NASAL ASSIMILATION AND RELATED PROCESSES IN TSHIVENDA: A LINEAR AND NON-LINEAR PHONOLOGICAL ANALYSIS

BY

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DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis 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.

ABSTRACT

This study focuses on nasal strengthening and nasal assimilation processes in Tshivenda. Two phonological models are applied in order to present credible descriptions and explanations of these phenomena. After having described the core components of, respectively, the classical Transformational Generative (TG) model of Chomsky & Halle (1968), and the more contemporary feature Geometry (FG) model, analyses of the phenomena are presented. It appears as if the TG model can handle the idiosyncrasies of the language more elegantly, with a sustained high level of credibility. The FG model is unable to render the same results.

OPSOMMING

Hierdie studie fokus op nasaalversterking en nasaalassimilasie in Tshivenda. Twee fonologiese modelle word aangewend om hierdie verskynsels te beskryf en te verklaar. Die klassieke versie van liniêre fonologie, die sogenaamde SPE model van Chomsky en Halle (1968) is eerste aan die orde gestel. Daar is gevind dat dit tot 'n groot mate daarin slaag om die onderskeie prosesse te verklaar. Nadat die kernkomponente van die sogenaamde FG model verduidelik is, is hierdie model ook toegepas. Verskeie gebreke in die toepassing van hierdie model het na vore gekom. Ten slotte word bevind dat die klassieke TG model die verskynsels meer omvattend kan hanteer as die FG model.

MANWALEDZO

Hoyu ndi mushumo u no khou ita tsedzuluso ho sedzwa mimodolo mivhili wa ḽinia na u si wa ḽinia uri ndi ufhio une wa ṱalutshedza khwine tshanduko dza mibvumo ya nasala na minwe re na vhukwamani na wa nasala kha luambo lwa Tshivenḓa.

Ndima ya u thoma i ri ṋea zwinwe zwa zwiga zwi no ḓisa tshanduko ya mibvumo. Ndivho na nzudzanyo ya mushumo uyu yo bviselwa khagala henefha.

Ndima ya vhuvhili i sengulusa maipfi a fonetiki a Tshivenḓa ho sedzwa zwiṱaluli sa zwe zwa sumbedzwa nga Chomsky na Halle (1968).

Ndima ya vhuraru i ṋea ṱhaluso ya tshivhumbeo tsha tshanduko ya mibvumo ya nasala kha Tshivenḓa sa luambo. Ho sedzwa tshanduko i no ḓiswa nga thangi /n/ ya kilasi ya vhuṱahe (9). Maipfi a Tshivenḓa o senguluswa ho shumiswa modulo wa ḽinia.

Ndima ya vhuṋa i sengulusa maipfi a Tshivenḓa ro sedza modulo u si wa linia.

Ndima ya vhuṱanu i ri ṋea magumo, mawanwa, themendelo na bugu pfarwa.

I dedicate my thesis to:

My mother, Mukumela Nyadzani Radzhadzi

My wife, Malinda Mavis

My sons, Livhuwani Sydney, Mulamuleli Cyril

My daughter, Orifha

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Sound changes in a particular language may be motivated by various factors. It is, *inter alia*, the task of the phoneticians/phonologists to determine these factors and present credible explanations for these changes. It is well known that a number of factors play a role in sound changes (*cf.* Roux 2000).

1.1.1 Phonetic factors

Sound changes may often be ascribed to organs of speech adapting to changing environments, and hence being responsible for a new sound or sound combination to arising. The vowel raising phenomenon in African Languages is a clear example of a phonetically motivated sound change. That is, a mid-low vowel is raised to a mid-high vowel should it precede a high vowel occurring in the next syllable. Compare the following example:

(1) ɔ → o/ _ C i

$$\begin{bmatrix} +\text{voc} \\ -\text{high} \\ +\text{mid} \end{bmatrix} \rightarrow [+\text{high}]/ \_\_\_\_ \text{C} \begin{bmatrix} +\text{voc} \\ +\text{high} \end{bmatrix}$$

/βɔn +a/	/βɔn+is+a/
[βona] "see"	[βonisa]

The formalism in (1) above expresses that a [-high] vowel /ɔ/ in [βona] raises to a [+high] vowel /o/ in [βonisa]. This change is caused by a high vowel /i/ of the suffix /-is-/.

In searching for explanations for subsequent changes, it is necessary to start off by firstly looking at the physical (phonetic) aspects of the speech. This is mostly natural reason why sound changes take place (cf. Roux 2000).

1.1.2 Morphological factors

Closely related to the phonetic factors above are changes that may directly be caused by morphological factors. In the process of word formation it more than often happens that particular segments become juxterposed and form a syllable structure that is not tolerated in the language. Consider the following Tshivenda example:

(2) Passive formation

/βɔɸ + w +a/ > [βɔxwa] "be tied"

|

passive

In (2) above the combination of /ɸ/ and /w/ becomes /xw/. This combination /ɸ+w/ ought to have become /ɸw/ instead of /xw/. This sound change cannot be explained by phonetic factors, however it is clear that this final product is the result of a morphological process.

1.1.3 Historical factors

In the course of history, a sound x may have changed to z, passing through a phase y. This phase y may have been phonetically motivated. However is not attested anymore. All that remains is the "fact" that x>z. Unless there are reliable records (written or otherwise), it is quite clear that the change may be regarded as non-phonetic, and not easily explained. Consider the following example occurring in Sotho languages:

(3) **selepe** "an axe"

Sepedi

/selepe +ana/ > [selepʃ'ana] or [seletʃ'wana] or [selets'wana]

Setswana

/selep'e + ana/ > [selets'wana] or [selets'wana]

Sesotho

/selep'e +ana/ > [selets'wana]

The formalism in (3) above expresses that when a suffix "-ana" is suffixed to the word **selepe** becomes [selepʃⁱana], [seletʃ'wana], or [selets'wana] in Sepedi. In Setswana it becomes [seletʃ'wana] or [selets'wana]. In Sesotho it becomes [selets'wana].

This changes in Sesotho cannot be explained by phonetic or morphological factors, however, it is clear that this final product [selets'wana] is the result of a historical process, also known as "telescoping" (see Roux 1979).

1.1.4 Dialectical factors

The example above also exemplifies dialectical variation, where it has become quite clear that an original change (y above) has become the norm in a certain community.

1.1.5 Sociolinguistic factors

In some cases, changes took place due to sociolinguistic factors. That is, persons with a specific status may start using an alternative form for status reasons. They then deliberately change a form, and this may later become the norm. Consider the following example:

(4) **mpapawe** "paw paw tree"

[mp'ap'awɛ] or [mup'ap'awɛ]

In (4) above, those who are educated pronounce this word [mup'ap'awɛ] as [mp'ap'awɛ]. In other words, they have dropped the vowel /u/ in the first case.

This study focuses on the analysis of nasal/assimilation and related processes in Tshivenda. These processes are regarded as assimilation processes. Two phonological

models, i.e a linear and non-linear models will be employed in this analysis. Rules making provision for assimilation are normally transparent. The features used in such a rule normally "explain" the phenomenon.

Generative (linear) and post-generative (non-linear) phonological theories, inter alia, aim at providing explanations for sound changes. The manner in which these explanations manifest themselves is through the formalism used (cf. Roux 2000). Consider (1) in the previous example. The reason for /ɔ/ becoming /o/ in front of /i/ is quite clear – an assimilation of the feature [+high] took place.

1.2 AIM OF STUDY

The aim of the study is to employ:

(a) a linear phonological model as presented by Chomsky and Halle (1968) (henceforth the SPE model) as well as,
(b) a non-linear phonological model, the feature Geometry model (henceforth FG), in the analysis of nasal assimilation and related processes in Tshivenda.

The aim of the study is to determine whether any of these models can adequately account for the sound changes occurring in these phonological processes with respect to,

(i) rule formulation and derivational processes in the case of the linear model (SPE),
(ii) representations and various types of processes (spreading and delinking) in the case of the non-linear model (FG).

1.3 ORGANISATION OF THE STUDY

This study is divided into the following chapters:

Chapter 2

This chapter will focus on the phonetic bases of the distinctive features of Tshivenda followed by the matrices of the sounds of the language.

Chapter 3

Chapter three will present an exposition of the nature of the phonological processes under discussion. This will be followed by a linear analysis of the phenomenon, mainly employing the model of Chomsky and Halle (1968).

Chapter 4

Chapter four will focus on a non-linear analysis of the phenomenon implementing a Feature Geometry (FG) model.

Chapter 5

The focus will be on whether the two phonological models have adequately accounted for the sound changes. Recommendations will also be made in this chapter.

CHAPTER 2

THE PHONETIC BASES OF DISTINCTIVE FEATURES IN TSHIVENDA

2.1 INTRODUCTION

In this chapter the phonetic segments of Tshivenda will be analyzed in terms of a set of distinctive features as initially postulated by Chomsky and Halle (1968) and adapted where necessary. Attention will first be focused on consonants, whereas a description of vowels of Tshivenda will follow. The phonetic segments listed will:

(a) be assigned phonetic correlates after which
(b) they will be presented in appropriate matrices.

Prior to any further discussion it is necessary to make a few remarks on the phonetic status of labialization segment /s/z/dz/ in Tshivenda

There has been a tradition in Tshivenda in which specific phonetic segments have been assigned to fricative and affricates segments when labialised.

Compare the following:

(5)

Fricative	**non labialized**	**labialized**	
/s/	vusa[vusa]	vuswa[vuʂa]	"make somebody to wake up"
/z/	zuza[zuza]	zuzwa[zuʐa]	"be thrown down"

Affricate	**non labialized**	**labialized**	
/dz/	vhudza[βudza]	vhudzwa[βudʐwa]	"be told"
/ts/	tswipudza[tsˈip'udza]		"strike with a whip"
/tsʰ/	tswa[tsʰa]		"steal"

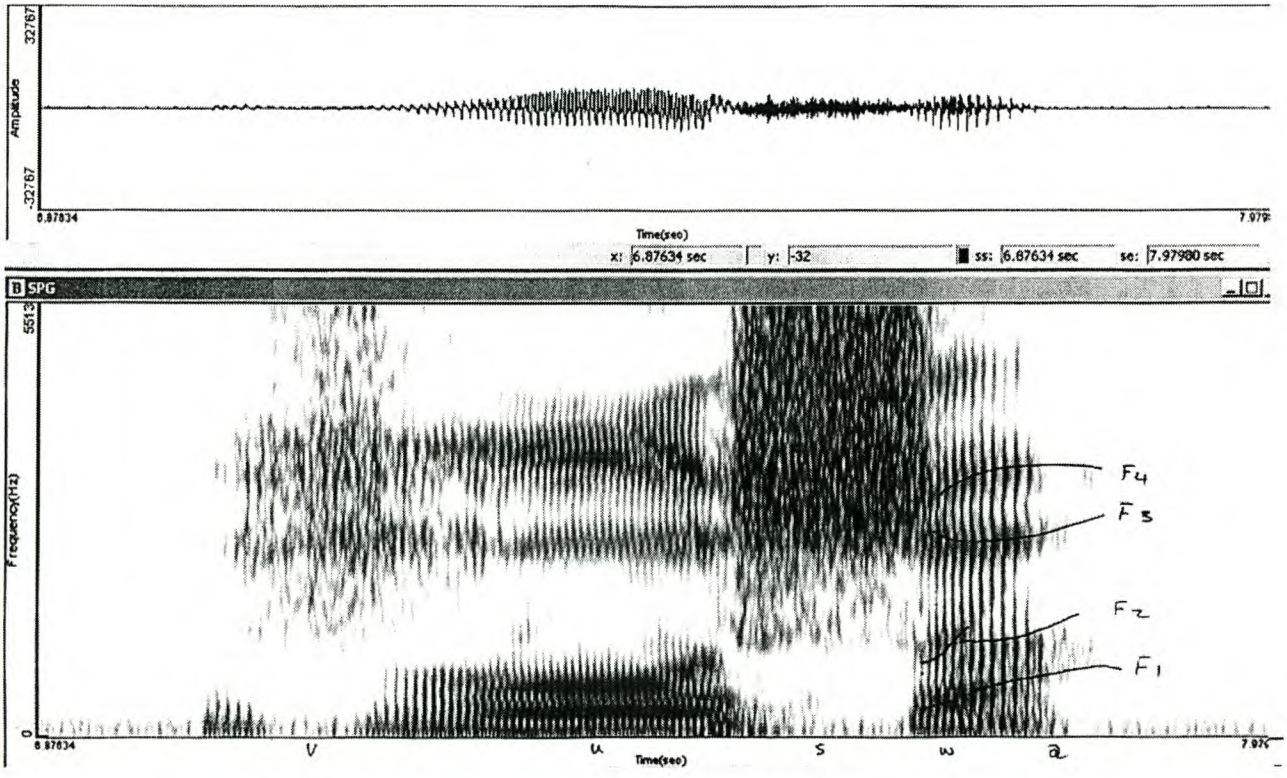
Compare these phonetic representations to other non-fricative segments.

