

A COMPARATIVE STUDY
OF
THE INFLUENCE OF THE NASAL PREFIX /n/ (FROM UR-BANTU "ni-")
ON SUCCEEDING CONSONANTS AT THE BEGINNING OF SOME LEXICAL ITEMS
IN
ZULU, XHOSA AND SOUTHERN SOTHO

BY

A.T. LEPHALLO

B.A. (HONS) (UZ), PTC

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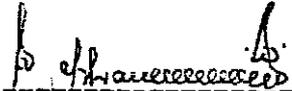
SUPERVISOR : PROF S.D. NGBONGWANE

DATE SUBMITTED : JANUARY 1990

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DECLARATION

I declare that all the material contained herein is my own work in design and in execution, and that this dissertation submitted by me at the University of Zululand had not previously been submitted by me for a degree at this or another University.


A.T. LEPHALLO

(ii)

DEDICATION

This work is dedicated to:

BONGUMUSA (wife) and

NOEL THABO (son)

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CHAPTER 1

1.0 INTRODUCTION

In any language, words are uttered systematically according to certain rules. Each language has therefore its own system. Language may be defined as "a system of utterances governed by a set of rules". In a language there are partial systems such as Phonetics, Morphology, Syntax, etc. When these partial systems are put together they form a unique system of a particular language. Phonetics is the study of a single speech sound. A word is made up of a number of phonetic units.

The phonetic units or individual speech sounds are also known as phones. A more abstract phonetic unit is called a "phoneme". A phoneme is:

A class of sounds which (1) are phonetically similar and (2) show certain characteristic patterns of distribution in the language or dialect under consideration.

(Gleason, 1955:261).

A phoneme is thus seen as a convenient label for a number of phonetic units. Thus, [n] may stand for [n̄], [ɲ], [ŋ], etc. The phonemes of a language come together to form grammar of that particular language.

Grammar, in any language can be seen as a system of rules that relates the sound and meaning. The portion of the grammar that describes the sounds, and the rules governing the distribution of

sounds is known as the phonological part or in a simple term "Phonology". Phonology is the study of speech sounds in juxtaposition as well as the influence which is brought about by one sound on another, with the ultimate formation of new sounds because of the incompatibility of homorganic sounds in juxtaposition. The new sounds are therefore named according to their place of articulation. Knowing the phonetic units or the individual speech sounds of a particular language does not necessarily mean that one knows the Phonology of that language. One needs to have a thorough knowledge of the phonetic sounds before examining the sound patterns of a particular language. Therefore:

Knowing the sounds (the phonetic units) of a language is only a small part of one's phonological knowledge. The Phonology is then the system and pattern of speech sounds.

(Fromkin and Rodman, 1978:71).

When we observe a full description of any language and its sound system and the rules (grammar) we usually notice that each morpheme has both an abstract or underlying phonemic representation containing all those features that cannot be predicted by general rules, and a concrete surface phonetic representation containing information about all the phonetic features controlled by the human vocal tract.

Among the basic phonological units of all human language sound systems are discrete elements called phonemes (the contrasting speech sounds of a language). The pronunciation of the phonemes is highly

structured; even our so-called casual pronunciation of words is governed by regular, but abstract, principles.

(Akmajian et. al., 1979:70).

In Phonology, the underlying segments are called phonemes and the underlying representations are referred to as phonemic Representations. The phonemes are sometimes so abstract that, in many instances it is impossible to tell from the phonetic properties of a segment alone what underlying segment it represents. The abstractness of phonemic representations of lexical items results in derivation of the phonemic manifestation of lexical items from phonological representations. This ultimately involves many ordered rules. Therefore, the abstract representations of phonemes are posited in Phonology, and the set of phonological generalisations convert these phonemic representations into phonetic representations. According to Langacker:

The underlying "surface" or phonetic representation of a sentence or lexical item is a more abstract entity referred to as its phonological representation. The goal of the phonological analysis is to determine the nature of these underlying phonological representations and to discover the general principles that relate them to the phonetic manifestations.

(Langacker, 1972:236).

We realise that speech sounds may be described in terms of small units that represent very small detailed aspects of human articulation of each sound. It is these phonetic features that

underlie the phonological regularities or phonological rules (P-Rules) of a natural language. The phonological system of a natural language will therefore consist of a set of phonemes and a set of conditions or rules which define the aspects of the pronunciation (phonetic features). The phonological rules thus account for phonological alternations by referring to the phonetic features. The phonemic and phonetic sounds are as a rule represented with the same symbol but the phonemic symbols are always enclosed in slashes, (/ /) while the phonetic symbols are enclosed in brackets, ([]).

1.1 DISTINCTIVE FEATURES

According to the feature changing rules or feature specification (F - S), i.e. when a certain speech sound undergoes a phonological change, the following are taken into consideration: Firstly, we observe the sound which changes, secondly, the manner in which it changes or how does it change and finally, the conditions under which it changes or simply the environment, i.e. where such a change occurs. The phoneme which undergoes a phonological change is characterised by the minimal set of distinctive features necessary for unique identification. Distinctive features identify natural classes of phonemes and enable us to detect underlying regularities in the phonological system of a language. Singh and Singh say:

Distinctive features are those indissoluble attributes of a phoneme that are required to differentiate one phoneme from another in a language .

(Singh and Singh, 1982:195).

1.1.1 Definition of Terms

The following are some of the distinctive features:

1.1.1.1 Consonantal

This feature is used for all sounds which are produced with the obstruction of air current as it travels through the mouth. All consonants i.e. obstruents and sonorants are therefore

+consonantal while vowels and semivowels are -consonantal .

Sloat et. al. confirm:

The +consonantal sounds are produced either with contact between articulator and a point of articulation, or with a degree of closure severe enough to produce friction. This feature distinguishes the true consonants (stops, fricatives, affricates, nasals, laterals and trills) from glides and vowels.

(Sloat et. al., 1978:83).

Schane also agrees:

The feature consonantal refers to a narrowed constriction in the oral cavity-either total occlusion or friction. Stops, fricatives, affricates, nasals and liquids are +consonantal . Vowels and semivowels without this degree of narrowing, are -consonantal .

(Schane, 1973:26)

1.1.1.2 Aspiration

All sounds which are produced with an extra puff of air or an audible air current which forces its way through the vocal cords, have aspiration. The consonants ph, th, kh are +aspiration while t', p', b, m are -aspiration. This feature is only limited to explosives in this discussion. Guma defines this feature thus:

The voiceless stops may also be produced with a puff of breath, in which case they are said to be aspirated. Aspiration is indicated by /h/ after the sound concerned, e.g. /th/, /ph/, /tsh/, written /tš/ .

(Guma, 1971:20)

1.1.1.3 Ejection

Sounds which are produced in such a way that the vocal cords are closed so that the sound is produced with a sharp ejective pronunciation are +ejection, e.g. k', t', p' while all other sounds are -ejection. Ejective sounds only occur in explosives and affricates in Zulu, Xhosa and Southern Sotho.

1.1.1.4 Vocalic

This feature is used for all sounds which are produced when the vocal tract is positioned in such a way that air moves through the vocal cords that are vibrating and then passes out of the oral

cavity without interference. Vowels and liquids are thus +vocalic while semivowels, nasals and obstruents (plosives, fricatives and affricates) are of course -vocalic.

1.1.1.5 Voice

All sounds which are produced when the airstream forces its way through the vocal cords, causing them to vibrate are said to be voiced. Langacker says that the voicing feature divides the segments of a language into two classes, those that are voiced and those that are voiceless. (Langacker, 1972:256).

The sounds, b, ɓ, d, a, z, e, l, m are said to be +voiced while sounds like p', ph, kh, s, tʃh, ʃ are -voiced.

1.1.1.6 Sonorant

These sounds are produced with spontaneous trills from the vocal cords. The vowels, nasals, liquids and semi-vowels are therefore +sonorant while all other sounds are -sonorant. We therefore notice that +sonorant sounds are also +voiced, but not all +voiced sounds are also +sonorant. Fromkin and Rodman agree when they say:

The nonnasal stops, the fricatives, and the affricates form a class of sounds that can be distinguished from all other sounds. Since the airstream cannot escape through the nose, it is totally obstructed in its passage through

the vocal tract. These sounds are called obstruents; all other sounds are called sonorants.

(Fromkin and Rodman, 1978:44).

This means that explosives (nonnasal stops), fricatives and affricates form a class of -sonorant sounds while nasals, liquids, vowels and semi-vowels are +sonorant. We therefore find that +voiced explosives, fricatives and affricates are -sonorant while nasals, liquids, vowels and semi-vowels being +sonorant are also +voiced. Sloat et. al. confirm this when they say:

Vowels, glides, nasal consonants, laterals, and r-sounds are +sonorant. Stops, fricatives and affricates are -sonorant.

(Sloat et. al., 1978:83).

Schane also agrees:

Vowels are always +sonorant, as are nasals, liquids and semi vowels. The obstruents - stops, fricatives, and affricates and laryngeal glides - are of course, -sonorant.

(Schane, 1973:26).

1.1.1.7 Anterior

These sounds are produced in such a way that the air current is obstructed in front in the mouth cavity. Labials and alveolars are thus +anterior. Emslie says:

Obstruction of the outgoing air in front of the palato-alveolar region of the palate results in anterior segments.

(Emslie, 1977:59.

Falk also agrees:

Sounds that are made by obstructing the air stream in front half of the oral cavity are +anterior; those involving an obstruction in the back half are -anterior.

Falk, 1978:98).

1.1.1.8 Coronal

All sounds which are produced by moving the blade of the tongue upwards are coronal. The alveolars, alveo-palatals and palatals are thus +coronal while bilabials, labio-dentals, velars and glottals are -coronal. Fromkin and Rodman confirm this thus:

Similarly the alveolar, postal alveolar or palatal sounds are all produced by raising the blade of the tongue. These sounds are designated as coronal.

(Fromkin and Rodman, 1983:59).

1.1.1.9 Strident

All fricatives and affricates which are produced with a friction noise are termed stridents. Therefore, sounds like ʃ, f, ʒ, tʃ', ts' are +strident while sounds like explosives are -strident. This is confirmed by William when he says:

A strident sound is produced by an obstruction in the oral cavity which forces the air through a relatively long, narrow constriction. As the air rushes out of the opening of this constriction, its turbulences serves as a primary noise source. This turbulent air is then directed against a second obstruction which causes a secondary noise source.

(William, 1972:39).

Falk also agrees:

The friction noise in fricatives and affricates is accounted for in systematic Phonetics by the feature strident.

(Falk, 1978:94).

1.1.1. ~~X~~ Nasals

The sounds which are produced through the obstruction and closure of air current in the mouth so that the velum is lowered to allow air to pass freely in the nasal cavity, are designated as nasals.

m, ŋ, p, ŋ, n are thus +nasal, while all other sounds are -nasal. According to Wise:

A nasal consonant is one characterised by the escape of the airstream through the nasal passages, the mouth passage being entirely blocked by the lips, by the tongue tip and alveolar ridge, or by the tongue back and velum.

(Wise, 1957:45)

1.1.1.11 Labials

Labial sounds are produced by using either one or both lips. Labio-dentals are produced by pressing the lower lip against the upper front teeth, while bilabials on the other hand are produced by using both lips. Bilabials and labio-dentals are therefore +labial while alveolars, alveo-palatals, velars and glottals are -labial. Fromkin and Rodman confirm:

The five sounds that comprise the three bilabials b, p, and m and the two labio-dentals f and v form the class of labial sounds.

(Fromkin and Rodman, 1983:41).

1.1.1.12 Laterals

All sounds which are produced by raising the tongue blade upwards and lowering the sides of the tongue in order to allow the air to escape on the sides, are designated as laterals. Sounds like l, tɬ', ɬ, tɬh, ɬ are thus +lateral while all other sounds are -lateral. Wise admits:

A lateral consonant is a consonant made by permitting the exit of the breath on one or both sides of the tongue, the tongue tip or blade being against the upper teeth or the root of the mouth.

(Wise, 1957:45).

1.1.1.13 Continuant

This feature is used for all sounds which are produced with partial obstruction of air current, thus leaving sufficient space for the airstream to continue moving through the mouth. Fricatives are thus +continuant while stop sounds are -continuant.

1.1.1.14 Stops

These sounds are produced with complete blockage or with a stop immediately followed by a fricative release. Plosives and affricates are therefore referred to as stops while fricatives are referred to as continuants. Singh and Singh agree that the affricates are also stops when saying that, with the four continuants, i.e. s, z, ʃ, ʒ, the two stops are formed and they are tʃ, dʒ. They further say:

The phonemes tʃ, dʒ are traditionally called affricates. The affricates are formed by a stop immediately followed by a fricative release.

(Singh and Singh, 1982:45).

Affricates, explosives and implosives will then have a common feature of being stop sounds. Langacker confirms this when he says that, a close relationship between affricates and stops exists since they involve a stop closure. (Langacker, 1972:259).

1.1.1.15 Obstruents

Obstruents are a type of speech sounds which are produced in the oral cavity, during which the passage of the airstream is constricted at some point as opposed to resonants. Sloat et.al. agree:

Obstruents, sounds made by obstructing the flow of air, are characterized by an extreme narrowing or constriction at some point in the vocal tract.

(Sloat, et. al., 1978:30).

The plosives (i.e. explosives and implosives), fricatives and affricates are thus obstruents and are characterized by the feature, -sonorant as opposed to nasals, liquids, vowels and semi-vowels, which are of course +sonorant. Schane confirms this when he says:

Vowels are always +sonorant, as are nasals, liquids, and semivowels. The obstruents - stops, fricatives, and affricates, and laryngeal glides - are of course, -sonorant.

(Schane, 1973:26).

1.1.1.16 Syllabic

This feature is used to distinguish all sounds which are produced as a stress of utterance containing a peak of sonority between two structures which are characterised by the lack of being sonorant. Vowels and some consonants have this feature. If we take for

instance in Zulu, the bilabial nasal [m], preceding the [u] which is succeeded by either a bilabial or labio-dental sound, becomes syllabic the moment this vowel is ejected off or discarded. This occurs only in words containing disyllabic or polysyllabic stems. In Southern Sotho, when both consonants (normally nasals and the liquids, [l]) are identical, the first consonant becomes syllabic.

Ferreira says:

Die klanke l, m, n, ng en ny kan ook sillabies wees, dit is altyd die geval wanneer hulle dubbel geskryf word, bv.

mollô	(vuur)	=	mo-l-lô
mmê	(moeder)	=	m-me
nna	(ek)	=	n-na
enngwe		=	e-ng-ngwe (n ander)
o a nnyala	(Hy trou met my)	=	o-a-ny-nyala

(Ferreira, 1964:5)

Schane agrees:

In general, vowels are [+syllabic], whereas consonants are [-syllabic]. This feature is also necessary for differentiating syllabic nasals and liquids [+syllabic] from their non-syllabic counterparts.

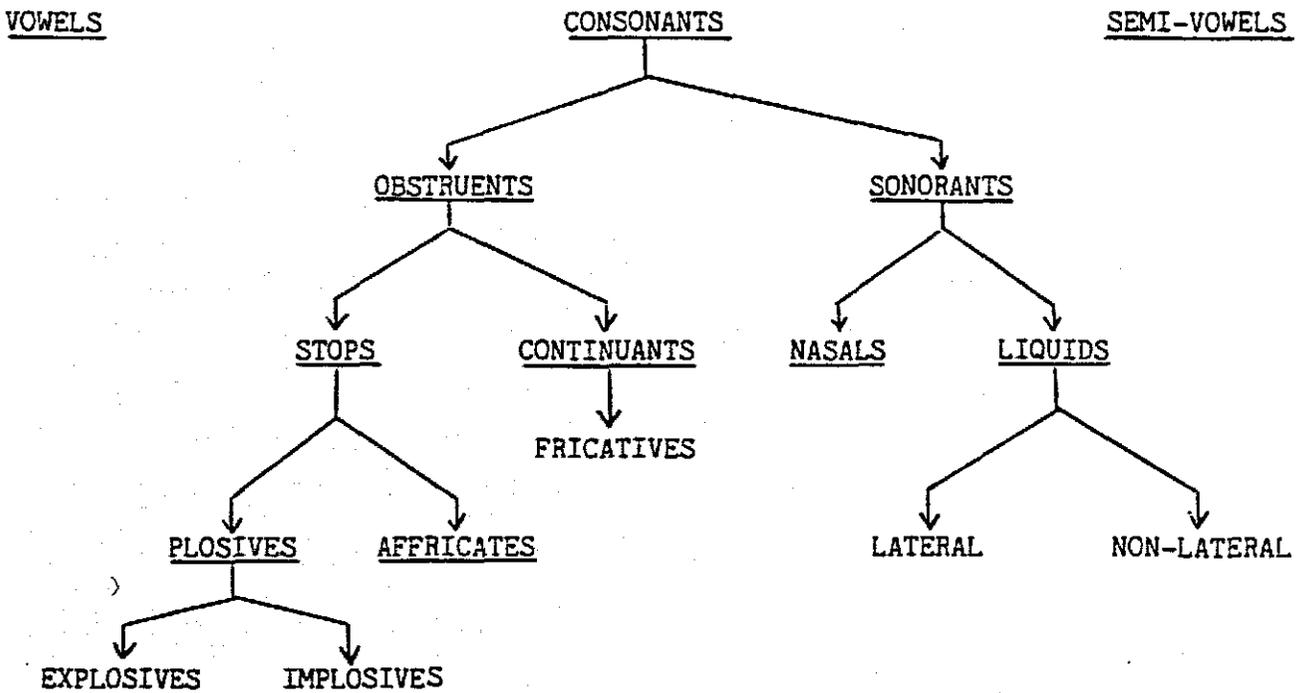
(Schane, 1973:26).

In Zulu and Xhosa we may have the following examples:

umfundisi	<u>umfundisi</u>	(*umufundisi)
umbuso	<u>umbuso</u>	(*umubuso)

1.1.2 Exposition of Distinctive Features

According to the Phonetic features system, a distinctive feature is written in square brackets. A plus or minus sign indicates whether that particular phoneme possesses the property or feature in question. In order to show the different distinctive features of each phoneme, the Zulu, Xhosa and Southern Sotho speech sounds (which are of course consonants in this discussion) will firstly be classified or grouped into obstruents and sonorants. The obstruents will embrace stops and continuants. The stops will be sub-divided into plosives and affricates. Plosives consist of an implosive and explosives. The sonorants on the other hand will be sub-divided into nasals and liquids. The liquids include the lateral and the non-lateral liquids. We can illustrate this as follows:



All consonants i.e. obstruents and sonorants are **+consonantal** as opposed to vowels and semi-vowels which are **-consonantal**. Obstruents are distinguished from sonorants by the feature **-sonorant**. We can therefore illustrate the distinctive features of the four natural classes of sonorants as well as those features of obstruents as follows:

VOWELS	SEMI-VOWELS	NASALS	LIQUIDS	OBSTRUENTS
-Consonantal +vocalic +sonorant	-Consonantal -vocalic +sonorant	+Consonantal -vocalic +sonorant	+Consonantal +vocalic +sonorant	+Consonantal -vocalic -sonorant

Some of the features are redundant, depending on the circumstances. It must however be noted that only those features that are common to all sounds in a natural class are used, and the redundant features are ignored. The single feature, **+nasal** can be used to identify nasals. If the nasals and liquids occur at the same time, only distinctive features common to both classes are used i.e. **+consonantal, +sonorant**. Distinctive features of consonants are therefore as follows:

STOPS	FRICATIVES	NASALS	LIQUIDS
+Consonantal -Sonorant -Continuant	+Consonantal -Sonorant +Continuant	+Consonantal +Sonorant +Nasal	+Consonantal +Sonorant -Nasal

The feature, **+strident** distinguishes affricates from plosives, as they are both **-continuant**. Affricates are therefore **-continuant, +strident** while plosives are **+consonantal, -continuant, -strident**. The feature, **+consonantal** will thus

be redundant for affricates because vowels and semi-vowels which are by implication **-consonantal** are **+sonorant** and the feature, **+strident** is predictably **-sonorant**. This means that **+strident** will predictably be consonants which are neither nasals nor liquids but at the same time produced with friction noise i.e. affricates and/or fricatives. To differentiate between the two, the feature, **continuant** is important because fricatives are **+continuant**. For plosives, the feature, **+consonantal** distinguishes them from vowels and semi-vowels which have also the features, **-continuant, -strident**.

When we ignore the redundant features, the following are distinctive features of plosives, affricates, fricatives, nasals and liquids:

PLOSIVES

AFFRICATES

FRICATIVES

NASALS

LIQUIDS

+consonantal
-sonorant
-strident

+strident
-continuant

+strident
+continuant

+nasal

+consonantal
+sonorant
-nasal

Above the feature, **+sonorant** is redundant for nasals because all nasals are by implication **+sonorant**. The features, **+sonorant, -nasal** distinguish liquids, vowels and semi-vowels from nasals which are **+nasal**, and **+consonantal** will distinguish liquids from vowels and semi-vowels which are also **+sonorant, -nasal**. The difference between explosives and implosives is that explosives are produced through pulmonic egressive airstream mechanism while implosives are produced through ingressive

glottalic airstream mechanism. The difference between the two is that implosives are **+glottalic** while explosives are **-glottalic**. The features of plosives i.e. explosives and implosives can be represented as follows:

EXPLOSIVES

+consonantal
-sonorant
-strident
-glottalic

IMPLOSIVES

+consonantal
-sonorant
-strident
+glottalic

The feature, **+lateral** distinguishes the lateral liquid, [l] from the non-lateral liquid, [r]. For the lateral liquid, the distinctive feature **+sonorant** is necessary to distinguish the [l] from the [tʃ], [tʃʰ], [tʃh] which are also **+lateral**. For the [r] sound, **-nasal** is thus necessary to distinguish the [r] from nasals which are also **-lateral**. We may illustrate this as follows:

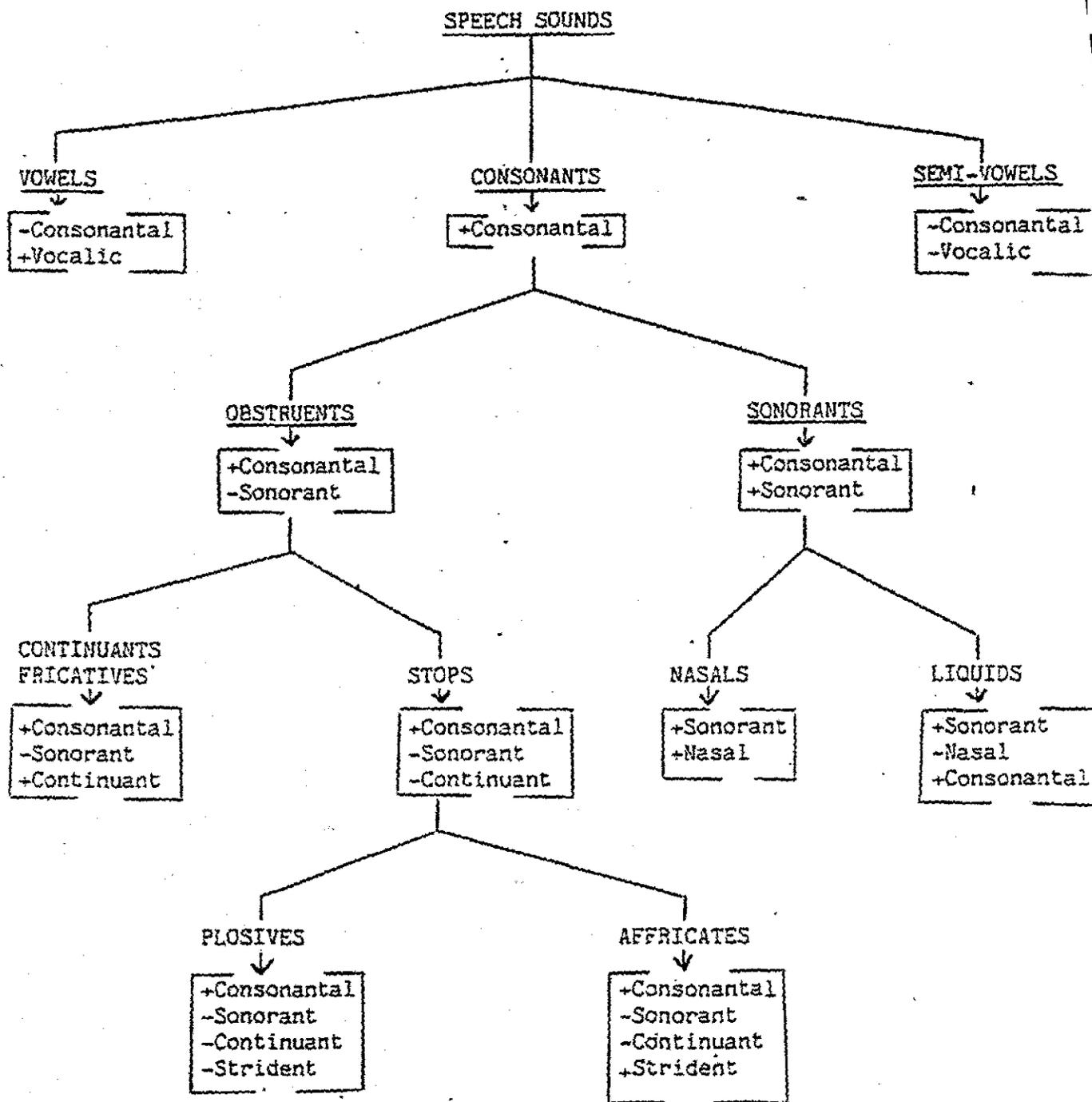
LATERAL LIQUID

+sonorant
+lateral

NON-LATERAL LIQUID

+sonorant
-lateral
-nasal

The distinctive features of consonants as opposed to those of vowels and semi-vowels can be illustrated as follows:



1.2 AIMS AND SCOPE OF THIS STUDY

The aim of this study is to determine influence which is caused by the juxtaposition of the nasal prefix [n] to succeeding consonants in Zulu, Xhosa and Southern Sotho. The consonants which are preceded by the nasal prefix [n] are subject to change in Bantu Languages. If we take for instance the following:

S.Sotho : n(i)- + -hlaba > ntlhaba

Zulu/Xhosa : in(i)- + -sola > insolo/intsolo [ints'ɔlb]

We realise that in Southern Sotho example, Nasal Strengthening causes the nasal prefix [n] to strengthen the voiceless radical alveolar lateral fricative [ɬ] which then undergoes a phonological change and changes to a voiceless aspirated alveolar lateral explosive [tʰ]. We therefore notice the following:

1. Nasal Strengthening as a main phonological process which results in a Phonological Change when:

1.1 A non-aspirated sound, [ɬ] becomes an aspirated sound [tʰ]

1.2 A fricative sound, [ɬ] changes to an explosive [tʰ]

2. Plosivation as a sub-phenomenon which results after [ɬ] has been strengthened by [n] i.e. after Nasal Strengthening.

In Zulu/Xhosa, Nasal Strengthening again has caused the nasal prefix [n] to strengthen the voiceless radical alveolar fricative

[s] to a voiceless ejective alveolar affricate [ts']. Here, the following are taken into consideration:

1. Nasal Strengthening as a main phonological process has resulted in a phonological change when:
 - 1.1 A non-ejective sound [s] becomes an ejective [ts'].
 - 1.2 A fricative sound [s] changes to an affricate [ts'].
2. Affricatization as a phonological process has resulted after Nasal Strengthening i.e. after [n] has strengthened [s] to [ts'].

In both Zulu/Xhosa and Southern Sotho examples, we realize that neither Assimilation nor Dissimilation is involved as a phonological process; but Meinhof thinks that:

When two sounds immediately follow on one another they exert an influence on one another in two different ways which may be described as Assimilation and Dissimilation.

(Meinhof, 1983:13).

Meinhof refers to Assimilation and Dissimilation as the only two main phonological processes which occur as a result of the juxtaposition of two speech sounds. This is also another aim of this study i.e. to determine the main processes which causes some phonological changes, thus resulting in other processes in the sequence of [n] + [c] (where n = nasal prefix and c = consonant) in Zulu, Xhosa and Southern Sotho.

1.3 STATEMENT OF THE PROBLEM

Certain sound combinations in Zulu, Xhosa and Southern Sotho are inadmissible. These combinations will as a result of phonological processes lead to certain phonological changes. Usually, there are main phonological processes which as a result of phonological changes, result in other processes; for instance in the formation of passives in Zulu, the following may occur:

e.g. phupha > *phuphwa > phushwa

In this example, we notice that the sequential structure [c] + [c] (c = consonant) where both consonants are bilabials, i.e. [ph] and [w], is inadmissible in Zulu. When the two are in juxtaposition, Dissimilation takes place. The aspirated bilabial explosive [ph] changes to a palatal [ʃ], hence Palatalization. We therefore notice that Dissimilation has occurred first and resulted in Palatalization. The former is thus taken as the main process and the latter as its end result.

Ur-Bantu has a class 9 prefix "ni-" which is also found in Bantu Languages. In some of the Bantu Languages e.g. Zulu and Xhosa, it appears as "in(i)-" while in others e.g. Southern Sotho and Tswana, it is "n(i)-". In Bantu Languages, the vowel "i" of this prefix is always deleted so that the nasal prefix [n] is juxtaposed to a succeeding consonant at the beginning of certain

It is also necessary to distinguish clearly between the phenomena, Assimilation, Nasal Strengthening and Plosivation. According to Ziervogel et. al., Plosivation is only used in Sotho, because:

In Sotho the sounds produced are generally voiceless plosives e.g. tsh < s, tšh < š, th < r, etc. A term which covers the resultant changes is Plosivation.

(Ziervogel, et. al., 1967:71)

From the above quotation, we notice that even the affricates (tsh, tš) are referred to as plosives. Seemingly, Plosivation and Nasal Strengthening refer to one and the same process. This is inter alia seen when they say:

Plosivation is usually caused by nasals. Hence the terms Nasal Strengthening or Nasalization. When a nasal precedes another sound, Nasal Strengthening occurs.

(Ziervogel, et. al., 1967:334).

According to them, this term does not apply either in Zulu or Xhosa. In Zulu and Xhosa, they use the term Nasal Strengthening which overlaps with Nasalization when deverbatives and adjectives are formed from Class 9 prefix "in(i)-". It thus seems as if there is no clear distinction between Plosivation, Nasal Strengthening, Nasalization, Affricatization and perhaps Fortization.

Another problem arises when they say that the cause of Palatalization is the influence of a vowel or a semi-vowel equivalent of a vowel on the preceding consonant. This is observed when diminutives and passives are formed in Zulu, Xhosa and Southern Sotho.

Zulu/Xhosa: uphappe + -ana } *uphappeana } *uphaphyana } uphashana
Zulu : inkabi + -ana } *inkabiana } *inkabyana } inkatshana
Xhosa : inkabi + -ana } *inkabiana } *inkabyana } inkatyana
S.Sotho : bohobe + -ana } *bohobeana } *bchobyana } bohojana

Zulu/Xhosa: phupha } *phuphwa } phushhwa
 : gubha } *gubhwa } gujhwa
S.Sotho : bopa } *bophwa } bothwa
 : roba } *robhwa } rojhwa

According to the last Southern Sotho example above, we notice that Palatalization has in actual fact occurred as a result of Dissimilation. When the voiced bilabial explosive [b] and the voiced bilabial semi-vowel [w] (similar sounds) were in juxtaposition, they were made dissimilar. When a phonological change occurred the bilabial explosive [b] became a palatal fricative [ɸ], hence Palatalization. Palatalization may also occur as a result of Assimilation:

e.g. Zulu/Xhosa: in- + -jabula > injabulo [ɪndʒabulo]
S. Sotho : n(i)- + -ja > ntja [ntʃ'a]

In the above examples, the alveolar nasal becomes assimilated into the palatal sound which it precedes. It thus changes to a palatal nasal [ɲ], hence Palatalization. This study is therefore done in an attempt to discover the phonological processes which generate sub-phenomena, and the sequential structure conditions which are inadmissible in Zulu, Xhosa and Southern Sotho when the consonants are preceded by the nasal prefix [n].

