]	phaphi	“piece”
(s) /leʔɔle+ana/	[leʔɔʒana]	lehlôle	“blood clot”
(t) /maβele+ana/	[maβeʒana]	mabêlê	“sorghum”
(u) /naleli+ana/	[naletʃ'ana]	naledi	“star”
(v) /pʰɔɔfɔɔɔ+ana/	[pʰɔɔfɔɔtʃ'wana]	phôôfôlô	“animal”
(w) /selelu+ana/	[seletʃ'wana]	seledu	“chin”
(x) /moʃemane+ana/	[moʃemaɲana]	mosêmane	“boy”
(y) /lek'eʃene+ana/	[lekeʃeneɲana]	lekêsênê	“location”
(z) /moʔare+ana/	[moʔaʃana]	mohlare	“tree”
(aa) /p'ere+ana/	[p'eʃana]	pêrê	“horse”
(bb) /moriri+ana/	[moriʃana]	moriri	“hair”
(cc) /seβet'e+ana/	[seβetʃ'ana]	sebeta	“liver”
(dd) /leβet'e+ana/	[leβetʃ'ana]	lebêtê	“pancreas”
(ee) /leβat'i+ana/	[leβatʃ'ana]	lebati	“door”
(ff) /seretʰe+ana/	[seretʃʰana]	serethê	“heel”
(gg) /marɔtʰi+ana/	[marɔtʃʰana]	marothi	“water droplets”
(hh) /leɣoŋ+ana/	[leɣoŋana]	legong	“piece of wood”

(cf. Appendix B)

The sound changes occurring in example (18) may be captured by formulating the following rule of palatalization:

Rule 3 Palatalization

$$\left[\begin{array}{l} + \text{ cons} \\ - \text{ high} \\ < + \text{ lab} > \end{array} \right] \rightarrow [\text{ high}] \quad \left/ \quad \text{---} + \quad \left[\begin{array}{l} - \text{ cons} \\ - \text{ voc} \\ + \text{ high} \end{array} \right]$$

Rule 3 attempts to explain that a consonant which is [+ lab - high] becomes [+ high] when it precedes morpheme boundary (optional) and a glide.

This rule implies that a consonant which is labial and [- high] become palatalized when it appears before a morpheme boundary (optional) and a glide. As a result it lacks generality, hence it fails to account for palatalization in coronals and velars.

Northern Sotho seems to be inconsistent with regard to palatalization of coronals and velars, eg (19) /t'/ a coronal consonant becomes [tʃ] a palatal affricate when precedes the glide [j] However, the glide [w] appears not to trigger palatalization of /t'/ (cf. also 2.4.1). And with regard to velar consonants some of them are palatalized in the context of either [j] or [w] while others fail to undergo the same process.

Compare

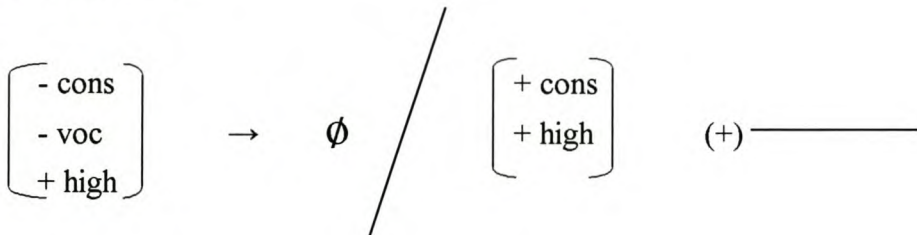
(20) /leɣoŋ + ana/ > [leɣoŋana]

(21) /mołak'i + ana/ > [mołak'ana]

In example (20) /ŋ/ (a velar) becomes [ɲ] (a palatal) whilst a velar stop such as /k'/ in (21) gives rise to vowel deletion (cf. also Appendix A and B).

The semivowels [j] and [w] do not constitute the output (phonetic representation) of the words in example (18). However, they are deleted by a rule. This rule will be formulated to account for the deletion of semivowels (glides) after rule 3 has been applied in Northern Sotho.

Rule 4 Glide deletion rule



Rule 4 states that a glide is deleted when it follows a [+ high] consonant and / or a morpheme boundary. This rule could optionally be applied in Northern Sotho.

2.5.5 Derivation

(22) Input:	/ rɔ	β +	u +	a /	/ rɔ	β +	u +	a /	“break”
Rule 2 (SV)			w				w		
Rule 3 (PAL)		β ₃				β ₃			
Rule 4 (SV.del)			w						
Output:	[rɔ	β ₃		a]	[rɔ	β ₃	w	a]	

It is shown in the derivation that the triggers of palatalization process, i.e. glides appears to be deleted or in some cases optionally maintained. (cf. also Appendices B, C and G).

2.5.6 Rule Ordering

It may argued that Rule 2 (semivocalization), Rule 3 (Patalization) and Rule 4 (Semivowel deletion) stand in a feeding order of application in Northern Sotho. This means that semivocalization rule precedes the palatalization rule and the latter precedes the semivowel deletion rule.

The derivation presented above provide the correct phonetic representation in that each rule in the derivation serve as an input for the other to apply, i.e feeding order (cf. also Kenstowicz and Kisseberth 1979:315; Hyman 1975: 129; Gussenhoven and Jacobs 1998:99).

2.5.7 Exceptional forms

The Northern Sotho language shows sound changes in which a labial consonant becomes alveolarized in a palatal context, i.e. / p' / a labial consonant becomes alveolar consonant [tsw].

It is assumed that this shift of place of articulation in labials is referred to as rule telescoping. This implies that intermediate derivational stages become lost, rendering a natural process to become unnatural (cf. also Roux 1979:259; Hyman 1975:173).

Telescoping

(23) **Input :** / l e r o p e + a n a / “ruin”

Rule 2 (SV)	j
Rule 3 (PAL)	pʃ
Rule 4 (SV DEL)	ʃ

Output: [pʃ]

Place change: [tʃw]

Depalatalization: [tsw]

It may be assumed that the order of the change of / p' / to [tsw] has undergone the following stages:

p'	→	pʃ	→	tʃw	→	tsw
		step 1		step 2		step 3

Phonetically it may be argued that the segments constituting this labial affricate are labial stop /p'/ plus prepalatal fricative /ʃ/. The labial segment /p'/ is characterized by labial articulation coupled

with lip-rounding and /j/ is a prepalatal fricative having palatal articulation involving tongue raising. The shift from labio - palatal /p j/ to alveopalatal /tʃw/ may be due to the proximity of alveolars to palatals than labials to the latter (cf. Roux 1979:259).

2.6 Remarks

This study attempts to give phonological account of the palatalization process in Northern Sotho within the framework of a TG model. The application of the TG has been successful because it can create sequences of events, so as to provide environment for the palatalization process to take place. It has been shown that Northern Sotho front vowels and back vowels becomes [j] and [w] respectively. Both these glides serve as the input of palatalization, hence their [+ high] feature specification. The glides [j] or [w] has an influence on the preceding consonant (C) and optional processes such as deletion of semivowels may occur.

TG accounts the palatalization of labials and coronals in Northern Sotho in that they are [- high], and the glides have an influence in them because they are able to change them to [+ high]. The velar consonant / ŋ / becomes / ɲ / and / ɣ / becomes / ʃ / are already [+ high] and to claim that a glide may cause them to palatalize is not adequate. It may be argued that the palatalization of velars involve the feature change of [+ back] becomes [- back] which is regarded as fronting of velars by Lahiri and Evers 1991: 50.

CHAPTER 3

PALATALIZATION IN NORTHERN SOTHO: A NON-LINEAR PHONOLOGICAL ANALYSIS.

3.1 Introduction

The aim of this chapter is to analyse the Palatalization process within the framework of a Feature Geometry (non-linear) phonological model. This model holds the assumption that features characterizing a segment are hierarchically organized, that is, the appearance of for instance the category *coronal* in the tree structure will also introduce all the dependents of the coronal node, e.g. anterior and distributed (cf. also 1.2.3).

The sound changes which occur during the Palatalization process in Northern Sotho will be presented below.