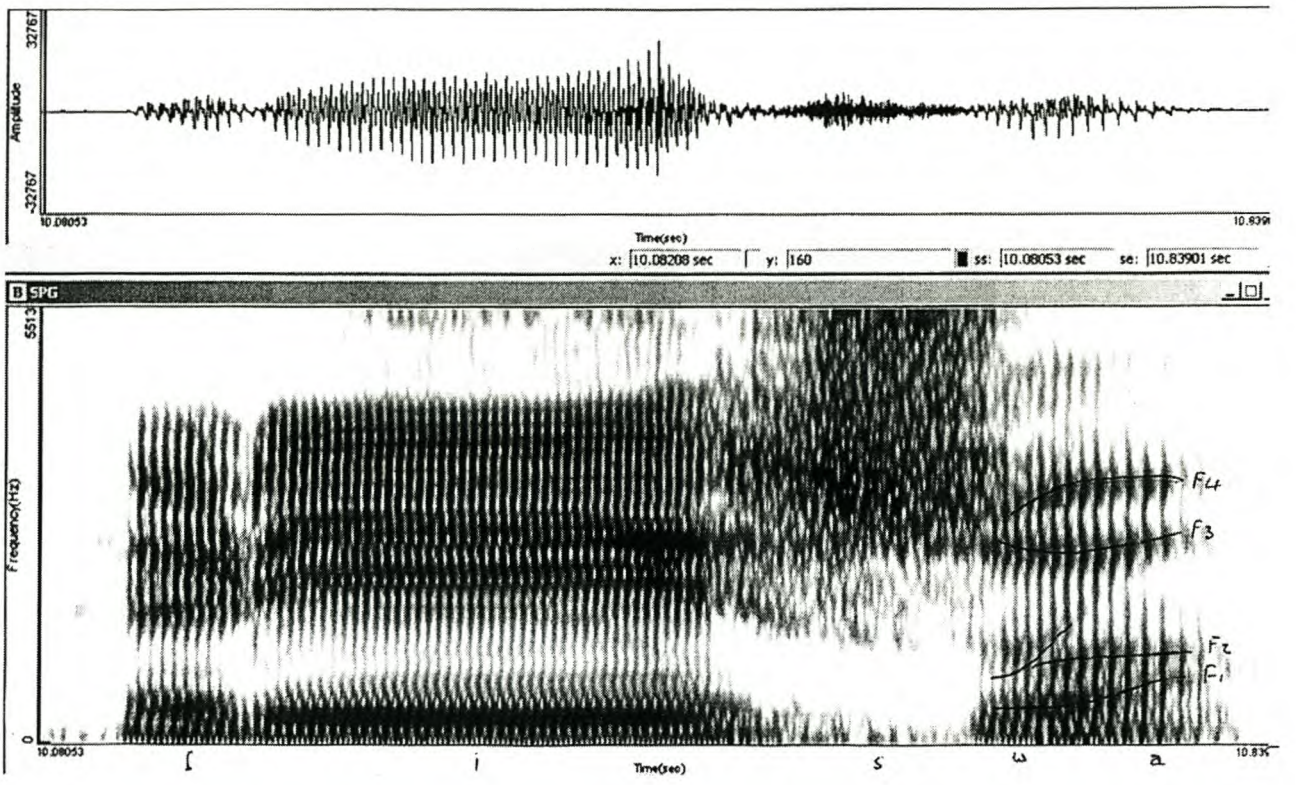
(6)	**nasal**	**non labialized**	**labialized**	
	/n/	vhona[βɔna]	vhonwa[βɔnwa]	"be seen"
	Retroflex	**non labialized**	**labialized**	
	ɾ	lila[ɾiɾa]	lilwa[ɾiɾwa]	"wanted"

From the above representations, it is clear that there are two ways currently in use to indicate secondary labialization in Tshivenda. In the case of (5) the phonetic representation [s] etc seems to indicate that there is no labio-velar offglide in the articulation. The examples in (6) however, clearly indicate a labio-velar offglide in the phonetic transcription, i.e. [lwa]. This situation calls for some experimental phonetic evidence.

Compare the spectogrammes of respectively:

(7) Vuswa "make someone to wake-up" and liswa "looked after"





When comparing the format movements of respectively F1 and F2, as well as F3 and F4, it is clear that there is indeed a labio-velar offglide present in the labialized forms. Hence it is suggested that the phonetic representation of labialized fricatives and africates be brought into line with those of the labialized segments:

(8) sw is to be represented by [sw] and not [s̪]
zw is to be represented by [zw] and not [z̪]
dzw is to be represented by [dzw] and not [dz̪]
tsw is to be represented by by [tsw] and not [tsʰ] or [ts']

This is also in accordance with the views of Poulos (1990:512) and (Milubi 1997:11).

(9) Phonetic inventory of Tshivenda (*cf.* Poulos 1990:510-512)

Consonants

Bilabials

[pʰ]	***phele***	spotted hyena	[pʰɛlɛ]
[p']	***-penya***	shine, glitter	[p'ɛna][1]
[b]	***bako***	cave	[bakʲɔ]

[ɸ]	***-fha***	give	[ɸa]
[β]	***vhea***	put, place	[βɛa]
[m]	**ima**	stand up	[ima]

Labiodentals

[øfʰ]	***pfene***	baboon	[ɸfʰɛnɛ]
[øf']	***kupfene***	small baboon	[k'uɸf'ɛnɛ]
[ɸv]	***-bvuma***	thunder, roar	[ɸvuma]
[f]	***-fa***	die	[fa]
[v]	***-vula***	open	[vufa]
[ɱ]	***mvula***	rain	[ɱɸvufa][2]

Dentals

[t̪ʰ]	***t̪hafu***	calf of the leg	[t̪ʰafu]
[t̪']	***-t̪amba***	wash	[t̪'amba]
[d̪]	***-d̪a***	come	[d̪a]
[l̪]	***-l̪a***	eat	[l̪a]
[n̪]	***n̪amusi***	today	[n̪amusi]

Alveolars

[tʰ]	thovho	mat	[tʰɔβɔ]
[tˈ]	-takala	become happy	[tˈak'ara]
[d]	-devha	split open (as a peanut)	[dɛβa]
[tsʰ]	tsimu	field	[tsʰimu]
[ts']	kutsimu	small field	[k'uts'imu]
[dz]	dzina	name	[dzina]
[ɾ]	lila	cry	[ɾiɾa]
[r]	-re̪da	collect firewood	[rɛda]
[s]	-sea	laugh at	[sɛa]
[z]	zazamela	itch	[zazamɛra]

[l][1]	hosi̯tele	hostel	[ɦɔsit'ɛlɛ]
[n]	-na	rain	[na]

(Pre-/mid-) Palatals

[tj']	***-tyetyenea***	laugh loudly	[tj'ɛtj'ɛnɛa]
[dj]	***dyelo***	craw of a fowl	[djɛlɔ]
[tʃʰ]	***tshigayo***	flour-mill	[tsʰigajɔ]
[tʃ']	***-tshipa***	strangle	[tʃ'ip'a]
[dʒ]	***-dzhema***	enter	[dʒɛna]
[ʃ]	***s huma***	work	[ʃuma]
[ʒ]	***zhaka***	trample down	[ʒak'a]
[ɲ]	***nyala***	onions	[ɲala]

Velars[2]

[kʰ]	***khuni***	firewood	[kʰuni]
[k']	***tshikolo***	school	[tʃʰik'ɔlɔ]
[g]	***gogo***	crowd	[gɔgɔ]
[x]	***-xa***	dry up	[xa]
[ŋ]	***-nana***	argue	[ŋaŋa]

Alveolabials

[tsʰw]	***-tswa***	steal	[tsʰwa]
[tsw']	***tswipudza***	strike with a whip	[tsw'ip'udza]
[dzw]	***dzwala***	give birth to (cattle etc)	[dzwala]
[sw]	***-swaswa***	joke	[swaswa]
[zw]	***zwino***	now	[zwinɔ]

Labio (pre-/mid-) palatals

[pjʰ]	***luphwaphwa***	mealiecob	[lupjʰapjʰa]
[pj']	***-pwasha***	break	[pj'aʃa]
[bj]	***-bwa***	dig	[bja]

[mj]	***-lim + wa***	plough + passive extention	[limja]

(Alternative pronunciations of this latter sound are [mŋ] or [ŋw]

Labiovelars

(Labiovelars are rare sound in Venda, and they occur as alternatives to the above labiopalatal sounds).

[pk^h]	***luphwaphwa***	mealiecob	[lupk^{h}apk^{h}a]
[pk']	***-pwasha***	break	[pk'aʃa]
[bg]	***-bwa***	dig	[bga]
[mŋ]	***-lim + wa***	plough + passive extention	[limŋa]

Semivowels

[j]	***-ya***	go to	[ja]
[w]	***-wa***	fall	[wa]

Vowels

[i]	***-lima***	plough	[lima]
[ɛ]	***-rema***	chop	[rɛma]
[a]	***-vala***	close	[vala]
[ɔ]	***-vhona***	see	[βɔna]
[u]	***-vula***	open	[vula]
[e]	***-rengisa***	sell	[rengisa]
[o]	***-vhonisa***	show	[βonisa]

2.2 PHONETIC CORRELATES

Chomsky and Halle (1968) list thirty-six individual features which they feel together represents the phonetic capabilities of man. (cf. Sloat 1978).

Most distinctive features are binary, that is, they can have only one of two values, a plus (+) or a minus (-).

Thus a sound is classed as either voiced, or voiceless, thus, if a segment is voiced it is said to carry the value plus (+) for the feature voice or to be [+voiced].

If a segment is not voiced, it still has the feature name (voiced) as part of its description, but this time accompanied by the minus specification [-voiced]. (cf. Sloat 1978).

Consider the following distinctive features of phonemes postulated for Tshivenda and their correlates.

2.2.1 Consonants

Major Class features

These are features that are not bound to a particular articulator; instead, they specify phonological critical degrees of constriction imposed by essentially articulator (cf. Kenstowicz 1994).

Consonantal, Syllabic and Sonorant constitute major class feature

[± Consonantal]
Consonantal sounds are all sounds produced with a constriction in the vocal tract at least equal to that found in fricative consonants

(10) [+cons]:
All segments except vowels and semivowels.
Non-consonantal sound is produced without such constriction.

(11) [-cons]:
All vowels and semivowels

[± Syllabic]
All sounds that constitute the peaks of syllables are syllabic sounds.

(12) [+syllabic]:
All vowels, nasals m, n, n
All sounds that do not constitute the peaks of syllables are non syllabic.

(13) [-Syllabic]:
All other sounds

[± Sonorant]
Sonorants are produced with a vocal tract configuration sufficiently open for the interoral air pressure to be approximately equal to the ambient air pressure.

(14) [+son]:
All vowels, glides like [w,j], liquids, and nasals. Non-sonorant are produced with a constriction sufficient to generate intra-oral pressure much greater than that of the surrounding air.

(15) [-son]:
Plosives, fricatives, affricates and laryngeal segments.

Cavity features

These features refer to place of articulation. They specify where in the vocal tract modifications of the air stream take place in the production of particular sounds (cf. Katamba 1989).

Coronal, anterior and labial constitute cavity.

[±Coronal]
When coronal sounds are produced, the blade of the tongue is raised from its neutral position.

(16) [+cor]:
Dentals, alveolars, alveolar-palatal, retroflex, palatals, liquids and trills.

None-coronals are produced with the blade of the tongue at its normal position.

(17) [-cor]:
Labials, velar, uvular and pharyngeals.

[± Anterior]
When anterior sounds are articulated, the blockage of air stream occurs at/or in front of the alveolar ridge.

(18) [+ant]:
Labials, dentals, labio-dentals and alveolars
Non-anterior are articulated with the constriction located behind the alveolar ridge.

(19) [-ant]:
Except those mentioned (18) above the rest are non-anterior.

Tongue body feature

These features refer to the role played by the body of the tongue during articulation. Some sounds are articulated with the body of the tongue at its neutral position and some are not.

[±High]
High sounds are articulated with the body of the tongue raised to the roof of the mouth. These are normally palatal and velar sounds.

(20) [+high]:
alveo-palatal, palatal, glides and velar
Non-high sounds are articulated without the body of the tongue raised.

(21) [-high]:
Except those mentioned in (20) above the rest are [-high].