1.4 RESEARCH METHODOLOGY

1.4.1 Preparatory Study

A number of lexical items which when prefixed with the Class 9 prefix "n(i)-/in(i)-" result in the formation of class 9 nouns (in Zulu, Xhosa and Southern Sotho), objectival concords of the first person singular (in Southern Sotho) and adjectival concords (in Zulu, Xhosa and Southern Sotho) have been collected. A preparatory study of the influence of the nasal prefix [n] on succeeding consonants was made by consulting various sources which will be listed in the bibliography. None of the authors of these sources has attempted a study based on comparing the influence of nasal prefix [n] on succeeding consonants in Zulu, Xhosa and Southern Sotho and none of them has actually gone deep into the phonological processes which may be generated by Assimilation and Nasal Strengthening. Kunene has somehow pointed out the main processes and sub-phenomena which are according to him (i.e. sub-phenomena) the sound changes.

Their information on the phonological changes which are as a result of the nasal prefix [n], has become evident in this research. For the sequence of consonants, the consonants which succeed the nasal prefix [n] have been grouped according to their natural classes. It has also been attempted to analyse the phonological rules and the sequential structure conditions through the aid of distinctive features in these languages. The phonological changes which the consonants undergo in matrices have also been analysed in this dissertation.

4.2 PRESENTATION OF STUDY

In Chapter 2 which deals with Zulu, the consonants which succeed the nasal prefix [n] have been grouped according to their natural classes i.e. plosives, fricatives, liquid and clicks. The phonological processes which cause phonological changes and result in sub-phenomena have been examined. The introduction of this chapter tries to distinguish clearly between a lenis and a fortis as well as between a fricative and an affricate. The distinctive features enable us to detect the underlying regularities in the phonological system of Zulu.

The summary of chapter 2 gives us the whole idea of the sequential structure of [n] + [c] in Zulu; where [n] represents the nasal prefix and [c], a succeeding consonant. The phonological rule which results from [n] + [c] if [c] is a natural class of phonemes is also given under the sequential structure constraints or conditions.

Chapter 3 deals with Xhosa. In this chapter the introduction gives a clearly distinct difference between Zulu and Xhosa speech sounds. A distinction is also made between fricatives and affricates. Again, the phonological processes which cause phonological changes and result in other processes have been thoroughly examined. The aid of distinctive features also enables us to detect the permissible sequence of consonants in Xhosa.

The summary of chapter 3 gives us the whole idea of the sequential structure of [n] + [c] in Xhosa. This enables us to compare the sequence of [n] + [c] in Zulu and Xhosa. The phonological rules which result from [n] + [c] if [c] is a natural class of phonemes is given under the sequential structure conditions.

In Chapter 4 which deals with Southern Sotho, the consonants are grouped according to natural classes, namely: explosives, fricatives, liquids, nasals and clicks. The introduction of this chapter gives a distinction between those speech sounds which occur in Southern Sotho only and those which occur only in Zulu and Xhosa and not in Southern Sotho. The phonological changes which are as a result of phonological processes have been explained. The results of phonological changes have also been explained.

The summary of chapter 4 gives us a clear picture of the sequence of [n] + [c] in Southern Sotho. This enables us to compare the sequence of [n] + [c] in Zulu, Xhosa and Southern Sotho and therefore deduce a phonological rule which is commonly applicable when the nasal prefix [n] precedes a consonant, [c] in Zulu, Xhosa

and Southern Sotho. The phonological rule which is applicable in the sequence of [n] + [c] if [c] is a natural class of phonemes in Southern Sotho, is given under the sequential structure conditions.

Chapter 5 gives us the summary of the investigation. A comparison is thus given to show the differences and similarities among the three languages. Findings and conclusions are also given.

1.5 A COMPARISON OF THE SOUND SYSTEMS OF ZULU, XHOSA AND SOUTHERN SOTHO

Zulu and Xhosa including Swazi are regarded as Nguni languages while Southern Sotho is one of the Sotho languages which also include Northern Sotho (Pedi) and Western Sotho (Tswana). When we look at the sound systems of Zulu and Xhosa compared to that of Southern Sotho, we find that they seem to be very close to one another.

In most cases, where Zulu and Xhosa have a voiced bilabial implosive [ɓ] as an initial consonant in verb stems, Southern Sotho will have a voiced bilabial explosive [b].

e.g. Zulu/Xhosa: <u>b</u> uza (ask)	Zulu/Xhosa: <u>b</u> asa (make fire)
S. Sotho : <u>b</u> utsa (ask)	S. Sotho : <u>b</u> esa (make fire)
Zulu/Xhosa: <u>b</u> ilisa (boil)	Zulu/Xhosa: <u>b</u> umba (mould/portray)
S. Sotho : <u>b</u> edisa (boil)	S. Sotho : <u>b</u> opa (mould/portray)
Zulu/Xhosa: <u>b</u> ona (see/they)	Zulu/Xhosa: <u>b</u> iza (call)
S. Sotho : <u>b</u> ona (see/they)	S. Sotho : <u>b</u> itsa (call)

Meinhof says:

The Sotho Language in many respects seems near enough to Zulu, yet the former often has fricatives where Zulu has plosives.

(Meinhof, 1984:178).

In consideration of the above statement, we can give the following examples:

Zulu/Xhosa: <u>pha</u> (give)	Zulu/Xhosa: <u>phambuka</u> (branch)
S. Sotho : <u>fa</u> (give)	S. Sotho : <u>fapoha</u> (branch)
Zulu/Xhosa: <u>phendula</u> (reply)	Zulu/Xhosa: <u>kuphela</u> (only)
S. Sotho : <u>fetula</u> (reply)	S. Sotho : <u>hofela</u> (only)
Zulu/Xhosa: <u>pheka</u> (cook)	Zulu/Xhosa: <u>phenduka</u> (turn)
S. Sotho : <u>pheha</u> (cook)	S. Sotho : <u>fetuha</u> (turn)

In some cases where Zulu and Xhosa have an aspirated alveolar explosive [th], Southern Sotho has an alveolar sound [r], for instance:

Zulu/Xhosa: <u>thanda</u> (love)	Zulu/Xhosa: <u>thuma</u> (send)
S. Sotho : <u>rata</u> (love)	S. Sotho : <u>roma</u> (send)
Zulu/Xhosa: <u>theza</u> (fetch wood)	Zulu/Xhosa: <u>thandaza</u> (pray)
S. Sotho : <u>rema</u> (fetch wood)	S. Sotho : <u>rapela</u> (pray)
Zulu/Xhosa: <u>thenga</u> (buy)	Zulu/Xhosa: <u>thunga</u> (mend)
S. Sotho : <u>reka</u> (buy)	S. Sotho : <u>ruka</u> (mend)

In other cases, the Zulu and Xhosa alveolar lateral non-fricative continuant, [l] remains unchanged in Southern Sotho, while in the former the ejective velar explosive [k'] appears as its voiced velar counterpart in nasal compound, for instance:

Zulu/Xhosa: lamba (to be hungry) Zulu/Xhosa: lungisa (repair/make)

S. Sotho : lapa (to be hungry) S. Sotho : lokisa (repair/make)

Zulu/Xhosa: landisa (explain/
tell) Zulu/Xhosa: langazelela
(eager to get something)

S. Sotho : latisa (explain/
tell) S. Sotho : lakaletša
(eager to get something)

Zulu/Xhosa: linga (try) Zulu/Xhosa: thengisa (sell)

S. Sotho : leka (try) S. Sotho : rekisa (sell)

1.6 WORKS OF PREVIOUS SCHOLARS

1.6.1 ZIERVOGEL

He is one of the greatest linguists who contributed a lot in the study of the Bantu Languages. Ziervogel has done a lot of work in the study of Phonetics and Phonology of Swazi, Zulu, Xhosa, Venda, Southern Sotho and other Bantu Languages. This is highlighted in one of his books, "Speech Sounds and Sound Changes of the Bantu Languages".

Ziervogel et. al. say that Assimilation in Zulu, Xhosa and Swazi occurs mainly as a result of class 9 nasal prefix [n] from the prefix "in-" and that of class 10. In Southern Sotho it is according to them as a result of the nasal prefix [n] from the

"N-" class 9 prefix and "diN-" class 10 prefix. This alveolar nasal becomes assimilated to the consonants which it precedes, such as [k], [dʒ], [ʃ] and [ph] in Zulu, Xhosa and Swazi. In Southern Sotho [n] is assimilated to [k'] and [p']. They have only given these two examples in the formation of objectival concords of the first person singular from the concord n in Southern Sotho. The nasal prefix [n] may also be assimilated to consonants [ʒ], [b] and [f] in Southern Sotho and [h] in Zulu and Xhosa.

When Ziervogel et. al. speak of Nasal Strengthening, they also refer to Nasalization. They say:

The term Nasalization derives its name from the alveolar nasal n of class prefix N- (Meinhof no.9) and M- (mu-, class 3) which causes certain sound changes with deverbatives. The term is especially applicable to the Nguni Languages since the influence of n in these languages is not uniform. In these Languages aspirated sounds become ejective, e.g. inkabi (ox) [ɪnk'aʃi] < -khaba (kick). Fricatives become affricates in Zulu and Xhosa but not in Swazi e.g. inhlalo [ɪntʰ'alo] (way of living) < -hlala [ɬala] (sit) in Zulu and Xhosa but [ɪnt'alo] in Swazi".

(Ziervogel et. al., 1967:71).

The term Nasal Strengthening is according to them applicable in both Nguni and Sotho Languages, but:

The term Plosivating is used for the Sotho Languages instead of Nasalization because the cause of the sound changes are not limited to the nasal. The sounds which develop are as a rule voiceless explosives or affricates, in other words they incline towards explosive sounds. c.f.

Nasalization. The term Strengthening or Nasal Strengthening is also acceptable, i.e. the sounds are "strengthened (by a nasal)" to a plosive, e.g. f > ph - mpha (give me) < -fa (give); -ipha (give oneself) < -fa (give).

(Ziervogel, et. al., 1967:71).

Labialization as a phonological process is according to them not a possible process to occur in Zulu and Xhosa, even though the following do occur:

e.g. Zulu/Xhosa: in(i)- + -biza > *inbizo > imbizo
: ezin(i)- + -bili > *ezinbili > ezimbili
: in(i)- + -fundisa > *infundiso > imfundiso
: in(i)- + -baza > *inbazo > imbazo

When the term labialization is defined, they say:

Labialization is a phenomenon in which non-labial consonants are changed in such a manner that they have to be pronounced with rounded lips.

(Ziervogel, et. al, 1967:70).

1.6.2 LOUW

He is one of the greatest scholars in the study of the African Languages. In his book, "Handboek van Xhosa" he deals with the Xhosa Grammar. He says that Zulu, Xhosa and Swazi form the Nguni Languages which consist of the biggest number of speakers of the African Language groups in South Africa.

When Louw talks about plosives he refers to explosives and an implosive [ɓ]. Unlike Ziervogel, he excludes affricates. He says that, when the devoiced plosives and click sounds are in nasal compound i.e. when they are preceded by a nasal, they become voiced. He also says that devoiced sounds are articulated without voice. He puts it thus:

Die plosiewe en suigklanke wat gedeeltelik stemloos gemaak word, word sonder enige stem geartikuleer totdat die spraakorgane op 'n baie ontspande manier ontsluit word sodat die stem wat daarna gehoor word, nie baie opvallend is nie.

Voorbeeld:

UGcaleka (uɔgalek'a)	- die vader van Hintsa
-gqala (-ɕala)	- aandag toespits op
amagxa (amaɣxa)	- skouers
-bhukuza (-ɓuk'uza)	- rooiklei te smeer
amadoda (amaɔɔda)	- mans
ukugula (ukugula)	- siek te wees
isidyoli (isiɔoli)	- spioen

Indien hierdie konsonante egter in nasaalverbindings gebruik word, word hulle met volle stem uitgespreek of dan gevokaliseer,

bv.:	-hamba (-hamba)	- loop
	indoda (indɔɔda)	- man
	ingozi (ingozi)	- gevaar
	indyebo (indɔɔɓɔ)	-oorvloed"

(Louw, 1978:18).

We notice from the first example above (i.e. "-hamba") that the "b" is in nasal compound and therefore a voiced bilabial explosive. When it is not accompanied by a nasal, it is an implosive [ɓ]. This means that Louw refers to [ɓ] as a plosive. He says that certain sound changes (which of course are as a result of phonological processes) in nasal compounds are described under Nasalization.

e.g. By intsimi is - simi die nominale stam en in die sing veroorsaak die nasaal van die prefiks dat die s verander in 'n affrikaat (n) ts.

(Louw, 1983:32).

The nasal prefix /n/ is also assimilated into a succeeding consonant. Louw says that the former is a phoneme which has allophones. He puts it thus:

Die alveolare nasale n is 'n foneem wat heel maklik gedeeltelik die kwaliteit kan oorneem van 'n volgende konsonant in nasaalverbindings. Daar bestaan op fonetiese gebied dus heelwat variante vir die foneem /n/, ---

(Louw, 1978:17).

1.6.3 MEINHOF

Carl Meinhof was born in July 1857 in Pommern. Later after his studies, he decided to take up the missionary work. During his time as a missionary, he was greatly attracted by the Bantu Languages. This was highlighted in his book, "Grundriss einer Lautlehre der Bantusprachen" published in 1899.

Meinhof's Ur-Bantu

The term "Bantu" was used +100 years ago by the philologist, Bleek who was a librarian to the Cape Governor, Sir George Grey. He used this term to refer to a person from conclusions he drew from the following:

Zulu : umuntu
Xhosa : umntu
Swazi : umuntfu

Sotho : motho
Venda : munhu
Tsonga : muthu

The term "Ur" is a Germanic term meaning "Proto". Meinhof studied the Bantu Phonology and postulated an original parent language which he termed 'Ur-Bantu'. This Ur-Bantu is a hypothetical original parent language from which the modern Bantu Languages have generated. Meinhof's Ur-Bantu consisted of:

... three basic vowels, a, i, u, with two light mixed-vowels, e, o, and two heavy mixed-vowels, i, a, these latter particularly being the cause of certain drastic sound-changes.

(Doke and Cole, 1969:71).

Meinhof had also basic consonants, namely:

- (1) the plosives, k, t, p
- (2) fricatives, ʃ, l, v
- (3) nasals, n, n, m
- (4) semi-vowels, y, w

He then added the derived sounds, k, t, l to these sounds.

A TABLE OF CORRESPONDENCES OF MEINHOF'S UR-BANTU AND ZULU,
 KHOSA AND SOUTHERN SOTHO NOUN CLASS PREFIXES.

<u>Class</u>	<u>Ur-Bantu</u>	<u>Zulu</u>	<u>Xhosa</u>	<u>S.Sotho</u>
1	*mu-	um(u)-	um-	mo-
2	*va	aba-	aba-	ba-
3	*mu-	umu-	umu-	mo-
4	*mi-	imi-	imi-	me-
5	*li-	i(li)-	i(li)-	le-
6	*ma-	ama-	ama-	ma-
7	*ki-	isi-	isi-	se-
8	*yî-	izi-	izi-	di-
9	*ni-	in(i)-	in(i)-	N-
10.	*li-ni-	izin-	i(z)i-	diN-
11.	*lu-	u(lu)-	u(lu)-	-
12.	*tu-	-	-	-
13.	*ka-	-	-	-
14.	*vu-	ubu-	ubu-	bo-
15.	*ku-	uku-	uku-	ho-
16.	*pa-	pha-	pha-	fa-
17.	*ku-	ku-	ku-	ho-
18.	*mu-	-	-	mo-
19.	*pî-	-	-	-
20.	*yu-	-	-	-
21.	*yî-	-	-	-

In an attempt to explain why sounds change from an Ur-Language to a spoken language, Meinhof gives a very sound reason. He says:

The spoken language does not remain as it is, but is subject to continual change as long as it is spoken at all. This generally takes place so very slowly that the speakers are very seldom aware of what is going on. Such change affects Grammar for instance, e.g. when a highly inflexional language like Latin loses its inflexions, or it may be the vocabulary that undergoes alterations. When through semantic change (change in meaning) words gradually lose their original meaning or function and finally fall into disuse, so that their place has to be taken by others. Such evolution is due to psychic and other causes ...

(Meinhof, 1984:12).

Meinhof says that the consonants may be juxtaposed and thus come into contact more especially, if the first of two syllables loses its vowel, as a result of the first syllable consisting of a nasal and a vowel in Bantu Languages. He continues and says:

N is assimilated to the following consonant. Before labials it becomes the labial m, before velars the velar n̄, before a cerebral it would of course remain cerebral n̄. When through any sound changes another articulation, is produced, n is still assimilated, so that it becomes palatal n̄ before palatals and dental n̄ before dentals.

(Meinhof, 1984:33).

1.6.4 KUNENE D.P.

When Kunene talks about Nasal Strengthening, he does somehow consider it as the main process which generates Explosivation (as he calls it) and Affricatization in Southern Sotho. He puts it as follows:

This is a blanket term used to cover a number of specific sound changes. The sounds which are liable to strengthening, and the sounds resulting from this process, are as follows:

b > p

f > ph

l > t

d > t

r > th

s > tsh

hl > tlh

j > tš

š > tšh

[g] > k or vowel and semivowel w
have placed before them

k

h > kh

g > kh

(Kunene, 1961:11)

When he mentions phonological processes which result from Nasal Strengthening, he says:

The Explosivation which takes place in strengthening, is necessary only for the achievement of the two changes mentioned above, as we will try to show presently ... it is clear that the Affrication and/or Explosivation of s to tsh, š to tšh, h and g to kg, hl to tlh, and f to ph, is also but a step in the same direction.

(Kunene, 1961:114).

In addition to the aforementioned, Kunene also views Assimilation as a main process which covers certain phonological processes. He says:

The various specific sound changes which take place in the Assimilation of consonants are labialization, prepalatalization, velarization and nasalization.

(Kunene, 1961:117)

When he describes Nasalization in Southern Sotho, he says:

Here b becomes m, and l becomes either m or n. This change takes place when the allomorph mo is prefixed to a stem commencing with the consonant b. The o of mo is elided, and the initial b of the stem is completely assimilated to the m. In other words, the sequence mob becomes mm.

Examples:

mmadi (reader)	mobadi
mmetli (carpenter)	mobetli
mmuso (government)	mobuso
mmona (see him)	mobona
mmatla (seek him)	mobatla

(Kunene, 1961:118).

1.6.5 CONCLUSION

Ziervogel et. al. make mention of Nasal Strengthening, Nasalization and plosivation (or Plosivating as they call it). There is no clear distinction between Nasal Strengthening and Plosivation. Even though they do not clearly define Nasalization, we may assume that by Nasalization, they refer to a phonological process occurring when a succeeding consonant becomes nasalized (during its production air escapes through the nasal cavity) as a result of the preceding nasal which is originally the [n] from "n(i)-" or "in(i)-". This may be taken from the paragraph quoted under his work on page 32 of this chapter.

The sounds which result from [n] + [c] in Southern Sotho are explosives and/or affricates; but they still refer to the resultant phonological process as Plosivation even if the resultant sound is an affricate. This shows that according to them Affricatization and Plosivation may still refer to one and the same process. Louw differs from them in that, according to him, plosives are explosives and implosives. But again like Ziervogel, he also states that there are sound changes which are described under Nasalization. In fact he does not speak of Nasal Strengthening being a process which results in the succeeding consonant being strengthened by a nasal.

Ziervogel et. al. also reject Labialization as a phonological process which occurs in Zulu and Xhosa. According to them, it takes place in Sotho and other languages. When Kunene talks about Labialization in Southern Sotho, he admits that the nasal prefix [n] which changes to [m] before bilabial consonants causes Labialization. This means that, because [n] does change to [m] in Zulu and Xhosa, the resultant phonological process is therefore to be named Labialization.

Kunene on the other hand, makes mention of Assimilation and Nasal Strengthening as "blanket terms" (as he calls them) which cover a number of specific sound changes. This means that Assimilation and Nasal Strengthening are to be considered as the main phonological processes which generate sub-phenomena. His definition of Nasalization is specifically based on the sound change which occurs when a non-nasal sound changes completely to a nasal. This means that in Southern Sotho, Nasalization is according to him as a result of Assimilation when [m] completely assimilates the [b] progressively. In this discussion, Nasalization will be taken as a phenomenon whereby a consonant succeeding a nasal becomes nasalized. Therefore, because Nasalization is in all respects the result of [n] + [c] in this discussion, it will thus be overlooked.

CHAPTER 2

2.0 THE INFLUENCE OF THE NASAL PREFIX /n/ ON SUCCEEDING CONSONANTS

IN ZULU

2.1 INTRODUCTION

The Zulu consonants are like in Xhosa and Southern Sotho, described in terms of manner and place of articulation. In Zulu, we have bilabial, labio-dental, alveolar, palato-alveolar, velar and glottal as places of articulation. According to the manner of articulation we have explosives, implosive, fricatives, affricates, nasals and liquids. The explosives and implosives form a class of sounds known as plosives. A plosive is a speech sound which is produced when air is blocked/stopped inside the mouth by both lips and thereafter released with a sudden explosion inside (implosive) or outside (explosive). According to Meinhof:

The position of the organs may be such that no air can pass through at all, and a stoppage is formed, e.g. before pronouncing p. Such sounds are therefore called "stops". When the closure is opened, the air rushes violently out, as it does from a bottle when the cork flies off, and the sound of an explosion is heard. For this reason they are also called plosives. Such are k, p, g, d, b.

(Meinhof, 1984:8).

The Zulu fricative sounds are lenes and not fortes. A lenis is a consonant which is produced with relaxed muscles, e.g. $\boxed{f, \beta, s}$ and a fortis is a consonant produced with tense organs or muscles, e.g. $\boxed{t'}$, k' , t' , \boxed{kxh} . Singh and Singh say:

The term 'fortes' suggests a greater amount of force, and the term 'lenes' suggests a smaller amount of force employed in the production of consonants.

(Singh and Singh, 1982:46).

These fricatives change to fortes only when they are accompanied by an alveolar nasal [n] which is of course subject to change because of the succeeding consonant when the process of Assimilation takes place.

The Zulu "j" is regarded by linguists such as for instance Ziervogel and Louw as a voiced pre-palatal affricate even though it is not accompanied by an alveo-palatal nasal [ɲ]. The Zulu dl [ɸ] on the other hand is regarded by the same linguists as a voiced alveolar lateral fricative if it is not accompanied by an alveolar nasal. The Southern Sotho j [ʒ] is always regarded as a voiced alveo-palatal fricative. From these statements, we notice that the Zulu "j" is according to Ziervogel and Louw a fortis and the dl [ɸ] a lenis which when accompanied by the nasal [n] changes to a fortis i.e. dl [ɸ̣n], a voiced alveolar lateral affricate. The Southern Sotho j [ʒ] is a fricative sound and also a lenis.

During the production of lenes as already mentioned, the organs or muscles are relaxed while in fortes they are tense. This means that a greater amount of force is needed to produce fortes and a lesser amount to produce lenes. When lenes e.g. [s], [f] are produced, the muscles of the cheeks are relaxed, and tense when producing fortes such as for instance, [nts'], [mpf']. During the

production of "j" in Zulu, the lesser amount of force is applied and at the same time, the muscles of the cheeks are relaxed, but in Xhosa the opposite happens. Seemingly, the Zulu "j" should be similar to, or more or less identical with that of Southern Sotho, because both are lenes, produced at the same place.

With a number of Zulu-speakers pronouncing "j" in words such as "-jabula, -jikijela, -jubalala", I concluded that to produce "j" in Zulu, one needs a smaller amount of force to apply which is equivalent to that applied during the production of dl [h] in Zulu and Xhosa, and in Southern Sotho. With this assertion, we may assume that Zulu has a voiced alveo-palatal fricative j [ʒ]. The Zulu "j" is thus similar to the Afrikaans j [ʒ], "n stemhebbende pre-palatale frikatief" found in words such as for instance "genie" [ʒeni]. The Xhosa j [dʒ] on the other hand is similar to the Afrikaans j [j], "n stemhebbende pre-palatale affrikaat" in a word such as for instance "julle" [jələ]. In this discussion, it must therefore be noted that the Zulu "j" will be treated as a voiced palato-alveolar/alveo-palatal/pre-palatal fricative [ʒ], i.e. a voiced counterpart of [ʃ].

It must also be noted that the Zulu [h] which occurs at the beginning of lexical items (when deverbatives are formed) is voiceless. The voiced one also occurs at the beginning of verb stems. Here are some of the examples:

- hamba > inkambo (procedure) ([h] is voiceless)
- hala (to rake) ([f] is voiced)
- hambisa > inkambiso (the procedure) ([h] is voiceless)

2.2 THE INFLUENCE ON THE NATURAL CLASSES OF PHONEMES

The natural classes of phonemes will be divided into plosives, fricatives, liquids and clicks. The change of the alveolar nasal [n] as a result of the succeeding consonant will also be looked into:

2.2.1 THE INFLUENCE ON PLOSIVES

When a voiced alveolar nasal [n] precedes a voiceless aspirated bilabial explosive [ph], the former changes its place of articulation and becomes a bilabial nasal [m]. The latter becomes a voiceless ejective bilabial explosive [p'].

e.g. in(i)- + -phila > *inphilo > impilo [imp'ilo]

in(i)- + -phendula > *inphendulo > impendulo [imp'endulo]

in(i)- + -phatha > *inphatho > impatho [imp'atho]

In the above examples, the aspirated bilabial explosive [ph] has partially assimilated (Assimilation) the voiced alveolar nasal [n] retrogressively, and the latter has changed to a bilabial nasal [m], hence the process Labialization. When Nasal Strengthening occurs, the bilabial nasal causes the aspirated bilabial explosive to become a voiceless ejective bilabial

explosive, hence the process, Plosivation. We therefore notice that four phonological processes have occurred here, namely: Assimilation, Labialization, Nasal Strengthening and Plosivation.

When we apply phonological rules (P-Rules), the above phonological changes can be illustrated as follows:

If : [n] + [ph] → [mp']
 Then : [n] → [m] / - [ph]
 [ph] → [p'] / [n] -

The feature specifications (F-S) of these Rules are:

P-Rule 1: [n] → [m] / - [ph]
 F-S

+nasal
-labial

 →

+labial

 / -

-sonorant
-continuant
+labial
-strident
+aspiration

P-Rule 2: [ph] → [p'] / [n] -
 F-S

-sonorant
-continuant
+aspiration
-strident
+labial

 →

-voice
-aspiration

 / -

+nasal

In P-Rule 1 (under F-S) above, the features, [-continuant, +labial] distinguish the bilabial explosives and labio-dental affricates from labio-dental fricatives which are [+continuant, +labial].

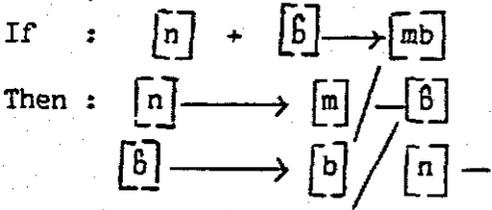
The features, $\boxed{-\text{sonorant}}$, $\boxed{-\text{strident}}$ distinguish explosives from semivowels which are $\boxed{+\text{sonorant}}$, $\boxed{-\text{strident}}$, and affricates which are $\boxed{-\text{sonorant}}$, $\boxed{+\text{strident}}$.

In P-Rule 2 (under F-S), the features, $\boxed{-\text{voice}}$, $\boxed{-\text{aspiration}}$ distinguish ejective explosives from voiced explosives which are $\boxed{+\text{voiced}}$, $\boxed{-\text{aspiration}}$ and aspirated explosives which are $\boxed{-\text{voice}}$, $\boxed{+\text{aspiration}}$.

If the voiced bilabial implosive $\boxed{\text{ɓ}}$ succeeds an alveolar nasal $\boxed{\text{n}}$, Assimilation also occurs. The bilabial implosive $\boxed{\text{ɓ}}$ partially assimilates the alveolar nasal $\boxed{\text{n}}$ and the latter changes to a bilabial nasal $\boxed{\text{m}}$. The bilabial implosive becomes so strengthened by $\boxed{\text{m}}$ that it changes its manner of articulation and becomes a voiced bilabial explosive $\boxed{\text{b}}$. Here again, the same processes which occurred in $\boxed{\text{n}}$ + $\boxed{\text{ph}}$ above, are the results.

- e.g. in(i)- + -biza > *inbizo > imbizo
- in(i)- + -baza > *inbazo > imbazo
- in(i)- + -bonga > *inbongi > imbongi

The phonological rules (P-Rules) will be as follows:



The feature specifications (F-S) are:

P-Rule 1: $[n] \longrightarrow [m] / -[ɓ]$

F-S $\begin{matrix} +nasal \\ -labial \end{matrix} \longrightarrow +labial / \begin{matrix} -sonorant \\ -continuant \\ +labial \\ +voice \\ +glottalic \\ -strident \end{matrix}$

P-Rule 2: $[ɓ] \longrightarrow [b] / [n] -$

F-S $\begin{matrix} -sonorant \\ -continuant \\ +glottalic \\ -strident \\ +labial \\ +voice \end{matrix} \longrightarrow -glottalic / +nasal -$

In P-Rule 2 (under F-S) above, the feature $[+glottalic]$ distinguishes implosives and ejective explosives from aspirated and voiced explosives which are $[-glottalic]$ because implosives and ejective sounds are produced through ingressive glottalic airstream mechanism. The implosive $[ɓ]$ is distinguished from the ejective bilabial explosive $[p']$ by the feature, $[+voice]$, though it is not included in the matrix, $[-glottalic]$. Only features which have changed are to be included in the matrix, after an arrow (it changes to).

The voiceless aspirated alveolar explosive $[tʰ]$ does not affect the alveolar nasal $[n]$ because both the former and the latter are alveolar sounds. This causes Assimilation not to occur. The voiced alveolar nasal $[n]$ strengthens the aspirated alveolar explosive $tʰ$ which then changes to an ejective counterpart i.e.

[t'], a voiceless ejective alveolar explosive, hence Plosivation.
 Only two phonological processes have occurred namely: Nasal
 Strengthening and Plosivation.

e.g. in(i)- + -thenga > *inthengo > intengo
 in(i)- + -thanda > *inthando > intando
 in(i)- + -thela > *inthela > intela

The phonological rule (P-Rule) here is:

If : [n] + [th] → [nt']
 Then : [th] → [t'] / [n] -

The feature specification (F-S) of this Rule is:

P-Rule: [th] → [t'] / [n] -

F-S

-sonorant
-continuant
-strident
+coronal
+anterior
+aspiration

→

-aspiration

/

+nasal
+anterior
+coronal

-

The devoiced alveolar explosive [t'] changes to a fully-voiced alveolar explosive [d] as a result of Nasal Strengthening. The same phonological processes which occurred in [n] + [th] also take place here.