3.2 Outline

Consider the following alternations:

(24)

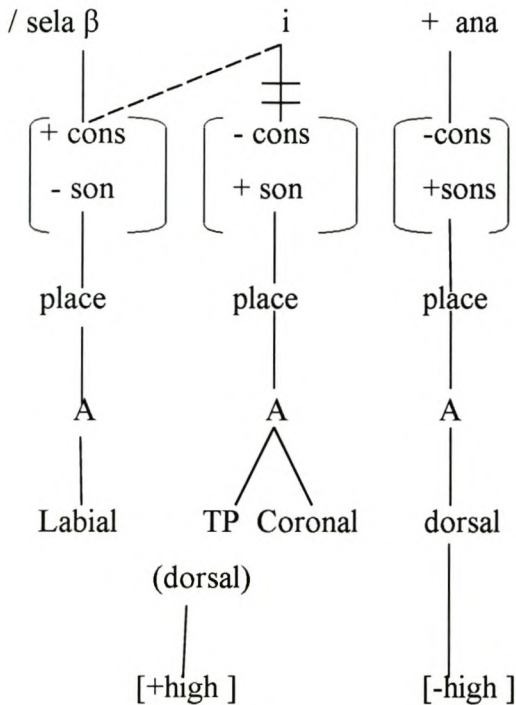
- (a) /β/ → [β̚] (series : bilabial fricatives)
- (b) /f/ → [f̚] (series : labio-dental fricatives)
- (c) /pʼ/ → [pʼ̚] (series : voiceless bilabial ejected stops)
- (d) /p^h/ → [p^h̚] (series : voiceless bilabial aspirated stops)
- (e) /tʼ/ → [tʼ̚] (series : voiceless alveolar ejected stops)
- (f) /t^h/ → [t^h̚] (series : voiceless alveolar aspirated stops)
- (g) /ɺ/ → [ɺ̚] (series : voiced alveolar stop)
- (h) /r/ → [r̚] (series : voiced alveolar liquid)
- (i) /ɽ/ → [ɽ̚] (series : voiced alveolar liquid)
- (j) /n/ → [n̚] (series : alveolar nasal)
- (k) /ŋ/ → [ŋ̚] (series : velar nasal)
- (l) /ɣ/ → [ɣ̚] (series : voiced velar fricative)

The sound changes shown in example (24) will be analysed (represented) with all vowel contexts in the examples below.

Representations

(25) /βi/ series : (bilabial fricatives)

selabi /selaβi + ana/ → selabjana [selaβʒana]

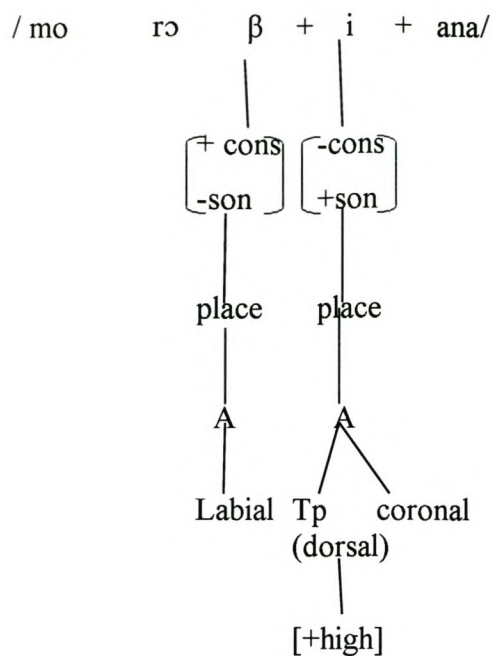


Representation (25) entails:

- Spreading of the root node of the front vowel [i] which is [+high] to the preceding consonant [β] which is [-high].
- This spreading is followed simultaneously with the deletion of [i] with all its features.
- The secondary palatal articulation of /β/, thus /β/ becomes [βʒ] (a palatal).

The problem with representation (25), however, is that it implies that any /i/ following a consonant will cause it to be palatalized. Below follows a representation that will explain this problem:

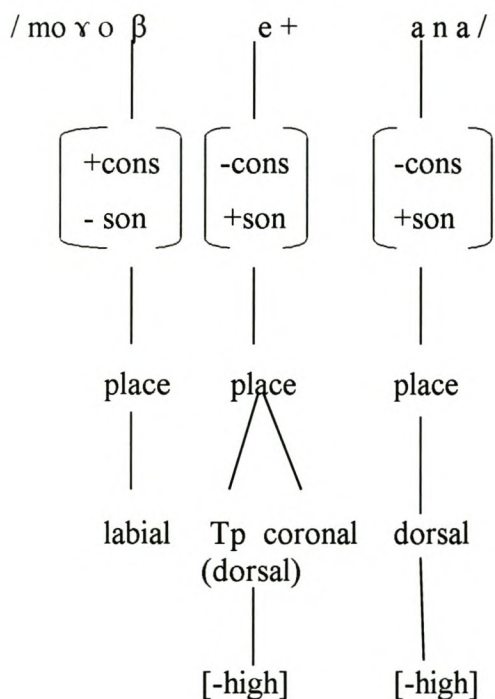
(26) /mo+ rɔ β+ i/ → * [morɔβzi]



In this representation (26) it is not possible to state that the front vowel (i) is able to cause the preceding consonant to palatalize. This implies that /m o + r ɔ β + i/ does not become [morɔβzi] . As a result this may be regarded as a counter example to the palatalization process in Northern Sotho.

(27) / βe/ series (bilabial fricatives)

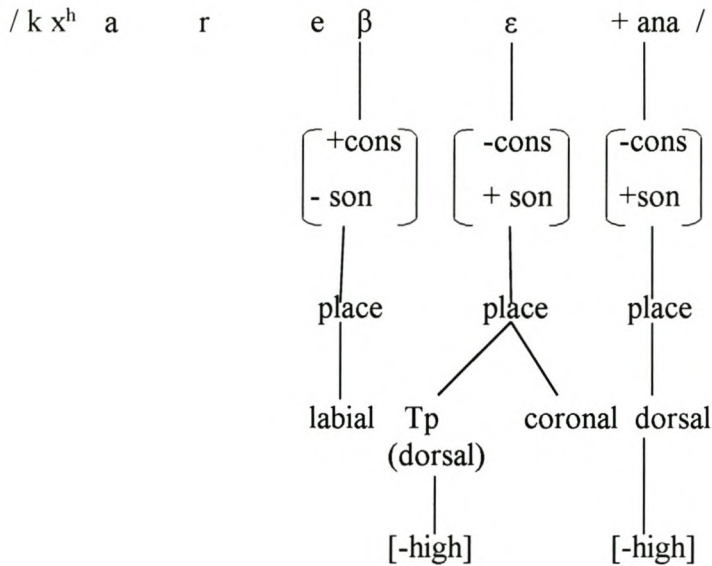
mogobe /mo γ o βe + ana/ → mogobjana [movoβzana]



In representation (27) it is not possible to state that the front vowel [e] which is [-high] can spread anything towards the preceding consonant [β] to change it to become [+high]. Thus, it is not possible to describe or explain this process adequately in terms of the FG model.

(28) / β ε / series (bilabial fricatives)

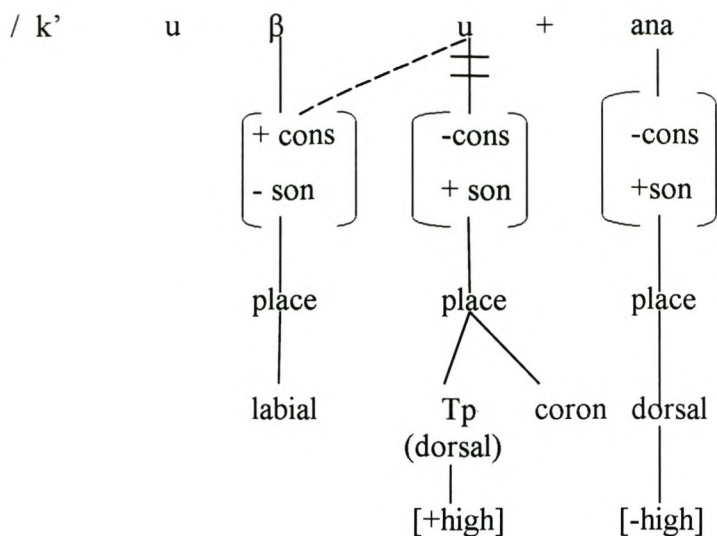
Kgarebê / kx^h a r e β ε + ana / → kgarebjana [kx^h a r e β ʒ ana]



This representation (28) shows that it is not possible for the front vowel [ε] which is [-high] to spread towards the preceding bilabial consonant [β] to cause it to become [+high]. Therefore, it is not possible to describe or explain this process adequately in terms of the FG model (cf. representation 27).

(29) /βu/ series (bilabial fricatives)

kubu / kʰu βu + ana / → kubjana [kʰu βʒana]

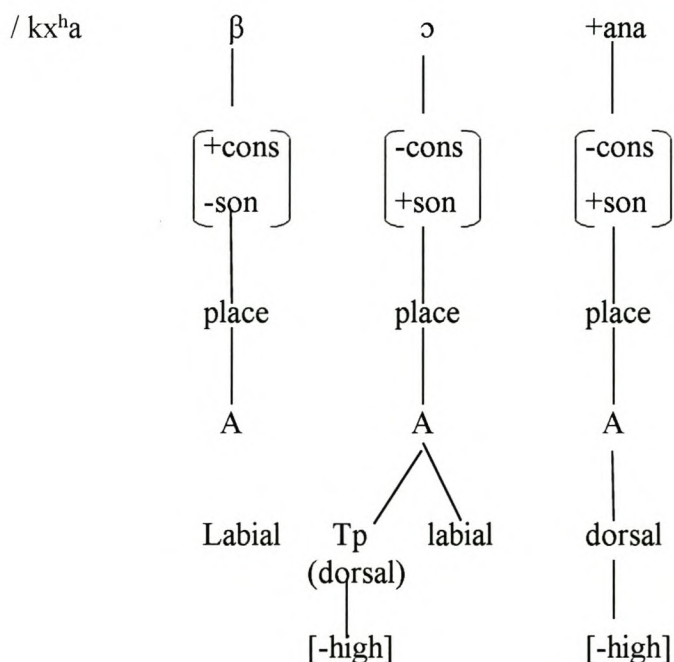


Representation (29) entails:

- Spreading of the root node of the back vowel [u] which is [+high] to the preceding consonant which is [-high].
- That this spreading is followed by the deletion of [u] with all its features.
- A secondary palatal articulation of the labial consonant /β/ which becomes [βʒ] (a palatal /β/).