[± Back]

Back sounds are all those segments that are articulated by retracting the body of the tongue towards the rear wall of the pharynx (from its neutral position).

(22) [+back]:
Velars, uvulars and pharungeals.
Non-back sounds are all sounds which are articulated when the body of the tongue is not retracted.

(23) [-back]:
labials, dentals, palatals and coronals.

Lip attitude

These features refer to the role played by the lips during the articulation of a sound.

[± Round]

Rounded sounds are produced with a narrowing of the lip orifice (cf. Chomsky and Halle 1968:309).

(24) [+ round]: = /w, kw, tw, sw, dzw, zw, tsw/
Unrounded segments have a spread or neutral lip position (cf. Durand 1990:47).

(25) [-round]:
Except those sounds mentioned above, all other sounds are unrounded.

[± Labials]

Labial sounds are formed with a constriction at the lips (cf. Durand 1990:48)

(26) [+ labials]:
All bilabials
Non-labial sounds are formed without such a constriction.

(27) [-labials]:
All other sounds except bilabials are non-labials.

Length of Structure

These features refer to the duration, which the air is constricted along the direction of the airflow.

[± Distributed]

Distributed sounds are produced with a constriction that extends for a considerable distance along the direction of the airflow (cf. Chomsky and Halle 1968:312).

(28) [+distributed] = /β, ɸ/ ,

Non-distributed sounds are produced with a constriction that extends only for a short distance in this direction (cf. Chomsky and Halle 1968:312).

(29) [-distributed]:

Apart from the examples in (28) above all other sounds in Tshivenda are [-distributed].

Secondary aperture

[± Nasal]

Nasal sounds are produced by lowering the velum and allowing the air to pass outwards through the nose.

(30) [+nasal]: /m,n,ŋ,ɱ, ɳ, ɲ/

Oral sounds (non-nasal) are produced with the velum raised to prevent air from passing through the nose, instead it passes through the mouth.

(31) [-nasal]:

Apart from those mentioned in (30) above all other sounds in Tshivenda are [-nasal].

[±Lateral]

Lateral sounds are produced with the air passing through one or both sides of the tongue.

(32) [+ lateral]: /l̪/

Non-lateral sounds are produced with air passing through the central and not the sides.

(33) [- lateral]:

Apart from the sound mentioned in (32) above, all other sounds in Tshivenda are [- lateral].

Manner of articulation

These features characterise the way in which the air stream is obstructed in the production of a consonant (cf. Katamba 1989:50).

[± Continuant]

Sounds produced with a primary constriction which allow the air to flow through the mid sagittal region of the vocal tract are [+cont].

(34) [+ continuant]:

Vowels, glides, r-sounds, fricatives are [+cont].

Non-continuant (stops) are formed by completely blocking the flow of air rough the center of the vocal tract (cf. Katamba 1989:50).

(35) [-continuant]:

Affricates, laterals, nasals and oral stops are non-continuant in Tshivenda.

[± Delayed release]

During the delayed release, turbulence is generated in the vocal tract so that the release phase of the affricates is acoustically quite similar to the cognate fricative (cf. Chomsky and Halle 1968:318).

(36) [+ delayed release]: All affricates
The instantaneous release is normally accompanied by much less or no turbulence.

(37) [- delayed release]:
Apart from the affricates all other sounds are [-delayed release].

Source feature

These features are also known as laryngeal features. The larynx acts as the initiator during the production of a sound.

[± Constricted glottis]
Constricted sounds are glottalised. They are produced with a severe obstruction of the glottis, which is made using the vocal cords. This inhibits or prevents the free vibration of the vocal cords (cf. Katamba 1989:50).

(38) [+ constricted glottis]:
Implosives, ejectives, glottalised and laryngeal consonants are [+constricted glottis].
Non-constricted glottis is produced without such a gesture.

(39) [- constricted glottis]:
all other sounds apart from those in (38) above are [-constricted glottis].

[± Spread glottis]
During the production of these sounds the vocal cords are pushed wide apart creating a wide glottal opening allowing the air to flow through the glottis and inhibits voicing. Usually this is the feature of aspirated sounds.

(40) [+ spread glottis]:
Aspirated stops, murmured and breathy voice sounds.
Non-spread glottis is pronounced without the gesture mentioned in (40) above.

(41) [- spread glottis]:
All other sounds apart from those mentioned in (40) above are [- spread glottis].

[± Voiced]
Voiced sounds are produced with the vocal cords vibrating at regular intervals.

(42) [+ voiced]:
Vowels, liquids, nasals, voiced obstruents.
Voiceless sounds are produced with a glottal opening so wide that it will prevent vocal vibration if air flows through it.

(43) [- voiced]:
All other sounds except those mentioned in (42) are [- voiced].

[±Strident]
Strident sounds are produced with a constriction forcing the air stream to strike two surfaces producing a high-intensity noise. They are distinguished by faster airflow, a rougher surface and angle of incidence closer to 90 degrees.

(44) [+ strident]: Fricatives and affricatives.
Non-strident sounds are produced without the constriction mentioned in (44) above.

(45) [- non-strident]:
All other sounds except fricatives and affricates.

Dental and Retroflex

These features must also be included in Tshivenda. There are sounds which are classified as dental and retroflex in this language.

[± Dental]
Dental sounds are produced with the tip of the tongue between the upper and lower front teeth (more commonly against the back of the upper front teeth.

(46) [+ dental]: = /t̪, t̪ʰ, n̪, l̪, nd̪, d̪/

Non-dental sounds are produced without the tip of the tongue between the upper and lower front teeth.

(47) [- dental]:

All other sounds except those mentioned in (46) above are [- dental].

[± Retroflex]

Retroflex is a descriptive of a consonant sound made by the tongue tip against the back of the alveolar ridge (cf. Crystal 1992:332).

(48) [+ retroflex]: = /ɾ/

Non-retroflex sounds are pronounced without the gesture in (47) above.

(49) [- retroflex]:

All other sounds apart from those in (48) above are [-retroflex].

2.2.2 Vowels

Vowels refer to all sounds that are produced without a constriction at all. Only three features, high, back and mid are used to classify vowels. In Tshivenda there are seven vowels (see 9 or 56).

[± High]

A high vowel is formed when a part of the tongue is raised so high that it comes very near to the palate.

(50) [+ high]: /i/ and /u/

Non-high vowels are produced when a part of the tongue is not raised so high that it comes very near to the palate.

(51) [- high]:

All vowels except /i/ and /u/ are [- high].

[± Mid]

Mid vowels are produced when a part of the tongue is raised from a very low position, but not as high as in high vowels.

(52) [+ mid]: /ɔ, o, ɛ, e/

Non-mid vowels are produced with the part of the tongue raised very high or very low.

(53) [- mid]:

Apart from the vowels mentioned in (52) above, the rest of the vowels are [- mid].

[± Back]

Back vowels are produced with the back part of the tongue lifted.

(54) [+ back]: /u, ɔ, o, a/

Non-back vowels are produced without the back part of the tongue raised.

(55) [- back]:

Except those mentioned in (54) above, all other vowels are [- back].

The vowel features can be best represented on a vowel chart.

Consider the following four level table of (56)

	- back	+ back
+ high - mid	i	u
+ high - mid	e	o
+ high - mid	ɛ	ɔ
+ high - mid		a

2.2.3 Semivowels

When semivowels are produced, there is a relatively wide opening in the mouth through which the air passes (cf. Poulos 1990:499).

In Tshivenda there are only two semivowels (see 9).

[± High]

(57) [+ high]:
All semivowels are [+ high].

[± Back]

A back semivowel sound is produced when the back part of the tongue is raised.

(58) [+ back]: /w/
Non-back semivowel sound is produced without raising the back part of the tongue.

(59) [- back]: /j/

2.3 MATRICES OF TSHIVENDA CONSONANTS, VOWELS AND SEMIVOWELS

The representation of a segment by features captures this coordinated activity by placing features in an array called a matrix (cf. Makuya and Mudau 1989: 67).

2.3.1 Feature matrix for Tshivenda Consonants

(60)

	pʰ	pˈ	b	ɸ	β	m	ɸfʰ	ɸfˈ	ɸv	f	v	ɱ	t̪ʰ
Consonant	+	+	+	+	+	+	+	+	+	+	+	+	+
Sonorant	-	-	-	-	-	+		-	-	-	-	+	-
Syllabic	-	-	-	-	-	+	-	-	-	-	-	-	-
Coronal	-	-	-	-	-	-	-	-	-	-	-	-	-
Anterior	+	+	+	+	+	+	+	+	+	+	+	+	+
High	-	-	-	-	-	-	-	-	-	-	-	-	-
Back	-	-	-	-	-	-	-	-	-	-	-	-	-
Round	-	-	-	-	-	-	-	-	-	-	-	-	-
Labial	+	+	+	+	+	+	+	+	+	+	+	+	-
Distributed	-	-	-	+	+	-	-	-	-	-	-	-	-
Lateral	-	-	-	-	-	-	-	-	-	-	-	-	-
Nasal	-	-	-	-	-	+	-	-	-	-	-	+	-

Continuant	-	-	-	+	+	-	-	-	-	+	+	-	-
Delayed release	-	-	-	-	-	-	-	-	-	-	-	-	-
Constricted glottis	-	+	-	-	-	-	-	-	-	-	-	-	-
Spread glottis	+	-	-	-	-	-	-	-	-	-	-	-	+
Voiced	-	-	+	-	-	+	-	-	+	-	+	+	-
Strident	-	-	-	+	+	-	-	-	-	+	+	-	-
Dental	-	-	-	-	-	-	-	-	-	-	-	-	+
Retroflex	-	-	-	-	-	-	-	-	-	-	-	-	-

	t’	d	l	n	t^h	t’	d	ts^h	ts’	dz	ɾ
Consonant	+	+	+	+	+	+	+	+	+	+	+
Sonorant	-	-	+	+	-	-	-	-	-	-	+
Syllabic	-	-	-	+	-	-	-	-	-	-	-
Coronal	-	-	-	-	+	+	+	+	+	+	+
Anterior	+	+	+	+	+	+	+	+	+	+	+
High	-	-	-	-	-	-	-	-	-	-	-
Back	-	-	-	-	-	-	-	-	-	-	-
Round	-	-	-	-	-	-	-	-	-	-	-
Labial	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	-	-	-	-	-	-	-
Lateral	-	-	+	-	-	-	-	-	-	-	-
Nasal	-	-	-	+	-	-	-	-	-	-	-
Continuant	-	-	+	-	-	-	-	-	-	-	+
Delayed release	-	-	-	-	-	-	-	+	+	+	-
Constricted glottis	+	-	-	-	-	+	-	-	+	-	-
Spread glottis	-	-	-	-	-	-	-	+	-	-	-
Voiced		+	+	+			+			+	+
Strident	-	-	-	-	-	-	-	-	-	-	-
Dental	+	+	+	+	-	-	-	-	-	-	-
Retroflex	-	-	-	-	-	-	-	-	-	-	+

	r	s	z	n	tj'	dj	tʃʰ	ts'	dʒ	ʃ	ʒ
Consonant	+	+	+	+	+	+	+	+	+	+	+
Sonorant	+	-	-	-	-	-	-	-	-	-	-
Syllabic	-	-	-	-	-	-	-	-	-	-	-
Coronal				+	+	+	+	+	+		
Anterior	+	+	+	+	+	+	+	+	+	+	+
High	-	-	-	-	+	-	-	-	-	+	-
Back	-	-	-	-	-	-	-	-	-	-	-
Round	-	-	-	-	-	-	-	-	-	-	-
Labial	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	-	-	-	-	-	-	-
Lateral	-	-	-	-	-	-	-	-	-	-	-
Nasal	-	-	-	+	-	-	-	-	-	-	-
Continuant	+	+	+	-	-	-	-	-	-	+	-
Delayed release	-	-	-	-	-	-	+	+	+		+
Constricted glottis	-	-	-	-	+	-	-	+	-	-	-
Spread glottis	-	-	-	-	-	-	+	-	-	-	-
Voiced	+		+	+	-	+	-	-	-	-	+
Strident	-	+	+	-	-	-	+	+	+	+	+
Dental	-	-	-	-	-	-	-	-	-	-	-
Retroflex	+	-	-	-	-	-	-	-	-	-	-