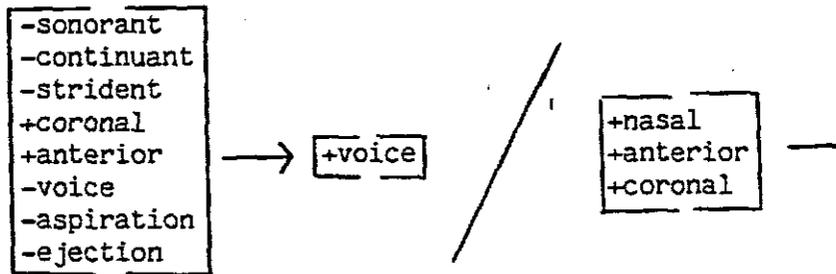
e.g. in(i)- + -dala > indalo (nature)
 in(i)- + -dumala > indumalo (disappointment)

The phonological rule (P-Rule) is as follows:

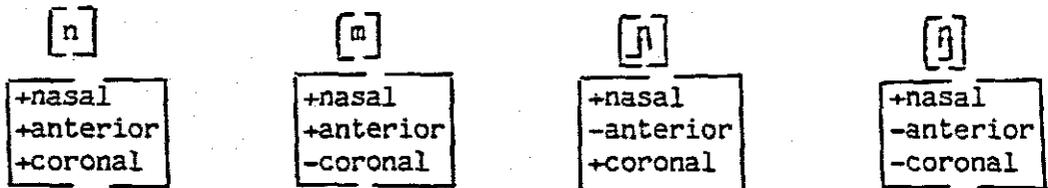
If : [n] + [d] → [nd]
 Then : [d] → [d]/[n] -

The feature specification (S-F) of this Rule is thus:

P-Rule: [d] → [d]/[n] -



The features, -voice, -aspiration, -ejection above, distinguish devoiced explosives from voiced (+voice), aspirated (+aspiration), and ejective (+ejection) explosives. The features +anterior, +coronal will distinguish alveolar nasal [n] from a bilabial nasal [m], a palato-alveolar nasal [ɲ] and a velar nasal [ŋ]. The distinctive features of these four nasals are as follows:



We therefore have to distinguish [n] from these other nasals because as it does not change when it precedes the alveolar sounds [tʰ] and [d], it is the only nasal which is responsible

for the change of [th] to [t'] and [d̥] to [d]. In [n] + [ɓ] → [mb] above, the [n] preceding [ɓ] and [m] in [mb] are both nasals. When the implosive [ɓ] occurs after a nasal [n], it changes to an explosive [b], and the [b] should always occur before a nasal [m] in Zulu. Therefore we need not differentiate between the two nasals n and m here because, if [ɓ] → [b] before a nasal, the nasal is predictably an alveolar nasal [n] which finally results in [m].

When a voiceless aspirated velar explosive [kh] is preceded by an alveolar nasal [n], the latter changes to [ŋ] and the former to [k'].

e.g. in- + -khuthala > *inkhuthalo > inkuthalo [ɪnk'uthalɔ]
 en- + -khulu > *enkhulu > enkulu [ɛnk'ulu]
 in- + -khokhela > *inkhokhelo > inkokhelo [ɪnk'ɔkheɪɔ]

Here, we notice that the succeeding aspirated velar explosive has partially assimilated the alveolar nasal [n]₅ which changed to a velar nasal [ŋ], hence Velarization. When Nasal Strengthening occurs, the [kh] became a fortis, a voiceless ejective velar explosive [p'], hence Plosivation. Four phonological processes have occurred here, namely: Assimilation, Velarization, Nasal Strengthening or Fortization and Plosivation.

The phonological rules of the above changes are:

If : [n] + [kh] → [ŋk']
 Then: [n] → [ŋ] / - [kh]
 [kh] → [k'] / [n] -

The feature specification of the above P-Rules will be as follows:

P-Rule 1 [n] → [ŋ] / - [kh]

F-S

+nasal
+anterior
+coronal

 →

-anterior
-coronal

 / -

-sonorant
-continuant
-strident
-anterior
-coronal
+aspiration

P-Rule 2: [kh] → [k'] / [n] -

-sonorant
-continuant
-strident
-anterior
-coronal
+aspiration

 →

-aspiration
+ejection

 /

+nasal
+anterior
+coronal

 -

The feature, -anterior distinguishes velar sounds from labials which are also -coronal while -strident will distinguish explosives from affricates which are +strident. Therefore, -strident, -coronal, -anterior will predictably be velar explosives.

The devoiced velar explosive [g̊] changes to a fully-voiced velar explosive [g] when succeeding the nasal [n]. The nasal [n] becomes a velar nasal [ŋ]. The same phonological processes which occurred above in [n] + [kh] → [ŋk'] also occur here.

The phonological rules (P-Rules) are as follows:

If : $[n] + [g] \rightarrow [ng]$
 Then : $[n] \rightarrow [ŋ] / -[g]$
 $[g] \rightarrow [g] / [n] -$

The feature specifications (F-S) are:

P-Rule 1: $[n] \rightarrow [ŋ] / -[g]$

F-S $\begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} \rightarrow \begin{matrix} -anterior \\ -coronal \end{matrix} / - \begin{matrix} -sonorant \\ -continuant \\ -strident \\ -anterior \\ -coronal \\ -voice \\ -aspiration \\ -ejection \end{matrix}$

P-Rule 2: $[g] \rightarrow [g] / [n] -$

$\begin{matrix} -sonorant \\ -continuant \\ -strident \\ -anterior \\ -coronal \\ -voice \\ -aspiration \\ -ejection \end{matrix} \rightarrow [+voice] / \begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} -$

2.2.2 The Influence on Fricatives

The Zulu fricative sounds are lenes and are labio-dentals, alveolars, palato-alveolars and glottals.

When a voiced alveolar nasal [n] precedes a voiceless radical labio-dental fricative [f] the former changes to a labio-dental nasal [m] and the latter, to a labio-dental affricate [ɸf']

e.g.: in(i)- + -fihla > *infihlo > imfihlo [imɸf'iɬɔ]
 in(i)- + -funda > *infundo > imfundo [imɸf'undɔ]
 in(i)- + -feketha > *infeketho > imfeketho [imɸf'ɛkethɔ]

In the afore-mentioned examples, the alveolar nasal [n] becomes partially assimilated by labio-dental fricative [f]. The former changes to a labio-dental nasal [m], hence Labialization and the latter is strengthened by the nasal. As a result of Nasal Strengthening, the labio-dental fricative [f] changes to a voiceless ejective labio-dental affricate [ɸf'], hence Affricatization.

The phonological rules of these changes are:

If : [n] + [f] → [mɸf']
 Then : [n] → [m] / - [f]
 [f] → [ɸf'] / [n] -

The feature specifications of these phonological rules are as follows:

P-Rule 1: [n] → [m] / - [f]
 F-S [+nasal] [-labial] → [+labial] / - [+continuant] [+strident] [+labial] [-voice]

The feature $[-\text{voice}]$ above, distinguishes radical fricatives from fricatives ($[\text{+continuant}, \text{+strident}]$) which are voiced, because voiceless fricatives are neither aspirated nor ejective. Therefore, $[-\text{voice}]$ fricatives will predictably be radical fricatives. This means that all radical fricatives are by implication $[-\text{voice}]$.

The voiced labio-dental fricative $[v]$ changes to a voiced labio-dental affricate $[\phi v]$ when it succeeds the nasal $[n]$. The alveolar nasal $[n]$ changes to a labio-dental nasal $[\eta]$.

e.g.: $in(i)- + -vamisa \rangle *invamisa \rangle imvamisa$ $[\text{in}\phi\text{v}\text{amisa}]$
 $in(i)- + -vubela \rangle *invubelo \rangle imvubelo$ $[\text{in}\phi\text{v}\text{ubel}\phi]$
 $in(i)- + -vunula \rangle *invunulo \rangle imvunulo$ $[\text{in}\phi\text{v}\text{unul}\phi]$

What we notice here is that the same phonological processes which occurred in $[n] + [f] \rightarrow [\text{mpf}']$ also occur.

The phonological rules (P-Rules) are as follows:

If : $[n] + [v] \rightarrow [\text{in}\phi\text{v}]$
 Then : $[n] \rightarrow [\eta] / -[v]$
 $[v] \rightarrow [\phi v] / [n] -$

The feature specifications (F-S) of these phonological rules are:

P-Rule 1: [n] → [ɲ] / -[v]

F-S: $\begin{bmatrix} +nasal \\ +labial \end{bmatrix} \longrightarrow \begin{bmatrix} +labial \end{bmatrix} / - \begin{bmatrix} +continuant \\ +strident \\ +labial \\ +voice \end{bmatrix}$

P-Rule 2: [v] → [ɓv] / [n] -

F-S: $\begin{bmatrix} -continuant \\ +strident \\ +labial \\ +voice \end{bmatrix} \longrightarrow \begin{bmatrix} -strident \end{bmatrix} / \begin{bmatrix} +nasal \\ +anterior \\ +coronal \end{bmatrix} -$

The Zulu alveolar fricatives are divided into two: There are those which are lateral fricatives, such as [ɸ, ɸ̣] and those which are non-lateral, such as [s, z]. As already mentioned, the juxtaposition of alveolar sounds does not result in Assimilation. The nasal only strengthens the succeeding consonant.

e.g.: in(i)- + -hlala > inhlalo [ɪntɸ̣'alo]
 in(i)- + -hlupha > inhlupho [ɪntɸ̣'upho]
 en(i)- + -hle > enhle [ɛntɸ̣'ɛ]

In the above examples, the alveolar nasal [n] strengthens the voiceless radical alveolar lateral fricative [ɸ̣] and the latter changes its manner of articulation and becomes a voiceless ejective alveolar lateral affricate [tɸ̣'], hence Affricatization.

The phonological rule (P-Rule) can be represented as:

If : [n] + [ɸ̣] → [ntɸ̣']
 Then : [ɸ̣] → [tɸ̣'] / [n] -

The feature specification of this rule is:

P-Rule : $\boxed{t\phi}$ \longrightarrow $\boxed{t\phi'}$ / \boxed{n} -

F-S $\begin{array}{|l|} \hline +\text{continuant} \\ +\text{strident} \\ +\text{lateral} \\ +\text{anterior} \\ +\text{coronal} \\ -\text{voice} \\ \hline \end{array}$ \longrightarrow $\begin{array}{|l|} \hline -\text{continuant} \\ +\text{ejection} \\ \hline \end{array}$ / $\begin{array}{|l|} \hline +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \\ \hline \end{array}$ -

When the alveolar nasal \boxed{n} precedes a voiced alveolar lateral fricative \boxed{h} , the fricative changes to a voiced alveolar lateral affricate dl \boxed{dh} as a result of Nasal Strengthening.

e.g. in(i)- + -dlulamithi (-dlula + imithi) > indlulamithi $\boxed{\text{indhulamithi}}$

We can represent the phonological rule (P-Rule) as follows:

If : \boxed{n} + \boxed{h} \longrightarrow \boxed{ndh}
 Then: \boxed{h} \longrightarrow \boxed{dh} / \boxed{n} -

The feature specification (F-S) will be:

P-Rule: \boxed{h} \longrightarrow \boxed{dh} / \boxed{n} -

F-S $\begin{array}{|l|} \hline +\text{continuant} \\ +\text{strident} \\ +\text{lateral} \\ +\text{anterior} \\ +\text{coronal} \\ +\text{voice} \\ \hline \end{array}$ \longrightarrow $\begin{array}{|l|} \hline -\text{continuant} \\ \hline \end{array}$ / $\begin{array}{|l|} \hline +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \\ \hline \end{array}$ -

The voiceless radical alveolar fricative \boxed{s} changes to a voiceless ejective alveolar affricate $\boxed{ts'}$ as a result of Nasal Strengthening.

e.g. in(i)- + -salela > insalela ints'alɛla
 in(i)- + -sola > insolo ints'ɔlɔ
 in(i)- + -sindisa > sindisa ints'indisɔ

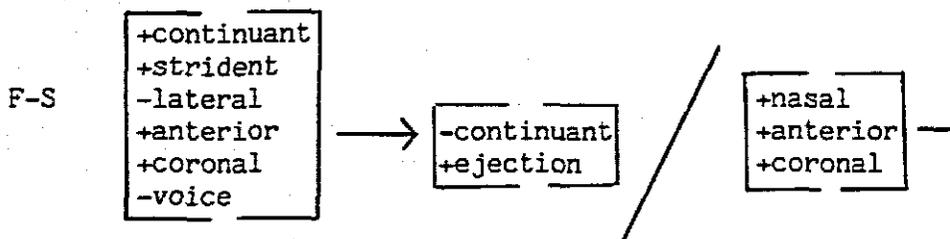
The phonological rule states thus:

If : [n] + [s] → nts'

Then : [s] → [ts'] / [n] -

The feature specification (F-S) is:

P-Rule: [s] → [ts'] / [n] -



The voiced alveolar fricative [z] will always change to a voiced alveolar affricate [dz] as a result of the alveolar nasal [n], which it succeeds during Nasal Strengthening.

e.g. in(i)- + -zala > inzalo indzalnɔ
 in(i)- + -zuza > inzuzo indzuzɔ
 in(i)- + -zila > inzilo indzilɔ

The phonological rule displayed by the above examples is:

If : [n] + [z] → ndz

Then : [z] → [dz] / [n] -

The feature specification (F-S) of this P-Rule is:

P-Rule: [z] → [dz] / [n] -

F-S

+continuant
+strident
-lateral
+anterior
+coronal
-voice

→

-continuant
+ejection

/

+nasal
+anterior
+coronal

-

The feature, [-lateral] above distinguishes an alveolar fricative [z] from an alveolar lateral fricative [ɸ] which is [+lateral, +continuant, +strident].

If the voiced alveolar nasal [n] precedes a voiceless radical alveo-palatal fricative [ʃ] we notice the following:

e.g. in(i)- + -shisekela > *inshisekelo > intshisekelo [ɪntʃ'isek'elo]
 in(i)- + -shumayela > *inshumayelo > intshumayelo [ɪntʃ'umajelo]
 en(i)- + -sha > *ensha > entsha [ɛntʃ'a]

The alveo-palatal fricative [ʃ] partially assimilates the alveolar nasal n and the latter changes to an alveo-palatal nasal [ɲ], hence the process Palatalization. When Nasal Strengthening occurs, the alveo-palatal fricative [ʃ] changes to a voiceless ejective alveo-palatal affricate [tʃ'], hence Affricatization.

The phonological rules are as follows:

If : [n] + [ʃ] → [ɲtʃ']
 Then : [n] → [ɲ] / - [ʃ]
 [ʃ] → [tʃ'] / [n] -

The feature specifications(F-S) of these P-rules are as follows:

P-Rule 1: [n] → [ɲ] / - [S]

F-S

+nasal
+anterior
+coronal

 →

-anterior

 / -

+continuant
+strident
+coronal
-anterior
-voice

P-Rule 2: [S] → [tʃ] / [n] -

F-S

+continuant
+strident
+coronal
-anterior
-voice

 →

-continuant

 /

+nasal
+anterior
+coronal

 -

When the voiced alveo-palatal fricative [ʒ] succeeds an alveolar nasal n , the following takes place:

e.g.: in(i)- + -jabula > injabulo [ɲdʒabulo]
 in(i)- + -jula > injula [ɲdʒula]
 in(i)- + -jwayela > injwayelo [ɲdʒwajelo]

The voiced alveo-palatal fricative [ʒ] partially assimilates the alveolar nasal [n] retrogressively such that the latter changes its place of articulation and becomes an alveo-palatal nasal [ɲ], hence Palatalization. When Nasal Strengthening occurs, the alveo-palatal fricative [ʒ] changes its manner of articulation and becomes a voiced alveo-palatal affricate [dʒ], hence Affricatization.

The above-mentioned changes can be represented by phonological rules (P-Rules) as follows:

If : [n] + [ɣ] → [ɲdɣ]
 Then : [n] → [ɲ] / - [ɣ]
 [ɣ] → [dɣ] / [n] -

The feature specifications (F-S) of these phonological rules are:

P-Rule 1: [n] → [ɲ] / - [ɣ]

F-S

+nasal
+anterior
+coronal

 →

-anterior

 / -

+continuant
+strident
+coronal
-anterior
+voice

P-Rule 2: [ɣ] → [dɣ] / [n] -

F-S

+continuant
+strident
+coronal
-anterior
+voice

 →

-continuant

 /

+nasal
+anterior
+coronal

It must be borne in mind that the feature [+coronal] distinguishes alveolar and palato-alveolar sounds from labials, velars and glottals which are [-coronal] while [+coronal, -anterior] will distinguish palato-alveolar sounds from alveolars which are [+coronal, +anterior].

It is interesting to notice the phonological changes which occur when the nasal prefix [n] precedes the glottal fricative [h]. The following are some of the examples where n precedes [h].

e.g. in(i)- + - hamba > *inhambo

inɣambɔ

 > inkambo

inɣambɔ

 in(i)- + -hambisa > *inhambiso

inɣambisɔ

 > inkambiso

inɣ'ambisɔ

Firstly, the alveolar nasal [n] causes the voiceless glottal fricative [h] to change its place of articulation and becomes a voiceless radical velar fricative [x]. This is caused by the fact that the two sounds in juxtaposition i.e. [n] + [h] must have a common feature according to the ⁸place of articulation in order that they may be homorganic sounds. In other words, one sound must assimilate at least one quality of another, i.e. partial Assimilation. The glottal fricative [h] thus loses the glottal quality and assumes a common place, the velar quality i.e. [x]. This is what we may call the first Nasal Strengthening because [x] is a lenis it has to be strengthened for the second time to a fortis.

The velar fricative [x] then partially assimilates the alveolar nasal [n] and the latter changes to a velar nasal [ŋ], hence Velarization. When the second Nasal Strengthening occurs, the velar nasal [ŋ] strengthens the velar fricative [x] and the latter becomes a voiceless ejective velar explosive [k'], hence Plosivation. We therefore realise that we have double Strengthening here.

The phonological rules (P-Rules) are as follows:

If : [n] + [h] → [ŋk']
 Then : [n] → [ŋ] / -[h]
 [h] → [k'] / [n] -

The feature specifications (F-S) of these phonological rules (P-Rules) can be illustrated as follows:

P-Rule 1: [n] → [ŋ] / -[h]

F-S

+nasal +anterior +coronal	→	-anterior -coronal	/	-	+continuant -strident -anterior -coronal -voice
---------------------------------	---	-----------------------	---	---	---

P-Rule 2: [h] → [kʰ] / [n] -

F-S

+continuant -strident -anterior -coronal -voice	→	-continuant +ejection	/	-	+nasal +anterior +coronal
---	---	--------------------------	---	---	---------------------------------

2.2.3. The Influence on Liquids

The Zulu [l] which is a voiced alveolar lateral non-fricative continuant is a lenis. If the sound is preceded by an alveolar nasal [n] it changes to a fortis. This is inter alia observed in the following examples:

e.g. in(i)- + -lima > *inlima > indima
 in(i)- + -linganisa > *inlinganiso > indinganiso

It is likely possible that the Zulu [ɖ], a devoiced alveolar explosive (a lenis) and [d], a voiced or fully-voiced alveolar explosive (a fortis) must have developed out of [l] as a result of Nasal Strengthening and/or sound-shift. Some of the Zulu-speakers still use the verb "-loba" (fishing) while most have shifted to [ɖ] i.e. "-doba". The plural form of the noun is "izindobo"

(fishing rods or fishing hooks) and this shows that the alveolar nasal prefix [n] of class 10 "izin-" has strengthened the [l], which has finally become [d] i.e. izin- + -loba > *izinlobo > izindobo. Meinhof says:

... u-do'bo pl. izindo'bo 10 "fish-hook"
 from lo'ba "catch fish". The verb - do'ba id.
 also occurs, and is perhaps derived from the
 noun or by analogy with it.

(Meinhof, 1984:87).

The phonological rule (P-Rule) of this change is as follows:

If : [n] + [l] → [nd]
 Then : [l] → [d] / [n] -

The feature specification (F-S) of the P-Rule above is:

P-Rule : [l] → [d] / [n] -

F-S

+sonorant	→	-sonorant	/	+nasal	-
+continuant		-continuant		+anterior	
+lateral		-lateral		+coronal	
+anterior		-strident			
+coronal		+voice			

The Zulu [r] which is a voiced alveolar rolled vibrant is a kind of speech sound which is borrowed from other languages, especially English and/or Afrikaans. The [r] does not feature in this discussion.

e.g. irula
 irabha
 ilori

2.2.4 The Influence on Clicks

Click sounds also known as suction sounds are a type of speech sounds or consonants which were borrowed from the Khōisan family of languages i.e. Bushman and Hottentot Languages. Louw agrees:

Die suigklanke of soos hulle meer populêr bekend staan klapklanke, is die spraakklanke wat vroeër oorgeneem is uit die Boesman -en/of Hottentotdialekte.

(Louw, 1978:13).

The click sounds are according to their place of articulation, divided into three types, namely: the dental, alveo-palatal and lateral clicks. Zulu has all these three kinds.

When a voiced alveolar nasal [n] precedes a voiceless radical dental click [ʘ] the following occurs:

e.g. in(i)- + -ceba > *incebo > ingcebo [ɪŋ/gɛʘ]
in(i)- + -caca > *incaca > incgaca [ɪŋ/ga/a]
in(i)- + -cacisa > *incaciso > incgaciso [ɪŋ/ga/isʘ]

What we notice above, is that the voiceless radical dental click [ʘ] partially assimilates the alveolar nasal [n] retrogressively and the latter changes to a voiced velar nasal [ŋ], hence Velarization. This is caused by the fact that during the

production of clicks the back of the tongue is always raised so as to touch the velum. When Nasal Strengthening occurs, the voiceless radical dental click [ʄ] changes to a fully-voiced dental click [ɠ].

The phonological rules (P-Rules) of the above representations are:

If : [n] + [ʄ] — [ɠ/ɠ]
 Then : [n] → [ŋ] / - [ʄ]
 [ʄ] → [ɠ] / [n] -

The feature specifications (F-S) of the above P-Rules are:

P-Rule 1: [n] → [ŋ] / - [ʄ]

F-S

+nasal
+anterior
+coronal

 →

-anterior
-coronal

 / —

-sonorant
-continuant
-strident
+velaric
+anterior
+coronal
-voice
-aspiration

P-Rule 2: [ʄ] → [ɠ] / [n] -

F-S

-sonorant
-continuant
-strident
+veralic
+anterior
+coronal
-voice
-aspiration

 →

+voice

 / —

+nasal
+anterior
+nasal

With the voiceless aspirated dental click [ʄʰ] the following occurs:

e.g. in(i)- + -chazela > *inchazelo > incazelo iŋ/azɛlɔ
 in(i)- + -chwensa > *inchwenso > incwenso iŋ/wɛnts'ɔ
 in(i)- + -chithakala > *inchithakalo > incithakalo iŋ/ithakalɔ

The voiced alveolar nasal [n] becomes partially assimilated into the aspirated dental click [h] thus becoming a velar nasal [ŋ], hence Velarization. As a result of Nasal Strengthening, the aspirated dental click becomes a voiceless nasalized dental click [h̥], hence the process, Nasalization.

We may represent Phonological Rules (P-Rules) for the above changes as follows:

If : [n] + [h] — [ŋ]
 Then : [n] —> [ŋ] / - [h]
 [h] —> [h̥] / [n] -

The feature specifications (F-S) can be illustrated thus:

P-Rule 1: [n] —> [ŋ] / - [h]

F-S +nasal
+anterior
+coronal —> -anterior
-coronal / — -sonorant
-continuant
-strident
+velaric
+anterior
+coronal
-voice
-aspiration

P-Rule 2: $[\text{h}] \longrightarrow [\text{ʔ}]/[\text{n}] -$

F-S

-sonorant -continuant -strident +veralic +anterior +coronal +aspiration	→	-aspiration	/	+nasal +anterior +coronal	-
---	---	-------------	---	---------------------------------	---

If the voiced alveolar nasal prefix $[\text{n}]$ precedes a voiceless radical alveo-palatal click $[\text{ʔ}]$ the following changes occur:

e.g. in(i)- + -qonda > *inqondo > ingqondo inʔgonda
 in(i)- + -qala > *inqala > ingqala inʔgala
 in(i)- + -qaphela > *inqapheli > ingqapheli inʔgapheli

The voiceless radical alveo-palatal click $[\text{ʔ}]$ partially assimilated the alveolar nasal $[\text{n}]$. The latter loses its place of articulation and changes to a velar nasal $[\text{ŋ}]$, thus resulting in Velarization. When Nasal Strengthening occurs, the nasal causes the alveo-palatal click $[\text{ʔ}]$ to become a fully voiced alveo-palatal click $[\text{!g}]$.

The representations of the above phonemic analysis are:

If : $[\text{n}] + [\text{ʔ}] \longrightarrow [\text{ŋ!g}]$
 Then : $[\text{n}] \longrightarrow [\text{ŋ}]/-[\text{ʔ}]$
 $[\text{ʔ}] \longrightarrow [\text{!g}]/[\text{n}] -$

The feature specifications (F-S) of these representations are as follows:

P-Rule 1: [n] → [ŋ] / -[!]

F-S

+nasal
+anterior
+coronal

→

-anterior
-coronal

/

-sonorant
-continuant
-strident
+velaric
+coronal
-anterior
-voice
-aspiration

P-Rule 2: [!] → [!g] / [n] -

F-S

-sonorant
-continuant
-strident
+velaric
+coronal
-anterior
-voice
-aspiration

→

+voice

/

+nasal
+anterior
+nasal

It must however be noted that the feature [+velaric] distinguishes velar sounds e.g. [ŋ], [kʷ], [g] and click sounds from all other sounds while the features [+velaric, +coronal] will distinguish clicks from non-click velar sounds which are [-coronal]. The feature [-anterior] also distinguishes alveo-palatal clicks above, from dental clicks which are [+anterior].

The voiceless aspirated alveo-palatal click, [!h] is also affected when it is preceded by the nasal prefix [n].

e.g. in(i)- + -qhuba > *inqhubo > inqubo [iŋ!uβɔ]
 in(i)- + -qhubeka > *inqhubeko > inqubeko [iŋ!uβɛkɔ]

After the alveo-palatal click [!h] has assimilated the nasal [n] retrogressively, Nasal Strengthening occurs. The aspirated click [!h] changes to an unaspirated [!]. The above Phonic Representations can be illustrated as follows:

If : [n] + [!h] → [ŋ!]
 Then : [n] → [ŋ] / - [!h]
 [!h] → [!] / [n]

We can then illustrate the feature specifications (F-S) of these phonological rules (P-Rules) as follows:

P-Rule 1: [n] → [ŋ] / - [!h]

F-S

+nasal
+anterior
+coronal

 →

-anterior
-coronal

 / -

-sonorant
-continuant
-strident
+velaric
+coronal
-anterior
+aspiration

P-Rule 2: [!h] → [!] / [n] -

F-S

-sonorant
-continuant
-strident
+velaric
+coronal
-anterior
+aspiration

 →

-aspiration

 /

+nasal
+anterior
+coronal

When the voiceless radical lateral click [//] is preceded by the nasal prefix [n], we notice the following:

e.g. in(i)- + -xabana } *inxabano } ingxabano $\boxed{\text{in} // \text{gabano}}$
 in(i)- + -xoxa } *inxoxo } ingxoxo $\boxed{\text{in} // \text{goxo}}$
 in(i)- + -xathu } *inxathu } ingxathu $\boxed{\text{in} // \text{gathu}}$

In the above examples, the voiceless radical lateral click $\boxed{//}$ partially assimilates the alveolar nasal $\boxed{\text{n}}$ and the latter changes to a velar nasal $\boxed{\text{ŋ}}$, hence Velarization. When Nasal Strengthening occurs, the radical lateral click $\boxed{//}$ changes to a fully-voiced lateral click $\boxed{//g}$.

The phonological rules (P-Rules) of these phonemic representations are:

If : $\boxed{\text{n}} + \boxed{//} \rightarrow \boxed{\text{ŋ} // \text{g}}$
 Then : $\boxed{\text{n}} \rightarrow \boxed{\text{ŋ}} / - \boxed{//}$
 $\boxed{//} \rightarrow \boxed{//g} / \boxed{\text{n}} -$

The phonetic features of these P-Rules can be represented as follows:

P-Rule 1: $\boxed{\text{n}} \rightarrow \boxed{\text{ŋ}} / - \boxed{//}$

F-S $\boxed{\begin{array}{l} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{array}} \rightarrow \boxed{\begin{array}{l} -\text{anterior} \\ -\text{coronal} \end{array}} / - \boxed{\begin{array}{l} -\text{sonorant} \\ -\text{continuant} \\ -\text{strident} \\ +\text{velaric} \\ +\text{lateral} \\ -\text{voice} \\ -\text{aspiration} \end{array}}$

P-Rule 2: $\boxed{[//]} \longrightarrow \boxed{[//g]} / \boxed{[n]} -$

F-S $\boxed{\begin{array}{l} -sonorant \\ -continuant \\ -strident \\ +velaric \\ +lateral \\ -voice \\ -aspiration \end{array}} \longrightarrow \boxed{+voice} \quad / \quad \boxed{\begin{array}{l} +nasal \\ +anterior \\ +coronal \end{array}} -$

The voiceless aspirated lateral click $\boxed{[//h]}$ also assimilates the nasal prefix $\boxed{[n]}$ and the latter becomes a velar nasal $\boxed{[ŋ]}$. As a result of Nasal Strengthening the aspirated lateral click $\boxed{[//h]}$ becomes voiceless nasalized lateral click. This is approved in the following example :

e.g. in(i)- + -xhoza > *inxhoza > inxoza $\boxed{[iŋ//xza]}$
 in(i)- + -xhakaxhaka > *inxhakaxhaka > inxakaxhaka $\boxed{[iŋ//akaxhaka]}$

The phonological rules (P-Rules) of the above phonetic representations are:

If : $\boxed{[n]} + \boxed{[//h]} \longrightarrow \boxed{[ŋ//]}$
 Then : $\boxed{[n]} \longrightarrow \boxed{[ŋ]} / - \boxed{[//h]}$
 $\boxed{[//h]} \longrightarrow \boxed{[//]} / \boxed{[n]} -$

The feature specifications (F-S) of these phonological rules (P-Rules) are:

P-Rule 1: $\boxed{[n]} \longrightarrow \boxed{[ŋ]} / - \boxed{[//h]}$

F-S $\boxed{\begin{array}{l} +nasal \\ +anterior \\ +coronal \end{array}} \longrightarrow \boxed{\begin{array}{l} -anterior \\ -coronal \end{array}} \quad / \quad \boxed{\begin{array}{l} -sonorant \\ -continuant \\ -strident \\ +velaric \\ +lateral \\ +aspiration \end{array}}$

P-Rule 2: $\boxed{[h]}$ \longrightarrow $\boxed{[ʔ]}$ / $\boxed{[n]}$ -

F-S $\boxed{\begin{matrix} -\text{sonorant} \\ -\text{continuant} \\ -\text{strident} \\ +\text{verbalic} \\ +\text{lateral} \\ -\text{aspiration} \end{matrix}}$ \longrightarrow $\boxed{-\text{aspiration}}$ / $\boxed{\begin{matrix} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{matrix}}$ -

2.2.5 The Influence on the Nasal

As a result of the succeeding consonant, the nasal prefix $\boxed{[n]}$ changes its place of articulation and becomes:

An alveo-palatal nasal $\boxed{[ɲ]}$:

e.g. in(i)- + -tshontsha > intshontsho $\boxed{[ɲtʃ'ɔntʃ'ɔ]}$
 in(i)- + -shumayela > intshumayelo $\boxed{[ɲtʃ'umajɛlɔ]}$
 in(i)- + -jabula > injabulo $\boxed{[ɲdʒabulɔ]}$

The feature specification (F-S) indicating the change of the nasal can be represented as:

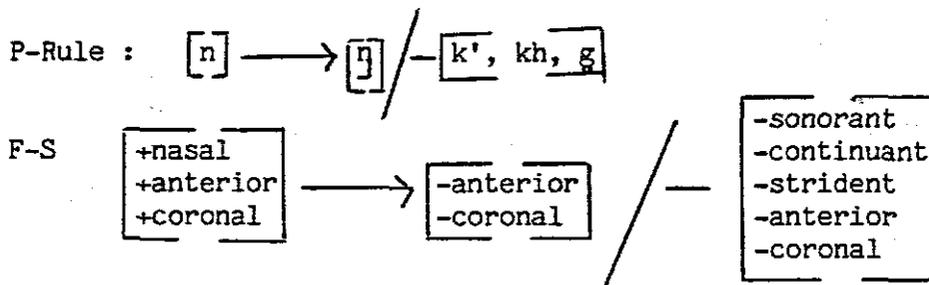
P-Rule : $\boxed{[n]}$ \longrightarrow $\boxed{[ɲ]}$ / $\boxed{-\text{tʃ', ʃ, ʒ}}$

F-S $\boxed{\begin{matrix} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{matrix}}$ \longrightarrow $\boxed{-\text{anterior}}$ / $\boxed{\begin{matrix} -\text{continuant} \\ +\text{strident} \\ -\text{anterior} \\ +\text{coronal} \end{matrix}}$

A velar nasal $\boxed{[ŋ]}$:

e.g. in(i)- + -khathaza > inkathazo $\boxed{[ŋk'athazɔ]}$
 in(i)- + -khuthala > inkuthalo $\boxed{[ŋk'uthalɔ]}$
 en(i)- + -khulu > enkulu $\boxed{[ŋk'ulu]}$

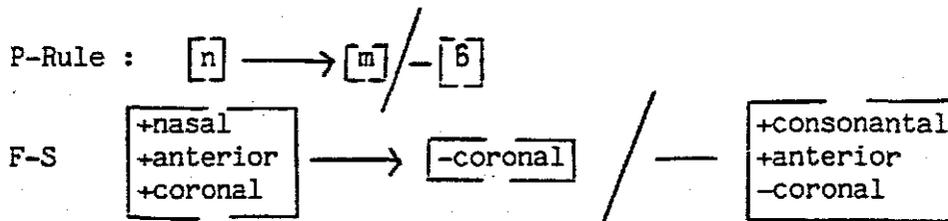
The feature specification (F-S) of this phonological rule (P-Rule) is:



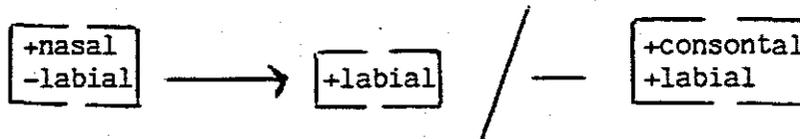
A bilabial nasal [m] :

- e.g. in(i)- + -baza > imbazo
 in(i)- + -bonga > imbongi
 en(i)- + -bi > embi

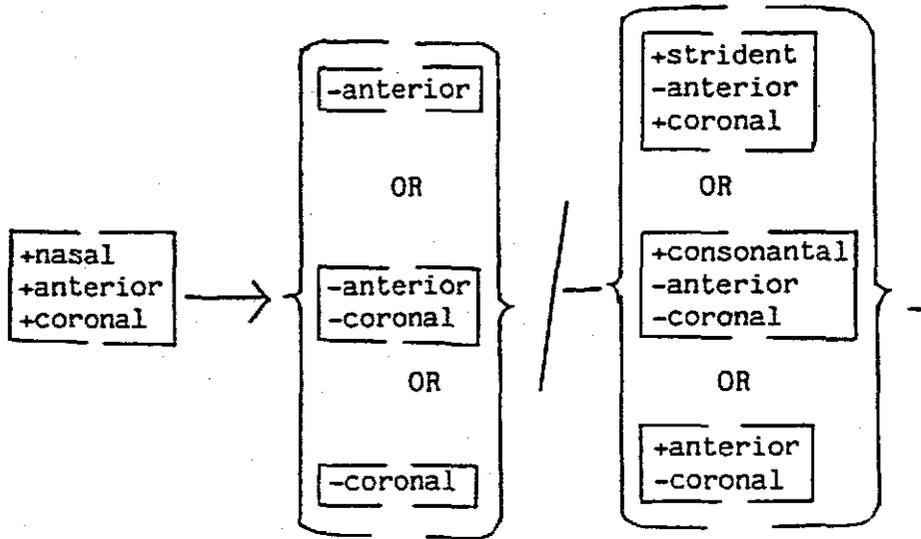
The feature specification (F-S) can be illustrated as follows:



OR



The feature specifications (F-S) of the change of the alveolar nasal [n] may also be illustrated as follows:



2.3 DEFINITION OF TERMS USED

1. Assimilation

This term describes a phonological change occurring between two dissimilar speech sounds following on one another, in such a way that either of the two acquires the qualities or characteristics of another. Senekal et. al. admit:

Dit beteken in die fonetiek die gelykmaking van n klank aan sy klankomgewing.