(30) /βɔ / series (bilabial fricatives)

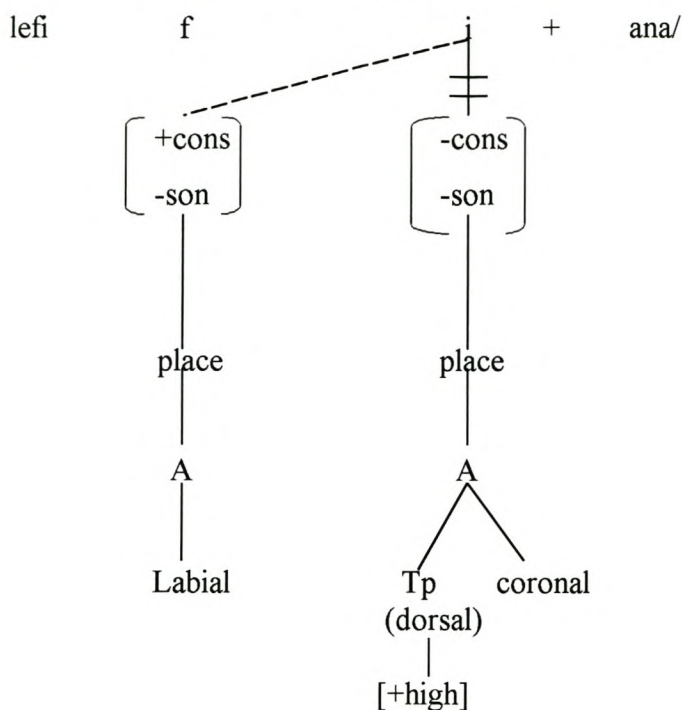
Kgabô /kxʰ aβɔ + ana / → kgabjana [kxʰ a βʒana]



Representation (30) demonstrate that the back vowel [ɔ] which is [-high] is unable to spread towards the preceding consonant, in order to render it [+high]. As a result, it is not possible to explain this process adequately within the FG model.

(31) /fi/ series : (labio-dental fricative)

lefifi / lefifi+ ana/ → lefifšana [lefif]ana

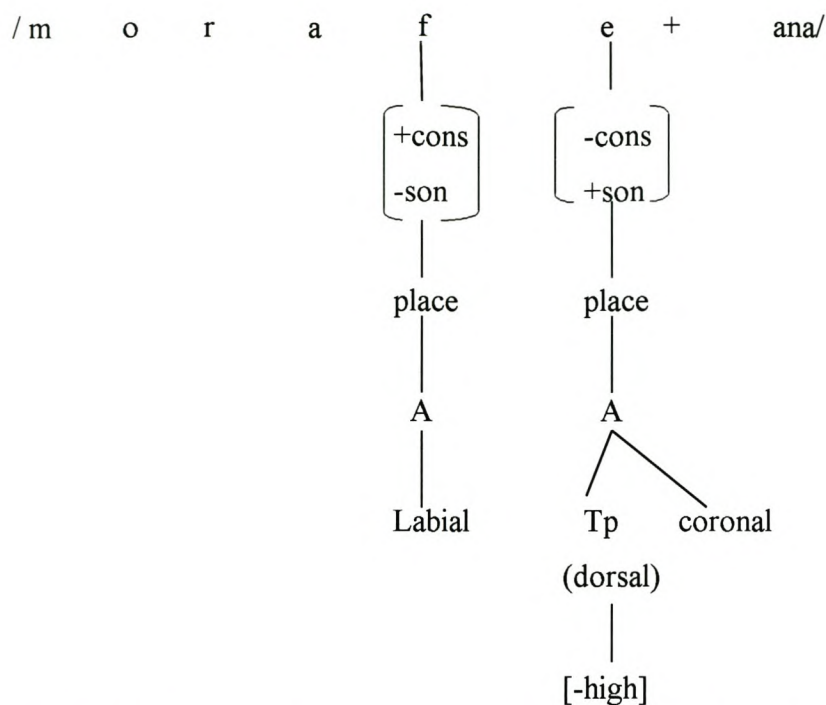


(31) Entails:

- The spreading of a root node of front vowel [i] which is [+high] to the preceding consonant [f] which is [-high].
- Spreading occurring with concomitant delinking of the front vowel [i] together with all its features
- A secondary palatal articulation of /f/. Thus /f/ a non-palatal becomes [fʃ], a palatal consonant.

(32) /fe/ series (labio – dental fricatives)

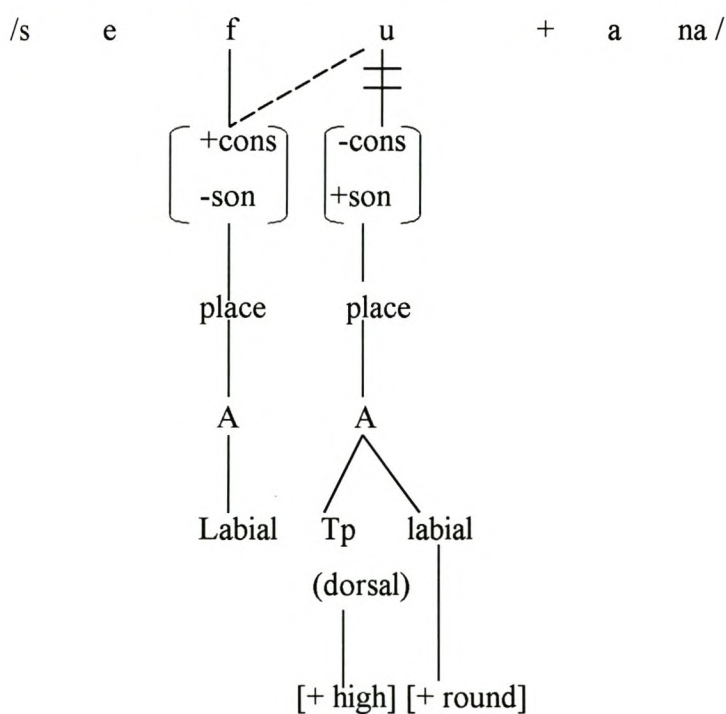
Morafe / mo+rafe + ana/ → morafšana [morafʃana]



Representation (32) implies that the front vowel [e] which possess a [-high] feature specification cannot spread anything towards the preceding consonant [f] in order to change it to [+high]. It is therefore not possible to explain this process within FG model.

(33) / fu/ series (labio – dental fricatives)

Sefu /sefu +ana / sefšana [sefʃana]

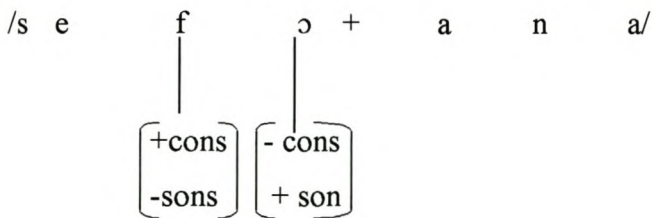


(33) Entails:

- The spreading of the root node of the back vowel [u] which is [+high] to the preceding consonant which is [-high].
- Spreading occurring with concomitant delinking of the back vowel [u] together with all its features.
- A non palatal segment /f/ becomes palatal [fʲ].

(34) /f ɔ / series (labio – dental fricatives)

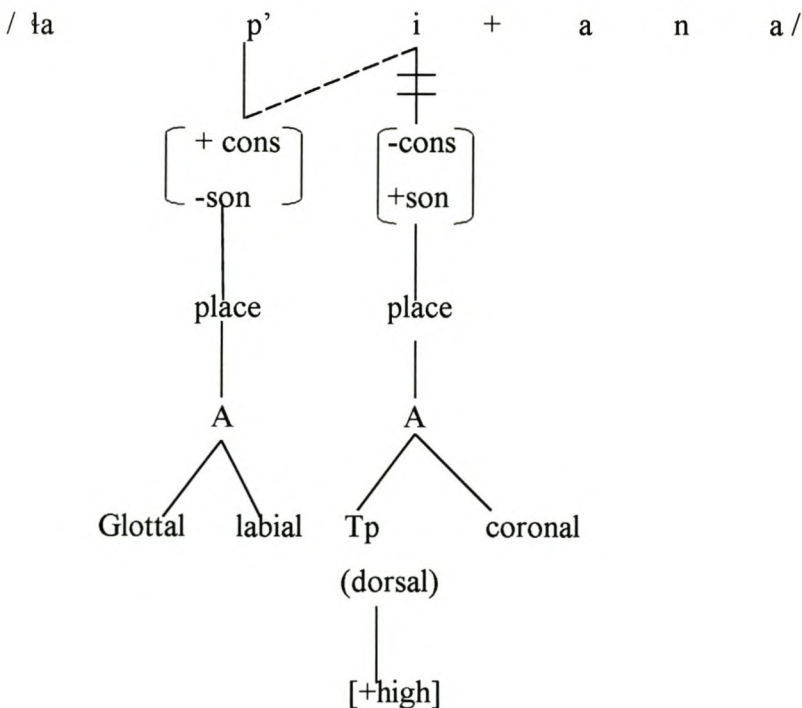
sefō / sefɔ + ana/ → sefšana [sefʲana]



In this representation (34) it appears impossible to state that the back vowel [ɔ] which is [-high] can spread towards the preceding consonant [f] in order to change it to [+high]. As a result the FG model is unable to explain this process.