	ɲ	kʰ	k	g	x	ŋ	ɦ	pj'	pjʰ
Consonant	+	+	+	+	+	+	+	+	+
Sonorant	+	-	-	-	-	+	-	-	-
Syllabic	-	-	-	-	-	+	-	-	-
Coronal	+	-	-	-	-	-	-	-	-
Anterior	+	-	-	-	-	-	-	+	+
High	+	-	-	-	-	-	-	-	-
Back	-	+	+	+	+	+	+	-	-
Round	-	-	-	-	-	-	-	-	-
Labial	-	-	-	-	-	-	-	+	+
Distributed	-	-	-	-	-	-	-	-	-
Lateral	-	-	-	-	-	-	-	-	-
Nasal	+	-	-	-	-	+	-	-	-
Continuant	-	-	-	-	+	-	+	-	-
Delayed release	-	-	-	-	-	-	-	-	-
Constricted glottis	-	-	+	-	-	-	-	+	-
Spread glottis	-	+	-	-	-	-	-	-	+
Voiced	+	-	-	+	-	+	-	-	-
Strident	-	-	-	-	+	-	-	-	-
Dental	-	-	-	-	-	-	-	-	-
Retroflex	-	-	-	-	-	-	-	-	-

	bj	mj	sw	zw	tsw	dzw
Consonant	+	+	+	+	+	+
Sonorant	-	+	-	-	-	-
Syllabic	-	-	-	-	-	-
Coronal	-	-	-	-	-	-
Anterior	+	+	+	+	+	+
High	-	-	-	-	-	-
Back	-	-	-	-	-	-
Round	-	-	+	+	+	+
Labial	+	+	+	+	+	+
Distributed	-	-	-	-	-	-
Lateral	-	-	-	-	-	-
Nasal	-	-	-	-	-	-
Continuant	-	-	+	+	-	-
Delayed release	-	-	-	-	+	+
Constricted glottis	-	-	-	-	-	-
Spread glottis	-	-	-	-	-	-
Voiced	+	+	-	+	-	+
Strident	-	-	+	+	+	+
Dental	-	-	-	-	-	-
Retroflex	-	-	-	-	-	-

2.3.2 Feature matrices for Tshivenda vowels

(61)	a	ɛ	e	i	ɔ	o	u
cons	-	-	-	-	-	-	-
high	-	-	+	+	-	+	+
mid	-	+	+	-	+	+	-
back	+	-	-	-	+	+	+

2.3.3 Feature matrices for Tshivenda semivowels

(62)	j	w
high	+	+
back	-	+

An analysis of nasal assimilation and related processes in Tshivenda within the Linear Model (SPE) will be presented in chapter 3.

CHAPTER 3

NASAL ASSIMILATION AND RELATED PROSESSES: LINEAR PHONOLOGICAL ANALYSIS

3.1 INTRODUCTION

This chapter will:

(a) describe the nature of nasal assimilation processes as found in Tshivenda, and will present data to this effect, and

(b) analyse these phenomena in terms of a linear phonological model, i.e. the S.P.E model of Chomsky and Halle (1968).

3.2 ASSIMILATION

Assimilation is a general term in phonetics, which refers to the influence exercised by one sound segment upon the articulation of another, so that they become more alike or identical (cf. Crystal 1980).

Richard (1992: 28) maintains that, assimilation occurs when a speech sound changes and becomes more like another sound, which follows it or precedes it.

Trask (1997:22) argues that any phonetic or phonological process in which a particular sound becomes more similar to some other nearby sound, is to be regarded as an assimilation process.

The segment that undergoes the assimilation process is the target and the segment that condition the assimilation process is a trigger (cf. Cole, 1991). Consider the two examples (62) and (63)

(62) /n + mama/ "suckle" [mmama] "suckle me"

In (62) an assimilation process has taken place in the environment /n + m/ and the result is /mm/.

(63) /n + m/ > /mm/

In (62) and (63) the two important segments for assimilation are /n/ and /m/. The bilabial nasal /m/ influences the alveolar nasal /n/ to become bilabial nasal /m/. Therefore the /n/ is the target and the /m/ is the trigger.

3.2.1 Nasal assimilation

Nasal assimilation is a type of assimilation that involves the /n + C/ or the /n + V/ combination. /N/ denotes a nasal segment without a specified place of articulation. /C/ and /V/ denote the initial consonant or vowel of a segment. The nasal /N/ is prefixed to a verb stem to form a passive verb or to form a noun. Consider the example below:

(64) /n + C/

/n + kand + a/ > [ŋkanda] "tread on me"

In (64) above /n/ is a nasal segment that undergoes assimilation. /K/ is the initial consonant of the verb stem. The initial consonant /K/ is in juxtaposition with the nasal segment /n/. This results in the nasal segment to assimilate and become similar or homographic to the initial consonant. In most cases after the nasal assimilation process, the output is a nasal compound that is a resulting nasal segment from the nasal assimilation process and the initial consonant. See (65) below:

(65) /n + k/ > [ŋk]

Consider the example of /N + V/

(66)[a] /n + ɔʃ + ɔ/ > [ɲ ɔʃ ɔ] "drawing"

(66)[b] /n + ɛnd + ɔ/ > [ɲ ɛndɔ] " trips"

The verbs in (66) have the vowels /ɔ/ and /ɛ/ as the initial sound of the segment. Each is signified by /V/ in /n + v/ combination. The initial vowels /ɔ/ and /ɛ/ are in juxtaposition with the preceding nasal /n/. Therefore, it conditions the spreading element to spread into a

preceding nasal compound i.e. the spreading nasal assimilates, and becomes similar or homorganic to the initial vowel. See (67) below.

(67)[a] /n + ɔ/ > [ɲ ɔ]

(67)[b] /n + ɛ/ > [ɲ ɛ]

The following types of nasal assimilation in Tshivenda will be discussed.

Progressive nasal assimilation

This type of assimilation occurs when the succeeding sound becomes similar to the proceeding nasal sound.

Sloat (1978: 113) argues that "If a sound becomes more like a preceding sound, the assimilation is said to be progressive".

In Tshivenda progressive nasal assimilation occurs when the objectival concord of the first person singular precedes a verb or a noun.

See the following example.

(68) nndema /n + ʃ ɛm + a/ "spoil me"

In (68) above progressive nasal assimilation takes place in the environment /n + ʃ/ and the result is /nnd/.

(69) / n + ʃ/ > /nnd/

In (68) and (69) the two important segments are i) an objectival concord /n/ ii) and a verb stem /ʃ ɛ m/.

Consider the following data:

(70)

Data A

a	nndamba	"divorce me"	[nndamba]
b	nndema	"spoil me"	[nndɛma]
c	nndinga	"test me"	[nndinga]
d	nnduma	"bite me"	[nnduma]
e	nndevhela	"fight me"	[nndɛβɛʃa]
f	nndidza	"make me cry"	[nndiza]
g	nnduvha	"honour me"	[nndupβa]
h	nndosha	"salute me"	[nndɔʃa]
i	nndonga	"put me in"	[nndɔnga]
j	nndamulela	"save me"	[nndamuʃɛʃa]
k	nnduvhelela	"burg me"	[nnduβeʃɛʃa]
l	nndela	"raise me"	[nndɛʃa]
m	nndowa	"bewitch me"	[nndɔwa]
n	nndindela	"wait for me"	[nndindɛʃa]
o	nndukela	"we are for me"	[nnduk'ɛʃa]
p	nnduka	"braid me"	[nnduka]
q	nndelela	"look after the child for me"	[nndɛlɛʃa]
r	nndowela	"bewitch for me"	[nndɔwɛʃa]
s	nndivhuwa	"thank me"	[nndiβuwa]
t	nndugela	"be good for me"	[nndugɛʃa]
u	nndalela	"ambush me"	[nndaʃɛʃa]
v	nndimela	"plough for me"	[nndimɛʃa]
w	nndaya	"advice me"	[nndaja]
x	nnduvhela	"wear my clothes"	[nnduβɛʃa]
y	nnditsha	"divorce me"	[nndits^{h}a]
z	nndwisa	"fight me"	[nndwisa]
aa	nndala	"lie over me"	[nndaʃa]

Retrogressive nasal assimilation

This type of assimilation occurs when the preceding nasal sound assimilates the following sound.

Nyelelano iyi ndi ine mubvumo wa u thoma wa itiwa uri u fane na wa vhuvhili. (This assimilation is the one in which the first sound is made to become like the second one). (cf. Milubi 1997).

Sloat (1978:113) maintain that retrogressive assimilation is a phonological process which occurs when sound assimilates to the following sound. This shows that the process of retrogressive assimilation goes to the left hand direction.

In Tshivenda retrogressive nasal assimilation takes place when the object concord /n/ of the first person singular precedes the verb or the noun. See the following example:

(71) nkona "disappoint me" [ŋkɔna]

/n + kɔn + a/

In the above phenomenon in (71), retrogressive nasal assimilation has taken place in the environment of /n + k/ and the result is /ŋk/.

(72) /n + k/ > /ŋk/

In the above (71) and (72) the two important segments of assimilation are i) an object concord of first person singular /n/ and (ii) a verb stem /-kɔn-/.

Consider the following data

(73)

Data B

a	nkanda	"tread on me"	[ŋkanda]
b	nkona	"disappoint me"	[ŋkɔna]
c	nkela	"draw water for me"	[ŋkɛla]
d	nkisa	"draw water with me"	[ŋkisa]
e	nkunda	"defeat me"	[ŋkunda]
f	nkala	"measure me"	[nkala]
g	nkweta	"scratch me"	[ŋkwat'ɛ la]
h	nkwatela	"angry for me"	[ŋkwat'ɛ la]
i	nnona	"make noise for me"	[ŋɔŋa]
j	nnena	"cut me"	[ŋɛna]
k	nnwata	"scratch me"	[ŋwat'a]
l	nnwala	"write on me"	[ŋwala]
m	nnwambatela	"cut a piece for me"	[ŋwambat'ɛla]
n	nkwasha	"break me"	[ŋkwaʃa]
o	mmama	"suck me"	[mmama]

p	mmila	"swallow me"	[mmiɬa]
q	mmuna	"kiss me"	[mmuna]
r	nt̪o̪da	"look for me"	[ntɔda]
s	nnula	'hear me out"	[nnuɬa]
t	nt̪uma	"add me"	[nntuma]
u	nkunga	"attract me"	[ŋkunga]
v	nkumba	"collect me"	[nkumba]
w	nkuda	"bump against me"	[ŋkunda]
x	ngotsha	"grill me"	[ŋgɔtsʰa]
y	nkunakisa	"make me clean"	[ŋkunakisa]
z	ngama	"comb me"	[ŋgama]

Mutual nasal assimilation

Mutual nasal assimilation occurs when changes occur on both sides, that is both the preceding and the succeeding sound may share one or more features of each other.

Katamba (1992:85) and Lass (1985:175) call this process bi-directional or fusion assimilation, as changes occur on both sides. According to Crystal (1991:28), this process may be called coalescent or reciprocal assimilation, for there is mutual influence of fusion of sounds upon each other.

In Tshivenda mutual assimilation occurs when the singular subject concord of the first person of class 9 precedes the verb of which the initial segment is a bilabial continuant.

See the following example:

(74) mmbudza "tell me" [mmbudza]

/n + βudz + a/

In (74) above mutual assimilation takes place in the environment /n + β/ and the result is /mmb/.

(75) /n + m/> /mmb/

In (74) and (75) above the two important segments of assimilation are: i) an objectival concord /n/ and ii) a verb stem /-βudz-/.

Consider the following data.

(76)

Data C

a	mmbona	"see me"	[mmbɔna]
b	mmbanda	"clap me"	[mmbanda]
c	mmbinga	"marry me"	[mmbinga]
d	mmbula	"mention my name"	[mmbuʃa]
e	mmbudza	'tell me"	[mmbudza]
f	mphedza	"spy me"	[mpʰɛdza]
g	mphunga	"make noise for me"	[mpʰunga]
h	mpfuna	"love me"	[ŋɸfuna]
i	mpfela	"spit on me"	[ŋɸfɛʃa]
j	mpfara	"arrest me"	[ŋɸfara]
k	mpfunela	"love me for"	[ŋɸfunɛʃa]
j	mphodza	"heal me"	[mpʰɔdza]
k	mmbulanga	"lay me to my final resting place"	[mmbuʃunga]
s	mphira	"overtake me"	[mpʰira]
m	mmbenga	"hate me"	[mmbɛnga]
n	nkhela	"disappear from me"	[ŋkʰɛʃa]
o	nkhana	"divorce me"	[ŋkʰana]
p	nkhunga	"tie me"	[ŋkʰunga]
q	mphoma	"smear me"	[mpʰɔma]
r	mphura	"rob me"	[mpʰura]
s	nkisa	"win over me"	[ŋkʰisa]
t	nkhumisa	"send me back"	[ŋkʰumisa]
u	nkhoya	"give somebody something not whole heartedly	[ŋkʰɔja]

3.2.2 Related processes

Assimilation also takes place under the following circumstances:

Nasals and vowel stems

Nasals may be influenced by the following vowel status:
In Tshivenda this assimilation occurs when the nouns are formed from verbs which begins with a vowel. Consider the following example:

(77) Nyolo "drawing" [ɲɔlɔ]

/n (i) + ɔl + ɔ/

In (77) above assimilation takes place in the environment /n (i) + ɔ/ and the result is /ɲ/

(78) /n (i) + ɔ/ > /ɲ/

In (77) and (78) the two important segments of assimilation are:

(i) an objectival concord of class a first person singular /n (i)/ and
(ii) a verb root that commences with a vowel /ɔɬa/

Form the historical point of view, the objectival concord of a first person singular /n/ seems to be derived from underlying /ni/.