(Senekal et. al., 1981:18).

Assimilation has a natural explanation in coarticulation. During the production of a sound, the organs of articulation may be anticipating the production of another sound, and consequently the first sound will be modified in the direction of the second or the articulation of the first may be carried over into that of the second. (Schane, 1973:61).

Meinhof confirms this:

The cause of assimilation is that the speaker, while uttering one sound has the next already in the mind, or conversely, is still thinking of the first sound when he should be attending to the pronunciation of the next. This affects his speech, that is to say, his organs of speech are compelled, while articulating one sound, to approach more or less the position for the one preceding or following, consequently the pronunciation of one sound or both is changed.

(Meinhof, 1984:13).

Senekal et. al. also agree:

By die uitspraak van twee opeenvolgende klanke hou ons by die artikulasie-stand van die eerste sodat die uitspraak van die volgende klank daardeur beïnvloed word of ons maak ons psigies reeds gereed vir die uitspraak van die tweede klank sodat die uitspraak van die voorafgaande klank daardeur beïnvloed word.

(Senekal et. al., 1981:18).

When considering the above statements, Assimilation may be described in terms of its direction. We speak in terms of Progressive Assimilation when the preceding sound influences the succeeding one and Retrogressive Assimilation when the opposite occurs. Reciprocal Assimilation occurs when both sounds influence one another.

e.g. $\overset{\curvearrowright}{\text{ukhakayi}} \rangle \text{ukhakhayi}$ (Ziervogel et. al.) :

Progressive Assimilation

$\text{in(i)-} + \text{-jabula} \rangle \text{injabulo}$ $\boxed{\text{ipdjabusul}\text{ɔ}}$:

Retrogressive Assimilation

$\text{in(i)-} + \text{-funda} \rangle \overset{\curvearrowright}{*}\text{infundo} \rangle \text{imfundo}$ $\boxed{\text{imɔf'und}\text{ɔ}}$:

Reciprocal Assimilation

It must be noted that in Zulu and Xhosa, Progressive Assimilation is only limited to few examples which are of course given by Ziervogel. He says for instance, the aspirated velar explosive [kh] normally occurs on the first syllable of the word. If it occurs on another syllable, it is as a result of the Assimilation of [kh] in the first syllable. In the last example above, the [ɸ] which occurs before [f], is a voiceless radical bilabial fricative occurring as a result of the labial nasal [m].

During the process of Assimilation, the influenced sound may be assimilated in two ways, namely: (1) it may be so influenced that it changes and becomes similar to the influencing one or (2) it may become identical with it. When the two sounds are similar to each other, we speak of Incomplete or Partial Assimilation and when they are identical, we speak of Complete Assimilation. Roger says:

Broadly, in Assimilation one segment becomes more like (or identical to) another (or two become more like each other).

(Roger, 1984:171).

We may therefore conclude that:

We distinguish between Incomplete and Complete Assimilation. In the former, the sounds only become similar to one another, in the latter they become identical.

(Meinhof, 1984:13).

2. Labialization

This term is used to describe a phonological change when a sound loses its qualities and assumes the labial qualities. In other words, it changes its place of articulation and becomes a labial sound.

e.g. in(i)- + -bonga > imbongi

in(i)- + -funda > imfundo

3. Nasal Strengthening

When nasals follow consonants, the latter are normally strengthened in Bantu Languages. The nasals are thus responsible for the strengthening of consonants. The phonological process is therefore said to be Nasal Strengthening.

4. Plosivation

When the nasal precedes a consonant e.g. an implosive, the implosive becomes strengthened in such a way that it changes to an explosive sound. This phonological phenomenon is described by the term Plosivation.

e.g. in(i)- + -biza > imbizo ([ɓ] → [b]/[n] -)

in(i)- + -baza > imbazo ([ɓ] → [b]/[n] -)

in(i)- + -hamba > inkambo ([h] → [k']/[n] -)

5. Velarization

In this phonological phenomenon, a non-velar consonant loses its place of articulation in order to become a velar sound.

e.g. en(i)- + -khulu > enkulu [enk'ulu]
in(i)- + -hamba > inkambo [ink'ambu]
in(i)- + -kholwa > inkolo [ink'olo]

6. Affricatization

This phonological phenomenon occurs when a non-affricate sound becomes an affricate. In this discussion, it occurs when the nasal strengthens a succeeding consonant.

e.g. in(i)- + -sola > insolo [ints'olo]
in(i)- + -shisekela > intshisekelo [intʃ'isekelo]
en(i)- + -sha > entsha [ɛntʃ'a]

7. Palatalization

This phenomenon occurs when a non-palatal sound changes to a palatal which may either be an alveo-palatal or palatal sound. In this discussion, Palatalization occurs immediately after a palatal sound has assimilated the nasal prefix [n] retrogressively.

e.g. in(i)- + -jabula > injabulo [indʒabulo]
in(i)- + -shisekela > intshisekelo [intʃ'isekelo]
en(i)- + -sha > entsha [ɛntʃ'a]

8. Homorganic Sounds

These are two sounds which are produced at the same point of articulation. The two sounds are therefore pronounced simultaneously. Langacker confirms this:

Two segments that have the same place of articulation are said to be homorganic. m and p, for instance, are homorganic, since both are bilabial.

(Langacker, 1972:261).

2.4 SUMMARY

When the nasal prefix [n] precedes a consonant in Zulu, the following are observed:

2.4.1 Common Features

All voiced sounds remain voiced and the place of articulation does not change. It is the manner of articulation which changes. The nasal prefix [n] only changes its place of articulation. Voiceless sounds remain voiceless. The nasal prefix [n] undergoes a phonological change and changes its place of articulation from being an alveolar to a bilabial, labio-dental, alveo-palatal or a velar nasal because of Assimilation in Zulu.

The aspirated explosives will become ejective as a result of Nasal Strengthening. This phonological process also affects the Zulu devoiced sounds which become fully-voiced. We also notice that Assimilation results in the change of the place of articulation

while Nasal Strengthening results in the change of the manner of articulation. The Zulu explosive sounds do not, as a result of Nasal Strengthening change the place of articulation, but all fricative sounds in Zulu will, as a result of Nasal Strengthening become affricates.

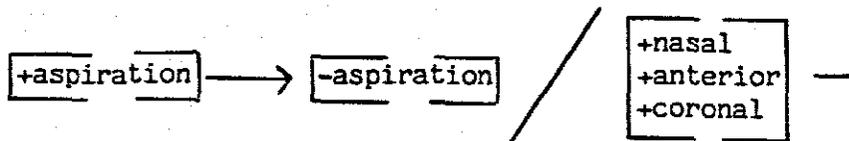
All Zulu radical fricatives with the exception of the radical glottal fricative [h], change to ejective affricates. The Zulu glottal fricative changes to an ejective velar explosive. The liquid [l] is also so affected by the nasal prefix that it changes to a voiced explosive.

When clicks undergo a phonological change, all voiceless radical clicks become voiced. All aspirated clicks become voiceless nasalized.

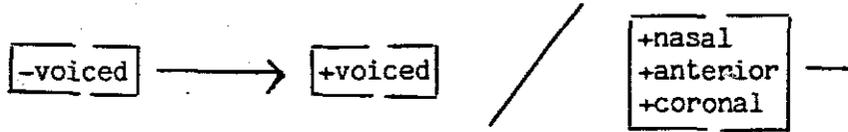
2.4.2 Feature Specifications

The feature specifications (F-S) of the afore-mentioned phonological changes may be illustrated as follows:

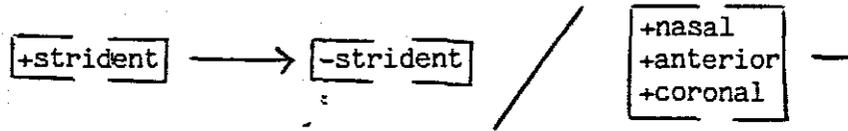
The aspirated sounds become unaspirated after a nasal prefix [n].



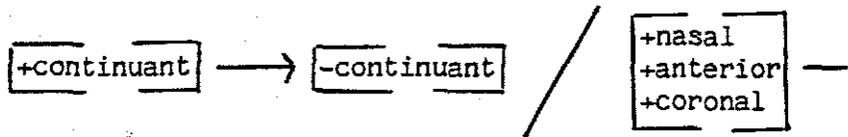
The devoiced sounds become voiced when preceded by a nasal prefix [n].



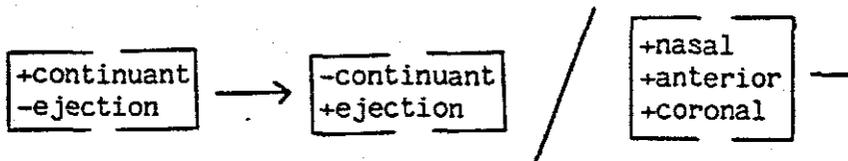
All fricative sounds with the exception of the glottal fricative [h], become affricates.



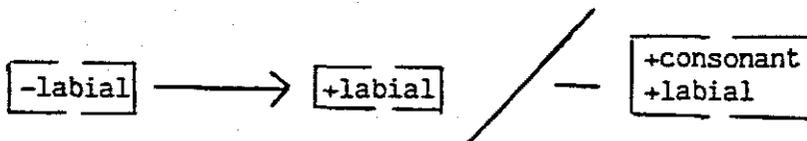
The continuants (fricatives, lateral liquid) become stop sounds after the nasal prefix [n].



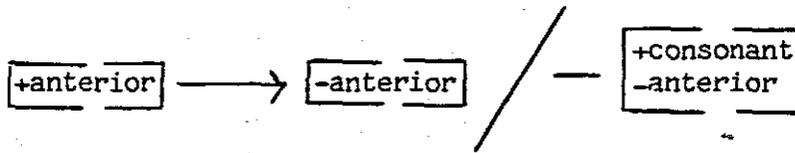
All radical fricatives change to ejective sounds.



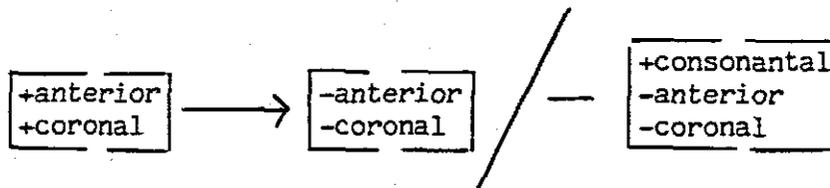
The nasal prefix becomes a labial nasal before a labial sound.



The nasal prefix changes to an alveo-palatal nasal when preceding an alveo-palatal consonant.



The nasal prefix changes to a velar nasal before a velar consonant.



2.4.3 The Table of Sounds

We may illustrate the change of the sounds in the form of table as follows:

THE TABLE OF SOUNDS AND DESCRIPTION

SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
<p>ph [ph]</p> <p>b [β]</p> <p>bh [b̥]</p> <p>th [tʰ]</p> <p>d [d̥]</p> <p>kh [kʰ]</p> <p>g [g̥]</p>	<p><u>Plosives</u></p> <p>voiceless aspirated bilabial explosive</p> <p>voiced bilabial implosive</p> <p>devoiced bilabial explosive</p> <p>voiceless aspirated alveolar explosive</p> <p>devoiced alveolar explosive</p> <p>voiceless aspirated velar explosive</p> <p>devoiced velar explosive</p>	<p>p [pʰ]</p> <p>b [b]</p> <p>b [b]</p> <p>t [tʰ]</p> <p>d [d]</p> <p>k [kʰ]</p> <p>g [g]</p>	<p>voiceless ejective bilabial explosive</p> <p>voiced bilabial explosive</p> <p>voiced bilabial explosive</p> <p>voiceless ejective alveolar explosive</p> <p>voiced alveolar explosive</p> <p>voiceless ejective velar explosive</p> <p>voiced velar explosive</p>

SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
	<p><u>Fricatives</u></p>		
f [f]	voiceless radical labio-dental fricative	f [ɸf']	voiceless ejective labio-dental affricate
v [v]	voiced labio-dental fricative	v [ɸv]	voiced labio-dental affricate
s [s]	voiceless radical alveolar fricative	s [ts']	voiceless ejective alveolar affricate
z [z]	voiced alveolar fricative	z [dz]	voiced alveolar affricate
hl [ɸ]	voiceless radical alveolar lateral fricative	hl [tɸ']	voiceless ejective alveolar lateral affricate
dl [ɸ]	voiced alveolar lateral fricative	dl [dɸ]	voiced alveolar lateral affricate
sh [ʃ]	voiceless radical alveo-palatal fricative	tsh [tʃ']	voiceless ejective alveo-palatal affricate
j [ʒ]	voiced alveo-palatal fricative	j [dʒ]	voiced alveo-palatal affricate
h [h]	voiceless radical glottal fricative	k [k']	voiceless ejective velar explosive

SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
l [l]	<u>Liquid</u> voiced alveolar lateral non-fricative continuant	d [d]	voiced alveolar explosive
n [n]	<u>Nasals</u> voiced alveolar nasal	m [m]	voiced bilabial nasal
		m [ɱ]	voiced labio-dental nasal
		n [ɲ]	voiced alveo-palatal nasal
		n [ŋ]	voiced velar nasal
c [ɕ]	<u>Clicks</u> voiceless radical dental click	gc [ɕ̚]	voiced dental click
ch [t͡ʃ̥]	voiceless aspirated dental click	c [t͡ʃ̥]	voiceless nasalized dental click
q [t͡ʃ̥̥]	voiceless radical alveo-palatal click	gq [t͡ʃ̥̥̥]	voiced alveo-palatal click
qh [t͡ʃ̥̥̥]	voiceless aspirated alveo-palatal click	q [t͡ʃ̥̥̥̥]	voiceless nasalized alveo-palatal click
x [t͡ʃ̥̥̥̥]	voiceless radical lateral click	gx [t͡ʃ̥̥̥̥̥]	voiced lateral click
xh [t͡ʃ̥̥̥̥̥]	voiceless aspirated lateral click	x [t͡ʃ̥̥̥̥̥̥]	voiceless nasalized lateral click

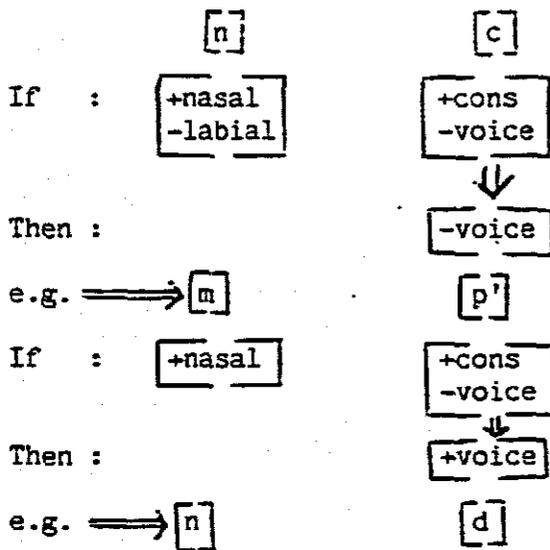
2.4.4. The Sequential Structure Constraints/Conditions

We have already seen that the sequence of [n] + [c] (n = nasal, c = consonant) results in phonological changes. The sequential structure conditions form one of the most important part of the phonological component. They capture what type of segments can follow on one another. They also capture the conditions or constraints on those unacceptable sequences. The two main important things with the sequential structure constraints are:

1. The structure conditions and
2. The "if then" conditions.

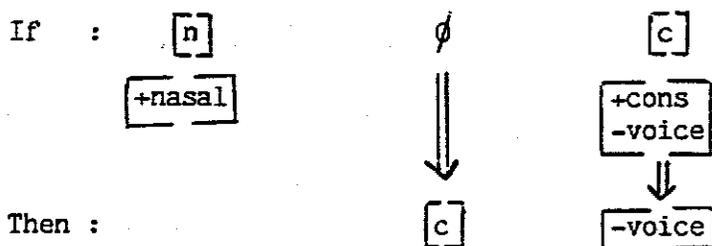
With Zulu plosives, the following were noticed:

If [n] + [c'] → [nc'] then, [c'] will only be [-voice], provided that [c'] is also [-voice], but if [c'] is [+voice] or [-voice] then [c'] will only be [+voice]. This can be illustrated as follows:



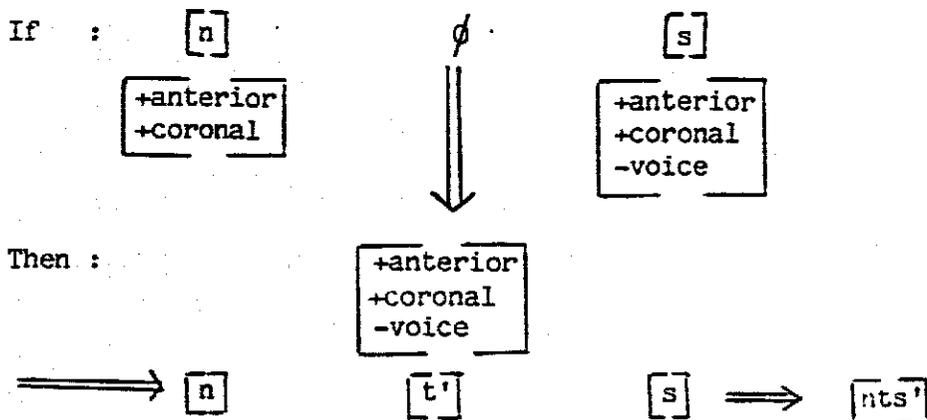
We have also realized that with plosives, there is no consonant which is inserted between the nasal prefix and the succeeding consonant.

With fricatives, there is a striking phonological change in the sequence of [n] + [c]. If : [n] + [c'] → [nc²c'] then the consonants marked [c'] are identical in the practical orthography and in the phonetic script, except that there is a difference of ejection when [c²] is inserted. If [c'] is voiceless then [c²] is also voiceless but if [c'] is voiced, [c²] should also be voiced. This means that:

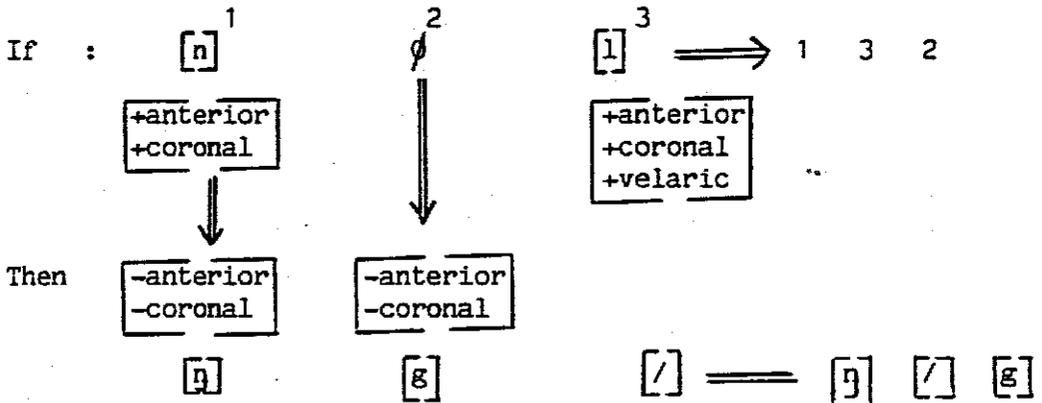


The consonant which is inserted between the nasal and the consonant must have the common quality of the nasal and the other consonant. We may illustrate this as for instance:

Example 1



Example 4



It is obvious that when we pronounce "ngc", the "c" [l] comes before [g] and for that reason, the "ngc" is phonetically written as [ŋ/g] .

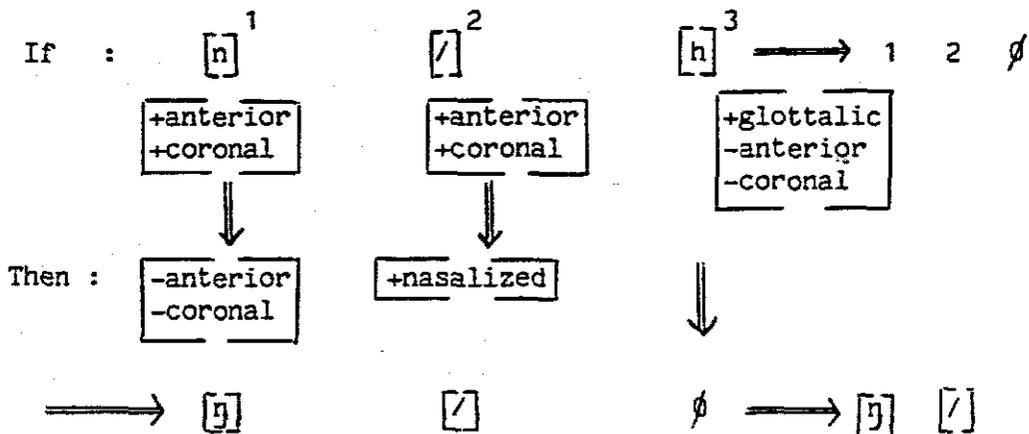
In the above examples, we have noticed the occurrence of the Insertion Rule or Epenthesis in the sequence of [n] + [c] where [c] represents fricatives (except the glottal one) and clicks which are voiceless radical.

Reduction Rule

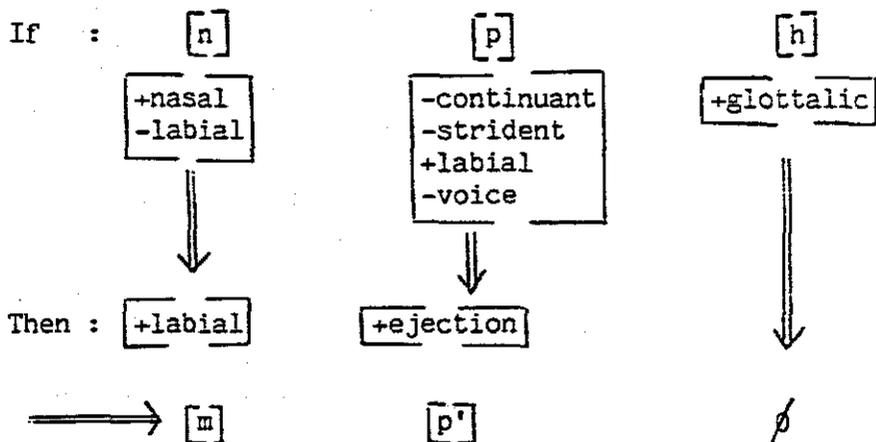
When we look at the sequence of [n] + [c] with aspirated clicks and explosives, the opposite of the above takes place.

If [n] + [c'] → [nc'²], then the consonant marked [c²] falls off or is deleted. Therefore [n] + [c'] → [nc'∅] if [c'] is aspirated or if [∅] is the aspiration of [c']. This Consonant Reduction may be illustrated as follows:

Example 1



Example 2



The sequential structure constraints have thus resulted in the Insertion Rule or "Epenthesis" as well as the "Consonant Reduction" in Zulu.

CHAPTER 3

3.0 THE INFLUENCE OF THE NASAL PREFIX /n/ ON SUCCEEDING CONSONANTS IN
XHOSA

3.1 INTRODUCTION

Ziervogel et. al. differ from Louw in the phonetic transcription of certain Xhosa speech sounds. The phonetic symbols differ here and there especially with labio-dental affricates, which result when the nasal prefix [n] precedes a fricative sound. Louw for instance, uses [pf'] for the voiceless ejective labio-dental affricate while Ziervogel et.al. use [ɸf']. The same applies to the voiced counterpart of [pf'] / [ɸf']. Louw uses [bv] while Ziervogel et.al. use [ɓv].

When we compare their phonetic symbols of clicks, Ziervogel et.al. use the same symbols in both Zulu and Xhosa. Louw's symbol of an alveo-palatal click i.e. q is [C] while that of Ziervogel et.al. is [ʔ]. The lateral click, x is according to Louw represented as [ɰ] while Ziervogel et.al.'s representation is [//]. In this discussion, Ziervogel et.al.'s phonetic symbols of clicks will be used.

Ziervogel et. al. say that affricatization occurs with Palatalization in Xhosa. This is of course true but on the other hand, the sequence of the nasal prefix [n] and a fricative may also result in affricatization; e.g. [n] + [f] → [ɲf']. Here, the [ɲf'] is an affricate. There is a slight difference in the

representation of Zulu and Xhosa practical orthography of [nts'] and [ntl'] . The Zulu [nts'] is always represented as ns while in Xhosa it is written as nts, for instance:

Zulu	:	in(i)- + -sola	>	insolo
	:	in(i)- + sindisa	>	insindiso
Xhosa	:	in(i)- + -sola	>	intsolo
	:	in(i)- + -sindisa	>	intsindiso

The practical orthography of [ntl'] is according to Xhosa written as ntl while Zulu uses nhl, for instance:

Xhosa	:	in(i)- + -hlala	>	intlalo
	:	in(i)- + -hlokoma	>	intlokomo
Zulu	:	in(i)- + -hlala	>	inhlalo
	:	in(i)- + -hlokoma	>	inhlokomo

When Ziervogel et. al. describe Labialization, they only mention one type i.e. the one in which the back vowel or semi-vowel is regarded as the cause of this phenomenon. Here, the semi-vowel [w] is simultaneously pronounced with the preceding consonant in Sotho languages. They put it thus:

Labialization is indicated only by the semi-vowel w, which follows a consonant. It does not represent a consonant which is at the same time pronounced with w. In tw we therefore pronounce the t simultaneously, and not first the t and then the w. Labialization is not characteristic of Nguni.

(Ziervogel, et. al., 1967:70).

In the above quotation, the statement "Labialization is not characteristic of Nguni" contrasts with what happens in Nguni Languages when passives are formed especially in Zulu and Xhosa.

e.g. phupha } * -phuphwa } -phushhwa
 luma } * -lumuwa } -lunyuwa
 bumba } * -bumbuwa } -bunjuwa

In the above examples, we realize that the sounds, sh, ny and nj are simultaneously pronounced with the semi-vowel w and this should have been, according to Ziervogel et.al.'s explanation of Labialization, the cause of this phenomenon in Nguni Languages. Labialization is in fact indicated by [w]. Labialization is therefore characteristic of Nguni Languages. This type of Labialization occurring in Zulu, Xhosa and Southern Sotho may be regarded as a secondary Labialization, because:

Labialization is a phenomenon in which non-labial consonants are changed in such a manner that they have to be pronounced with rounded lips.

(Ziervogel, et. al., 1967:70).

In consideration of the above quotation, we cannot deny the fact that Primary Labialization will only occur in Zulu and Xhosa when

$[n] \rightarrow [m]$ and $[n] \rightarrow [ŋ]$.

e.g. Zulu/: in(i)- + -bonga > imbongi

Xhosa: in(i)- + -biza > imbizo

: in(i)- + -funda > imfundo

: in(i)- + -phendula > impendulo

3.2 THE INFLUENCE ON NATURAL CLASSES OF PHONEMES

Like Zulu, the Xhosa natural classes will be plosives, fricatives, liquid and clicks. The click sounds will be divided into the dental, alveo-palatal and lateral clicks. The change of the alveolar nasal prefix $[n]$ will also be looked into.