(35) /p' i/ series (voiceless bilabial ejected stop)

Hlapi / ʔapi + ana/ → hlapšana [ʔapʲ'ana]

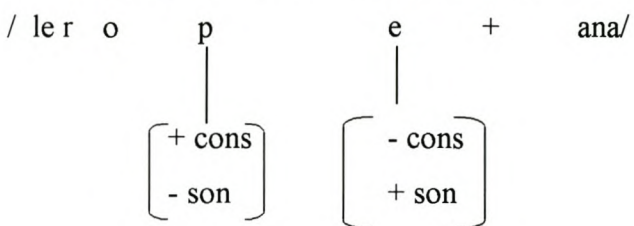


(35) Entails:

- The spreading of the root node of front vowel [i] to the preceding consonant [p'] which is [-high].
- Spreading occurring with the delinking of the front vowel [i] together with all its features.
- A labial consonant /p'/ becoming [pʃ'] (a palatal /p'/) .

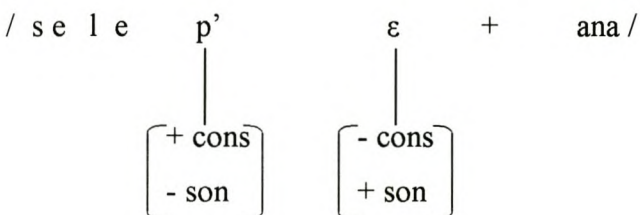
(36) /pe/ series (voiceless bilabial ejected stops)

lerope / lero p' e + ana / → lerôpšana [leropʃ'ana]



(37) /p'ε/ series (voiceless bilabial ejected stops)

selepê / selep'ε + ana / → selepšana [selepʃ'ana]

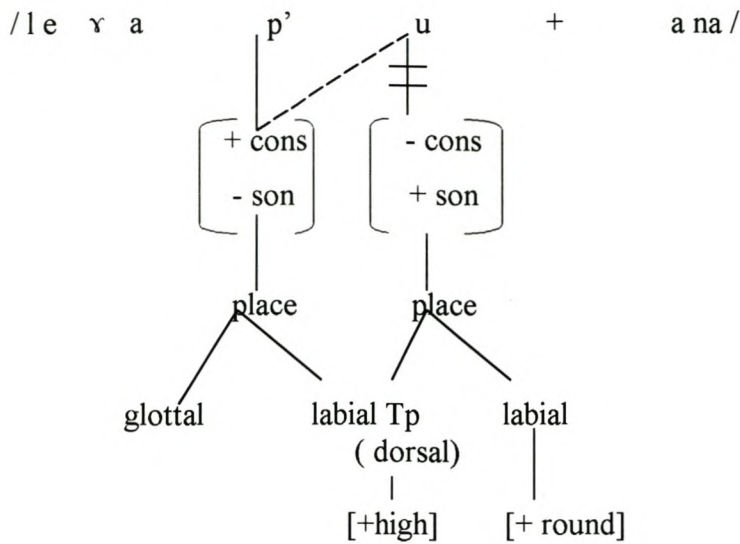


(36) and (37) entail that:

- there is no spreading of the features characterizing [e] and [ε] towards the preceding consonant [p'] because both of these front vowels are [-high].
- these processes shown by (36) and (37) cannot be described or explained in terms of the FG model.

(38) /p'u / series (voiceless bilabial ejected stops)

legapu / le ɣ apu + ana/ → legapšana [levapʃana]

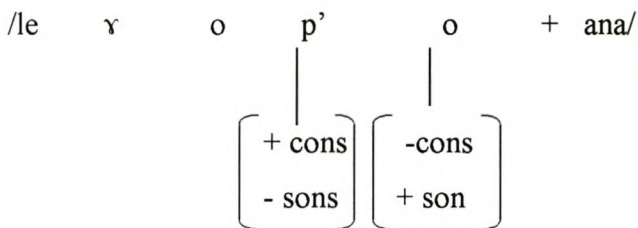


(38) Is interpreted as:

- the spreading of the root node of the back vowel [u] which is [+ high] to the preceding consonant [p'] which is [- high],
- this spreading occurring with the deletion of the back vowel [u] together with all its features,
- a non palatal /p'/ becomes [pʃ'] (a palatal / p'/).

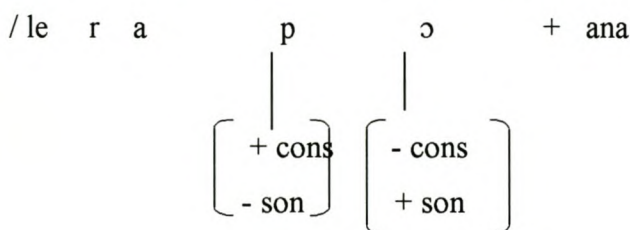
(39) /p'o/ series (voiceless bilabial ejected stops)

legopo / le ɣ op'o + ana / → legopšana [le ɣ opʃ'ana]



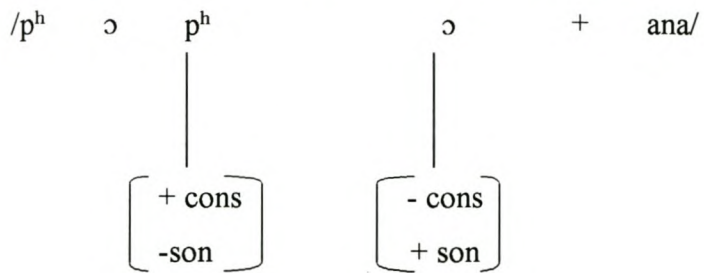
(40) /p'ɔ / series (voiceless bilabial ejected stops)

lerapô / lerap'ɔ + ana/ → lerapšana [lerapʃ'ana]



(43) /phɔ/ series (voiceless bilabial aspirated stops)

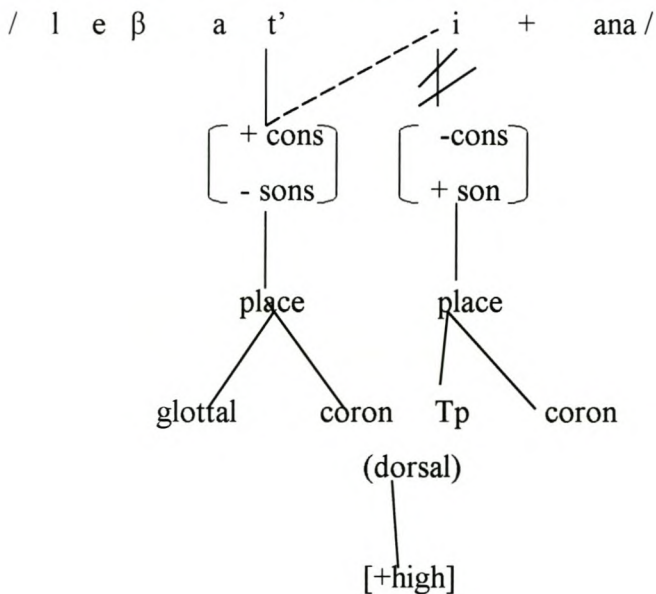
phôphô / p^h ɔ p^h ɔ + ana / → phôphšana [phɔp^hana]



In representation (42) and (43) it is not possible to state that both the front vowel [ɛ] and the back vowel [ɔ] which are [-high] spread anything to the preceding consonant /p^h/

(44) /t'i/ series (voiceless alveolar ejected stop)

lebati / leβat'i + ana / → lebatšana [leβat'^hana]

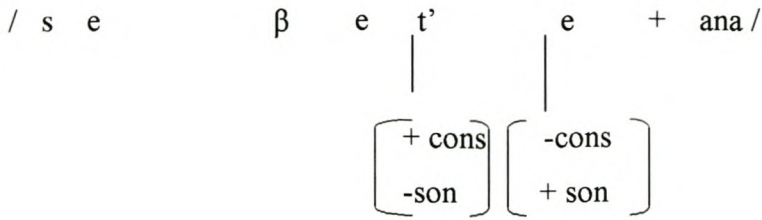


(44) Should be interpreted as:

- the spreading of the root node of the front vowel [i] which is [+high] to the preceding consonant [t'] which is [-high],
- the delinking of the front vowel [i] together with all its features,
- a non-palatal /t'/ becomes [t'^h], a palatal consonant.