Consider the following data:

(79)

Data D

a	nyolo	"drawings"	[ɲɔɬɔ]
b	nyelo	"measurements"	[ɲɛɬɔ]
c	nyimbo	"songs"	[ɲimbɔ]
d	nyalo	"laying in a bed"	[ɲaɬɔ]
e	nyambo	"languages"	[ɲambɔ]
f	nyingo	"put on top of each other"	[ɲingɔ]
g	nyendo	"trips"	[ɲɛndɔ]
h	nyaluwo	"growth"	[ɲaɬuwɔ]
i	nyofho	"fear"	[ɲɔɸɔ]
j	nyukhutho	"a process of making clothes to dry by moving it on air with great force"	[ɲuk^{h}ut^{h}ɔ]
k	nyemulo	"love"	[ɲɛmuɬa]
l	nyuvhula	"pull out"	[ɲuβuɬa]
m	nyelelo	"flow"	[ɲɛɬɛɬɔ]

<u>Double nasal assimilation</u>

This process may be termed nasal insertion/syllabification. This is a process whereby a nasal with the same features is inserted as the first element of a sequence comprising a nasal and consonant (-NC).

This rule only seems to apply in Tshivenda. Double nasal occurs when the object concord /N/ of the first (1st) person singular precedes:

a) a verb root of which the first initial segment is a retroflex, a voiced bilabial fricative

Consider the example below:

(80) mmbona "see me" [mmbɔna]

/n + βɔn + a/

/n + β/ > /mmb/

In (80) above, assimilation takes place in the environment /n + β / and the results is /mmb/, that is /n + β / >/ mmb/.

(b) A monosyllabic verb root stem of which the initial segment in a sequence is a tril or a lateral. This process occurs during the formation of nouns from verbs. Consider the examples below:

(81) nndwa "fight" [n̩ndwa]

The diacritic under [n̩] indicates that this nasal is syllabic

/n + lw + a /

/n + lw / > / nnd/

The formalism in (81) above expresses that /n + lw/ becomes /nnd/.

(c) a verb root which begins in a vowel. See example below:

(82) nnyofha "be afraid of me" [ɲ ɔ ɸ a]

/ n + ɔ ɸ + a /

/ n + ɔ / > / ɲ /

In (82) above the assimilation takes place in the environment of /n + ɔ / and the result is /ɲ/

Consider the following data:

(83)

Data E

a	nnyofha	fear me	[ɲɔɸa]
b	nnyamba	talk about	[ɲamba]
c	nnyimba	sing about me	[ɲimba]
d	nnyima	fread on me	[ɲima]
e	nnduma	bite me	[nnduma]
f	nndonda	look after me	[nndɔnda]
g	nnditsha	free me	[nndits^{h}a]
h	nndata	ignore me	[nnda̰t'a]
i	nnduka	weave me	[nnduk'a]
j	nndela	look after me	[nndɛɬa]
k	nndila	want me	[nndiɬa]
l	mmbona	see me	[mmbɔna]
m	mmbumba	create me	[mmbumba]
n	mmbinga	marry me	[mmbinga]
o	mmbivha	jealous me	[mmbiβa]
p	mmbenga	hate me	[mmbɛnga]
q	mmbudza	tell me	[mmbudza]
r	mmbulunga	lay me to rest	[mmbuɬunga]
s	mmbula	mention me	[mmbuɬa]
t	nndivhuwa	thank me	[nndiβuwa]
u	nndwisa	fight me	[nndwisa]
v	nndaya	advice me	[nndaja]
w	nndindela	wait for me	[nndindɛɬa]
x	nndidza	make me cry	[nndidza]
y	nndamba	divorce me	[nndamba]
z	nndema	spoil me	[nndɛma]

Homorganic nasal assimilation

Occlusion is a term used in phonetics referring to the duration of the closure, which is made while a plosive consonant is being articulated (cf Crystal, 1980).

This is the process which mostly occurs in Tshivenda during the formation of nouns. The objectival concord /n/ of class 9 of the first person singular precedes a verb root, of which the fricative continuant is the initial segment. The /n/ becomes /m/ when followed by a bilabial fricative, a voiced denti-labial and becomes /nd/ when followed by lateral or a retroflex. But the /n/ delinks when followed by other fricative continuants. See (84) below:

In the following sections a linear analysis based on the data provided will be done.

3.3 A LINEAR ANALYSIS OF THE DATA

3.3.1 An outline

The linear model has its roots in Chomsky and Halle's work. Trask (1996:207) argues that linear model is a theory employing ordered rules, the theoretical stance that all rules of a language can be placed in a single unique linear order, and that all rules which apply in a particular derivation must apply in that order, at least within a single cycle.

Linear model implies that phonological processes take place in a strict linear order of rules, i.e. one rule operates after the other. Linear phonological model has four components, which are:

- distinctive features
- phonetic representation
- underlying representation
- phonological rule and derivation
- derivation

Distinctive features

These are features, which are used to analyze phonemes. Thus a sound is classified as voiced [+voiced] or voiceless [-voiced] (see 2.2). Consider the following example:

(86)

/k/	/m/
+consonant	+consonant
-sonorant	+sonorant
-syllabic	+syllabic
+back	-back
-voiced	+voiced
-nasal	+nasal

The two sounds in (86) above share the feature consonant, and do not share of the other features.

Phonetic representation

The phonetically more or less fully specified representation of a word or a longer sequence, especially when this is contrasted with its phonological term (cf. Trask, 1996:269). Consider the following example:

(87) Vhona "see"
[βɔna]

Underlying representation

An underlying representation is an abstract representation of a word or a sentence, which is posited by linguists in order to allow certain generalizations to be expressed more readily (cf. Trask, 1997). It is a hypothetical abstract base form described with binary distinctive feature and transformed by phonological rules into a concrete (phonetic) form. Consider (88) below:

(88) nndamba "divorce me"
UR: / n + ɾamb + a /

object concord of 1st person singular	root	terminating vowel Positive Present tense

The formolism in (81) above expresses the fact that [nndamba] was derived from the root /-ɾamb-/. This root was prefixed the object concord /n/ of first person singular, and a vowel /a/ was suffixed to the root. The final vowel indicates positive and present tense.

Phonological rule

Trask (1996:273) regards a phonological rule as a rule, which in some analysis is posited as involved in deriving a pronunciation from an underlying phonological representation. Consider the example below:

(89) A fricative continuant becomes a stop when following a nasal

$$\beta \longrightarrow b \,/\, \underline{\quad} \; n$$

$$\begin{bmatrix} +\text{cons} \\ +\text{cont} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{cons} \\ -\text{cont} \end{bmatrix} \,/\, \underline{\quad} \begin{bmatrix} +\text{cons} \\ -\text{cont} \end{bmatrix}$$

The rule in (89) above states that a [+continuant] segment (/β/) is transformed into a [-continuant] segment (/b/) if it precedes a [-continuant] consonant (/n/). Thus the trigger imparts some of the features, i.e. [+ continuant] to a [-continuant] segment to facilitate an assimilation process.

Phonological derivations

The procedure by which an underlying form is converted into a phonetic form by the application of relevant phonological rules constitutes a phonological derivation (cf. Trask, 1996).

A phonological derivation occurs when an output form is derived from an input form by means of the phonological rules. Compare the following example:

(90)	input	/ n +	β ɔ n + a /
	OCL		b
	HOMNAS	m	
	NI/S	m	
	output	[mmbɔna]	

The formalism in (90) expresses that oclusivation rule (OCL) transforms the bilabial fricative continuant /β/ to a bilabial plosive /b/. The homorganic nasal assimilation (HOMNAS), transforms the alveolar nasal /n/ to a bilabial nasal /m/. The last rule to operate is the nasal insertion and concomitant syllabification, which inserts a nasal with the same features as the first element of a segment comprising a nasal and a consonant.

3.3.2 Analysis

In the following section analysis will be performed on the data presented in the previous section (3.2.1).

Data A

Compare the following examples from Data A (3.2.1.1).

(91) nndamba 'divorce me' <-lamba
UR / n + ʃamb + a
Phonetic rep [nndamba]

The following phonological rules seem to play a role in the generation of this group of utterances (Data A).

Occlusivation (OCL)

This rule is very prominent in most of African languages. It describes a phenomenon whereby fricatives/continuant become stops when following a nasal. It may be formulated as follows:

(92) OCL

$$\begin{bmatrix} +\text{cons} \\ +\text{cont} \end{bmatrix} \longrightarrow [-\text{cont}] \,/\, [+\text{nasal}] \,\_\_\_$$

Another rule that plays a role is that of homorganic nasal assimilation (HOMNAS), which may be presented as follows:

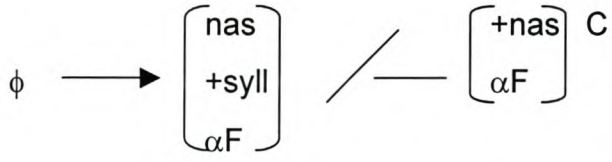
(93) HOMNAS

$$[+\text{nas}] \rightarrow \begin{bmatrix} \alpha\ \text{ant} \\ \beta\text{cor} \\ \gamma\text{back} \\ \theta\text{high} \end{bmatrix} \,/\, \_\_\_ \begin{bmatrix} +\text{nas} \\ \alpha\text{ant} \\ \beta\text{cor} \\ \gamma\text{back} \\ \theta\text{high} \end{bmatrix}$$

The very general rule states that a nasal will acquire the same feature values of an immediately following consonant.

The third rule, which only seems to apply to Tshivenda is that of nasal insertion and concomitant syllabification. This rule may be treated as "nasal insertion/syllabification (NI/S) and may be formulated as follows:

(94) NI/S



This rule implies that a nasal with the same features (cf. [αF]) is to be inserted as first element of a segment comprising a nasal and consonant (-NC).

A derivation for the generation of the phonetic data in Data A may therefore take the following form:

(95) Derivation

input	/	n	+	ʃamb + a/
OCL				d
HOMNAS		n		
NI/S	n			
output	[nndamba]			

The formalism in (95) above expresses that:

(a) fricative /ʃ/ becomes a stop when preceded by an alveolar nasal, because the /ʃ/ assimilates [–continuant] features
(b) alveolar nasal /n/ is assimilated and acquires the features of /d/
(c) an alveolar nasal /n/ is inserted as the first element of a sequence comprising a nasal and a consonant (-NC)

Data B

Consider the following example from Data B.

(96)	nkanda	"tread on me"	<-kanda
	UR	/n + k a nd + a/	
	Phonetic rep	[ŋkanda]	

The following phonological rule seems to have played a prominent role in the generation of this group of utterances (Data B).

Velarisation (VEL)
This rule is prominent in most of African languages. It describes a phenomenon whereby a subjectival concord /n/ of class 9 becomes a velar nasal when followed by a velar sound. This rule may be formulated as follows:

(97) VEL

$$\begin{bmatrix} +\text{cons} \\ -\text{back} \end{bmatrix} \longrightarrow [+\text{back}] \; / \; - \; [+\text{back}]$$

A derivation for the generation of the phonetic data in (B) may therefore take the following form:

(98)	input	/n + kand + a /
	VEL	ŋ
	output	[ŋkanda]

In the above formalism (98) an alveolar nasal /n/ becomes a velar nasal /ŋ/ sound. The alveolar nasal has acquired the back feature from the velar ejective /k/.

Data C

Compare the following examples from Data C:

(99) mmbona "see me" <-vhona

UR /n + βɔn + a)

Phonetical rep [mmbɔna]

The following phonological rules seem to have played a role in the formation this group of words (Data C).