3.2.1 The Influence on Plosives

When the nasal prefix $[n]$ precedes a voiced bilabial implosive $[ɓ]$ the following occurs:

e.g.: in(i)- + -bilisa > *inbiliso > imbiliso $[ɓ]$

in(i)- + -banga > *inbangi > imbangi $[ɓ]$

in(i)- + -buyisela > *inbuyiselo > imbuyiselo $[ɓ]$

We notice that the bilabial implosive [ɓ] partially assimilates the alveolar nasal [n] and the latter changes to a bilabial nasal [m], hence a phonological process called Labialization. As a result of Nasal Strengthening, the bilabial implosive changes to a bilabial explosive [b], hence Plosivation. The phonological representations of these phonemes may be as follows:

If : [n] + [ɓ] → [mb]
 Then : [n] → [m] / -[ɓ]
 [ɓ] → [b] / [n] -

The feature specifications (F-S) of the above phonological rules (P-Rules) may be illustrated as follows:

P-Rule 1: [n] → [m] / -[ɓ]

F-S

+nasal
-labial

 →

+labial

 / -

-sonorant
-continuant
-strident
+labial
+glottalic

P-Rule 2: [ɓ] → [b] / [n] -

F-S

-sonorant
-continuant
-strident
+labial
+glottalic

 →

-glottalic

 /

+nasal

 -

If the nasal prefix [n] is succeeded by a voiceless aspirated bilabial explosive ph we notice the following:

e.g. in(i)- + -phokophelela } *inphokophelelo } impokophelelo
 in(i)- + -phazama } *inphazamo } impazamo
 in(i)- + -phoqa } *inphoqa } impoqa

Here, the aspirated bilabial explosive [ph] partially assimilates the alveolar nasal [n] retrogressively. The alveolar nasal then assumes the bilabial quality of [ph] and changes to a bilabial nasal [m], hence Labialization. When Nasal Strengthening takes place, the aspirated bilabial explosive changes to an ejective bilabial explosive [p'], hence Plosivation. We can represent the above phonological changes as follows:

If : [n] + [ph] — [mp']
 Then : [n] —→ [m] / -[ph]
 [ph] —→ [p'] / [n] -

The feature specifications (F-S) of these phonological rules (P-Rules) are as follows:

P-Rule 1: [n] —→ [m] / -[ph]

F-S

+nasal
-labial

 —→

+labial

 / -

-sonorant
-continuant
-strident
+labial
+aspiration

P-Rule 2: [ph] —→ [p'] / [n] -

F-S

-sonorant
-continuant
-strident
+labial
+aspiration

 —→

-aspiration

 /

+nasal

 -

With the alveolar explosive [th] the following takes place:

e.g. in(i)- + -thanda > *inthando > intando
 in(i)- + -thetha > *inthetho > intetho
 in(i)- + -thenga > *inthengo > intengo

We realize that the succeeding consonant does not influence the preceding alveolar nasal prefix and therefore, Assimilation does not take place. The cause is that both sounds are alveolars. The nasal prefix only strengthens the aspirated alveolar explosive [th] to an ejective alveolar explosive [t']. The phonological representation can be illustrated as follows:

If : [n] + [th] → [nt']
 Then : [th] → [t'] / [n] -

The feature specification (F-S) of the aforementioned phonological rule (P-Rule) is:

P-Rule : [th] → [t'] / [n] -

-sonorant -continuant -strident +coronal +anterior +aspiration	→	-aspiration	/	+nasal +anterior +coronal	-
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When this nasal prefix [n] is succeeded by a devoiced alveolar explosive [d̥], the following occurs:

e.g. in(i)- + -dida > indida
 in(i)- + -dabuka > indabuko
 in(i)- + -dumisa > indumiso

As a result of Nasal Strengthening, the devoiced alveolar explosive [d̥] changes its manner of articulation and becomes a fully-voiced alveolar explosive [d]. The phonological rule (P-rule) of this phonemic representation can be illustrated as follows:

If : [n] + [d̥] → [nd]
 Then : [d̥] → [d] / [n] -

The feature specification (F-S) of this phonological rule (P-Rule) is:

P-Rule : [d̥] → [d] / [n] -

F-S

-sonorant
-continuant
-strident
+coronal
+anterior
-voice
-aspiration
-ejection

→

+voice

/

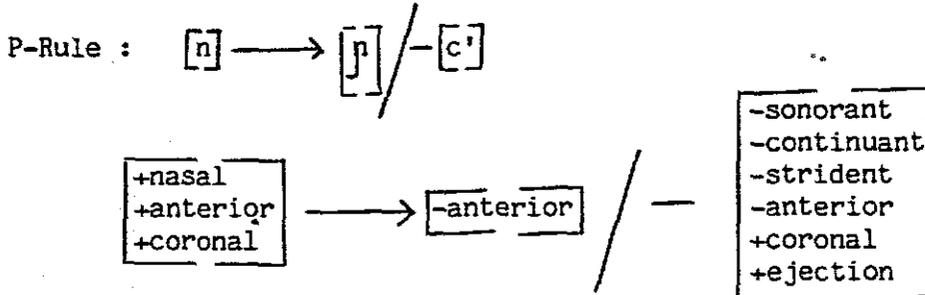
+nasal
+anterior
+coronal

-

When the alveolar nasal [n] becomes partially assimilated into the palatal explosive [c'], the former changes to a palatal nasal [ɲ], hence Palatalization. As a result of [c'] being a fortis, the [c'] does not become affected by nasal [n]. This means that Nasal Strengthening does not occur. This phonemic representation can be illustrated as follows:

If : [n] + [c'] → [nc']
 Then : [n] → [ɲ] / [c'] -

The feature specification (F-S) of this phonological rule (P-Rule) may be represented as follows:

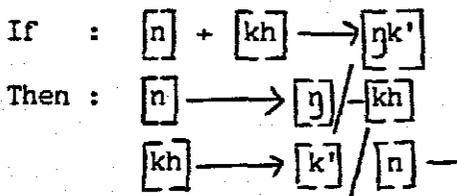


When the voiceless aspirated velar explosive [kh] is preceded by the nasal prefix [n], the following takes place:

- e.g. in(i)- + -khohlisa > *inkhohliso > inkohliso iŋk'ɔ̄ɦisɔ
 in(i)- + -khathaza > *inkhathazo > inkathazo iŋk'athazɔ
 in(i)- + -khanyisa > *inkhanyiso > inkanyiso iŋk'anisɔ

We realise that in the above examples, the alveolar nasal [n] becomes partially assimilated into the velar explosive kh so that the [n] changes to a velar nasal [ŋ], hence Velarization. When Nasal Strengthening takes place, the aspirated velar explosive [kh] becomes an ejective velar explosive [k'], hence Plosivation.

The phonological rules of these phonemic representations can be illustrated as follows:



The feature specifications (F-S) of these phonological rules (P-Rules) may be indicated as follows:

P-Rule 1: [n] → [ŋ] / - [kh]

F-S

+nasal
+anterior
+coronal

→

-coronal
-anterior

/ -

-sonorant
-continuant
-strident
-anterior
-coronal
+aspiration

P-Rule 2: [kh] → [k'] / [n] -

F-S

-sonorant
-continuant
-strident
-anterior
-coronal
+aspiration

→

-aspiration

/ -

+nasal
+anterior
+coronal

With the devoiced velar explosive [g̊] the following takes place as a result of the preceding nasal prefix [n].

e.g. in(i)- + -godusa > ingoduso
in(i)- + -gana > ingane

Here, the devoiced velar explosive [g̊] partially assimilates the alveolar nasal [n] and the latter changes to a velar nasal [ŋ]. As a result of Nasal Strengthening, the devoiced velar explosive becomes a fortis, i.e. a fully-voiced velar explosive [g]. These phonological changes can be represented as follows:

If : $[n] + [g] \rightarrow [ŋg]$
 Then : $[n] \rightarrow [ŋ] / -[g]$
 $[g] \rightarrow [g] / [n] -$

The feature specifications (F-S) of these phonological rules (P-Rules) may be illustrated as follows:

P-Rule 1: $[n] \rightarrow [ŋ] / -[g]$

F-S

+nasal +anterior +coronal	→	-coronal -anterior	/-	-sonorant -continuant -strident -anterior -coronal -voice -aspiration -ejection
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P-Rule 2: $[g] \rightarrow [g] / [n] -$

F-S

-sonorant -continuant -strident -anterior -coronal -voice -aspiration -ejection	→	+voiced	/-	+nasal +anterior +coronal
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3.2.2 The Influence on Fricatives

When the voiced alveolar nasal $[n]$ precedes a voiceless radical labio-dental fricative $[f]$, the following takes place:

e.g. in(i)- + -funda > *infundo > imfundo $\boxed{\text{im}\phi\text{f}'\text{und}\text{ɔ}}$
 in(i)- + -feketha > *infeketho > imfeketho $\boxed{\text{im}\phi\text{f}'\text{eketh}\text{ɔ}}$
 in(i)- + -fihlakala > *infihlakalo > imfihlakalo $\boxed{\text{im}\phi\text{f}'\text{i}\phi\text{ak}'\text{al}\text{ɔ}}$

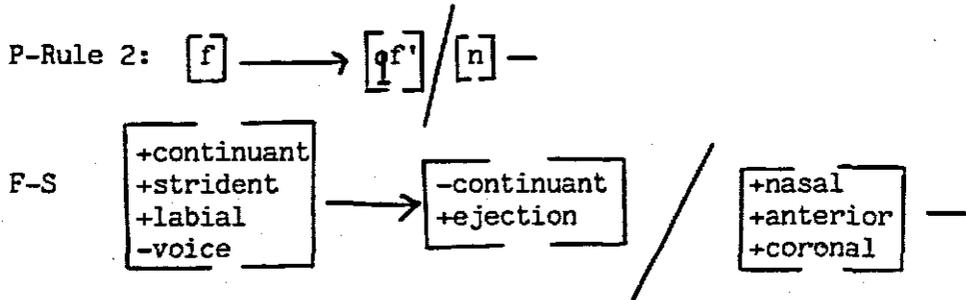
In the above examples, the voiceless labio-dental fricative $\boxed{\text{f}}$ partially assimilates the nasal $\boxed{\text{n}}$. The alveolar nasal then changes its place of articulation in order to be a labio-dental nasal $\boxed{\text{m}}$, hence Labialization. When Nasal Strengthening occurs the voiceless radical labio-dental fricative $\boxed{\text{f}}$ becomes a voiceless ejective labio-dental affricate $\boxed{\phi\text{f}'}$, hence Affricatization.

When we represent the above phonological changes, the following may be taken into consideration:

If : $\boxed{\text{n}} + \boxed{\text{f}} \rightarrow \boxed{\text{m}\phi\text{f}'}$
 Then : $\boxed{\text{n}} \rightarrow \boxed{\text{m}} / -\boxed{\text{f}}$
 $\boxed{\text{f}} \rightarrow \boxed{\phi\text{f}'} / \boxed{\text{n}} -$

The Feature Specifications (F-S) of these Phonological Rules (P-Rules) may be illustrated as follows:

P-Rule 1: $\boxed{\text{n}} \rightarrow \boxed{\text{m}} / -\boxed{\text{f}}$
 F-S $\boxed{\begin{matrix} +\text{nasal} \\ -\text{labial} \end{matrix}} \rightarrow \boxed{+\text{labial}} / - \boxed{\begin{matrix} +\text{continuant} \\ +\text{strident} \\ +\text{labial} \\ -\text{voice} \end{matrix}}$

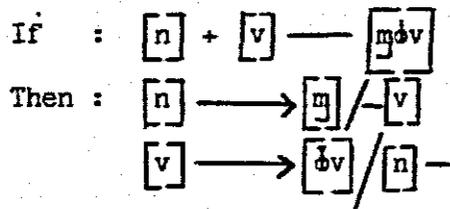


Xhosa, like Zulu has also a voiced labio-dental fricative $[v]$.
 When this fricative is preceded by the nasal prefix $[n]$,
 Assimilation and Nasal Strengthening occurs:

e.g. in(i)- + -vama } *invama } imvama $\boxed{im\phi vama}$
 in(i)- + -vubela } *invubelo } imvubelo $\boxed{im\phi vubel\epsilon\lambda\text{ɔ}}$
 in(i)- + -vika } *inviki } imviki $\boxed{im\phi vik'i}$

We realize that the labio-dental fricative $[v]$ partially assimilates the nasal prefix $[n]$ retrogressively. The latter changes to a labio-dental nasal $[m]$, hence Labialization. When Nasal Strengthening occurs the voiced labio-dental fricative $[v]$ changes to a voiced labio-dental affricate $[\phi v]$, hence Affricatization.

The phonological changes mentioned above can be illustrated as follows:



We may thus represent the feature specifications (F-S) of these phonological rules (P-Rules) as follows:

P-Rule 1: $[n] \longrightarrow [ŋ] / - [v]$

F-S $\begin{matrix} +nasal \\ -labial \end{matrix} \longrightarrow \begin{matrix} +labial \end{matrix} / - \begin{matrix} +continuant \\ +strident \\ +labial \\ +voice \end{matrix}$

P-Rule 2: $[v] \longrightarrow [ɸv] / [n] -$

F-S $\begin{matrix} +continuant \\ +strident \\ +labial \\ +voice \end{matrix} \longrightarrow \begin{matrix} -continuant \end{matrix} / \begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} -$

As I have mentioned in alveolar explosives, the fact that the nasal prefix $[n]$ is an alveolar sound does not cause Assimilation in the sequence of $[n] + [c]$ if $[c]$ is an alveolar fricative.

e.g. $in(i)- + -sindisa \rangle *insindiso \rangle intsindiso$ $\boxed{ints'indisɔ}$
 $in(i)- + -salela \rangle *insalela \rangle intsalela$ $\boxed{ints'alɛla}$
 $in(i)- + sola \rangle *insolo \rangle intsolo$ $\boxed{ints'ɔlɔ}$

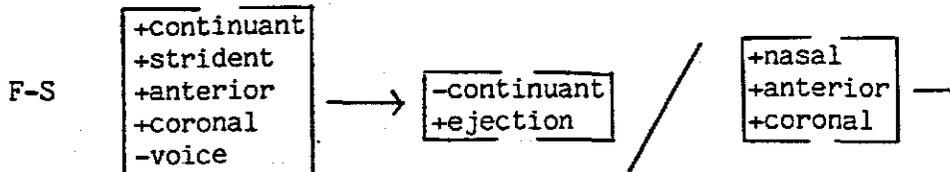
As a result of Nasal Strengthening, the voiced alveolar nasal $[n]$ causes the voiceless radical alveolar fricative $[s]$ to become a fortis i.e. a voiceless ejective alveolar affricate $[ts']$, hence Affricatization.

The above phonological changes can be illustrated as follows:

If : $[n] + [s] \longrightarrow [nts']$
 Then : $[s] \longrightarrow [ts'] / [n] -$

The feature specifications (F-S) of these phonological rules (P-Rules) may be represented as follows:

P-Rule : $[s] \longrightarrow [ts'] / [n] -$



When the voiced labio-dental fricative $[z]$ is preceded by the nasal prefix $[n]$, the following takes place:

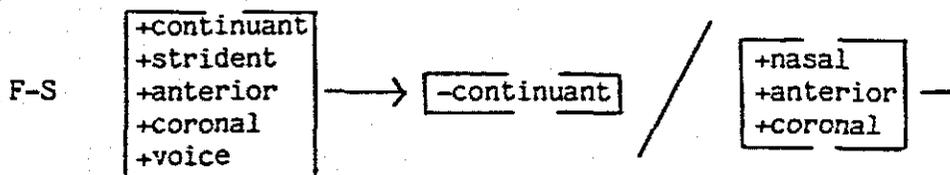
e.g. in(i)- + -zuza > inzuzo indzuzɔ
 in(i)- + -zonda > inzondo indzɔndɔ
 in(i)- + -zala > inzalo indzalɔ

When Nasal Strengthening occurs, the voiced alveolar fricative $[z]$ changes to a voiced alveolar affricate $[dz]$. This phonological change may be illustrated as follows:

If : $[n] + [z] \longrightarrow [ndz]$
 Then : $[z] \longrightarrow [dz] / [n] -$

The feature specification (F-S) of this phonological rule (P-Rule) may be represented as follows:

P-Rule : $[z] \longrightarrow [dz] / [n] -$



If the nasal prefix [n] is succeeded by a voiceless radical alveo-palatal fricative [ʃ] the following takes place:

e.g. in(i)- + -shisekela > *inshisekelo > intshisekelo [ɪntʃ'isekɛlɔ]
 in(i)- + -shumayela > *inshumayelo > intshumayelo [ɪntʃ'umājɛlɔ]
 en(i)- + -sha > *ensha > entsha [ɛntʃ'a]

The main phonological processes which take place here, are Assimilation and Nasal Strengthening. The voiceless radical alveo-palatal fricative [ʃ] partially assimilates the alveolar nasal [n] retrogressively and the latter changes to an alveo-palatal nasal [ɲ], hence Palatalization. When Nasal Strengthening occurs, the voiceless radical alveo-palatal fricative [ʃ] becomes a voiceless ejective alveo-palatal affricate [tʃ'], hence Affricatization.

The phonological changes mentioned above can be represented as follows:

If : [n] + [ʃ] → [ɲtʃ']
 Then : [n] → [ɲ] / - [ʃ]
 [ʃ] → [tʃ'] / [n] -

The feature specifications (F-S) of these phonological rules (P-Rules) may look as follows:

P-Rule 1: [n] → [ɲ] / - [ʃ]

F-S

+nasal
+anterior
+coronal

 →

-anterior

 / -

+continuant
+strident
+coronal
-anterior
-voice

P-Rule 2: $[s] \longrightarrow [tʃ'] / [n] -$

F-S $\begin{matrix} +\text{continuant} \\ +\text{strident} \\ +\text{coronal} \\ -\text{anterior} \\ -\text{voice} \end{matrix} \longrightarrow \begin{matrix} -\text{continuant} \\ +\text{ejection} \end{matrix} / \begin{matrix} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{matrix} -$

When the nasal prefix $[n]$ precedes a voiceless radical glottal fricative $[h]$ the following takes place:

e.g. in(i)- + -hamba > *inhambo $[inxambo]$ > inkambo $[ink'ambu]$
 in(i)- + -hambisa > *inhambiso $[inxambiso]$ > inkambiso $[ink'ambiso]$

The two main phonological processes which occur here are Nasal Strengthening and Assimilation. When the first Nasal Strengthening takes place, the glottal fricative $[h]$ is caused to change to a voiceless radical velar fricative $[x]$. This velar fricative partially assimilates the alveolar nasal $[n]$ and the latter changes to a velar nasal $[ŋ]$, hence Velarization. When the second Strengthening occurs, the velar fricative $[x]$ changes to a voiceless ejective velar explosive $[k']$, hence Plosivation. We thus have double strengthening again like in Zulu.

These phonological changes may be illustrated as follows:

If : $[n] + [h] \longrightarrow [ŋk']$
 Then : $[n] \longrightarrow [ŋ] / -[h]$
 $[h] \longrightarrow [k'] / [n] -$

The feature specifications (F-S) of these phonological rules (P-Rules) may look as follows:

P-Rule 1: [n] → [ŋ] / -[h]

F-S

+nasal
+anterior
+coronal

 →

-anterior
-coronal

 / -

+continuant
-strident
-anterior
-coronal
-voice

P-Rule 2: [h] → [kʰ] / [n] -

F-S

+continuant
-strident
-anterior
-coronal
-voice

 →

-continuant
+ejection

 /

+nasal
+anterior
+coronal

 -

3.2.3 The Influence on Affricates

In Chapter 2, it has been mentioned that the Xhosa "j" will in this work be regarded as a voiced alveo-palatal affricate [dʒ] which is thus described in the same way as Louw and Ziervogel do. When this sound succeeds a nasal prefix [n], the following occurs:

e.g. in(i)- + -jabula > injabulo [ɪndʒabulo]
 in(i)- + -jula > injula [ɪndʒula]
 in(i)- + -jwayeza > injwayezo [ɪndʒwajɛzo]

In the above examples, the alveo-palatal affricate [dʒ] partially assimilates the nasal prefix [n] and the latter changes to an alveo-palatal nasal [ɲ], hence Palatalization. Nasal Strengthening does not occur because [dʒ] is a fortis. This phonological change can be illustrated as follows:

If : [n] + [dʒ] = [ɲdʒ]
 Then : [n] → [ɲ] / -[dʒ]

This phonological rule (P-Rule) can be illustrated by the following feature specification (F-S):

P-Rule : $[n] \longrightarrow [ɲ] / -[d_3]$

F-S $\begin{array}{|l|} \hline +nasal \\ +anterior \\ +coronal \\ \hline \end{array} \longrightarrow \begin{array}{|l|} \hline -anterior \\ \hline \end{array} / \begin{array}{|l|} \hline -continuant \\ +strident \\ +coronal \\ -anterior \\ +voice \\ \hline \end{array}$

3.2.4 The Influence on Liquids

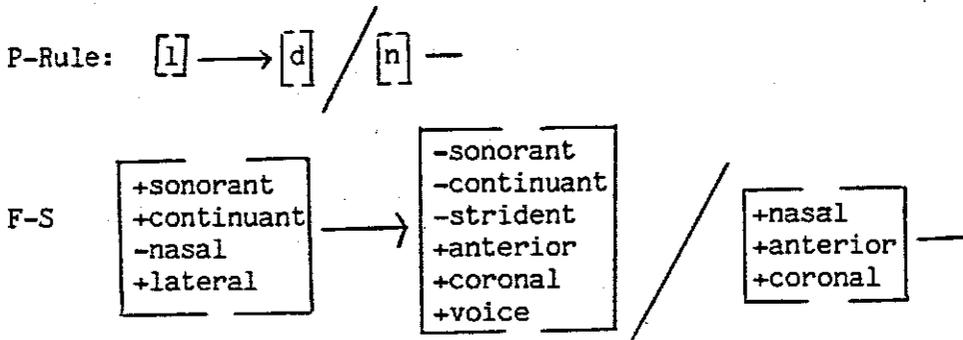
As it occurs in Zulu, the Xhosa $[l]$ is a lenis, a voiced alveolar lateral non-fricative continuant. If this sound is preceded by the alveolar nasal $[n]$, the main process which takes place is Nasal Strengthening or Fortization.

e.g. in(i)- + -lima > *inlima > indima
 in(i)- + -linganisa > *inlinganiso > indinganiso

In the above examples, Nasal Strengthening causes the alveolar lateral non-fricative continuant to change to a voiced alveolar explosive $[d]$, hence Plosivation. This phonological change can be illustrated as follows:

If : $[n] + [l] \longrightarrow [nd]$
 Then : $[l] \longrightarrow [d] / [n] -$

The feature specification (F-S) of this phonological rule (P-Rule) may be represented as follows:

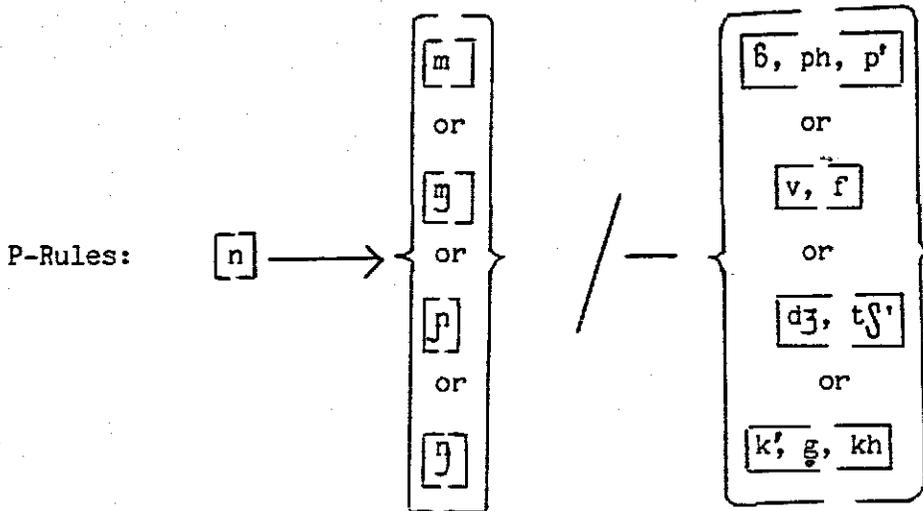


3.2.5 The Influence on the Nasal Prefix [n]

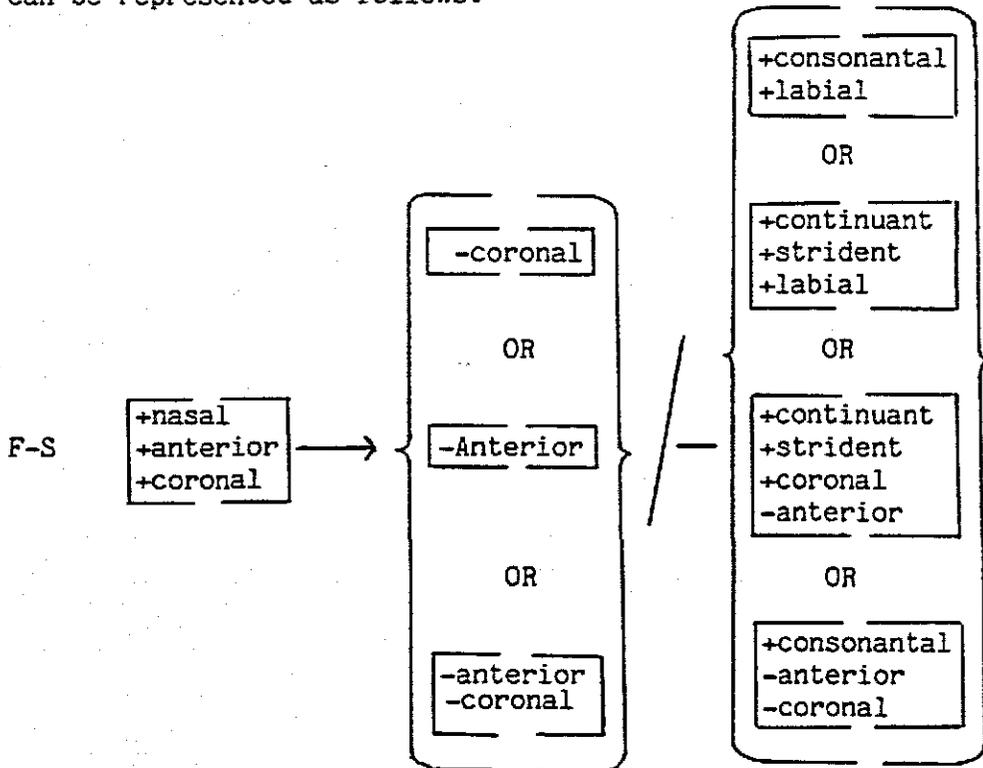
The alveolar nasal prefix [n] has a tendency of changing its place of articulation as a result of the succeeding consonant. When it precedes a labial sound it becomes a bilabial nasal (before bilabials) [m] or a labio-dental nasal (before labio-dentals) [ɱ]; before palatals, a palatal nasal [ɲ] and before velar sounds, a velar nasal [ŋ]. This is exhibited in the following examples:

- e.g. in(i)- + -bilisa } *inbiliso } imbiliso [ɪmbiliso]
- in(i)- + -funda } *infundo } imfundo [ɪmpf'undo]
- in(i)- + -jabula } injabulo [ɪɲdʒabulo]
- in(i)- + -khongozela } *inkhongozelo } inkongozelo [ɪŋk'ɔŋgɔzɛlo]

These phonological changes can be illustrated by means of the following phonological rules (P-Rules):



The feature specifications (F-S) of the above phonological rules can be represented as follows:



3.2.6 The Influence on Clicks

Xhosa has also three different places of articulating clicks. The three types of clicks are the dental clicks, alveo-palatal and lateral clicks.

The Influence on Dental Clicks

When the voiceless radical dental click [ʘ] succeeds a voiced alveolar nasal [n], the following will take place:

e.g. in(i)- + -caca > *incaca > ingcaca in̩/ga/a
 in(i)- + -camanga > *incamango > ingcamango in̩/gamango
 in(i)- + -ceba > *incebo > ingcebo in̩/gɛbo

The alveolar nasal [n] is partially assimilated into the click [ʘ] and the former changes to a velar nasal, hence Velarization. When Nasal Strengthening occurs, the radical dental click changes to a voiced dental click [g].

These phonological changes can be illustrated as follows:

If : [n] + [ʘ] → [ŋ/g]
 Then : [n] → [ŋ] / - [ʘ]
 [ʘ] → [g] / [n] -

The above phonological rules (P-Rules) may be represented by the following feature specifications:

P-Rule 1: [n] → [ŋ] / - [ʘ]

F-S +nasal
-labial → +nasal / - -sonorant
-continuant
-strident
+velaric
+anterior
+coronal
-voice
-aspiration

P-Rule 2: $[ʔ] \rightarrow [g] / [n] -$

F-S $\left[\begin{array}{l} -\text{sonorant} \\ -\text{continuant} \\ -\text{strident} \\ +\text{velaric} \\ +\text{anterior} \\ +\text{coronal} \\ -\text{voice} \end{array} \right] \rightarrow [-\text{voice}] / \left[\begin{array}{l} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{array} \right] -$

With the voiceless aspirated dental click $[h]$ the following occurs when it is preceded by a nasal prefix $[n]$:

e.g. in(i)- + -chithakala > *inchithakalo > inkcithakalo > $[i\eta / \text{ithak}'\text{al}\text{ɔ}]$
 in(i)- + -chwensa > *inchwenso > inkcwenso > $[i\eta / \text{wents}'\text{ɔ}]$
 in(i)- + -chazela > *inchazelo > inkcazelo > $[i\eta / \text{azel}\text{ɔ}]$

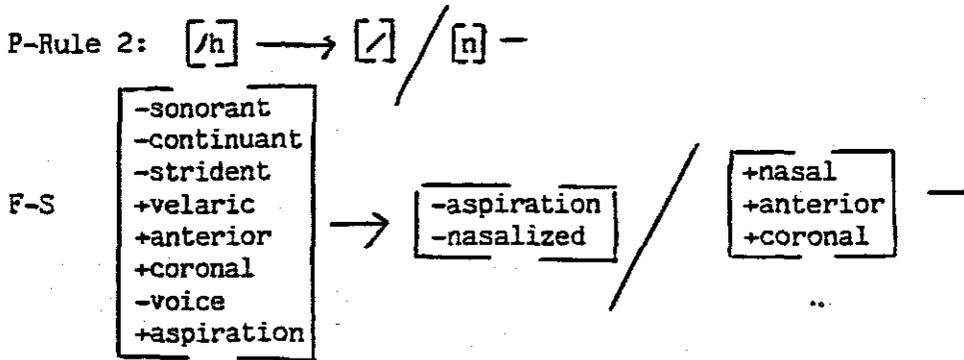
The representation of the above phonological changes may be illustrated as follows:

If : $[n] + [h] \rightarrow [g]$
 Then : $[n] \rightarrow [g] / -[h]$
 $[h] \rightarrow [ʔ] / [n] -$

The feature specifications (F-S) of these phonological rules (P-Rules) will be:

P-Rule 1: $[n] \rightarrow [g] / -[h]$

F-S $\left[\begin{array}{l} +\text{nasal} \\ +\text{anterior} \\ +\text{coronal} \end{array} \right] \rightarrow \left[\begin{array}{l} -\text{anterior} \\ -\text{coronal} \end{array} \right] / \left[\begin{array}{l} -\text{sonorant} \\ -\text{continuant} \\ -\text{strident} \\ +\text{velaric} \\ +\text{anterior} \\ +\text{coronal} \\ -\text{voice} \\ +\text{aspiration} \end{array} \right] -$



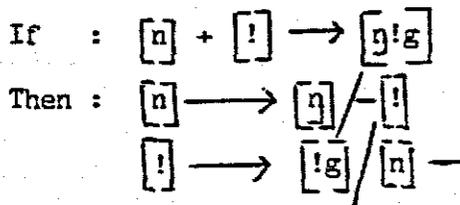
The Influence on Alveo-palatal Clicks

If the voiceless radical alveo-palatal click $[\text{!}]$ is preceded by the nasal prefix $[\text{n}]$ the following takes place:

e.g. in(i)- + -qala > ingqala $[\text{in!gala}]$
 in(i)- + -qonda > ingqondo $[\text{in!gondɔ}]$
 in(i)- + -qaphela > ingqapheli $[\text{in!gapheli}]$

In the above examples, the alveolar nasal $[\text{n}]$ is partially assimilated into the click sound and the former changes to a velar nasal $[\text{ŋ}]$, hence Velarization. When Nasal Strengthening occurs, the radical alveo-palatal click $[\text{!}]$ changes to a voiced alveo-palatal click $[\text{!g}]$.

The above phonological changes may be illustrated as follows:



The feature specifications (F-S) of these phonological rules (P-Rules) are as follows:

P-Rule 1: [n] → [ŋ] / - [!]