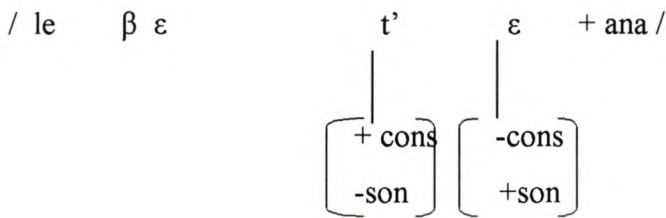
(45) /t'e / series (voiceless alveolar ejected stop)

seβete / seβet'e + ana / → seβetšana [seβet]ʼana]



(46) /t'ε/ series (voiceless alveolar ejected stop)

lebêtê / leβet'ε + ana / → lebêtšana [le βet]ʼana]

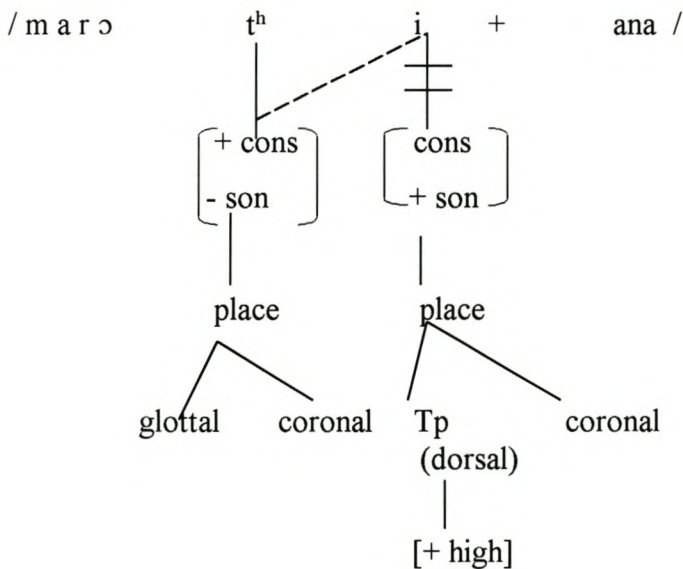


(45) and (46) entail that:

- it is not possible to argue that the front vowels [e] and [ε] which are [-high] spreads to the preceding consonant / t / in order to cause it to be [+ high],
- it is impossible to describe these processes adequately in terms of the FG theory.

(47) /thi /series (voiceless alveolar aspirated stops)

Marôthi / mar ɔ tʰi + ana / → marôtšhana [marot]ʰana]

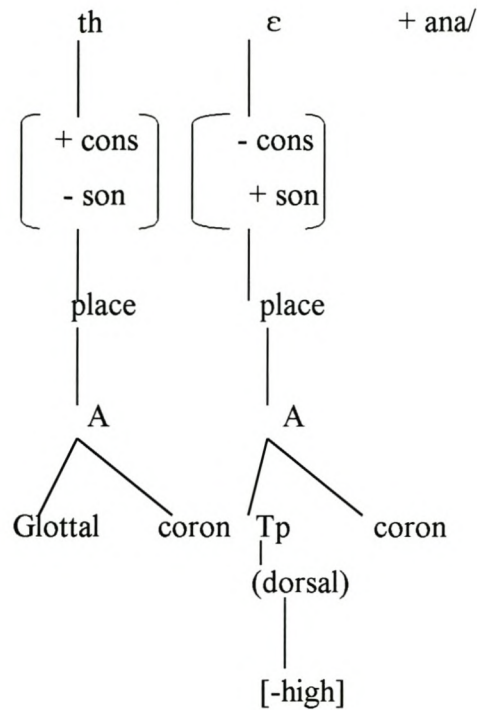


(47) should be interpreted as:

- the spreading of the root node of the front vowel [i] which is [+high] to the preceding consonant / t^h / which is [-high],
- the delinking of the front vowel [i] together with all its features,
- a non-palatal /t^h/ becoming a palatal [t^h].

(48) / the / series (voiceless alveolar aspirated stop)

serêthê / ser ε

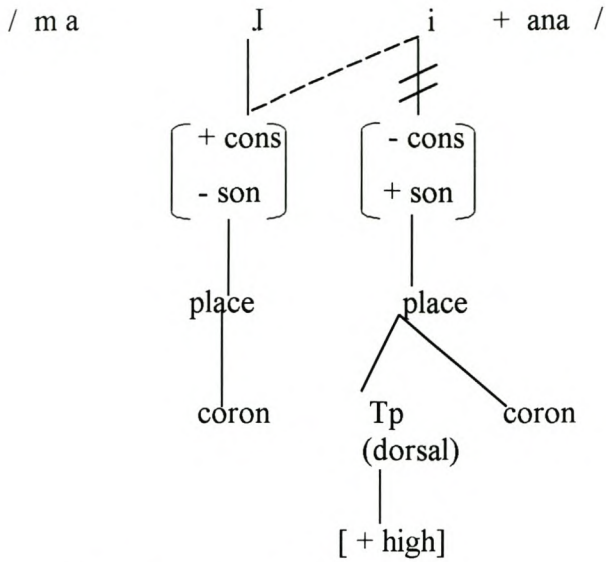


(48) Entails that:

- there is no spreading of the features of [ε] which is [-high] to the preceding consonant because it seems that [ε] has nothing to spread in order to cause /t^h/ become [+high],
- the FG model fails to explain this process.

(49) /Ii/ series (voiced alveolar stop)

madi / ma I i + ana / → matšana [matʃ'ana]

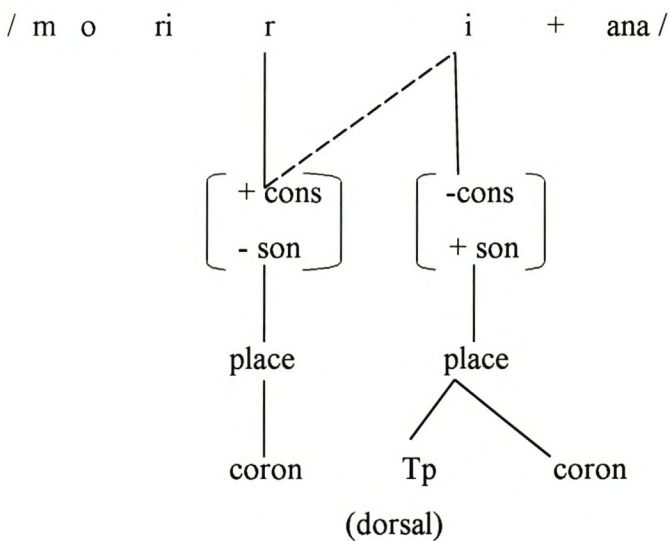


(49) should be interpreted as:

- the spreading of the root node of the front vowel [i] to the preceding consonant to make it [+high],
- the deletion of the front vowel [i] together with all its features,
- the palatal articulation of the coronal /I/ to become [tʃ'].

(50) /ri/ series (voiced alveolar liquid)

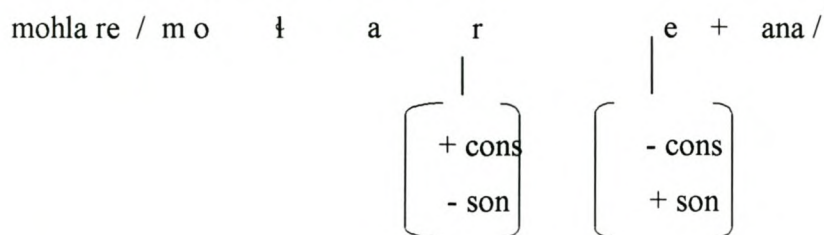
moriri / mo ri ri + ana / → morišana [moriʃana]



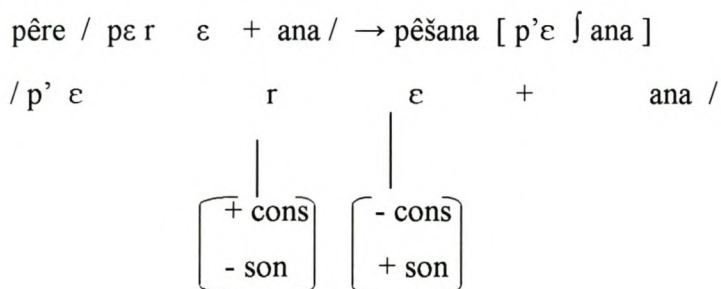
(50) implies:

- the spreading of root node of front vowel [i] which is [+high] to the preceding consonant [r] which is [-high],
- the deletion of the front vowel [i] together with all its features,
- a non-palatal segment /r/ becomes palatal [ɺ].

(51) /r e/ series (voiced alveolar liquid)



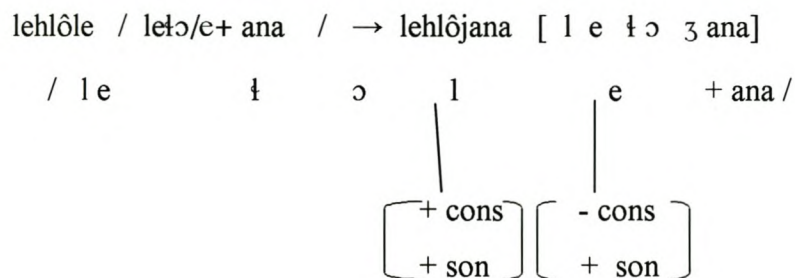
(52) /rɛ/ series (voiced alveolar liquid)



(51) and (52) entail that:

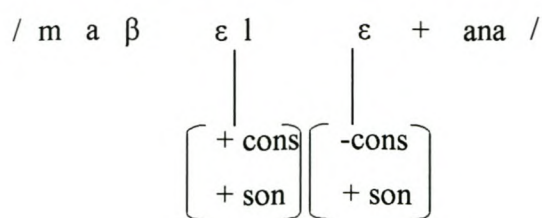
- spreading does not occur in that the front vowels [e] and [ɛ] have nothing to spread towards the preceding consonant,
- it is impossible to account for these processes in terms of the FG model.