OCL

Firstly, the occlusion (OCL) rule plays a prominent role in most of African languages. It describes a phenomenon whereby fricatives/continuants become stops when following a nasal. This rule may be formulated as follows:

(100) OCL

$$\begin{bmatrix} +\text{cons} \\ +\text{cont} \end{bmatrix} \longrightarrow [\text{-cont}] \,/\, [\text{+nasal}] \text{ -}$$

Another rule which played a role is a HOMNAS, which may be formulated as follows:

(101) HOMNAS (see 93)

A third rule, which only seems to apply for Tshivenda is that of NI/S and it may be formulated as follows:

(102) NI/S (see 94)

A derivation for the generation of the phonetic data in Data C may therefore take the following form:

(103)	input	/ n +	βɔn + a/
	OCL		b
	HOMNAS	m	
	NI/S	m	
	output	[mmbɔna]	

The formalism in (103) expresses that:

(a) the OCC rule changes a bilabial fricative /β/ which is following the alveolar nasal /n/ to become a bilabial plosive /b/.

(b) the HOMNAS rule changes /n/ to a labial /m/ due to the brilabial nasal /b/

(c) the NI/S rule inserts a bilabial nasal /m/ as the first element of a sequence comprising a nasal and a consonant (-NC)

Data D

Compare the following example from Data D.

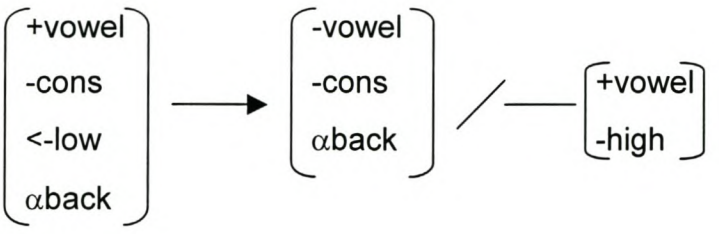
(104)	Nyolo "drawing"	< - ola
	UR	/ n(i) + ɔ ɾ + a/
	Phonetic rep	[ŋɔɾɔ]

The following phonological rules seem to play a role in the generation of this group of utterances (Data D).

Semivocalisation (SV)

This rule describes a phenomenon whereby vowels become semivowels. This rule can be formulated as follows:

(105) SV



Another rule which plays a pat is that of HOMNAS which may be formulated as follows:

(106) HOMNAS (see 93)

Semivowel deletion (SVDEL)

Another rule, which is playing a role, is the semivowel deletion (SVDEL). This rule describes a phenomenon whereby semivowels are deleted if they are preceded and followed by round or high consonant. This rule may be formulated as follows:

(107) SVDEL

(a) C w → C
[+round] [+round]

(b) C j → C
[+high] [+high]

A derivation for the generation of the phonetic data in Data D may take the following form:

(108)

input	/	n(i)	+	ɔʃ+ ɔ/
SV		j		
HOMNAS		ɲ		
SVDEL			ϕ	
output	[ɲɔʃɔ]			

The formalism in (108) expresses that:

(a) a high front vowel /i/ becomes a high semivowel /j/ when preceded by a nasal /n/ and followed by a vowel /ɔ/ (n - ɔ)

(b) the alveolar nasal /n/ is assimilated and becomes a palatal nasal /ɲ/

(c) a high semivowel /j/ is deleted when preceded by a palatal nasal /ɲ/ and followed by a vowel /ɔ/

Data E

Compare the following example

(109) nnduma "bite me" < - luma
UR / n + ɾ u m + a/
Phonetic rep [nnduma]

The following phonological rules seem to play a role in the generation of this group of utterances (Data E).

(110) OCL (see 92)

Another rule seem to play a role, is that of HOMNAS

(111) HOMNAS (see 93)

A third rule, which only seems to apply for Tshivenda is that of NI/S

(112) NI/S (see 94)

A derivation for the generation of the phonetic data in Data E is similar to the derivation of Data A. (See 95).

Data F

Compare the following examples from Data F.

(113) Phungo "rumour" <-fhunga
UR /n + ɸ u n g + A/
Phonetic rep [P^{h}ungɔ]

The following rules seem to have played a prominent role in the generative of this group of utterances (Data F).

(114) OCL

$$\begin{bmatrix} +\text{cons} \\ +\text{cont} \end{bmatrix} \longrightarrow [-\text{cont}] \,/\, [+\text{nasal}]\ -$$

Nasaldeletion (NASDEL)

Another rule that seems to have played a prominent role is the nasal deletion (NASDEL). This rule is very prominent in most African languages. It describes the phenomenon whereby nasals become deleted should they be followed by a stop sound. This rule may be formulated as follows:

(115) NASDEL

$$N \longrightarrow \phi / \ - + \begin{bmatrix} -\text{cont} \\ -\text{voiced} \\ -\text{son} \\ +\text{spread} \end{bmatrix}$$

A derivation for the generation of the phonetic data in Data F may, therefore take the following form:

(116)

Input	/ n	+	ɸung + a
OCL			P^{h}
NASDEL	ɸ		
Output	[p^{h}ungɔ]		

The formalism in (116) expresses that:

(a) a bilabial fricative /ɸ/ becomes a bilabial aspirated plosive /p^h/ when preceded by an alveolar nasal /n/.

(b) an alveolar nasal /n/ is deleted when followed by a bilabial aspirated plosive.

CHAPTER 4

NASAL ASSIMILATION AND RELATED PROCESSES NON-LINEAR PHONOLOGICAL ANALYSIS

4.1 INTRODUCTION

The aim of this chapter is to apply aspects of a non-linear model Feature Geometry(FG) to Tshivenda nasal assimilation and related processes. In order to do this, attention will first be paid to some core concepts related to the model, especially to:

(i) the role of distinctive features, and
(ii) the nature of the presentation of phonological processes

This will be followed by an analysis of the phenomena studied in this assignment. The success of the FG model to account adequately for these phenomena will finally be evaluated.

4.2 NON-LINEAR MODEL FEATURE GEOMETRY

In non-linear phonological model (feature geometry) features are organised in a hierarchical tree of one sort or the other. This means that some features may be dependent on others (or put otherwise, they may be dominated by others), whilst others may be totally independent.

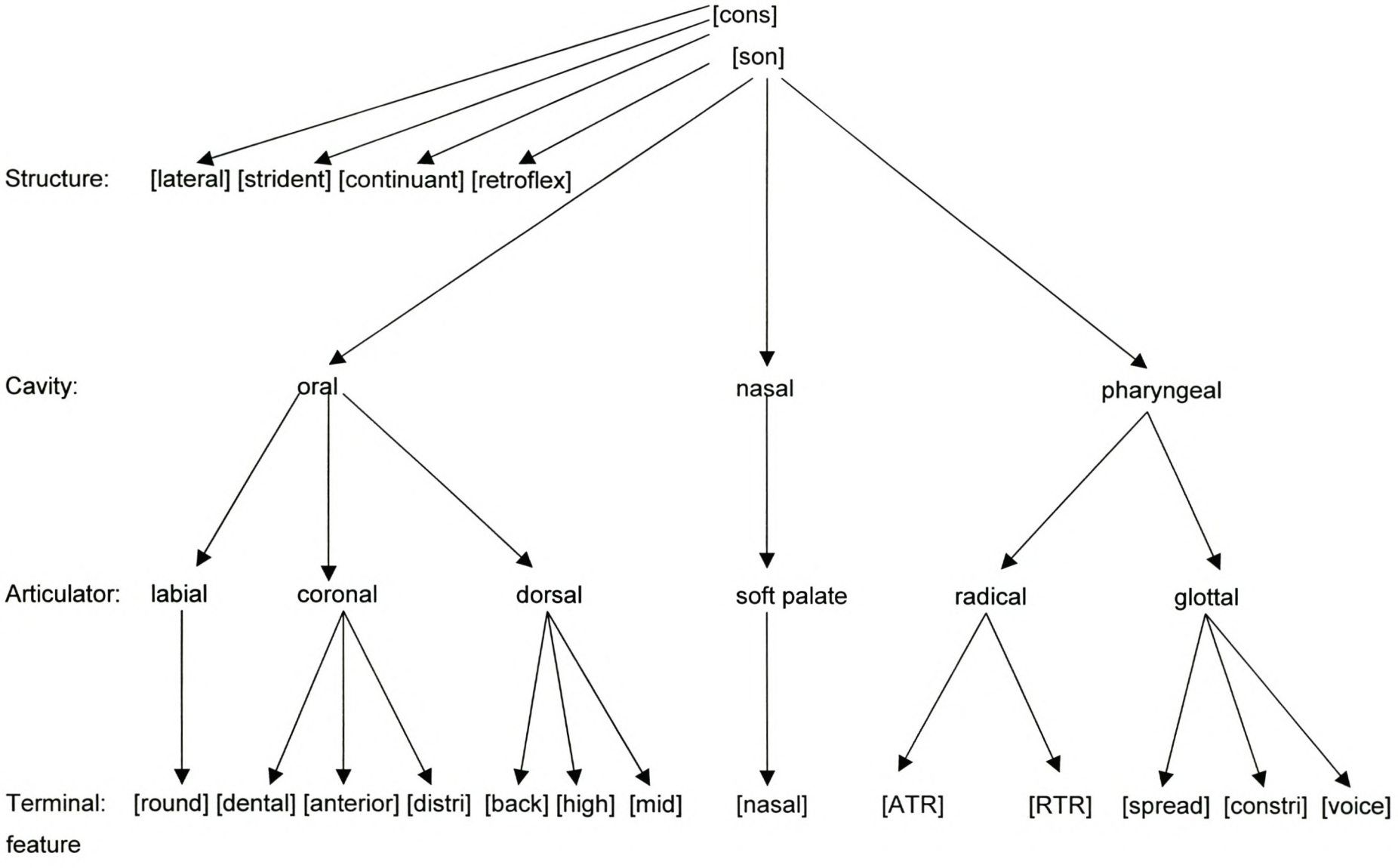
This type of model does away with many traditional concepts, including concepts of rule ordering.

4.2.1 The nature of distinctive features with FG

In a tree structure, features are not accorded the same values, some features are dominated by others.

Consider the following tree diagram in (117):

(117) Feature Geometrical model by Clements (1985) as adopted for Tshivenda:



The root node

The root node is the highest node in a hierarchy. It dominates everything under it. If assimilation could take place at a root, everything is affected. The structure features (strident, continuant, lateral, retroflex, consonantal and sonorant) are attached to it.

The cavity node

The oral, nasal and pharyngeal features, which form the cavity node, are the second level in a hierarchy. The oral, nasal and pharyngeal are sister nodes since they are attached to the same root node and are all dominated by one node, the root. A rule identifying the oral node affects it with its dependants.

The articulator

Labial, coronal, dorsal, soft palate, radical and glottal features form the articulatory node and they form the third level on a hierarchy. Labial, coronal and dorsal are sister nodes since an oral node dominates them. The same applies to glottal and radical, the rule identifying the dorsal node would affect itself with its dependants such as back, high and low.

The terminal features

Round, anterior, distributed, back, high, low, nasal, RTR, ATR, spread glottis, constricted glottis, voiced and dental which are the terminal features form the last and lowest level on a hierarchy. Spread glottis, constricted glottis and voice are sister nodes since they are dominated by glottal.

4.2.2 The nature of phonological analysis

This type of phonology does away with many traditional concepts including the concepts of rules and rule ordering. Nodes may be spread from one to the other, and nodes may be deleted or duplicated.

Spreading

Spreading is a language-particular operation that may include trigger and target conditions, and also a directionality parameter (cf Rice and Avery, 1991).

The theory of spreading can be summarised as follows:

- Spreading can occur only if the spreader is spreading to the same node that dominates it, that is, a structural target must be present.
- A feature or node can spread only to an empty position (cf. Rice and Avery, 1991)

Consider the following example:

(118)

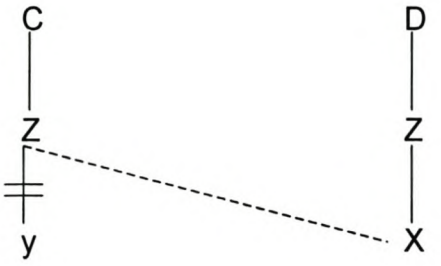
The formalism in (118) Z is spreading into an empty space, which is a feature filling node where, partial or incomplete assimilation results.

Delinking

Delinking is the procedure by which a feature is disconnected from its superordinate node and hence, removed from a phonetic realization of a segment (cf. Trask, 1996).

Consider the following example:

(119)



In (119) above, X spreads into the node Z, this caused the node y to delete so that Z assimilates X. This type of assimilation is partial or incomplete.

Assimilation

Assimilation is represented by a dotted line, connecting the features of the source to the target or focus of the rule (cf. Kenstowicz, 1994).

Consider the following example:

(120)

In (120) the dotted line joining x and z represents assimilation. Y assimilates the features of z and y is deleted.