F-S

+nasal
+anterior
+coronal

→

-anterior
-coronal

/ -

-sonorant
-continuant
-strident
+velaric
+anterior
+coronal
-voice
+aspiration

P-Rule 2: [!] → [!g] / [n] -

F-S

-sonorant
-continuant
-strident
+velaric
+anterior
+coronal
-voice

→

+voice

/ -

+nasal
+anterior
+coronal

With the voiceless aspirated alveo-palatal click [!h], the following occurs when it is preceded by the nasal prefix [n]:

e.g. in(i)- + -qhuba > *inqhubo > inqubo [ɪŋ!uβɔ]
 in(i)- + -qhubeka > *inqhubeko > inqubeko [ɪŋ!uβɛk'ɔ]

The main phonological processes which occur in the above examples are Assimilation and Nasal Strengthening. With Assimilation, we realise that the [n] takes the qualities of the alveo-palatal click and becomes a velar nasal [ŋ]. When Strengthening occurs, the aspirated click becomes voiceless but neither aspirated nor nasalized i.e. [!].

The representation of these phonological changes may be as follows:

If : [n] + [!h] → [ŋ!]
 Then : [n] → [ŋ] / - [!h]
 [!h] → [!] / [n] -

The feature specifications (F-S) of these phonological rules (P-Rules) are as follows:

P-Rule 1: [n] → [ŋ] / - [!h]

F-S

+nasal +anterior -coronal	→	-anterior -coronal	/ -	-sonorant -continuant -strident +velaric +anterior +coronal +aspiration
---------------------------------	---	-----------------------	-----	---

P-Rule 2: [!h] → [!] / [n] -

F-S

-sonorant -continuant -strident +velaric -anterior +coronal +aspiration	→	-aspiration -nasalized	/ -	+nasal +anterior +coronal
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The Influence on Lateral Clicks

When the nasal prefix [n] is succeeded by a voiceless radical lateral click [//], the following takes place:

e.g. in(i)- + -xoxa > *inxoxo > ingxoxo [in//gɔ//ɔ]
 in(i)- + -xaka > *inxaki > ingxaki [in//gak'i]
 in(i)- + -xela > *inxelo > ingxelo [in//gɛlɔ]

In the above examples, we realise that the radical lateral click [//] partially assimilates [n] and the latter becomes a velar nasal [ŋ]. When strengthening of the consonant occurs, the lateral click [//] changes from being voiceless and becomes fully-voiced:

We can illustrate these phonological changes as follows:

If : [n] + [//] → [ŋ//g]
 Then : [n] → [ŋ] / -[//]
 [//] → [//g] / [n] -

These phonological rules (P-Rules) may be illustrated by the following feature specifications (F-S):

P-Rule 1: [n] → [ŋ] / -[//]
 F-S:

+nasal
+anterior
+coronal

 →

-anterior
-coronal

 / -

-sonorant
-continuant
-strident
+velaric
+coronal
+lateral
-voice
-aspiration

P-Rule 2: [//] → [//g] / [n] -
 F-S:

-sonorant
-continuant
-strident
+velaric
+coronal
+lateral
-voice
-aspiration

 →

+voice

 /

+nasal
+anterior
+coronal

With the aspirated lateral click $[//h]$ the following occurs when it is preceded by the nasal prefix $[n]$:

e.g. in(i)- + -xhasa > *inxhaso > inxaso $[i\eta//as\textcircled{a}]$
 in(i)- + -xhoza > *inxhoza > inxoza $[i\eta//\textcircled{a}za]$

What we notice in the above examples is that the click has assimilated the nasal prefix $[n]$ to a velar nasal $[\eta]$. As a result of Nasal Strengthening, the aspirated $[//h]$ has become neither aspirated nor nasalized in Xhosa. We may illustrate these phonological changes as follows:

If : $[n] + [//h] \rightarrow [\eta//]$
 Then : $[n] \rightarrow [\eta] / - [//h]$
 $[//h] \rightarrow [//] / [n] -$

The feature specifications (F-S) of these phonological rules (P-Rules) may be illustrated as follows:

P-Rule 1: $[n] \rightarrow [\eta] / - [//h]$

F-S $\begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} \rightarrow \begin{matrix} -anterior \\ -coronal \end{matrix} / - \begin{matrix} -sonorant \\ -continuant \\ -strident \\ +velaric \\ +coronal \\ +lateral \end{matrix}$

P-Rule 2: $[//h] \rightarrow [//] / [n] -$

F-S $\begin{matrix} -sonorant \\ -continuant \\ -strident \\ +velaric \\ +coronal \\ +lateral \\ +aspiration \end{matrix} \rightarrow \begin{matrix} -aspiration \\ -nasalized \end{matrix} / \begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} -$

3.3 SUMMARY

In Xhosa, we have already noticed that the phonological processes which are exhibited by the juxtaposition of the nasal prefix [n] and the succeeding consonant are also Assimilation and Nasal Strengthening. Phonological processes which occur after Assimilation are Labialization, Palatalization and Velarization. Nasal Strengthening generates Plosivation and Affricatization. All Xhosa fricatives which are lenes are so strengthened by the nasal prefix [n] that they lose the quality of being continuants and become Affricates (which are of course fortes).

3.3.1 Common Features of Sounds

Xhosa fortes may either be voiceless or voiced, depending on the consonant which succeeds the nasal prefix [n]. The devoiced sounds become fully-voiced.

The Xhosa fricative sounds behave like those of Zulu when succeeding the nasal prefix [n]. They all become affricates. The fact that Xhosa has similar sound pattern with Zulu is also proved when all aspirated sounds become unaspirated after the Nasal. The radical fricatives become ejective affricates when preceded by the nasal prefix [n]. The behaviour of the glottal fricative [h] after the nasal prefix [n] is in Xhosa, similar to that of Zulu, in that it becomes an ejective explosive. The change of the nasal prefix [n] is also similar to that which occurs in Zulu.

3.3.2

THE TABLE OF SOUNDS AND DESCRIPTION

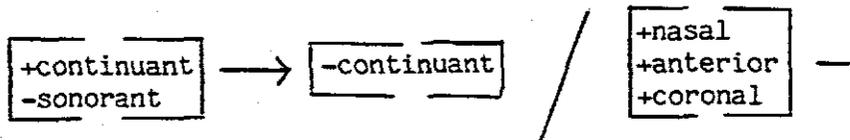
SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
<p>ph [ph]</p> <p>b [β]</p> <p>bh [b̥]</p> <p>th [tʰ]</p> <p>d [d̥]</p> <p>kh [kʰ]</p> <p>g [g̥]</p>	<p><u>Plosives</u></p> <p>voiceless aspirated bilabial explosive</p> <p>voiced bilabial implosive</p> <p>devoiced bilabial explosive</p> <p>voiceless aspirated alveolar explosive</p> <p>devoiced alveolar explosive</p> <p>voiceless aspirated velar explosive</p> <p>devoiced velar explosive</p>	<p>p [pʰ]</p> <p>b [b]</p> <p>b [b]</p> <p>t [tʰ]</p> <p>d [d]</p> <p>k [kʰ]</p> <p>g [g]</p>	<p>voiceless ejective bilabial explosive</p> <p>voiced bilabial explosive</p> <p>voiced bilabial explosive</p> <p>voiceless ejective alveolar explosive</p> <p>voiced alveolar explosive</p> <p>voiceless ejective velar explosive</p> <p>voiced velar explosive</p>

SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
<p>f [f]</p> <p>v [v]</p> <p>s [s]</p> <p>z [z]</p> <p>hl [ɸ]</p> <p>dl [ɓ]</p> <p>sh [ʃ]</p> <p>h [h]</p>	<p><u>Fricatives</u></p> <p>voiceless radical labio-dental fricative</p> <p>voiced labio-dental fricative</p> <p>voiceless radical alveolar fricative</p> <p>voiced alveolar fricative</p> <p>voiceless radical alveolar lateral fricative</p> <p>voiced alveolar lateral fricative</p> <p>voiceless radical alveo-palatal fricative</p> <p>voiceless radical glottal fricative</p>	<p>f [ɸf']</p> <p>v [bv]</p> <p>ts [ts']</p> <p>z [dz]</p> <p>tl [tɸ']</p> <p>dl [dlɓ]</p> <p>tsh [tʃ']</p> <p>k [k']</p>	<p>voiceless ejective labio-dental affricate</p> <p>voiced labio-dental affricate</p> <p>voiceless ejective alveolar affricate</p> <p>voiced alveolar affricate</p> <p>voiceless ejective alveolar lateral affricate</p> <p>voiced alveolar lateral affricate</p> <p>voiceless ejective alveo-palatal affricate</p> <p>voiceless ejective velar explosive</p>

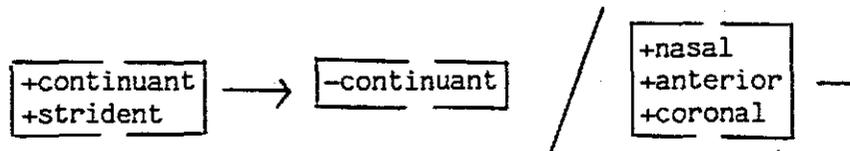
SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
l [l]	<u>Liquid</u> voiced alveolar lateral non-fricative continuant	d [d]	voiced alveolar explosive
	<u>Clicks</u>		
c [ʘ]	voiceless radical dental click	gc [ʘg]	voiced dental click
ch [ʘh]	voiceless aspirated dental click	c [ʘ]	voiceless dental click
q [ǀ]	voiceless radical alveo-palatal click	gq [ǀg]	voiced alveo-palatal click
qh [ǀh]	voiceless aspirated alveo-palatal click	q [ǀ]	voiceless alveo-palatal click
x [ǁ]	voiceless radical lateral click	gx [ǁg]	voiced lateral click
xh [ǁh]	voiceless aspirated lateral click	x [ǁ]	voiceless lateral click
	<u>Nasals</u>		
n [n]	voiced alveolar nasal	m [m]	voiced bilabial nasal
		m [ɱ]	voiced labio-dental nasal
		n [ɲ]	voiced alveo-palatal nasal
		n [ŋ]	voiced velar nasal

3.3.3 The Feature Specifications

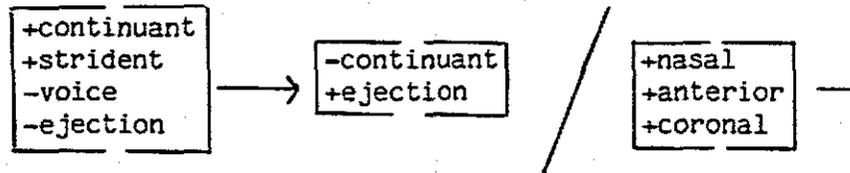
The fricatives change to stops after the nasal prefix [n].



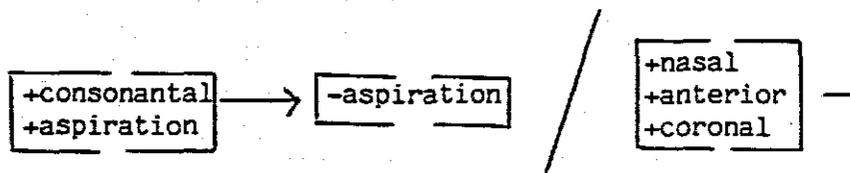
All fricatives with the exception of [h] become affricates when preceded by the nasal prefix [n].



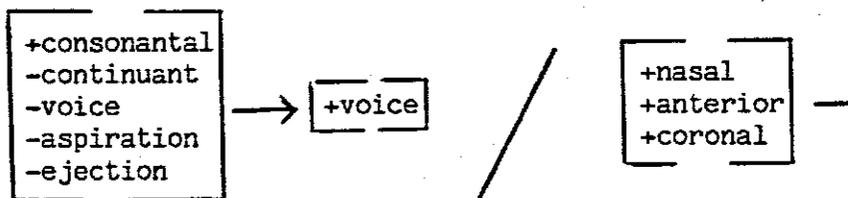
Voiceless fricatives except [h], change to ejective affricates after [n].



All aspirated sounds become unaspirated when succeeding the nasal prefix [n].

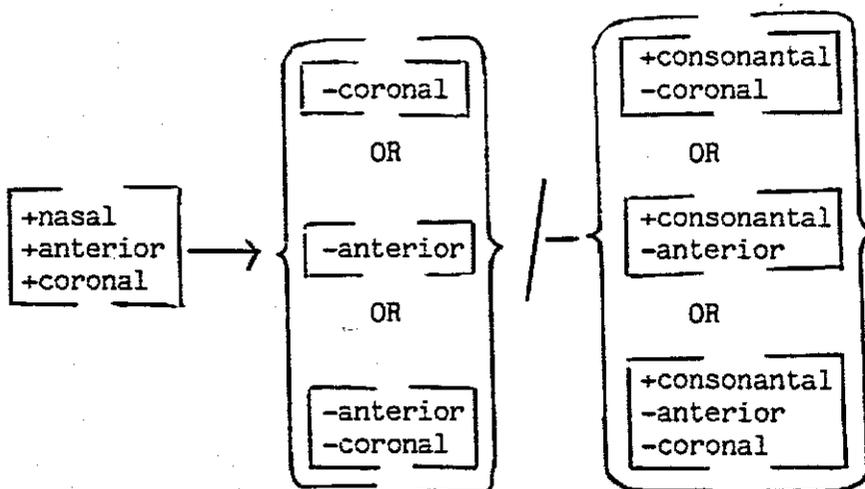


All devoiced sounds become fully-voiced when preceded by the nasal prefix [n].



It must be noted however that the feature, $[-\text{continuant}]$ is only included in the above matrix in order to distinguish the devoiced ($[-\text{voice}, -\text{aspiration}, -\text{ejection}]$) explosives ($[-\text{continuant}]$).

The nasal prefix $[n]$ loses its place of articulation because of the succeeding consonant. It may either become a labial (bilabial or labio-dental), a palatal or a velar nasal.



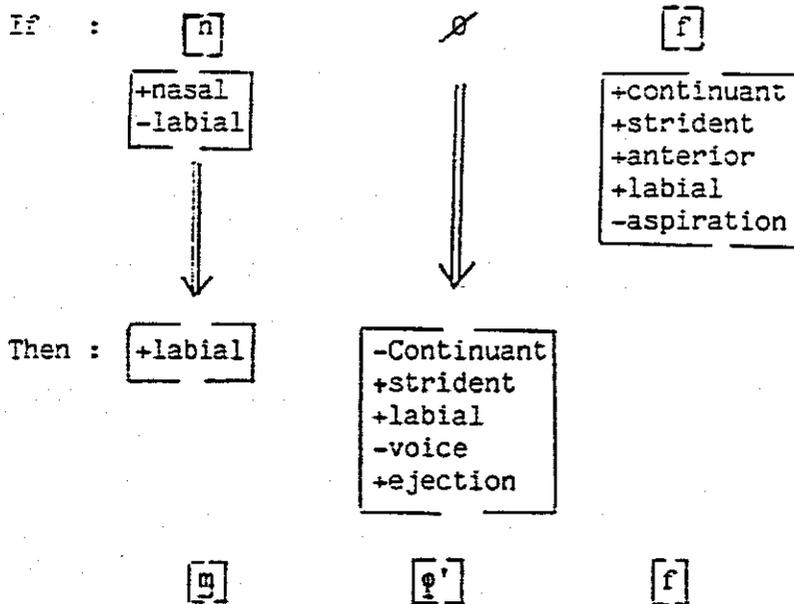
3.3.4 The Sequential Structure Constraints/Conditions

In Xhosa we have thus realized that: if $[n] + [c']$ $[nc^2]$, (where n = nasal prefix and c = consonant), then $[C^2]$ is unaspirated if $[c']$ is aspirated. We may illustrate this as follows:

The Insertion Rule

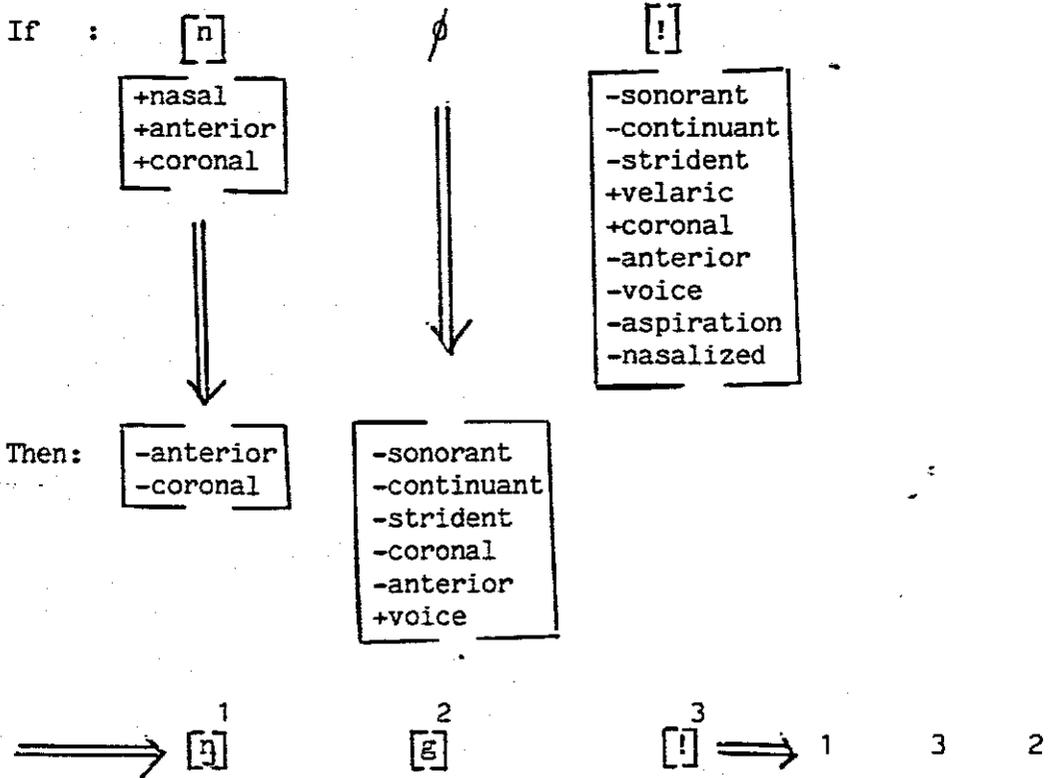
In Xhosa, we have noticed that in the sequence of [n] + [c] where [c] is a fricative sound, Epenthesis takes place. If [c] is a fricative, the resultant sound is an affricate (if [c] is not a glottal fricative). Epenthesis also occurs with clicks. With fricatives it occurs when [n] + [c'] → [nc²c']. Here [c'] is identical with [c] and [c²] is a fricative sound produced at the same place of articulation as in [c]. [c²] is thus inserted before [c']. We may illustrate the sequence of [n] and a fricative as follows:

Example 1

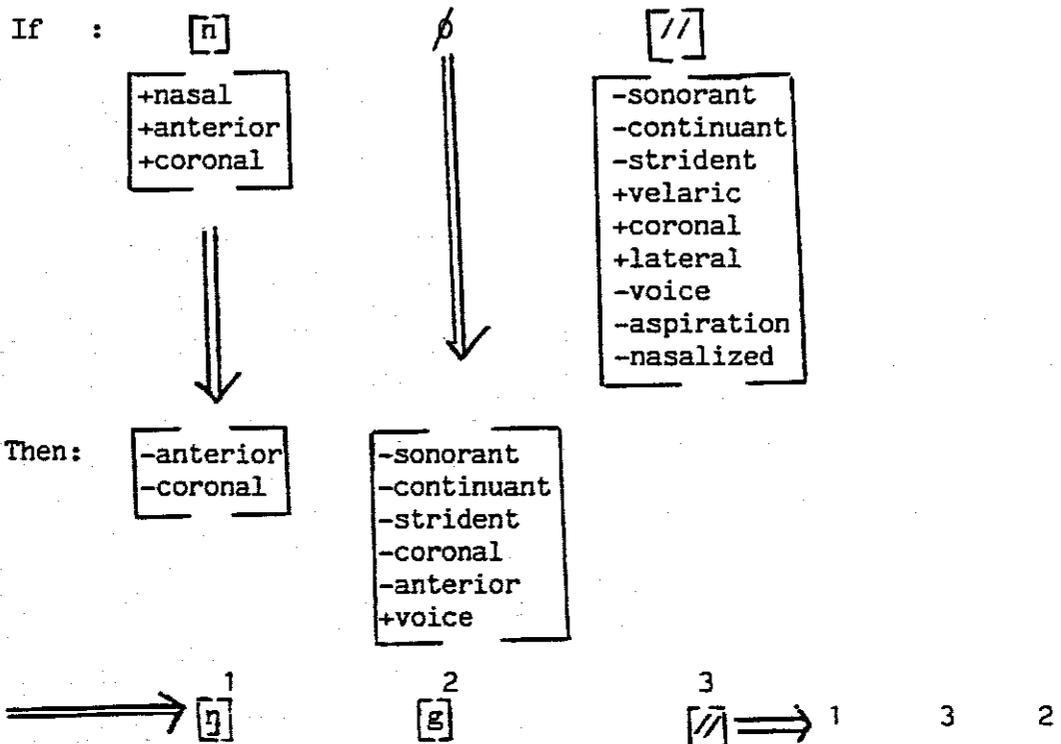


It must also be noted that because of [ɸ'] being ejective, then the homorganic sounds [ɸf'] must also be ejective. The diachritic sign "' is thus placed after [f] even though the latter, on its own is a radical sound i.e. neither voiced, aspirated nor ejective.

Example 6



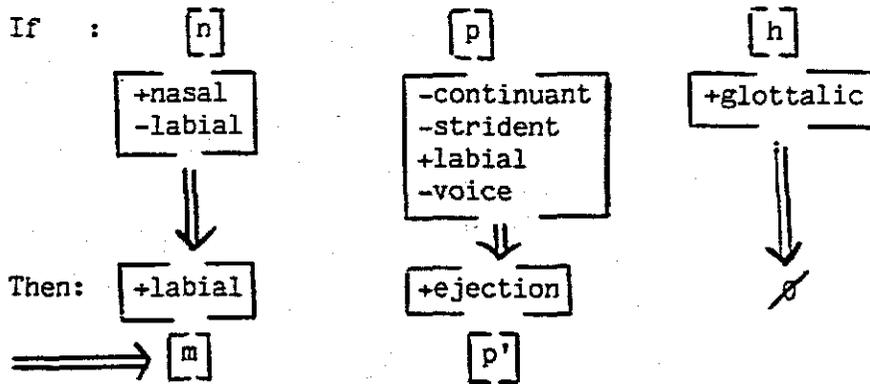
Example 7



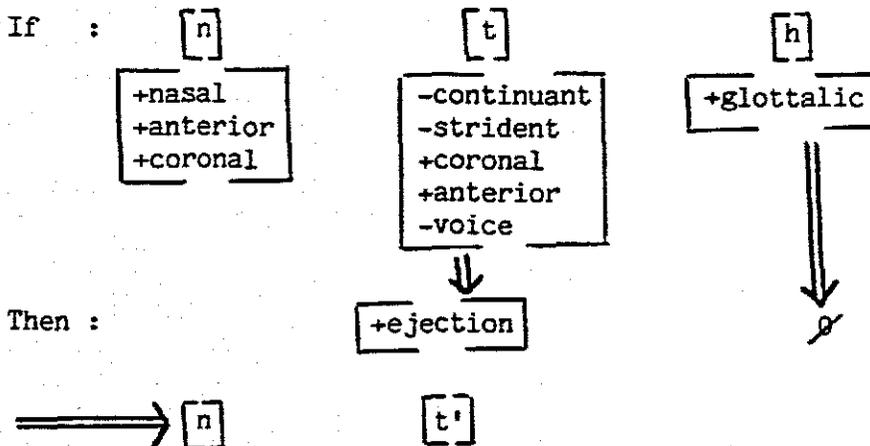
Reduction Rule

We have also realized that like in Zulu Consonant Reduction also takes place. In the sequence of [n] + [c], where [c] is an aspirated sound, reduction of the consonant representing aspiration takes place. This means that if [n] + [c'c²] → [nc'] where [c²] is the aspiration of [c'], then [c²] is elided because of [n]. Because of [n], [c'] is thus ejective if [c'] is an explosive. This also means that the consonants marked [c'] and [c²] are identical. This may be illustrated as follows:

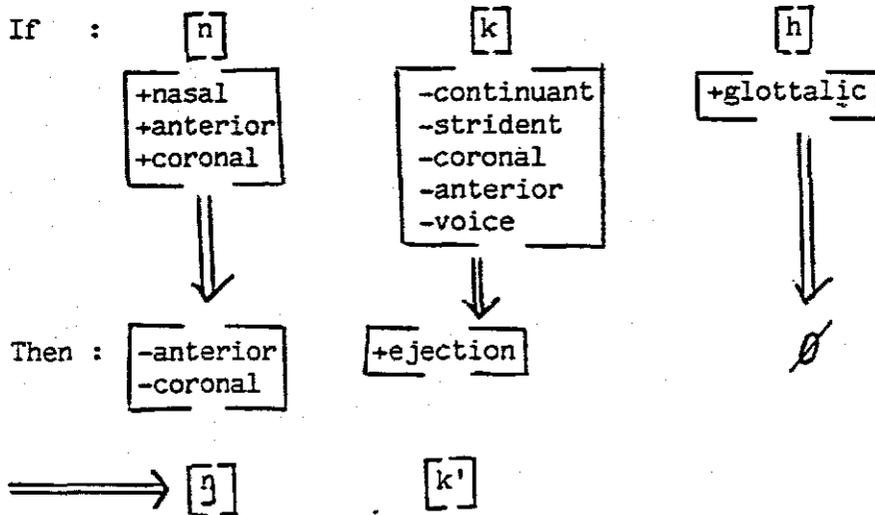
Example 1



Example 2



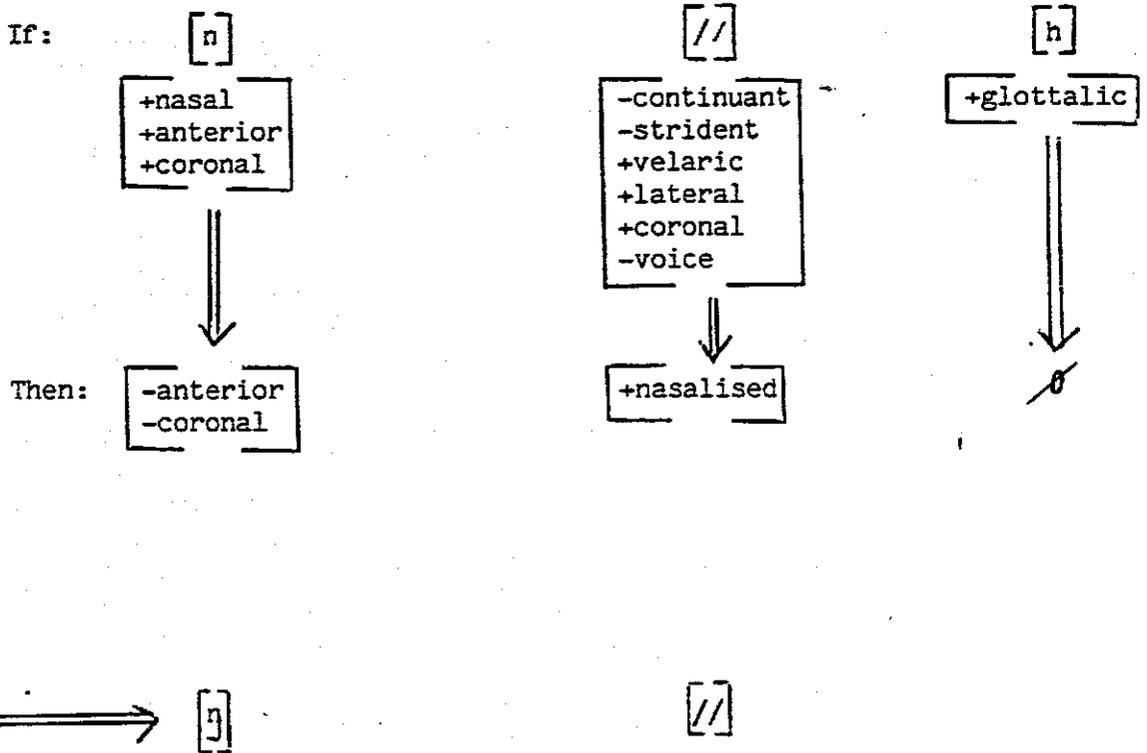
Example 3



EPENTHESIS AND REDUCTION

With the aspirated click sounds, Epenthesis occurs simultaneously with reduction. If $[n] + [c^1c^2] \rightarrow [nc^3c^1]$, then $[c^3]$ is inserted between $[c^1]$ and $[c^2]$ and $[c^2]$ which is the aspiration of $[c^1]$ is elided. $[c^3]$ is the velar explosive, $[k]$ which is of course voiceless because of the voiceless $[c^1]$. As a result of $[c^3]$ being produced by raising the back of the velum, the $[n]$ becomes a velar nasal; and for this reason, $[ŋ]$ and $[k]$ cause $[c^1]$ i.e. the radical click to be nasalized. We may illustrate this as follows:

Example 3



The Sequential Structure Constraints have thus resulted into Epenthesis, Consonant Reduction as well as Insertion and Reduction Rules.

CHAPTER 4

4.0 THE INFLUENCE OF THE NASAL PREFIX /n/ ON SUCCEEDING CONSONANTS
IN SOUTHERN SOTHO

4.1 INTRODUCTION

Southern Sotho has no implosive sounds such as for instance the [ɓ] which occurs in Zulu and Xhosa. Instead, the [b] occurring without the accompaniment of the nasal [n] or [m] is an explosive sound. It must also be noted that the Southern Sotho [ɸ] occurring at the beginning of lexical items is voiced while that of Zulu and Xhosa is voiceless (in the formation of deverbatives only).

Like Zulu and Xhosa, Southern Sotho does have a voiceless radical alveolar lateral fricative [ɬ]. The voiced counterpart, [ɮ] does not exist in Southern Sotho, but the lateral affricate [tɬ'] which occurs in Zulu and Xhosa, is in Southern Sotho a lateral explosive [tɬ'] which is phonetically written similar as in the practical orthography of Xhosa e.g. intlantla (lucky). This lateral explosive has its aspirated counterpart [tɬh] while in Zulu and Xhosa, there is a voiced counterpart of [tɬ'] i.e. [dɬ].

It must also be noted that the Southern Sotho [d] is a fully-voiced alveolar explosive because during its production, the vibration of the vocal cords (which is tested by closing both ears with pointing fingers) is similar to that described by Fromkin and Rodman when the [z] sound i.e. a voiced alveolar fricative, is produced. When describing the vibration of the vocal cords during the articulation of voiced sounds, they say:

If the vocal cords are together, the airstream forces its way through and causes them to vibrate. Such sounds are called voiced sounds and are illustrated by the sounds spelled b, d, g, and z in the words bad, god, dog, zebra, and buzz. If you put a finger in each ear and say "z-z-z-z-z" you can feel the vibrations of the sound as it goes through the vibrating vocal cords.

(Fromkin and Rodman, 1983:39).

Unlike Zulu and Xhosa, Southern Sotho has, besides the nasal [m] a [+syllabic] alveolar lateral [l] and nasals [n, ɲ, ŋ] which are also [+syllabic]. Each of these becomes syllabic when it precedes a sound with which it is identical. The classes 1 and 3 stems in Southern Sotho like those of Zulu and Xhosa, have a [+syllabic] [m] but this [m] does not feature in this discussion because it is not derived from class 9 nasal prefix [n].

In Southern Sotho, like in Zulu and Xhosa, the sequence of the nasal prefix + any consonant results in Nasalization i.e. the succeeding consonant becomes nasalised. Nasalization is thus a phonological process which takes place when a nasal precedes a consonant especially in Nguni and Sotho language groups. It is for this reason that Nasalization has been overlooked in this discussion. We have already noticed in the last two chapters that the sequence of [n] + [c] results in Nasal Strengthening which generates Plosivation and/or Affricatization. In contrast to Ziervogel et. al.'s explanation,

The term Plosivating is usually caused by nasals. Hence the term Nasal Strengthening or Nasalization.