(53) /l e/ series (voiced alveolar liquid)



(54) /l ε / series (voiced alveolar liquid)

mabêlê / ma βε l ε + ana / → mabêjana [maβε ʒ ana]

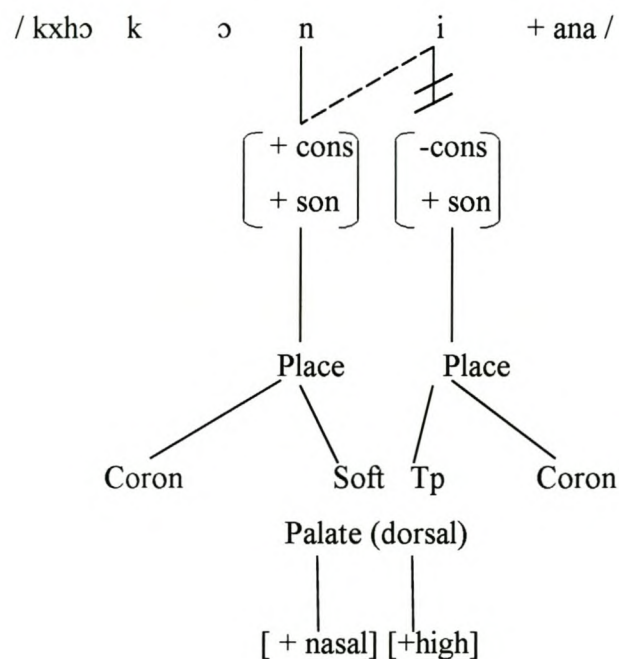


The representations (53) and (54) indicate that it is impossible to account for the two processes in that the front vowels [e] and [ε] spread nothing to the preceding consonant, since they are [-high].

(55) /ni /series (alveolar nasal)

It is acquired that the velar nasal [ŋ] is derived from underlying /ni/ (cf. locative formation in the Nguni languages). Thus,

kgokông / k x^hɔkɔni+ana / → kgôkônyana [kx^hɔk'ɔŋ ana]



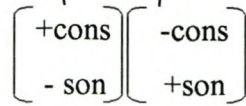
(55) entails:

- the spreading of the root node of the front vowel [i] which is [+high] to the preceding consonant [n] which is [-high],
- the deletion of [i] together with all its features,
- the palatal articulation of [n] which becomes [ŋ].

(56) / ne/ series (alveolar nasal)

Mošêmane / mo ʃ ε mane + ana / → mošêmanyana [moʃ εmajana]

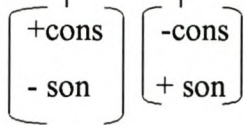
/ m o ʃ ε m a n e + ana /



(57) /n ε / series (alveolar nasal)

lekêšenê / lek'εʃεn ε + ana / → lekêʃenyana [le k'ε ʃ εɲ ana]

/ l e k' ε ʃ ε n ε + ana /

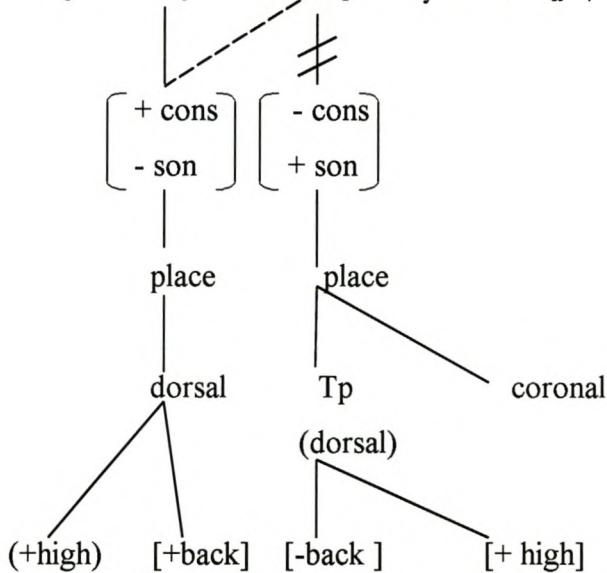


in representations (56) and (57) the implication is that the front vowels [e] and [ε] cannot spread anything towards the preceding nasal consonant [n] in order to change it to [+high] as they are both [-high]. It is not possible to describe or explain these processes adequately in terms of the FG model.

(58) /ɾi / series i (voiced velar fricative)

t l ôga / tɔɾ +iʃ + a / → t l ôša [tɔʃ a]

/ t l ɔ ɾ + i ʃ + a /



In representation (58) it may be stated that the front vowel [i] which is [+high – back] spreads its root node to the preceding consonant which is [+high + back] so as to cause it to become [-back]. This spreading is followed by the deletion of [i] together with all its features. This yields to palatal articulation of /ɣ/ a dorsal consonant. The Northern Sotho word /t l ɔ̄ɣ + iʃ+a/ becomes *[t l' ɔ̄]ʃa instead of [t l' ɔ̄ ʃ a]. It seems FG model is inadequate to explain this process in this language.

From the analyses presented above it has become clear that employing an FG model in the description and explanation of the phenomenon of palatalization in Northern Sotho leads to a number of inexplicable examples.

CHAPTER 4

EVALUATION OF THE MODELS

4.1 Introduction

In this chapter the two models will be assessed in order to ascertain their effectiveness in the description or explanation of the palatalization phenomenon in Northern Sotho.

4.2 Conclusion

This study has shown that:

- (i) The structuralist (taxonomic) model which was previously used in the description of palatalization in Northern Sotho is inadequate for the following reason:
 - It provided no **explanation** for the phenomenon.
- (ii) The Transformational Generative (linear) model is fundamentally adequate in its account of the Northern Sotho palatalization process, for the following reasons:
 - It provides explanations or descriptions of the phonological processes that occur before or after palatalization takes place.
 - The semivocalization or glide formation process occurs before palatalization.
 - The semi vowels [j] or [w] are responsible to induce palatalization.
 - Optional processes such as semi - vowel deletion or glide deletion occur after palatalization.
 - It may be stated that the TG model accounts for most of the alternations involving Northern Sotho palatalization.
- (iii) The Feature Geometry (non – linear) model seems to be inadequate in the descriptions or explanations of Northern Sotho Palatalization, for the following reasons:
 - It only accounts for the occurrence of palatalization involving [+ high] front vowel [i] or back vowel [u]
 - It fails to account for the occurrence of palatal consonants in the environment of the mid vowels [e, ɛ, o, ɔ] as it does not provide any formal mechanism to derive a glide which is a trigger for palatalization.

Appendix A

Phonetic outputs of /CV₁V₂/ Combinations

(* denotes an intermediate form)

C	V1 (Proper Nouns)							Deverbative Nouns		V2
	a	i	e	ε	u	o	ɔ	+i	+ɔ	
p'	∅	*j	*j	*j	*w	*w	*w	*j	*w	
p ^h	∅		*j	*j	*w		*w	*j	*w	
t'	∅	*j	*j	*j	w	w	w	*j	w	
t ^h	∅	*j	*j	*j	w	w	w	*j	w	
k'	∅	∅	∅	∅	w	w	w	∅	w	
tl'	∅		∅	∅		w	w	∅	w	
tl ^h	∅									
r	∅	*j	*j	*j	w	w	w	*j	w	
β	∅	*j	*j	*j	*w	*w	*w	*j	*w	
β ₃			∅	∅						
f	∅	*j	*j		*w	*w	*w	*j	*w	
fj										
fs										
s	∅	∅	∅	∅					w	
ʃ	∅	∅		∅	w	w	w			
ʒ								∅		
ʈ	∅						w	∅		
ʎ	∅					w	w	∅		
ɦ					w		w			
pʃ	∅									
pʃ ^h			∅							
ps ^h		∅								
ts'	∅	∅	∅	∅		w	w	∅	w	
ts ^h	∅	∅				w				
tʃ'	∅	∅	∅	∅	w		w	∅	w	
ts ^h	∅	∅	∅	∅	w		w	∅	w	
kx ^h	∅					w	w	∅	w	
m	∅									
n	∅	*j	*j	*j		w	w	*j	w	
p	∅							∅	w	
ŋ	∅							∅	w	
l	∅	*j	*j	*j	*w	w	*w	*j	w	
j	∅								w	
w	∅	∅	∅	∅						