4.3 KINDS OF ASSIMILATION

Three types of assimilation processes occur in the languages of the world (cf. Broe, 1992; Clements, 1985; Clements and Hume, 1995; Kenstrowicz, 1994). Tshivenda as a language is also included. These types of assimilation are:

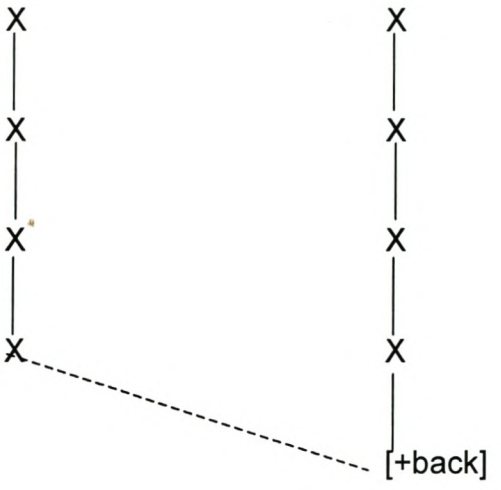
- Single feature assimilation processes
- Partial assimilation processes
- Total assimilation processes

4.3.1 Singe feature assimilation processes

Single feature assimilation processes refers to the spreading of a single feature (cf. Broe, 1992; Clements, 1985). In a single feature assimilation process, only a terminal feature or a "leaf' in the tree spreads (cf. Kenstowicz, 1994).

Consider the following example:

(121)



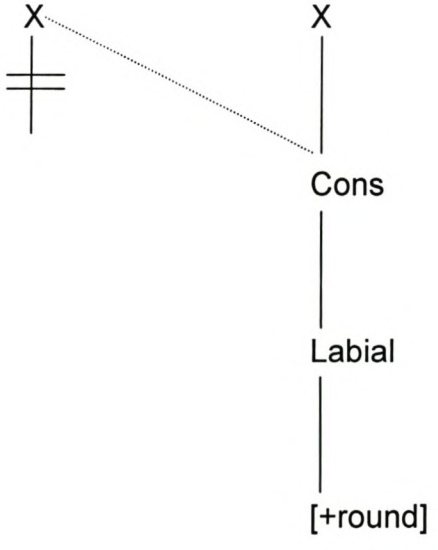
The rule in (121) expresses that [+back] specification spreads to a bare glottal articulator of the preceding consonant of the inflectional suffix (cf. Kenstowicz, 1994).

4.3.2 Total (complete) assimilation processes

Complete or total assimilation refers to the spreading of a root node (cf. Broe, 1992). Spreading of the root node implies the spreading of all the features dominated by the root node, which involves the entire set of features.

Consider the following example:

(122)

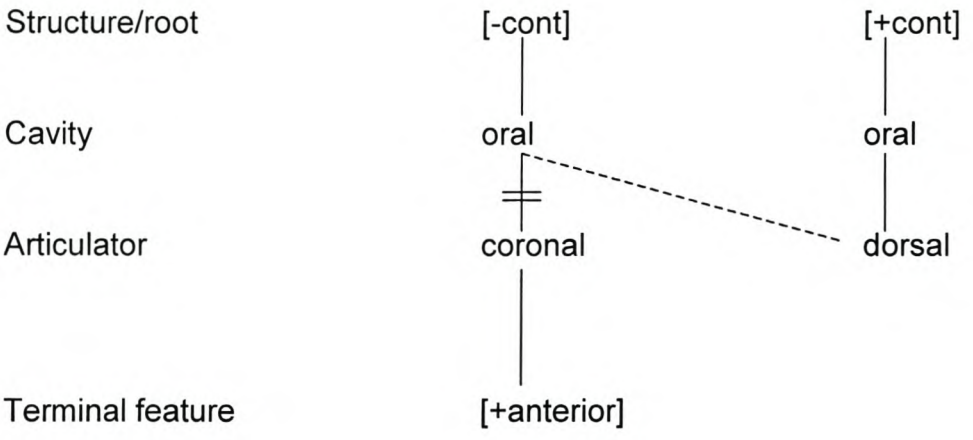


The formalism in (122) expresses the essence of complete assimilation. The spreading has occurred at the root delinking all the features dominated by the root. No trace of the original segment is left – just its position, which is filled by the spreading segment.

4.3.3 Partial assimilation processes

Partial assimilation process also termed incomplete assimilation, refers to the spreading of a class node (cf. Broe, 1992; Clements, 1985). Clements and Hume (1995:258) argues that if a lower level class node spreads, the target gets several, but not all the features of the trigger. Consider the following example:

(123)



The formalism in (123) expresses the fact that the preceding consonant assimilates the place feature node of the following dorsal consonant, simultaneously delinking its original specifications.

4.4 ANALYSIS

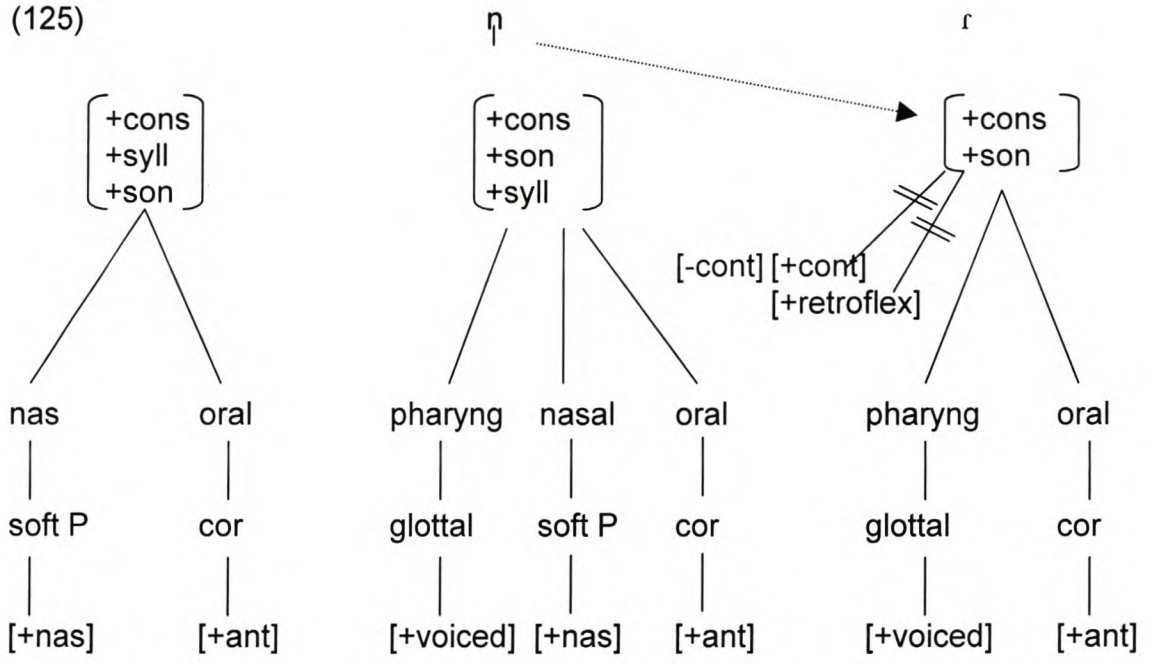
4.4.1 Data A

Compare the following example from Data A

(124)=(91)	nndamba "divorce me"	< – lamba
	UR	/n + ɾamb + a/
	Phonetic Rep	[ŋndamba]

Within a FG model the following representation of the above mentioned phenomenon may be presented.

(125)



In order to derive the appropriate representation, i.e. /n + ɾ / ⟶ /n + d /it appears as if the [-cont] feature spreads to the right and delinks the features [+cont] and [+retraflex]. At the same time a spreading of the nasal at the root node takes place to the left to account for the syllabic nasal /ŋ̩/

Thus, it seems as if the representation in terms of the FG model can in fact describe this phenomenon.

4.4.2 Data B

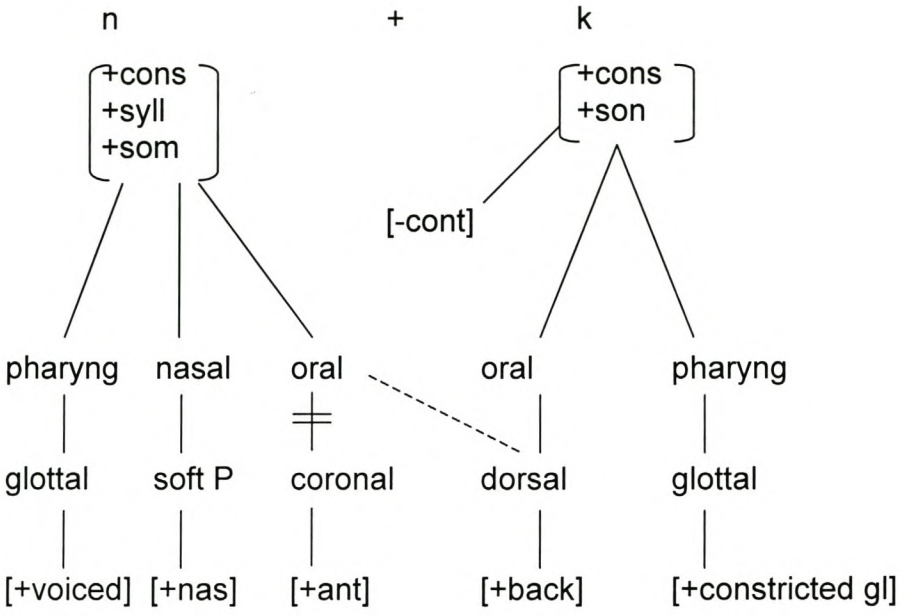
Compare the following example from data B

(126)=(96) nkanda "tread on me " <-kanda

UR	/ n + k'and + a/
Phonetic Rep	[ŋkanda]

The following representation of the above mentioned phenomenon can be presented within the FG model.

(127)



The formalism in (127) expresses that the dorsal features of a velar back /k/ spreads from the articulatory node to the oral node of preceding sound, alveolar nasal /n/, whilst delinking of coronal takes place and /n/ becomes /ŋ/. This is partial assimilation.

4.4.3 Data C

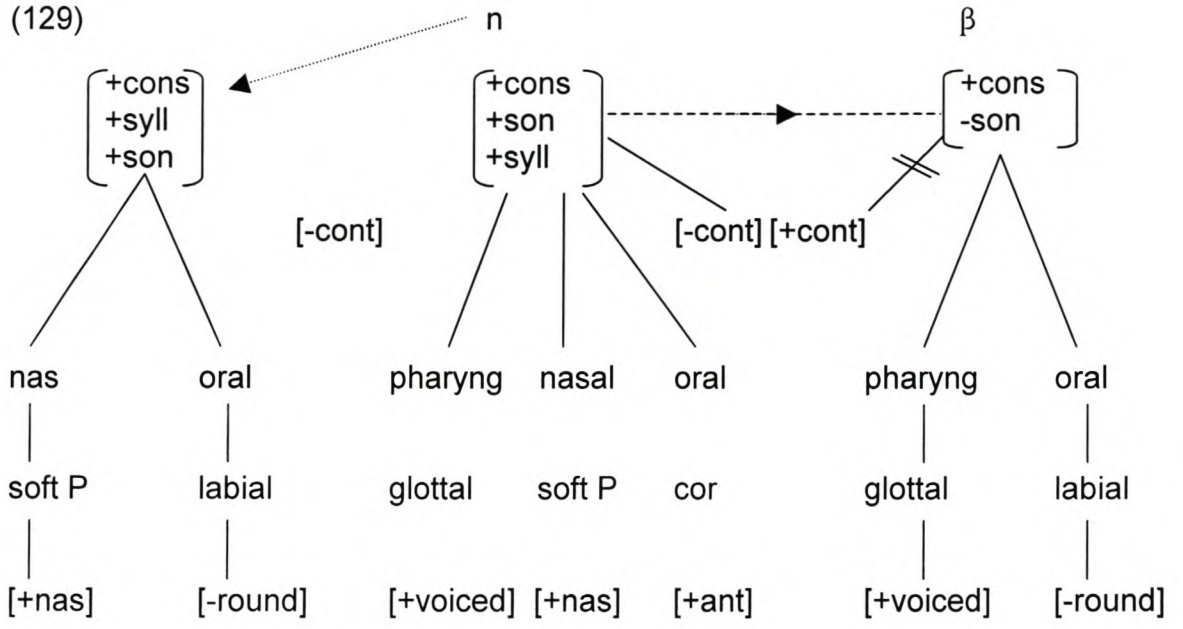
Compare the following example from data C:

(128)=(99) mmbona "see me" < -vhona

UR	/n + βɔn + a /
Phonetic Rep	[mmbɔna]

Within an FG model the representation of the above-mentioned phenomenon may be presented as follows.