(Ziervogel, et. al., 1967:306),

we may say that the sequence of [n] + [c] causes Nasal Strengthening or Fortization. This is caused by the fact that the succeeding consonant becomes a fortis i.e. a strengthened sound (produced with tense muscles/organs) after a nasal prefix [n].

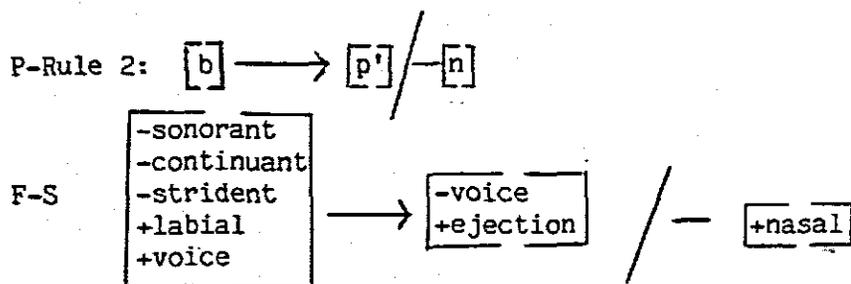
In addition to what has been mentioned above, all Southern Sotho voiced sounds especially the explosives, fricatives and liquids are lenes which become fortes when accompanied by the nasal prefix [n]. This nasal prefix may also change its place of articulation because of the succeeding consonant.

In Southern Sotho, the nasal prefix [n] from class 9 prefix "ni-" is necessary in the formation of nouns (deverbatives), objectival concords, of the first person singular and adjectival concords. When nouns and adjectival concords of the same class prefix are formed, the nasal [n] is sometimes discarded especially when the noun and the adjectival stems are di- and/or polysyllabic. This is among other things observed in the following examples:

n(i)- + -homo > *nhomo > *ngomo > *nkgomo > kgomo [kxh̩mo]
n(i)- + -holo > *nholo > *ngolo > *nkgolo > kgolo [kxholo]
en(i)- + -holo > *enholo > *engolo > *enkgolo > e kgolo [ɛ̣ kxholo]
en(i)- + -fubedu > *enfubedu > *engubedu > *enkgubedu > e kgubedu [ɛ̣ kxhubɛ̣du]

4.2 THE INFLUENCE ON NATURAL CLASSES OF PHONEMES

These will be divided into explosives, fricatives, liquids, nasals and clicks. The change of the alveolar nasal [n] will also be examined.



With the voiceless aspirated and ejective bilabial explosives, i.e. [pʰ] and [pʰ̥], both sounds remain unchanged because they are fortes. It is only the alveolar nasal [n] which loses its alveolar characteristic and assumes the labial quality. We therefore do not expect Nasal Strengthening to occur here, because the succeeding sounds are fortes.

e.g. n(i)- + -phahamisa > *nphahamisa > mphahamisa mphahamisa
 n(i)- + -phetla > *nphetla > mphetla [mphɛtʰl'a]
 n(i)- + -pata > *npata > mpata [mp'at'a]
 n(i)- + -pota > *npota > mpota [mp'ot'a]

If the nasal prefix [n] precedes a voiced alveolar explosive [d], the following changes always occur:

e.g. n(i)- + -dulela > *ndulela > ntulela [nt'uɛɛla]
 n(i)- + -disetsa > *ndisetsa > ntisetsa [nt'isɛts'a]
 n(i)- + -dudisa > *ndudisa > ntudisa [nt'udisa]

The alveolar nasal [n] does not lose its alveolar characteristics because, like in Zulu and Xhosa the [d] is an alveolar sound too. When Nasal Strengthening occurs, the alveolar explosive which is voiced becomes a voiceless ejective alveolar explosive.

The following is a phonological rule (P-Rule) of the above phonemic representation.

If : [n] + [d] → [nt']
 Then : [d] → [t'] / [n] -

The feature specification (F-S) of the above rule is:

P-Rule : [d] → [t'] / [n] -

F-S

-sonorant
-continuant
-strident
+anterior
+coronal
+voice

→

-voice
+ejection

/

+nasal
+anterior
+coronal

-

With other alveolar explosives, namely [t'], [th] and [tɬ], neither Nasal Strengthening nor Assimilation takes place. The sounds remain both unchanged.

e.g. n(i)- + -tena > ntena [nt'ena]
 n(i)- + -thetsa > nthetsa [nthets'a]
 n(i)- + -tlama > ntlama [ntɬ'ama]

4.2.2 The Influence on Fricatives

When the nasal prefix [n] precedes a glottal fricative [h], we notice the following:

e.g. n(i)- + -hata > *nhata > *n + gata > nkgata [ŋkxhat'a]
 n(i)- + -hana > *nhana > *n + gana > nkgana [ŋkxhana]
 en(i)- + -holo > *enholo > *en + golo > e kgolo [ɛ kxholo]

In the above examples, the alveolar nasal [n] causes a glottal fricative [h] to become a voiceless radical velar fricative [x] so that the nasal [n] may assimilate the velar qualities of [x]. This is the first Nasal Strengthening which has resulted in Velarization. When [n] has assimilated the velar quality and changed to a velar nasal [ŋ], the second Nasal Strengthening occurs. The voiceless velar fricative [x] which is a lenis changes to a fortis i.e. a voiceless aspirated velar affricate [kxh], hence Affricatization.

Here are phonological rules (P-Rules) of the above phonemic representations.

If : [n] + [h] → [ŋkxh]
 Then : [n] → [ŋ] / -[h]
 [h] → [kxh] / [n] -

The feature specifications (F-S) of these (P-Rules) are:

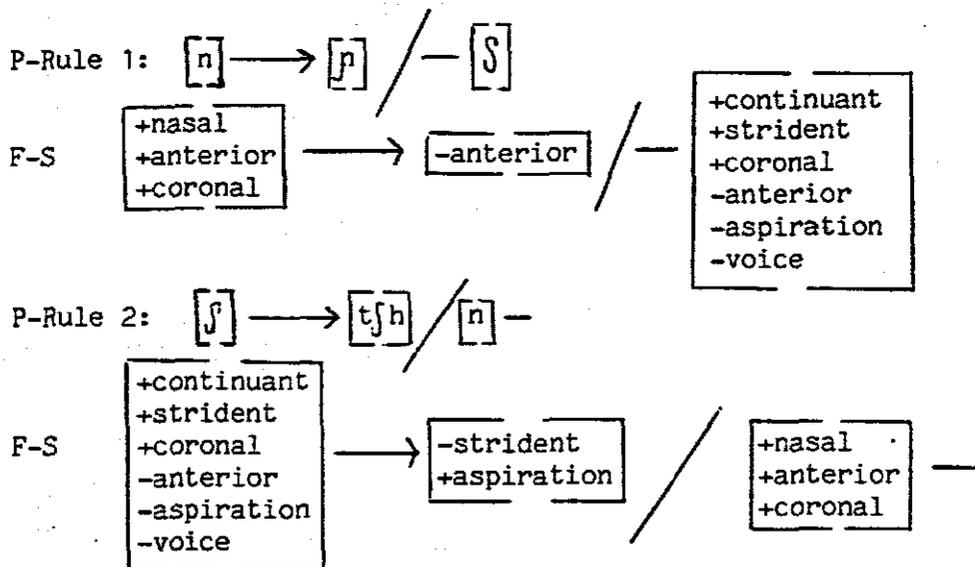
P-Rule 1: [n] → [ŋ] / -[h]

F-S

+nasal +anterior +coronal	→	-anterior -coronal	/	-[h]
---------------------------------	---	-----------------------	---	------

+continuant -strident -anterior -coronal +voice

The features, [-anterior, -coronal] above, distinguish velar and glottal sounds from all other consonants, while [+continuant, -strident] will distinguish glottal fricatives from velar fricatives which are [+continuant, +strident].



With the voiced alveo-palatal fricative [ʃ] is preceded by an alveolar nasal [n], we notice the following phonological changes.

e.g. n(i)- + -ja > *nja > ntja [ɲtʃ'a]
 n(i)- + -jara > *njara > ntjara [ɲtʃ'ara]
 n(i)- + -jela > *njela > ntjela [ɲtʃ'ɛla]

The alveolar nasal [n] becomes assimilated into the alveo-palatal fricative [ʃ] and the former changes to an alveo-palatal nasal [ɲ], as a result of Palatalization. As a result of Nasal Strengthening, the voiced alveo-palatal fricative [ʃ], becomes a voiceless ejective alveo-palatal affricate [tʃʰ], hence Affricatization.

The phonological rules (P-Rules) can be illustrated as follows:

lateral fricative [ɸ] changes to an alveolar lateral explosive [tlh] which is of course aspirated, hence Plosivation.

The Phonological rule (P-Rule) of the above phonemic representation is:

If : [n] + [ɸ] → [ntlh]
Then : [ɸ] → [tlh] / [n] -

The feature specification of this P-Rule is:

P-Rule : [ɸ] → [tlh] / [n] -

F-S

+continuant
+strident
+anterior
+coronal
-lateral
-voice
-aspiration

 →

-continuant
-strident
+aspiration

 /

+nasal
+anterior
+coronal

 -

When we observe the juxtaposition of the nasal prefix [n] and the voiceless radical alveolar fricative [s], the following occurs:

e.g. n(i)- + -sola > *nsola > ntshola [ntshɔla]
n(i)- + -senyetsa > *nsenyetsa > ntshenyetsa [ntshɛnɛts'a]
n(i)- + -sebeleetsa > *nsebeleetsa > ntshsebeleetsa [ntshɛbɛlɛts'a]

When Nasal Strengthening occurs in the above examples, the radical alveolar fricative [s] changes to an aspirated alveolar affricate [tsh], hence the process Affricatization.

The Phonological rule (P-Rule) of the above phonological change is:

If : [n] + [s] → [ntsh]

Then : [s] → [tsh] / [n] -

The feature specification (F-S) of this phonological rule is:

P-Rule : [s] → [tsh] / [n] -

F-S

+continuant +strident +anterior +coronal +lateral -voice -aspiration	→	-continuant	/	+nasal +anterior +coronal	-
--	---	-------------	---	---------------------------------	---

The juxtaposition of [n] and [f] i.e. when an alveolar nasal [n] precedes a voiceless radical labio-dental fricative [f] the following occurs:

e.g. n(i)- + -fahla	>	*nfahla	>	*mfahla	>	mphahla	[mphahla]
n(i)- + -fa	>	*nfa	>	*mfa	>	mpha	[mpha]
n(i)- + -feta	>	*nfeta	>	*mfeta	>	mpheta	[mphet'a]

In the above examples, the voiceless radical labio-dental fricative [f] partially assimilates the alveolar nasal [n] retrogressively and the latter changes to a bilabial nasal [m], hence Labialization. The change of [f] to [ph] may be described in two different ways; namely: as a result of Assimilation or secondly, as a result of Nasal Strengthening:

Assimilation

The bilabial nasal [m] partially assimilates the labio-dental fricative [f] progressively, and the latter changes to an aspirated bilabial explosive [ph], hence Labialization. This form of Assimilation is in terms of its direction, described as an Incomplete Reciprocal Assimilation, because [f] has also assimilated [n].

Nasal Strengthening

When Nasal Strengthening occurs, the labio-dental fricative [f] changes to a voiceless aspirated bilabial explosive [ph], hence Plosivation.

We can illustrate the phonological rules (P-Rules) as follows:

If : [n] + [f] → [mph]

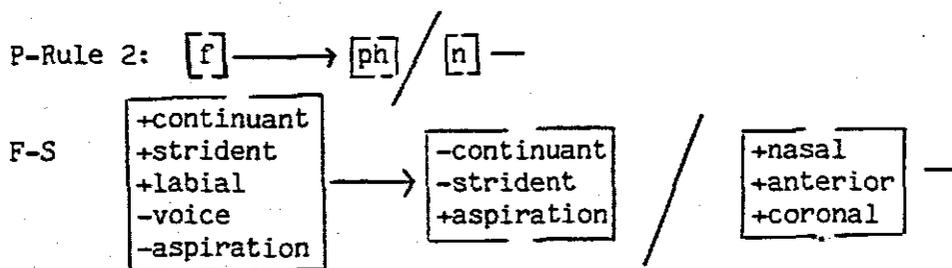
Then : [n] → [m] / -[f]

[f] → [ph] / [n] -

The feature specifications (F-S) of these phonological rules (P-Rules) are:

P-Rule 1: [n] → [m] / -[f]

F-S [+nasal
-labial] → [+labial] / - [+continuant
+strident
+labial
-voice]



4.2.3 The Influence on Liquids

When the alveolar nasal prefix [n] precedes a voiced alveolar lateral non-fricative continuant [l], the following occurs:

e.g. n(i)- + -laela } *nlaela } ntaela [nt'aɛla]
 n(i)- + -loma } *nloma } ntoma [nt'oma]
 n(i)- + -lokisetsa } *nlokisetsa } ntokisetsa [nt'ok'isɛts'a]

As a result of Nasal Strengthening, the voiced alveolar lateral continuant [l] becomes a voiceless ejective alveolar explosive [t'], which results in Plosivation.

The following are the P-Rules of the above examples:

If : [n] + [l] → [nt']
 Then : [l] → [t'] / [n] -

The feature specification (F-S) of the phonological rule is:

P-Rule: [l] → [t'] / [n] -

F-S

+continuant +strident -lateral +anterior +coronal +voice	→	-continuant -lateral -voice +ejection	/	+nasal +anterior +coronal	-
---	---	--	---	---------------------------------	---

Nasal Strengthening also occurs without Assimilation when the voiced alveolar rolled vibrant [r] succeeds a nasal prefix [n].

e.g. n(i)- + -rata > *nrata > nthata [nthat'a]
 n(i)- + -roma > *nroma > nthoma [nthoma]
 n(i)- + -roba > *nroba > nthoba [nthoba]

The alveolar nasal [n] strengthens the voiced alveolar rolled vibrant [r] such that the latter changes to a voiceless aspirated alveolar explosive [th].

The phonological rule (P-Rule) is as follows:

If : [n] + [r] → [nth]
 Then : [r] → [th] / [n] -

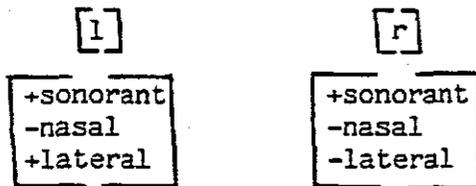
The feature specification (F-S) can be illustrated as follows:

P-Rule : [r] → [th] / [n] -

F-S

+sonorant -nasal -lateral +anterior +coronal	→	-sonorant -strident -voice +aspiration	/	+nasal +anterior +coronal	-
--	---	---	---	---------------------------------	---

The features, +anterior, +coronal above are only included in features of liquids in order to show similarities between each pair of features in matrices; otherwise [l] and [r] have the following distinctive features:



4.2.4 The Influence on Nasals

If the alveolar nasal prefix [n] precedes another alveolar nasal, both sounds do not change because neither Assimilation nor Nasal Strengthening occurs. The first sound becomes syllabic.

e.g. n(i)- + -nɛp > nɛp nɛp'a

n(i)- + -nɔntʃa > nɔntʃa nɔntʃa

n(i)- + -nɛha > nɛha nɛha

When an alveolar nasal [n] is succeeded by an alveo-palatal nasal [ɲ], the following are expected:

e.g. n(i)- + -nyala > nnyala ɲnala

n(i)- + -nyontʃa > nnyontʃa ɲnontʃa

n(i)- + -nyatsa > nnyatsa ɲnats'a

In the examples above, the alveo-palatal nasal [ɲ] completely assimilates the alveolar nasal [n] such that the latter becomes

identical with the former. Here, Complete Retrogressive Assimilation results in Palatalization when $[n] \rightarrow [ɲ]$. The first alveo-palatal nasal becomes $[+syllabic]$.

The above phonemic representation can be illustrated by the following phonological rule:

If : $[n] + [ɲ] \rightarrow [ɲɲ]$
 Then : $[n] \rightarrow [ɲ] / -[ɲ]$

The feature specification of this phonological rule (P-Rule) is:

P-Rule : $[n] \rightarrow [ɲ] - [ɲ]$

F-S $\begin{bmatrix} +nasal \\ +anterior \\ +coronal \end{bmatrix} \rightarrow \begin{bmatrix} -anterior \end{bmatrix} / - \begin{bmatrix} +nasal \\ -anterior \\ +coronal \end{bmatrix}$

When an alveolar nasal $[n]$ precedes a velar nasal $[ŋ]$, the following occurs:

e.g. n(i)- + -ngola > nngola $\begin{bmatrix} ɲɲola \end{bmatrix}$
 n(i)- + -ngwapa > nngwapa $\begin{bmatrix} ɲɲwap'a \end{bmatrix}$
 n(i)- + -ngala > nngala $\begin{bmatrix} ɲɲala \end{bmatrix}$

Here, the alveolar nasal $[n]$ is completely assimilated into the velar nasal $[ŋ]$ and the former becomes identical with the latter, i.e. it changes to a velar nasal $[ŋ]$, hence Velarization.

The phonological rules (P-Rules) of this representation are as follows:

If : $[n] + [ŋ] \rightarrow [ŋŋ]$
 Then : $[n] \rightarrow [ŋ] / -[ŋ]$

The feature specification of this P-Rule is as follows:

P-Rule : $[n] \rightarrow [ŋ] / -[ŋ]$
 F-S : $\begin{matrix} +nasal \\ +anterior \\ +coronal \end{matrix} \rightarrow \begin{matrix} -anterior \\ -coronal \end{matrix} / - \begin{matrix} +nasal \\ -anterior \\ -coronal \end{matrix}$

With the voiced bilabial nasal $[m]$ as a succeeding consonant, the following are noticed:

e.g. n(i)- + -makallela > *nmakallela > mmakallela $\boxed{mmak'allela}$
 n(i)- + -makatsa > *nmakatsa > mmakatsa $\boxed{mmak'ats'a}$
 n(i)- + -mathisa > *nmathisa > mmathisa $\boxed{mmathisa}$

In the above examples, Complete Retrogressive Assimilation takes place. The bilabial nasal $[m]$ assimilates the preceding alveolar nasal $[n]$ completely and the latter changes to a bilabial nasal, hence Labialization.

We can illustrate the phonological rule (P-Rule) as follows:

If : $[n] + [m] \rightarrow [mm]$
 Then : $[n] \rightarrow [m] / -[m]$

The feature specification (F-S) of this phonological rule is:

P-Rule : [n] → [m] / - [m]

+nasal
-labial

 →

+labial

 / -

+nasal
+labial

The change of the alveolar nasal prefix [n] as a result of the alveo-palatal [ɲ], velar [ŋ] or bilabial [m] may be illustrated as follows:

P-Rules: [n] →

[ɲ]
OR
[ŋ]
OR
[m]

 / -

[ɲ]
OR
[ŋ]
OR
[m]

The feature specifications (F-S) of these phonological rules (P-Rules) are:

+nasal
+anterior
+coronal

 →

-anterior
OR
-anterior
-coronal
OR
-coronal

 / -

+nasal
-anterior
+coronal
OR
+nasal
-anterior
-coronal
OR
+nasal
+anterior
-coronal

4.2.5 The Influence on Clicks

The Click sounds, as already mentioned are borrowed from Bushman and Hottentot Languages. Southern Sotho has only borrowed one type of clicks, namely: The alveo-palatal click [!] and its counterparts, the aspirated and the nasalized clicks.

When the voiceless radical alveo-palatal click [!] is preceded by the alveolar nasal prefix [n], the following are noticed:

e.g. n(i)- + -qosa	>	nqosa	$\boxed{\eta k!osa}$
n(i)- + -qaka	>	nqaka	$\boxed{\eta k!ak'a}$
n(i)- + -qeka	>	nqeka	$\boxed{\eta k!Ek'a}$

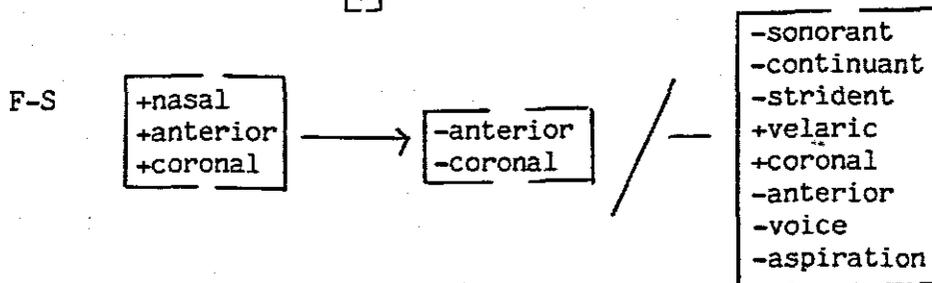
The palato-alveolar click [!] partially assimilates the alveolar nasal [n] retrogressively and the latter changes to a velar nasal [ŋ], hence Velarization. When Nasal Strengthening occurs, the radical palato-alveolar click becomes a voiceless nasalized palato-alveolar click.

The above phonological changes may be illustrated as follows:

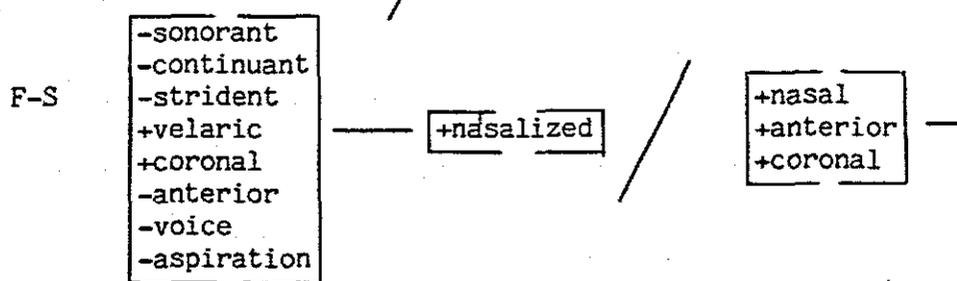
If : $\boxed{n} + \boxed{!} \longrightarrow \boxed{\eta k!}$
 Then : $\boxed{n} \longrightarrow \boxed{\eta} / - \boxed{!}$
 $\boxed{!} \longrightarrow \boxed{k!} / \boxed{n} -$

The feature specifications (F-S) of these phonological rules (P-Rules) are:

P-Rule 1: [n] → [ŋ] / - [!]



P-Rule 2: [!] → [k!] / [n] -



4.3 SUMMARY

In Southern Sotho, we have also realized that the phonological changes which are as result of the juxtaposition of the nasal prefix [n] and the succeeding consonant are dominated by two main processes, namely: Assimilation and Nasal Strengthening. Other phonological processes do occur after the main ones.

Unlike Zulu and Xhosa, when a voiced consonant succeeds a nasal which may be [m] or [n] in Southern Sotho, the former changes to a voiceless sound but which is also produced at the same place of articulation.

- e.g. n(i)- + - loma > ntoma [nt'oma]
- n(i)- + -bitsa > mpitsa [mp'its'a]
- n(i)- + -rata > nthata [nthat'a]

This is caused by Nasal Strengthening. As already mentioned in Chapter 2 that Nasal Strengthening causes alenis to become a fortis, we therefore notice that the Southern Sotho fortes are all voiceless sounds. The Zulu and/or Xhosa fortes are either voiced or voiceless.

When voiced consonants are identical in Southern Sotho, they both remain unchanged and the first one becomes syllabic i.e. +syllabic. If the two sounds are nasals the first nasal becomes assimilated into the second and the first one is of course +syllabic. In Southern Sotho, the following were noticed:

4.3.1 Common Features of Sounds

The Southern Sotho fortes are voiceless sounds i.e. all consonants preceded by the nasal prefix [n] become voiceless; even if they are voiced. We must note that the nasals which succeed the nasal prefix are excluded here. All fricative sounds change to stops (explosives and/or affricates) when succeeding the [n]. The fricatives, except [ɬ] and [f] become affricates. When we exclude [ɬ] and [f], the voiceless fricatives become the aspirated affricates when succeeding the nasal prefix [n]. The liquids become explosives after [n]. The radical click [!] changes to a voiceless nasalized click.

4.3.2

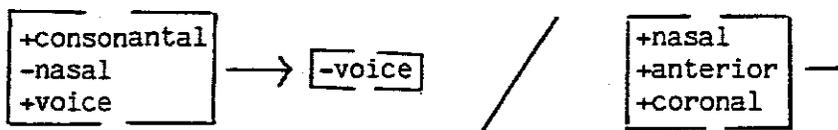
THE TABLE OF SOUNDS AND DESCRIPTION

SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
	<u>Plosives</u>		
b [b]	voiced bilabial explosive	p [p']	voiceless ejective bilabial explosive
d [d]	voiced alveolar explosive	t [t']	voiceless ejective alveolar explosive
	<u>Fricatives</u>		
f [f]	voiceless radical labio-dental fricative	ph [ph]	voiceless aspirated bilabial explosive
s [s]	voiceless radical alveolar fricative	tsh [tsh]	voiceless aspirated alveolar affricate
hl [ɸ]	voiceless radical alveolar lateral fricative	tlh [tlh]	voiceless aspirated alveolar lateral explosive
sh [ʃ]	voiceless radical alveo-palatal fricative	tjh [tʃh]	voiceless aspirated alveo-palatal affricate
j [ʒ]	voiced alveo-palatal fricative	tj [tʃ']	voiceless ejective alveo-palatal affricate
h [ħ]	voiced glottal fricative	kg [kxh]	voiceless aspirated velar affricate

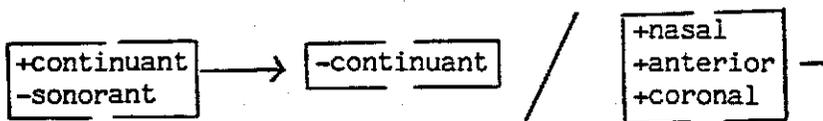
SOUND BEFORE CHANGE	DESCRIPTION	SOUND AFTER CHANGE	DESCRIPTION
l [l] r [r] n [n] q [!] qh [!h]	<p><u>Liquids</u></p> <p>voiced alveolar lateral non-fricative continuant</p> <p>voiced alveolar rolled vibrant</p> <p><u>Nasals</u></p> <p>voiced alveolar nasal</p> <p><u>Clicks</u></p> <p>voiceless radical alveo-palatal click</p> <p>voiceless aspirated alveo-palatal click</p>	t [t'] th [th] m [m] n [ɲ] n [ŋ] q [k!] qh [k!h]	<p>voiceless ejective alveolar explosive</p> <p>voiceless aspirated alveolar explosive</p> <p>voiced bilabial nasal</p> <p>voiced alveo-palatal nasal</p> <p>voiced velar nasal</p> <p>voiceless nasalized alveo-palatal click</p> <p>voiceless aspirated nasalized click</p>

4.3.3 The Feature Specifications

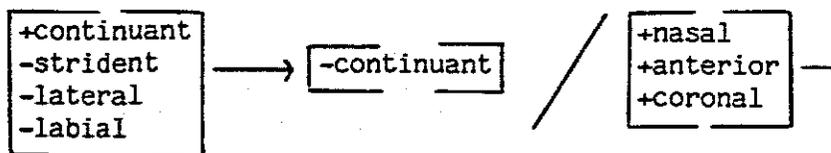
All voiced consonants except nasals, become voiceless when preceded by [n].



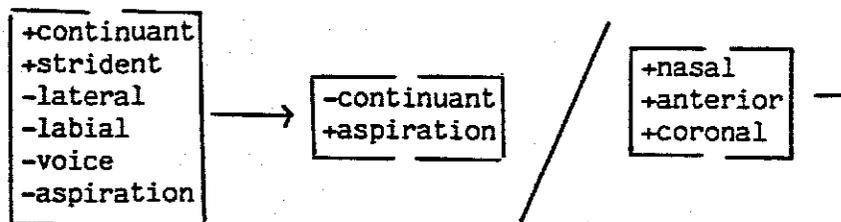
The fricatives change to stops after the nasal prefix [n].



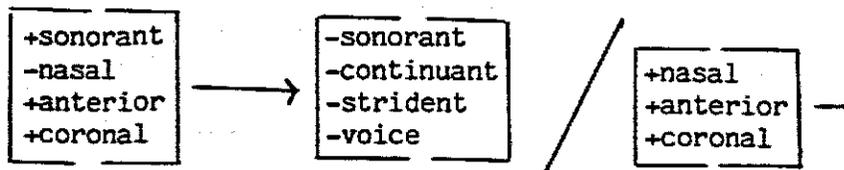
The fricatives, except [ɰ] and [f] become affricates.



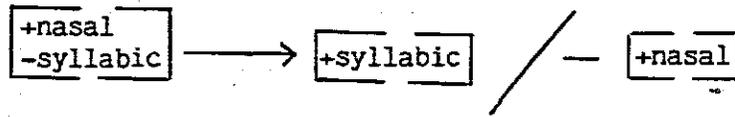
Voiceless fricatives, except [ɰ] and [f] change to aspirated affricates:



The liquids change to voiceless alveolar explosives.



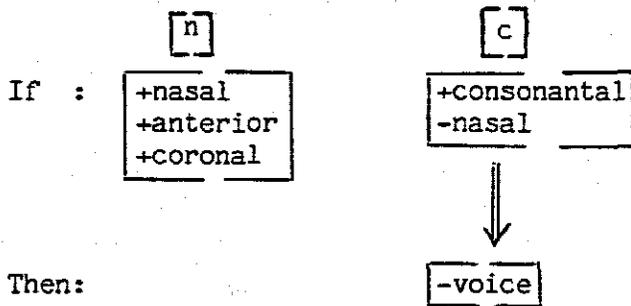
The alveolar nasal prefix [n] becomes syllabic before nasals.



4.3.4 Sequential Structure Constraints / Conditions

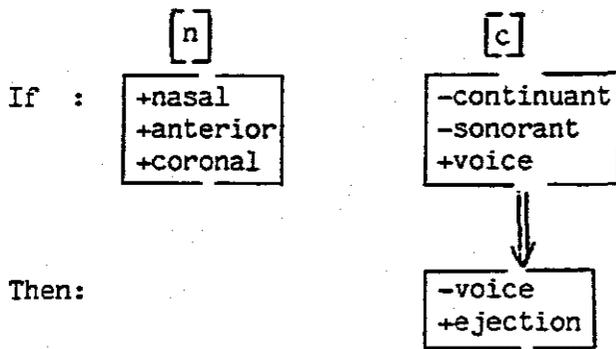
In Southern Sotho, we realized that: if [n] + [c'] → [nc²], (where n = nasal prefix and c = consonant), then [c²] is voiceless.

This can be illustrated as follows:

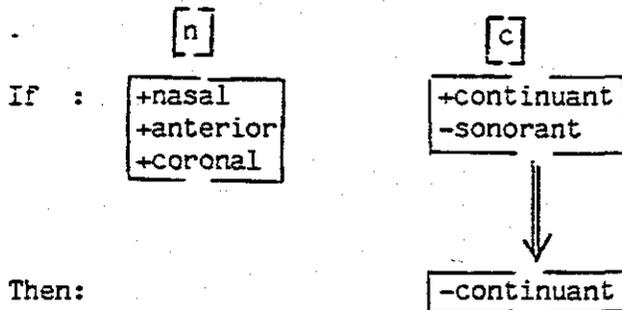


With explosives, we may conclude that those which are voiced become voiceless ejective and neither Epenthesis nor Consonant Reduction takes place. This means that if [n] + [c'] → [nc²], then [c²] is voiceless and ejective provided that [c'] is voiced, but if [c'] is voiceless, then [c'] and [c²] are identical.