Appendix B

/CV+V/ with proper nouns

CV + V Combination	Example	Gloss	Underlying Representation	Phonetic Representation
βa + ana	bana	children	/βa + ana/	[βana]
βe + ana	moqobe	pool	/moɣoβe + ana/	[moɣoβ3ana]
βε + ana	kgarebê	young women	/kx ^h areβε + ana/	[kx ^h areβ3ana]
βi + ana	selabi	fly or any little thing in the eye	/selaβi + ana/	[selaβ3ana]
βo + ana	letlotlobo	snake skin	/letl'otloβe + ana/	[letl'otloβ3ana]
βɔ + ana	kgabo	monkey	/kx ^h aβɔ + ana/	[kx ^h aβ3ana]
βu + ana	kubu	hippopotamus	/k'βu + ana/	[k'uβ3ana]
fa + ana	lefa	inheritance	/lefa + ana/	[lefana]
fe + ana	morefe	race	/morafe + ana/	[moraf3ana]
fe + ana				
fī + ana	lefifi	darkness	/lefifi + ana/	[lefif3ana]
fo + ana				
fɔ + ana	sefô	sieve	/sefɔ + ana/	[sef3ana]
fū + ana	sefu	trap	/sefu + ana/	[sef3ana]
ɣa + ana	leraga	mud	/leraya + ana/	[lerayana]
ɣo + ana	bosego	night	/boʃeɣo + ana/	[boʃeɣwana]
ɣɔ + ana	legô	wild fig	/leɣɔ + ana/	[leɣwana]
hɔ + ana	lehô	spoon	/lehɔ + ana/	[lehwana]
hu + ana	lehu	death	/lehu + ana/	[lehwana]
ka + ana	leswika	stone	/leswik'a + ana/	[leswik'ana]
ke + ana	lebake	dagga	/leβak'e + ana/	[leβak'ana]
ke + ana	lekêkê	ant	/lek'ek'e + ana/	[lek'ek'ana]
ki + ana	baki	jacket	/βak'i + ana/	[βak'ana]
ko + ana	moroko	bran	/morok'o + ana/	[morok'wana]
kɔ + ana	dikôkô	nuts	/ik'ɔk'ɔ + ana/	[ik'ɔk'wana]
ŋku + ana	puku	book	/p'uk'u + ana/	[p'uk'wana]
la + ana	morula	marula tree	/morula + ana/	[morulana]
le + ana	lehlolé	blood clot	/ledtɔle + ana/	[ledtɔ3ana]
le + ana	mabêlê	sorghum	/maβele + ana/	[maβe3ana]
li + ana	naledi	star	/naleli + ana/	[nalet/ana]
lo + ana	pelo	heart	/pelo + ana/	[pewana]
lɔ + ana	phôôfôlô	animal	/p ^h ɔɔfɔlɔ + ana/	[p ^h ɔɔfɔ3wana]
lu + ana	seledu	chin	/selelu + ana/	[seletswana]
na + ana	mosetsana	girl	/mosetsana + ana/	[mosetsaɲana]
ne + ana	mosemane	boy	/moʃemane + ana/	[moʃemaɲana]
ne + ana	lekêšê	location	/lek'eʃene + ana/	[lek'eʃɲana]
ni + ana	kgokong	wildebeest	/kx ^h okoni + ana/	[kx ^h okɔɲana]
no + ana	mohlono	wild apricot	/moɫono + ana/	[moɫɔɲwana]

nɔ + ana	lenônô	thin top of sweet-reed stalk	/lenɔnɔ + ana/	[lenɔnwana]
pa + ana	legapa	calabash	/leɣap'a + ana/	[leɣap]wana]
pe + ana	lerope	ruin	/lerop'e + ana/	[lerop]ana] [lerot]wana] [lerotswana]
pe + ana	selêpê	axe	/selep'e + ana/	[selep]ana] [selet]wana] [seletswana]
pi + ana	hlapi	fish	/tapi + ana/	[tɒp]ana] [tɒt]wana] [tɒtswana]
po + ana	legopo	trough	/leɣop'o + ana/	[leɣop]ana] [leɣot]wana] [leɣotswana]
pɔ + ana	lerapô	bone	/lerap'ɔ + ana/	[lerap]ana] [lerat]wana] [leratswana]
pu + ana	legapu	watermelon	/leɣapu + ana/	[leɣap]ana] [leɣat]wana] [leɣatswana]
ra + ana	sehlôra	squirrel	/seɬora + ana/	[seɬɔrana]
re + ana	mohlare	tree	/moɬare + ana/	[moɬa]ana]
re + ana	pêrê	horse	/per'e + ana/	[per]ana]
ri + ana	moriri	hair	/moriri + ana/	[mori]ana]
ro + ana	leroro	young corn plant	/leroro + ana/	[lerorwana]
rɔ + ana	seporo	railway line	/sep'ɔrɔ + ana/	[sep'ɔrwana]
ru + ana	kgêru	nutshell	/kx ^h eru + ana/	[kx ^h erwana]
sa + ana	masa	dawn	/masa + ana/	[masana]
se + ana	mose	skin apron	/mose + ana/	[mosana]
se + ana	mataêsê	dice	/mataese + ana/	[mataesana]
si + ana	nosi	bee	/nosi + ana/	[nosana]
sɔ + ana	pôsô	post	/pɔsɔ + ana/	[pɔswana]
tɕa + ana				
tse + ana				
tse + ana	kotsê	shield	/k'otse + ana/	[k'otswana]
tɕi + ana	kotsi	accident	/kotsi + ana/	[k'otsana]
tso + ana	motsotso	minute	/motsotso + ana/	[motsotswana]
tɕɔ + ana	kgôtsô	peace	/kx ^h ɔtsɔ + ana/	[kx ^h ɔtswana]
tsu + ana				
ta + ana	sebata	carnivore	/seβat'a + ana/	[seβat'ana]
te + ana	sebeta	liver	/seβete + ana/	[seβet]ana]
te + ana	lebetê	pancreas	/leβet'e + ana/	[leβet]ana]

ti + ana	lebuti	door	/leβat'i + ana/	[leβatʃana]
to + ana	molato	case	/molat'o + ana/	[molatwana]
tɔ + ana	lebatô	floor	/leβatɔ + ana/	[leβatwana]
tu + ana	bodutu	boredom	/βo ut'u + ana/	[βo.lutwana]
tʰa + ana	mokgotha	street	/mokxʰɔtha + ana/	[mokxʰɔthana]
tʰe + ana				
tʰe + ana	serêthê	heel	/seretʰe + ana/	[seretʃʰana]
tʰi + ana	marôthi	drops	/marɔthi + ana/	[marɔtʃʰana]
tho + ana	moratho	brother	/moratʰo + ana/	[moratʰwana]
thɔ + ana	morathô	bridge	/moratʰɔ + ana/	[moratʰwana]
thu + ana	mokgôthu	hottentot	/mokxʰɔtʰu + ana/	[mokxʰɔtʰwana]
pʰe + ana	tshêphê	springbok	/tsʰepʰe + ana/	[tsʰepʃʰana]
pʰɔ	phôphô	pawpaw	/pʰɔpʰɔ + ana/	[pʰɔpʃʰana]
tsʰa + ana	letsha	lake	/letsʰa + ana/	[letsʰana]
tsʰo + ana	dimtsho	sweet reeds	/intsʰo + ana/	[intsʰwana]
tla + ana	mmutla	hare	/mmutl'a + ana/	[mmutl'ana]
tle + ana	lewatile	sea	/lewatl'e + ana/	[lewatl'ana]
tle + ana	mantle	peaces	/mantl'ε + ana/	[mantl'ana]
ntlɔ + ana	ntlô	house	/ntl'ɔ + ana/	[ntlwana]
ʎa + ana	sehlahla	shanty	/seʎaʎa + ana/	[seʎaʎana]
ʎɔ + ana	mahlô	eyes	/maʎɔ + ana/	[maʎwana]
tʰa + ana	ntlha	tip	/ntlʰa + ana/	[ntlʰana]
psʰi + ana	mpshi	porridge made of milk	/mpshi + ana/	[mpsʰana]
ʃa + ana	seša	firebrand	/seʃa + ana/	[seʃana]
ʃe + ana				
ʃe + ana	mošê	the other side	/moʃe + ana/	[moʃana]
si + ana	kgoši	king	/kxʰɔʃi + ana/	[kxʰɔʃana]
ʃo + ana	sebêšo	hearth	/seβeʃo + ana/	[seβeʃwana]
ʃɔ + ana	sešô	sore	/seʃɔ + ana/	[seʃwana]
ʃu + ana	sešu	dung	/seʃu + ana/	[seʃwana]
tʃa + ana	molatša	porridge kept over from the previous night	/molatʃ'a + ana/	[molatʃ'ana]
tʃe + ana				
tʃe + ana	setšêtšê	estrilda – astrilda	/setʃe'tʃ'e + ana/	[setʃe'tʃ'ana]
tʃi + ana	letšatši	sun	/letʃ'atʃi + ana/	[letʃ'atʃana]
tʃo + ana	khutši	peace	/kʰutʃ' + ana/	[kʰutʃwana]
tʃɔ + ana	setšo	culture	/setʃ'ɔ + ana/	[setʃ'wana]
tʃu + ana	setšu	elbow	/setʃ'u + ana/	[setʃ'wana]
tʃʰa + ana	tšhatšha	hunting spider	/tʃʰatʃʰa + ana/	[tʃʰatʃʰana]
tʃʰe + ana	khabêtšhe	cabbage	/kʰaβetʃʰe + ana/	[kʰaβetʃʰana]