(129)



In order to derive the appropriate representation, i.e. /n + β/ → /m + b/, it appears as if the [-cont] feature spreads to the right and delinks the features [+cont]. At the same time a spreading of the nasal at the root node takes place to the left to account for the syllabic nasal /m/.

It seems as if the representation in terms of the FG model can in fact describe this phenomenon partially since the changing of /n/ to /m/ cannot be presented.

4.4.4 Data D

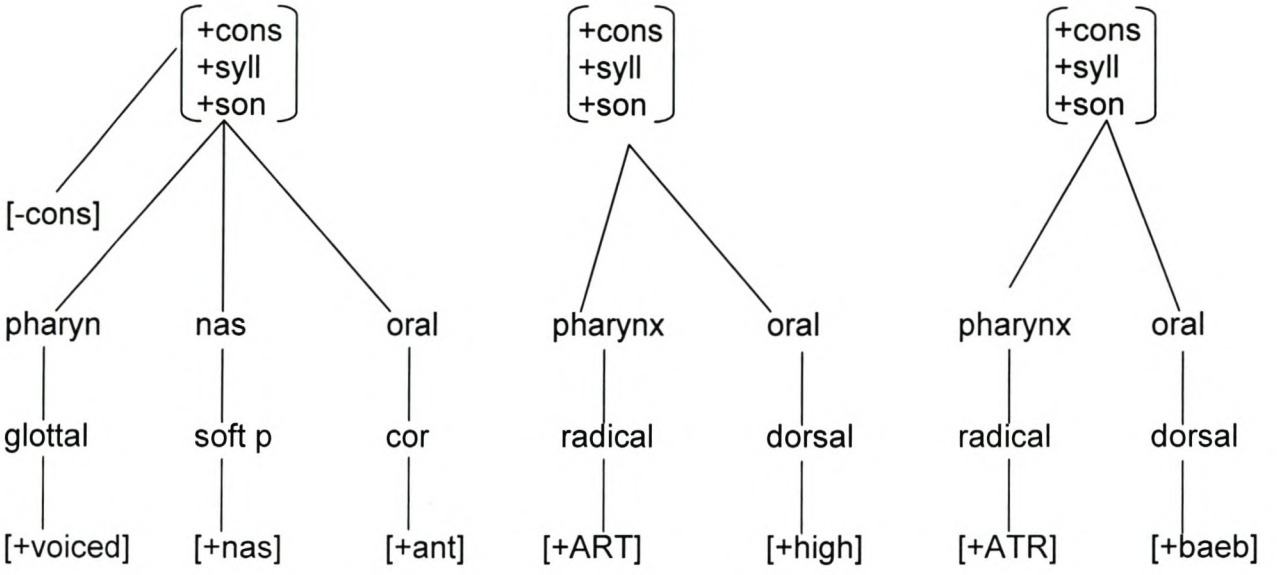
Compare the following example from data D:

(130) = (104) Nyolo "drawing" C – ola

UR	/n(i) + ɔʃ +ɔ /
Phonetic Rep	[ɲ ɔʃ ɔ]

The representation of the above mentioned phenomenon within the FG model can be presented as follows:

(131) n i + ɔ



The alveolar nasal /n/ becomes a palatal nasal /ŋ/ and the high front vowel /i/ is deleted.

This presentation is not adequate to account for the data in group D. There should be a complex process where one sound change feeds into the other sound. It is not possible to present such a complex process within FG.

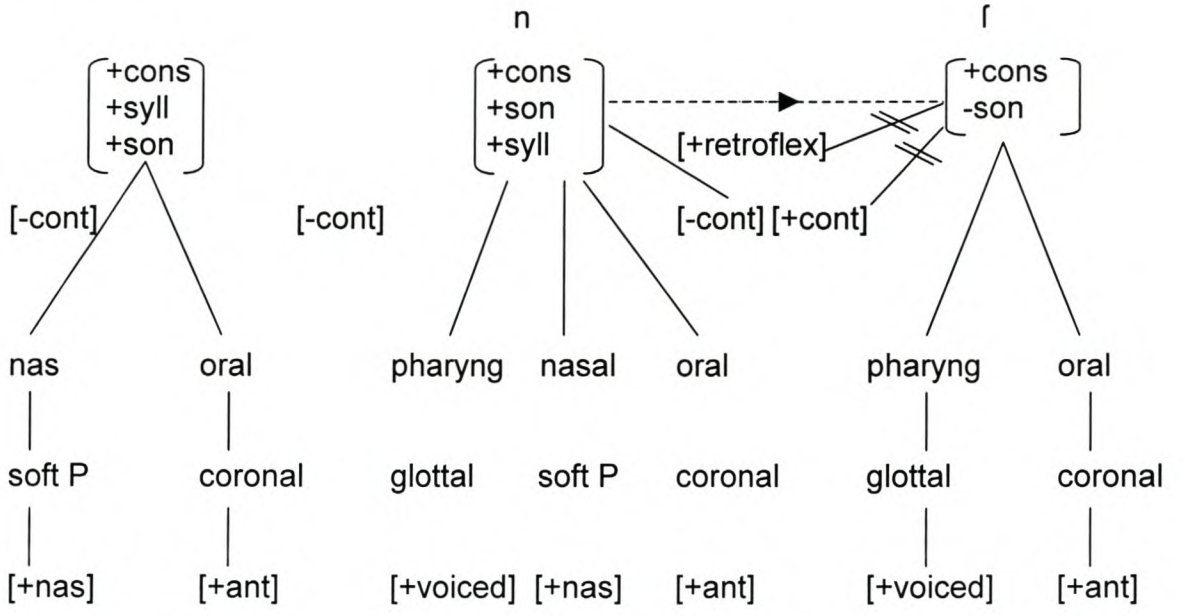
4.4.5 Data E

Compare the following example from data E:

(132) = (109) nnduma "bite me" < - luma
UR / n + ɾ um + a /
Phonetic Rep [nnduma]

Within a FG model the representation of the above mention phenomenon may be presented as follows:

(133)



In order to describe the appropriate representation, that is /n + ɾ/ ⟶ n + d/, it is assumed that the [-cont] feature spreads to the right and delinks the features [+cont] and [+retroflex]. At the same time a spreading of the nasal at the root node takes place to the left to account for the syllabic nasal /ŋ̩/

Thus, it seems as if the representation in terms of the FG model can in fact describe this phenomenon adequately.

4.4.6 Data F

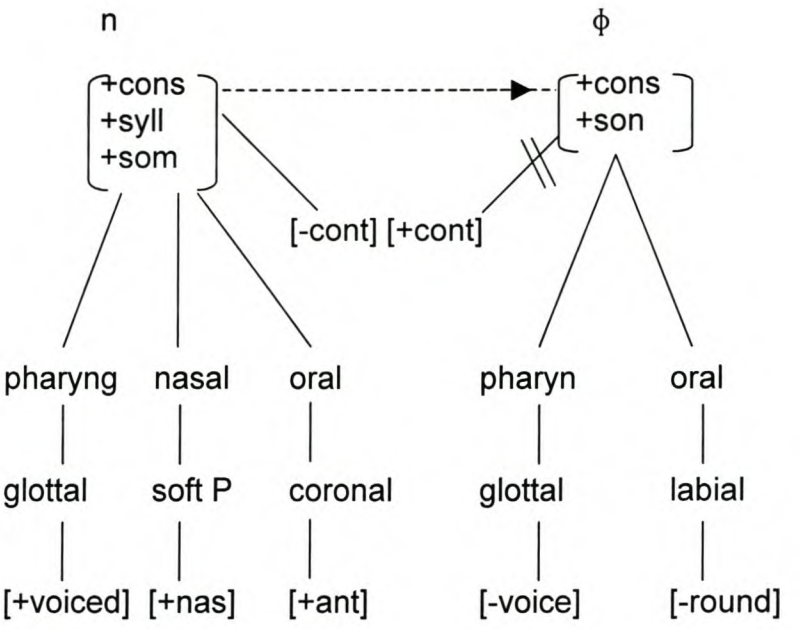
Compare the following example from Data F:

(134) = (113) Phungo "rumour" < -fhunga

UR	/n + ɸ ung + ɔ/
Phonetic Rep	[p^h uŋgɔ]

Within the FG model the representation of the above-mentioned phenomenon may be presented as follows:

(135)



In order to derive the appropriate representation, that is /n + Φ / > / m + p^h /, it is assumed that the [-continuant] feature spreads to the right and delinks the [+continuant] feature, there by changing the /Φ/ to /p^h/. The nasal /n/ is deleted. The presentation does not account for the deletion of /n/.

4.5 EVALUATION

Non-linear phonological model has proved to be successful in the analysis of sound changes in Tshivenda, however, there are some sounds that could not be accounted for.

The following are processes that were not accounted for or were only partially accounted for.

(a) Mutual assimilation (see 129)

This process of sound change was presented partially in a tree diagram, since not all spreading and delinking could be presented.

(i) The spreadings of the [-continuant] feature and of the nasal at the root node, the delinking of the [+continuant] feature were presented, but

(ii) the delinking or the changing of an alveolar nasal /n/ to /m/ could not be presented.

(b) Nasal and vowel stems (see 131)

This sound change could not be represented in a tree diagram. This sound change is not accounted for completely.

(c) Homorganic nasal assimilation (see 135)

The presentation of this sound change could be presented partially in a tree diagram. Not all spreadings and delinkings could be presented.

(i) the spreading of the [-continuant] feature and the delinking of the [+continuant] feature were presented, but

(ii) the delinking of an alveolar nasal /n/ or the changing of /n/ to /m/ could not be presented.

CHAPTER 5

CONCLUSION

5.1 CONCLUSION

This study aimed at evaluating a linear phonological model as presented by Chomsky and Halle (1968) and a non-linear phonological model (feature geometry model), to determine whether any of these models could adequately account for the nasal assimilation and related processes in Tshivenda as a language, with respect to role formulation and derivational processes in the case of linear model (SPE) or representations and various types of spreading and delinking in the case of non-linear phonological model (feature geometry).

5.2 FINDINGS

This study has revealed that:

(i) The linear phonological model provides an adequate explanation of sound changes for nasal assimilation and related processes in Tshivenda

The model has accounted for:

(a) Progressive nasal assimilation

(136) = (68) /n + ʃ ɛm + a/

/n + ʃ/ > / nnd /

(b) Retrogressive nasal assimilation

(137) = (71) /n + kɔn + a/

/n + k / > / ŋk /

(c) Mutual assimilation

(138) = (75) /n + βudz + a/

/n + β/ > / mmb/

Related processes

(d) Nasal and vowel stems

(139) = (78) /n (i) + ɔ ʃ + ɔ /

/n (i) + ɔ / > / ɲ /

(e) Double nasal

(140) – (80) /n + βɔn + a /

/n + β / > / mmb /

(e) Homorganic nasal assimilation

(141)=(84) /n + ɸung + ɔ /

/n + ɸ/ > / p^h /

(ii) The non-linear phonological model has also provided adequate explanations in some sound changes (processes). The sound changes in some other processes were partially accounted for and in some process the sound changes were not explained completely.

In the following processes the sound change has been explained adequately

(a) Progressive nasal assimilation

(142)=(68) /n + ʃɛm + a /

/n + ʃ / > / nnd/

(b) Retrogressive nasal assimilation

(143)=(71) /n + kɔn + a/

/n + k / > / ŋk /

(c) Double nasal

(144)=(80) /n + fɛm + a /

/n + f / > / nnd/

The model accounts partially for he sound change in the following processes

(d) Mutual assimilation

(145)=(80) /n + βudz + a /

/n + β / > /mmb/

The model explains the sound changes of bilabial fricative /β/ to a bilabial plosive /b/ and the introduction of a bilabial nasal /m/ as the first element of a syllable. The spreading and delinking can be seen in the representation. However, the model does not account for the changes of /n/ to /m/. There is no spreading or delinking in the representation.

(e) Homorganic nasal assimilation

(146)=(84) /n + ɸung + ɔ /

/n + ɸ/ > / p^h /

The model explains the sound change of /ɸ/ to /p^h/. Spreading and delinking can be seen in the representation. There is no spreading and delinking of the sound change of /n/.

The model does not account at all for the sound changes in the following process:

(f) Nasal and vowel stems

(147)=(77) /n (i) + ɔ ʃ + ɔ /

/n (i) + ɔ / > / ɲ /

On the representation no spreading or delinking could be traced. The representation seems not to explain for this sound change. Therefore it is not accounted for by a non-linear model.

5.3 RECOMMENDATIONS

Applications of both models do in some way or the other account for the data in a credible manner. However, it has become clear that the linear model is to be preferred to the non-linear model; due to the fact that it presents a better coverage of the data and that it makes provision for temporal organization of processes.

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