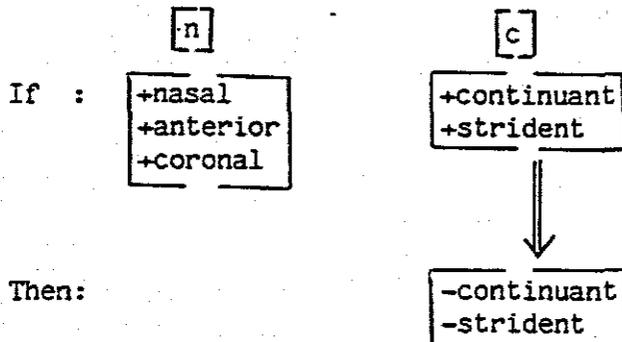
We can illustrate this as follows:



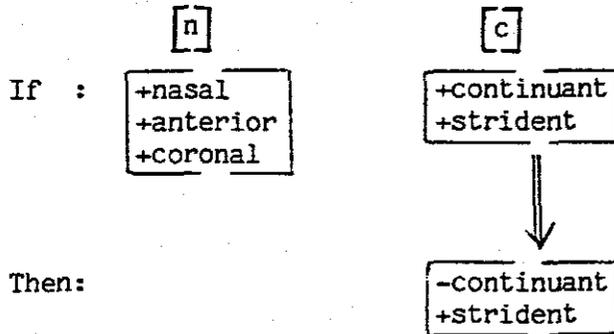
The Insertion Rule occurs with fricatives when they succeed the nasal prefix [n]. Firstly, we said that the sequence, [n] + [c] results in [c] being explosive or affricate. Therefore, if [n] + [c'] → [nc²], then [c²] is a stop sound provided that [c'] is a fricative sound. This means that:



Secondly, if [n] + [c'] → [nc²], then [c²] is an explosive provided that [c'] is a fricative sound; which means:



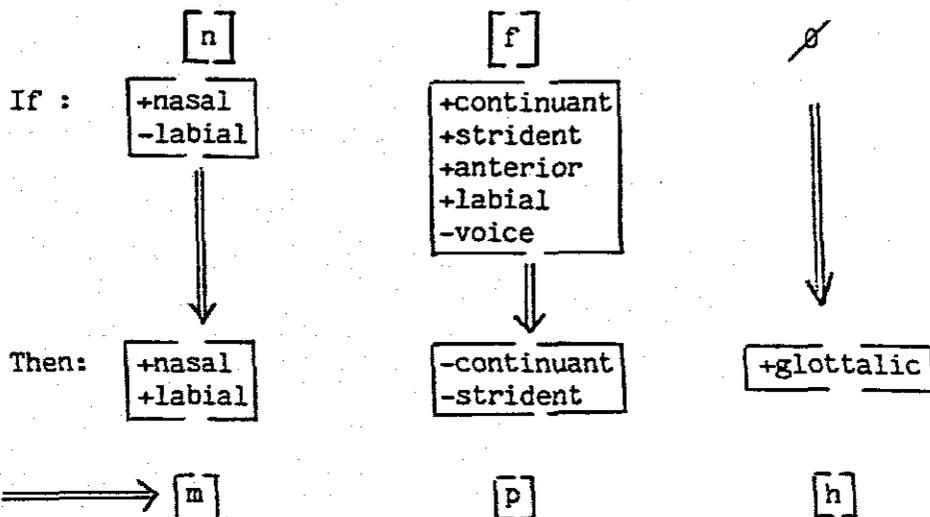
Thirdly, if $[n] + [c'] \rightarrow [nc^2]$, then $[c^2]$ is an affricate if $[c']$ is a fricative sound.



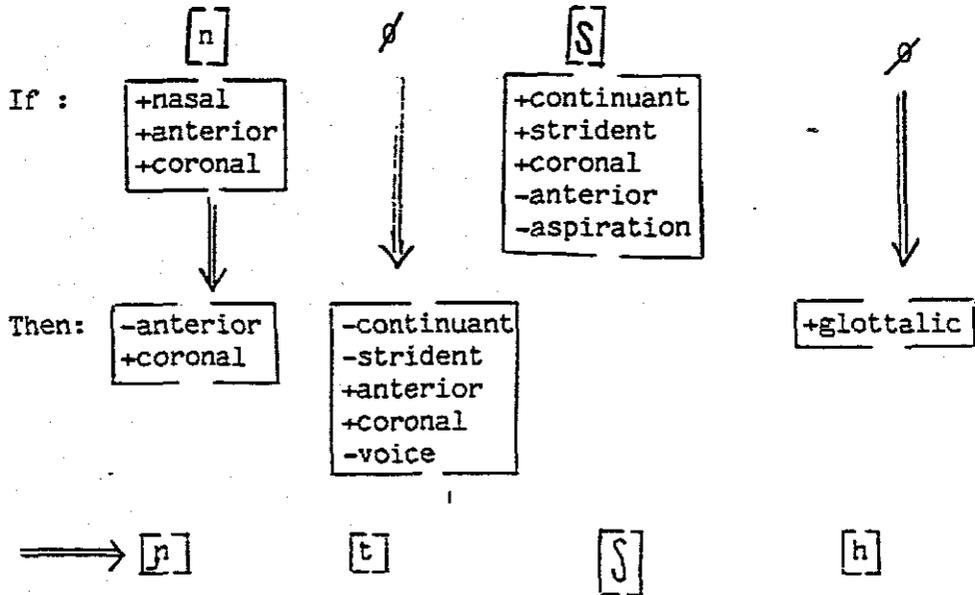
The Insertion Rule

The fricatives which change to explosives are $[f]$ and $[\phi]$. They become aspirated explosives. Therefore, if $[n] + [c'] \rightarrow [nc^2c^3]$, then $[c^2]$ possesses most of the features of $[c']$ and $[c^3]$ is the aspiration of $[c^2]$. $[c^3]$ is thus inserted after $[c^2]$. We may illustrate this as follows:

Example 1



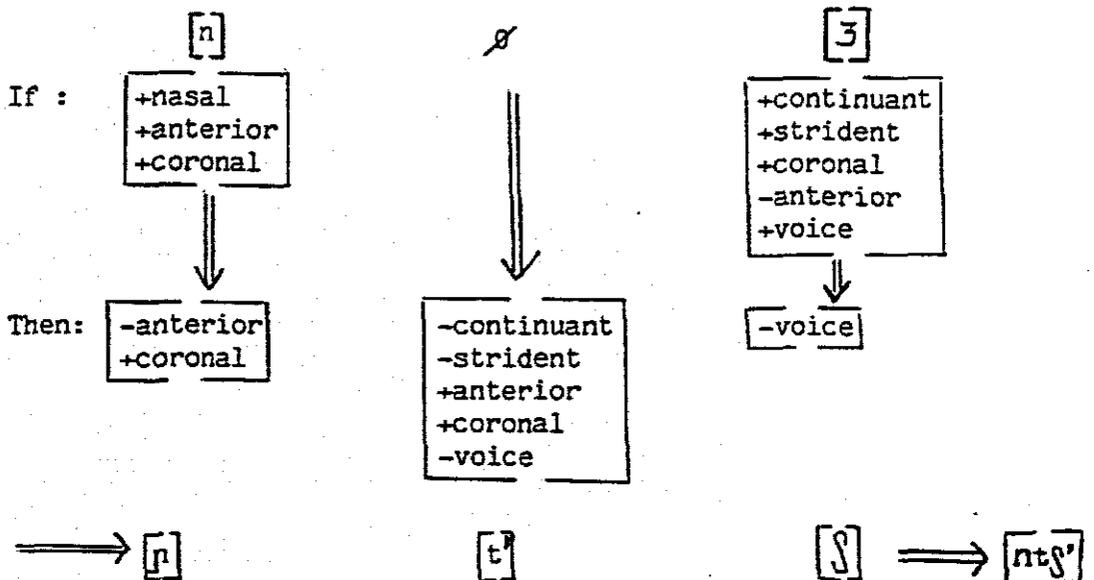
Example 5



The insertion of [t] between the nasal and the consonant succeeding it, is the result with fricatives in Southern Sotho.

With the voiced fricative [ʒ], [tʰ] is also inserted but ejection finalises here.

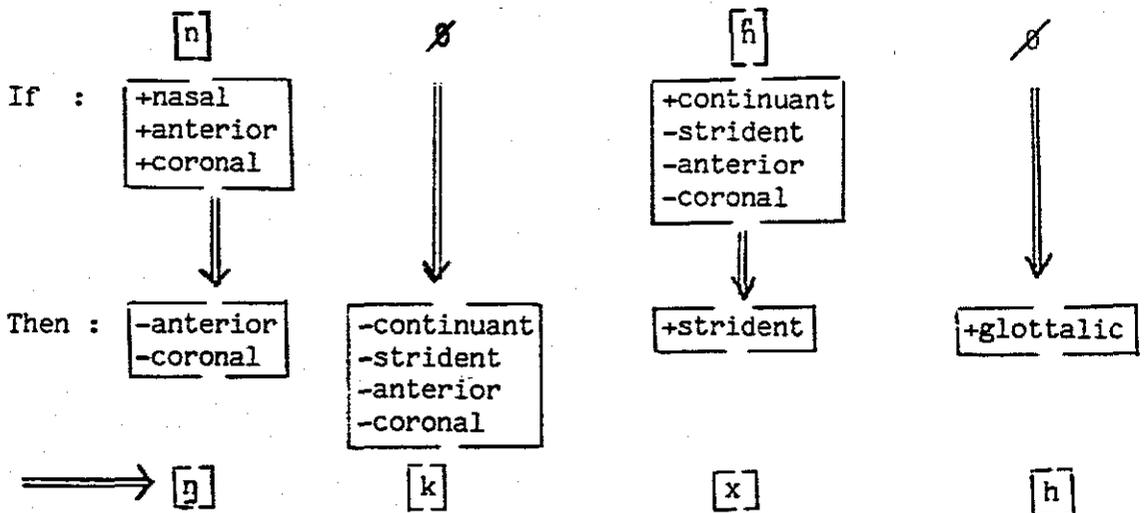
Example 6



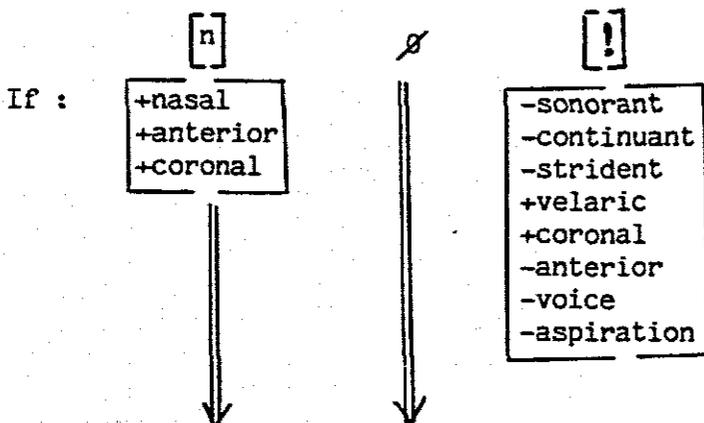
Above, we notice that, as [t'] is ejective, then the homorganic sounds [tʂ'] are also ejective.

The insertion of [k] occurs when the glottal fricative [h] is preceded by the nasal prefix [n] and aspiration occurs; the voiced [h] changes to a voiceless fricative [x] which is strengthened by the [k], when inserted between [n] and [x]. We may illustrate this as follows:

Example 7



Example 8



Then:

-anterior
-coronal

-sonorant
-continuant
-strident
-coronal
-anterior
-voice
-aspiration

→

ŋ

k

!

CHAPTER 5

5.0 CONCLUSION, FINDINGS AND RECOMMENDATIONS

5.1 CONCLUSION

The juxtaposition of the nasal prefix [n] to a succeeding consonant in Zulu, Xhosa and Southern Sotho causes some phonological processes, namely: Assimilation and Nasal Strengthening. These phonological processes cause some phonological changes which result in other processes. Assimilation and Nasal Strengthening are thus considered as the main phonological processes which generate sub-phenomena when the nasal prefix [n] precedes a consonant in Zulu, Xhosa and Southern Sotho. The Meinhof's idea which states that 'The juxtaposition of any two sounds causes one sound to exert an influence on another in two ways described as Assimilation and Dissimilation' should have also included Nasal Strengthening as the third main phonological process.

5.1.1 Assimilation

Assimilation is a phonological process in which two dissimilar speech sounds in juxtaposition tend to become similar. The influenced sound may be assimilated in two ways, namely: it may be so influenced that it changes its place of articulation to become similar to another sound or it may become identical with

it. We then speak in terms of Incomplete or Partial Assimilation (for similar sounds) and Complete Assimilation (for identical sounds).

Example

Zulu/Xhosa: in(i)- + -bonga > *inbongi > imbongi
: Incomplete Assimilation

in(i)- + -hamba > inkambo ink'ambu
: Incomplete Assimilation

S. Sotho : n(i)- + -ngwapa > nngwapa nngwap'a
: Complete Assimilation

n(i)- + -nyala > nnyala nyala
: Complete Assimilation

In terms of direction, Progressive Assimilation occurs when a preceding sound shares its qualities with the succeeding one. Retrogressive Assimilation only takes place when the opposite occurs i.e. the succeeding sound influences the preceding one. Southern Sotho has a good example of Reciprocal Assimilation i.e. when both sounds in juxtaposition influence one another.

Example

S. Sotho : n(i)- + -busa > *mobuso > [↗]*mbuso > mmuso
: Progressive Assimilation

: n(i)- + -kuta > [↖]nkuta nk'ut'a
: Retrogressive Assimilation

: n(i)- + -fa > [↗]*nfa > [↖]*mfa > mpha
: Reciprocal Assimilation

: n(i)- + -fosa > [↗]*nfosa > [↖]*mfosa > mphosa
: Reciprocal Assimilation

Zulu/Xhosa: in(i)- + -khuthaza > inkuthazo ink'uthazo
: Retrogressive Assimilation

: in(i)- + shisekela > [↖]intshisekelo int'sisek'elo
: Retrogressive Assimilation

prefix [n]. The speech sounds themselves are almost similar, although they may sometimes differ slightly in the practical and phonetic orthographies. The sound pattern of Southern Sotho differs from the sound patterns of Zulu and Xhosa in that in the sequence of [n] + [c], the resultant sound change (i.e. [c] as a final consonant after being strengthened by [n]) must always be voiceless.

The phonological processes which are generated by the main phonological processes when sound changes take place are the same in Zulu and Xhosa. In other words, all phonological processes which occur when the nasal prefix [n] precedes a consonant in Zulu, will also occur in Xhosa. In Southern Sotho, the sound changes which occur are sometimes not the same as those occurring in Zulu and Xhosa when the same sound is preceded by the nasal prefix [n].

Similar Processes:

Zulu	: in(i)- + -salela > insalela	[ints'alɛla]	: Affricatization
Xhosa	: in(i)- + -salela > *insalela	intsalela	: Affricatization
S.Sotho:	n(i)- + -sola > *nsola	ntshola	: Affricatization
Zulu	: in(i)- + -bonga > *in ^f bongi	imbongi	: Labialization
Xhosa	: in(i)- + -bonga > *in ^f bongi	imbongi	: Labialization
S.Sotho:	n(i)- + -bona > *n ^b bona	mpona	: Labialization

Zulu	: in(i)- + -jabula	> in ^h jabulo	iɲdʒabulo	: Palatalization
Xhosa	: in(i)- + -jabula	> in ^h jabulo	iɲdʒabulo	: Palatalization
S.Sotho:	n(i)- + -jela	> nt ^h jela	ntʃ'ela	: Palatalization

Dissimilar Processes

Zulu	: in(i)- + -funda	> imfundo	imɸf'undo	: Affricatization
Xhosa	: in(i)- + -funda	> imfundo	imɸf'undo	: Affricatization
S.Sotho:	n(i)- + -fahla	> mphahla	mphafʰa	: Plosivation
Zulu	: in(i)- + -hamba	> inkambo	ink'ambu	: Plosivation
Xhosa	: in(i)- + -hamba	> inkambo	ink'ambu	: Plosivation
S.Sotho:	n(i)- + -hata	> nkghata	ŋkxhat'a	: Affricatization

Assimilation as a main phonological process results into certain phonological processes such as Labialization, Palatalization and Velarization. This means that after Assimilation has taken place, these phonological processes occur; taking for instance:

e.g. S.Sotho : n(i)- + -kuta > nkuta ŋk'ut'a

Here, the velar explosive [k'] has partially assimilated the nasal prefix [n] retrogressively such that the latter has become a velar nasal [ŋ]. The change of an alveolar nasal [n] to a velar nasal [ŋ], is known as Velarization. Nasal Strengthening did not occur because [k'] is already a fortis. When a nasal precedes an ejective explosive or affricate, Assimilation may take place

without any occurrence of Nasal Strengthening. It is for this reason that Nasal Strengthening is excluded from phonological phenomena which take place when Assimilation causes sound changes.

5.2.1 Labialization

This is a phonological phenomenon whereby a sound which is not articulated in the labia becomes so influenced that it changes its place of articulation and becomes a labial sound i.e. a bilabial or labio-dental. It occurs in Zulu, Xhosa and Southern Sotho.

e.g. Zulu/Xhosa : in(i)- + -bhema) *in^hbhemi) imbemi
 : in(i)- + -biza) *in^hbizo) imbizo
 S. Sotho : n(i)- + -bona) *n^hbona) *mbona) mpona
 : n(i)- + -botsa) *n^hbotsa) *mbotsa) mpotsa

5.2.2 Palatalization

This is a phonological phenomenon whereby a non-palatal sound changes its place of articulation and becomes articulated at the hard palate. In this discussion, Palatalization has only occurred when the nasal prefix [n] became assimilated to the succeeding palatal consonant.

e.g. Zulu/Xhosa : in(i)- + -shisekela) intshisekelo [intʃ'isɛkɛlɔ]
 : in(i)- + -jabula) injabulo [ɪndʒabulɔ]
 S. Sotho : n(i)- + -shapa) ntjhapa [ntʃhap'a]
 : n(i)- + -ja) ntja [ntʃ'a]

In the above examples, Palatalization is not brought about by the influence of a vowel or a semi-vowel equivalent of a vowel on the preceding consonant (Ziervogel, et. al., 1967:332) but it is caused by the sound change taking place when the palatals [ʃ] and [ʒ] or [dʒ] assimilate [n] to [ɲ]

5.2.3 Velarization

This is a phonological phenomenon which takes place when a sound which is not articulated at the velum (soft palate) changes its place of articulation and becomes a velar sound. Sloat, et. al. agree:

Another modification of consonant sounds, called Velarization, is achieved by raising the back of the tongue toward the velum during articulation.

(Sloat, et. al., 1984:45).

e.g. Zulu/Xhosa :	in(i)- + -khomba	>	inkomba	ɪŋk'ɔmba
	: in(i)- + -hamba	>	inkambo	ɪŋk'ambo
S.Sotho :	n(i)- + -kata	>	nkata	ŋk'at'a
	: n(i)- + -kuta	>	nkuta	ŋk'ut'a

In this discussion, Velarization is brought about by the sound change which takes place when velar sounds ([k], [kh], [g]) assimilate the [n] to [ŋ]. Velarization like Palatalization and Labialization, may of course be brought about by other processes for instance Dissimilation, in the formation of passives:

e.g. S. Sotho: loma > *lomwa > longwa lonwa

Nasal Strengthening or Fortization results in the formation of plosives (an umbrella term for explosives and implosives) and affricates. It is thus a main phonological process which generates Plosivation and Affricatization.

5.2.4 Plosivation

This is a phonological phenomenon whereby a nasal, [m] or [n] causes a succeeding consonant to change from being a lenis to a fortis in the form of a plosive. A plosive is a speech sound which is produced when air explodes inside (implosive) or outside (explosive) the mouth after it has been momentarily blocked inside. In Plosivation we consider the end result of a sound change which is always an explosive in the sequence of [n] + [c]. It takes place in Zulu, Xhosa and Southern Sotho.

e.g. Zulu/Xhosa : in(i)- + -biza) *inbizo) imbizo
 : in(i)- + -thanda) *inthando) intando
 : in(i)- + -lima) *inlima) indima
S. Sotho : n(i)- + -rata) *nrata) nthata
 : n(i)- + -loma) *nloma) ntoma
 : n(i)- + -bitsa) *nbitsa) mpitsa

In the Zulu/Xhosa second example and Southern Sotho last example above, we notice that Plosivation has taken place even though the sounds before change are explosives because we consider the final sound (Zulu/Xhosa: [th] → [tʰ] ; S. Sotho: [b] → [pʰ]) which is an explosive in each of these languages.

5.2.5 Affricatization

Affricatization is a phonological process whereby a nasal, [m] or [n] causes a succeeding consonant to change from being a lenis to a fortis in the form of an affricate. An affricate is a combination of a stop sound and a fricative. It is thus a speech sound formed by a stop immediately followed by a fricative release. Sloat et. al. agree when they say:

Affricates are complex segment composed of stop closely followed by a fricative. Most commonly, the stop and the fricative that make up an affricate are homorganic.

(Sloat, et. al., 1978:30).

e.g. Zulu	:	in(i)- + -sola	>	insolo		<u>ints'ɔlɔ</u>
	:	in(i)- + -funda	>	*infundo	>	imfundo <u>imf'undɔ</u>
Xhosa	:	in(i)- + -sola	>	*insolo	>	intsolo <u>ints'ɔlɔ</u>
	:	in(i)- + -funda	>	*infundo	>	imfundo <u>imf'undɔ</u>
S.Sotho:		n(i)- + sola	>	*nsola	>	ntshola <u>ntshɔla</u>
	:	n(i)- + -jela	>	*njela	>	ntjela <u>ntʂ'ɛla</u>

When we look into Plosivation as a phonological process, we notice that in Zulu and Xhosa, it only occurs when a voiced bilabial implosive [ɓ] or a devoiced or aspirated explosive or a lateral liquid is preceded by the nasal [n], i.e.

$$\begin{array}{l} \boxed{n} + \boxed{b} \longrightarrow \boxed{mb} \\ \boxed{n} + \boxed{g} \longrightarrow \boxed{ng} \\ \boxed{n} + \boxed{p} \longrightarrow \boxed{mp} \\ \boxed{n} + \boxed{kh} \longrightarrow \boxed{ŋk'} \end{array}$$

In Southern Sotho, it takes place when an explosive, a labio-dental fricative or a liquid is preceded by \boxed{n} , i.e.

$$\begin{array}{l} \boxed{n} + \boxed{b} \longrightarrow \boxed{mp'} \\ \boxed{n} + \boxed{f} \longrightarrow \boxed{mph} \\ \boxed{n} + \boxed{l} \longrightarrow \boxed{nt'} \\ \boxed{n} + \boxed{r} \longrightarrow \boxed{nth} \end{array}$$

With Affricatization, we notice that in Zulu and Xhosa, a fricative sound (except \boxed{h}) will always become an affricate when preceded by a nasal prefix \boxed{n} and in Southern Sotho, it will either be an explosive or in most cases an affricate.

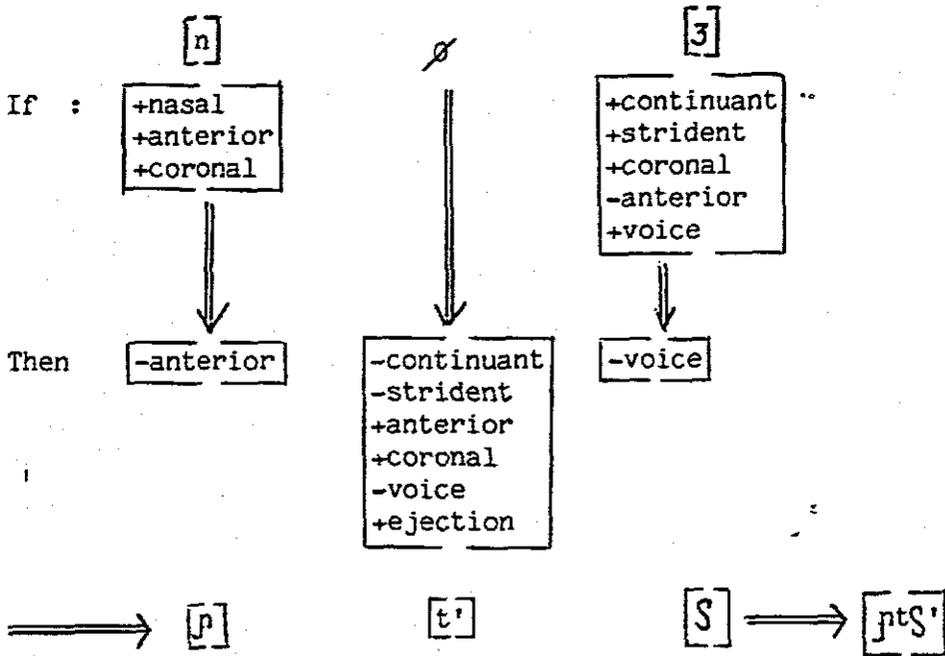
THE SEQUENTIAL STRUCTURE CONSTRAINTS AND PHONOLOGICAL RULES

5.2.6 Epenthesis

In all three languages Insertion Rule takes place in the sequence, $\boxed{n} + \boxed{c}$ if \boxed{c} is a fricative sound, i.e. $\boxed{n} + \boxed{c'} \rightarrow \boxed{nc^2c'}$ in Zulu and Xhosa. In Southern Sotho, the following takes place:

$$\boxed{n} + \boxed{c'} \longrightarrow \boxed{nc^2c'c^3} \text{ and } \boxed{n} + \boxed{c'} \longrightarrow \boxed{nc^2c^3}$$

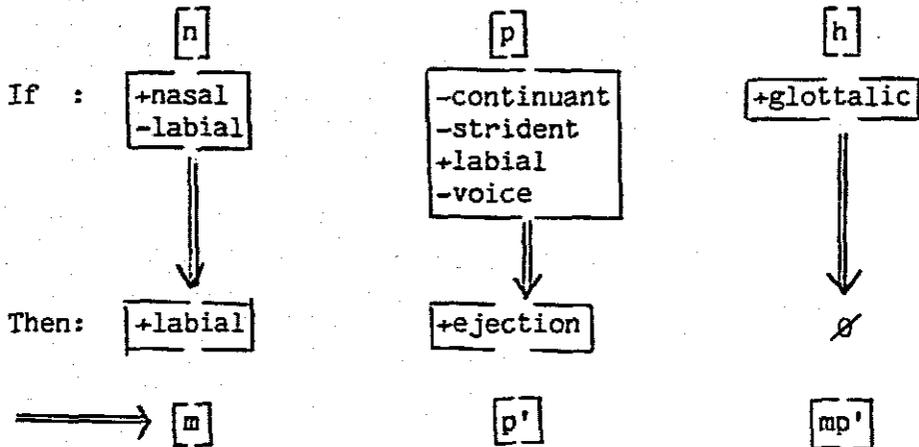
Example 3: Southern Sotho



5.2.7 Reduction Rule

Consonant Reduction occurs in Zulu and Xhosa in the sequence, $\begin{bmatrix} \text{[n]} \\ + \\ \begin{bmatrix} \text{[cʰcʰ]} \end{bmatrix} \end{bmatrix} \longrightarrow \begin{bmatrix} \text{[ncʰ]} \end{bmatrix}$ more especially if $\begin{bmatrix} \text{[cʰ]} \end{bmatrix}$ is the consonant representing the aspiration of $\begin{bmatrix} \text{[cʰ]} \end{bmatrix}$.

Example 1: Zulu and Xhosa



5.3 RECOMMENDATIONS

The Zulu "j" should be a fricative sound, [ʒ] and not an affricate, [dʒ] because it is produced with a lesser amount of force which is equivalent to that applied in the production of dl, [b]. This sound, "j" is therefore a lenis and only becomes an affricate, i.e. a fortis when it is accompanied by a nasal [n].

Nasal Strengthening should always be treated separately from Nasalization because they are two different phonological processes even though they overlap in many instances. The Xhosa phonetic symbols especially those of "mf" and "mv" are indicated by Louw as [mpf'] and [mbv] respectively. The [p'] and [b] seem to be the true sounds which are inserted between "m" and "f", and "m" and "v" respectively when these sounds are articulated. These sounds are therefore to be used instead of [mpf'] and [mbv].

When one describes Labialization, he must always think of it as a phenomenon which is divided into primary ([n] → [m̥], [mb̥] > mm) and secondary (phupha > phushwa, bona > bonwa) parts. Labialization should be taken as a phenomenon which also occurs in Zulu and Xhosa. Plosivation should also be considered in Zulu.

5.4 SUMMARY

This study was an attempt to examine and compare results of the influence of the nasal prefix [n] (which is derived from the Ur-Bantu class 9 prefix "ni-") on succeeding consonants in Zulu,

Xhosa and Southern Sotho. In chapter one, the following terms have been discussed:

- (i) Language
- (ii) Phonemes
- (iii) Grammar
- (iv) Phonology
- (v) Phonological Rules
- (vi) Feature Changing Rules and
- (vii) Distinctive Features.

It has been tried to state the problem clearly. The sound systems in Zulu, Xhosa and Southern Sotho have been compared in terms of phonemes. Certain parts from works of previous scholars have shown that this study was necessary in solving those problems mentioned in this dissertation. Phonological processes such as Assimilation and Nasal Strengthening were to be reviewed with an aim of discovering other phonological processes which are as a result of sound changes that take place.

Chapter two gives an analysis of sound changes which take place in Zulu when the nasal prefix [n] precedes a consonant at the beginning of a lexical item. Chapter three gives the same analysis in Xhosa and chapter four in Southern Sotho. In chapters two, three and four, a table of sounds and their description is provided in each of these chapters to show sounds before and after change. Each of these chapters has its own summary and

bibliography. The Sequential Structure Conditions in each of these chapters give the Phonological Rules which are applicable when [n] precedes a consonant in each of these languages.

Chapter five gives the conclusion, findings and recommendations of this investigation. The comparison of sound patterns shows similarities and dissimilarities among these languages. At the end of this chapter, a bibliography with all books which were consulted during this investigation, will be provided.

OPSOMMING

Hierdie studie was 'n poging om die gevolg (resultaat) van die invloed van die nasaal prefiks [n] (wat uit die Ur-Bantoe klas 9 prefiks "ni-" afgelei is) in opvolgende konsonante in Zoeloe, Xhosa en Suid-Sotho te ondersoek en vergelyk. In hoofstuk een, is die volgende terme bespreek:

- (i) Taal
- (ii) Foneme
- (iii) Grammatika
- (iv) Fonologie
- (v) Fonologiese Reëls
- (vi) Kenmerkende Veranderingsreëls
- (vii) Onderskeidende Kenmerke (Distinktiwe Kenmerke)

Dit word getoets om die probleem duidelik vas te stel. Die klank sisteem van Zoeloe, Xhosa en Suid-Sotho word in terme van foneme vergelyk. Sekere dele van vorige leerlinge se werke het daarmee gewys dat hierdie studie belangrik was, om daardie probleme wat in hierdie verhandeling genoem is, op te los. Fonologiese prosesse soos Assimilasie and Nasaal Versterking sou nagegaan word, met 'n doel om ander fonologiese prosesse uit te vind, wat as gevolg van klankveranderings plaasvind.

Hoofstuk twee gee 'n ontleding van klankveranderings wat in Zoeloe plaasvind wanneer die nasaal prefiks [n] 'n konsonant aan die begin van 'n leksikale item voorafgaan. Hoofstuk drie gee dieselfde

ontleding in Xhosa en hoofstuk vier in Suid-Sotho. In hoofstukke twee, drie en vier, word die tabel van klanke en hulle beskrywing in elke hoofstuk verskaf, om klanke voor en na verandering te wys. Elke van hierdie hoofstukke het sy eie opsomming en bibliografie. Die Opvolgende Struktuur Toestand gee, in elke van hierdie hoofstukke, die fonologiese reëls wat toepaslik is wanneer [n] 'n konsonant in elke van hierdie tale voorafgaan.

Hoofstuk vyf gee die gevolgtrekking, bevindinge en aanbeveling van hierdie navorsing. Die vergelyking van die klank patrone bewys die gelyksoortigheid en ongelyksoortigheid tussen hierdie tale. Aan die einde van hierdie hoofstuk sal 'n bibliografie, met alle boeke wat gedurende hierdie navorsing geraadpleeg is, verskaf word.

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