tʃ ^h ɛ + ana	mpšhe	ostrich	/mpʃ ^h + ana/	[mpʃ ^h ana]
tʃ ^h i + ana	ntšhi	fly	/ntʃ ^h i + ana/	[ntʃ ^h ana]
tʃ ^h ɔ + ana	seswantšhō	portrait	/seswantʃ ^h ɔ + ana/	[seswantʃ ^h ana]
tʃ ^h u + ana	ntšhu	eagle	/ntʃ ^h u + ana/	[ntʃ ^h wana]
βʒɛ + ana	mokgalabjê	old man	/mokx ^h alaβʒɛ + ana/	[mokx ^h alaβʒana]
ja + ana	moya	wind	/moja + ana/	[mojana]
wa + ana	lewa	cave	/lewa + ana/	[lewana]
we + ana	moswe	meercat	/moswe + ana/	[moswana]
we + ana	segwêgwê	frog	/seɣweɣwe + ana/	[seɣweɣwana]
wi + ana	maswi	milk	/maswi + ana/	[maswana]
ŋa + ana	lenga	crack	/leŋa + ana/	[leŋana]
na + ana	sethuya	pistol	/set ^h upa + ana/	[set ^h upana]
kx ^h o + ana	segokgo	spider	/seɣokx ^h o + ana/	[seɣokx ^h wana]
kx ^h ɔ + ana	meokgô	tears	/meokx ^h ɔ + ana/	[meokx ^h wana]

Appendix C

/CV+V/Structure in deverbative Nouns

CV + V Combination	Example	Gloss	Underlying Representation	Phonetic Representation
β + i + ana	moabi	allocator	/moaβ+i+ana/	[moaβzana]
β + ɔ + ana	kabô	allocation	/k'aβ+ɔ+ana/	[k'aβzana]
f + i + ana	mosefi	one who sieves	/mosef+i+ana/	[mosefʃana]
f + ɔ + ana	phofô	manner of flying	/p ^h of+ɔ+ana/	[p ^h ofʃana]
ɣ + i + ana	moagi	builder	/moaɣ+i+ana/	[moaɣana]
ɣ + ɔ + ana	kagô	build-up	/k'aɣ+ɔ+ana/	[k'aɣwana]
ʒ + i + ana	moji	eater	/moʒ+i+ana/	[moʒana]
ʒ + ɔ + ana	sejô	meal	/seʒ+ɔ+ana/	[seʒwana]
k' + i + ana	mohlaki	poor person	/mołak'+i+ana/	[mołak'ana]
k' + ɔ + ana	mohlakô	poverty	/mołak'+i+ana/	[mołak'wana]
l + i + ana	lešaedi	untidy person	/leʃae.l+i+ana/	[leʃaetʃ'ana]
l + ɔ + ana	kopelô	song	/kop'e.l+ɔ+ana/	[kop'e.lwana]
n + i + ana	baefani	people who invade each other	/βaefan+i+ana/	[βaefanana]
n + ɔ + ana	monônô	anointment	/monɔn+ana/	[monɔnwana]
p' + i + ana	mogapi	one who drives livestock	/moɣap+i+ana/	[moɣapʃana]
p' + ɔ + ana	mohlapô	manner of bathing	/mołap+ɔ+ana/	[mołapʃana]
p ^h + i + ana	phaphi	piece	/p ^h ap ^h +i+ana/	[p ^h ap ^h wana]
p ^h + ɔ + ana	t ^h ôphô	manner of gathering	/t ^h ɔp ^h +ɔ+ana /	[t ^h ɔp ^h wana]
s + ɔ + ana	diphasô	ancestral appeasement	/ip ^h as+ɔ+ana/	[ip ^h aswana]
t + i + ana	moruti	priest	/moɣut+ɔ+ana/	[moɣutwana]
t + ɔ + ana	mokatô	race	/mok'at+ɔ+ana/	[mok'atwana]
t ^h + i + ana	lerothi	droplet	/lerot ^h +i+ana/	[lerot ^h ana]
t ^h + ɔ + ana	morathô	bridge	/morat ^h +ɔ+ana/	[morat ^h wana]
ts + i + ana	moputsi	rewarder	/mop'uts+i+ana/	[mop'utsana]
ts + ɔ + ana	moputsô	payment	/mop'uts+ɔ+ana/	[mop'utswana]
r + i + ana	moreri	preacher	/morer+i+ana/	[morerana]
r + ɔ + ana	morerô	manner of preaching	/morer+ɔ+ana/	[morerwana]
tl' + i + ana	motlamotli	caterer	/motlametʃ+i+ana/	[motlametʃ'ana]
tl' + ɔ + ana	motlametlô	manner of catering	/motlametʃ+ɔ+ana/	[motlametʃwana]
ʎ + i + ana	moferehli	one who provoke	/mofereʎ+i+ana/	[mofereʎana]
ʎ + ɔ + ana	pherehlo	incitement	/p ^h ereʎ+ɔ+ana/	[p ^h ereʎwana]
ʃ + i + ana	morutiši	teacher	/morutiʃ+i+ana/	[morutiʃ'ana]
ʃ + ɔ + ana	mmušo	government	/mmuʃ+ɔ+ana/	[mmuʃ'wana]
tʃ + i + ana	moeletši	adviser	/moeletʃ+i+ana/	[moeletʃ'ana]
tʃ + ɔ + ana	seletšo	musical instrument	/seletʃ+ɔ+ana/	[seletʃwana]

t ^h + i + ana	molwantšhi	antagonist	/molwant ^h i+ana/	[molwant ^h ana]
t ^h + ɔ + ana	pôntšhō	show	/pɔnt ^h +ɔ+ana/	[pɔnt ^h wana]
j + i + ana	mohloyi	one who hates	/mołoj+i+ana/	[mołojana]
j + ɔ + ana	lehloyō	hatred	/lełoj+ɔ+ana/	[lełoj+ɔjana]
ŋ + i + ana	sengangi	one who pulls tight	/seŋaŋ+i+ana/	[seŋaŋana]
ŋ + ɔ + ana	ngangō	manner of pulling tight	/ŋaŋ+ɔ+ana/	[ŋaŋwana]
n + i + ana	mosenyi	spoiler	/mosep+i+ana/	[mosepana]
n + ɔ + ana	tshenyō	damage	/ts ^h ep+ɔ+ana/	[ts ^h epwana]

Appendix D

Pronouns

(i) Absolute Pronouns

Class	Example	Gloss	Underlying Representation	Phonetic Representation
2.p.s	wêna	you	/u+ena/	[wena]
1	yêna	he/she	/ε+ena/	[jena]
3	wôna	it	/ɔ+ɔna/	[wɔna]
4	yôna	him/her	/ε+ɔna/	[jɔna]
6	wôna	it	/ɔ+ɔna/	[wɔna]
9	yôna	it	/ε+ɔna/	[jɔna]

(ii) Demonstrative Pronouns: Position 1(a)

Class	Example	Gloss	Underlying Representation	Phonetic Representation
1	yô	this	/ε+ɔ/	[jɔ]
3	wô	this	/ɔ+ɔ/	[wɔ]
4	yê	this	/ε+ε/	[jε]
9	yê	this	/ε+ε/	[jε]

(iii) Possessive Pronouns

Class	Example	Gloss	Underlying Representation	Phonetic Representation
1	yêna	he/she	/ε+ena/	[jena]
	wêna	you	/u+ena/	[jena]
3	wôna	it	/ɔ+ɔna/	[wɔna]
9	yôna	it	/ε+ɔna/	[jɔna]

(iv) Quantitative Pronouns

Class	Example	Gloss	Underlying Representation	Phonetic Representation
1	yôhle	all	/ε+ɔɛ/	[jɔɛ]
3	wôhle	all	/ɔ+ɔɛ/	[wɔɛ]

Appendix E

Subject Concords

Class	Example	Gloss	Underlying Representation	Phonetic Representation
3	wa	of	/o+a/	[wa]
4	ya	of	/e+a/	[ja]

Appendix F

Causative Formations

Example	Gloss	Underlying Representation	Phonetic Representation
tlala	to fill up	/t'l'al+i] +a/	[t'l'at]a]
tsêna	enter	/tsen+i] +a/	[tsep]a]
belegg ^a	carry on the back	/βelex+i] +a/	[βele]a]
hlapa	bath	/ʔap+i] +a/	[ʔap]a]

Appendix G

Passive Formations

Example	Gloss	Underlying Representation	Phonetic Representation
rôba	break	/rɔβ+u+a/	[rɔβ]a] [rɔβ]wa]
bôfa	tie	/βɔf+u+a/	[βɔf]a] [βɔf]wa]
bopa	build	//βop+u+a	[βop]a] [βop]wa]
hlôpha	gather	/tɔp ^h +u+a/	[tɔp ^h]a] [tɔp ^h]wa]
tsena	enter	/tsen+u+a/	[tsep]a]

Appendix H

Locatives

Example	Gloss	Underlying Representation	Phonetic Representation
mpheng	landle	/mp ^h eŋeŋ/	[mp ^h epeŋ]
bjang	grass	/β]aŋeŋ/	[β]apeŋ]
legong	firewood	/lexoŋeŋ/	[lexopeŋ]

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