MIDLANDS STATE UNIVERSITY

FACULTY OF ARTS
DEPARTMENT OF ENGLISH AND COMMUNICATION

Constraint Interaction and Ranking in Vocalic Hiatus Contexts in Three Bantu Languages

by

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A thesis submitted to the Department of English and Communication, Midlands State University in fulfillment of the requirements for the Master of Philosophy in Linguistics Degree

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JUNE 2009

DECLARATION BY STUDENT

I **Collen Sabao (R0223636)** sincerely declare that this thesis is my original work that has not been previously submitted in any other university for examination. Proper citation and acknowledgements in line with the copyright laws and ethical requirements have been strictly adhered to in the writing of this text.

Signature of student: 

Date: **06/06/2009**

DEDICATION

For all my heroes, my father David (31.05.51 – 15.12.07), you are all of them!

…and for my two daughters:

Bethel Joyce Takudzwa
&
Herschelle Coleen Kuzivakwashe (24/03/09 – 11/04/09)

"You are only really dead when you are completely forgotten! I will forget not"

- Col.

ACKNOWLEDGEMENTS

I hereby acknowledge the inspiration, advice, guidance, suggestions and criticisms from my main supervisor(s), Professor Carolyn H. Harford and Dr. Charles Pfukwa that this thesis has benefited immensely from. I express gratitude to the Department of English and Communication of the Midlands State University for the opportunity to learn and for all the moral support.

I also express gratitude to the following people from the University of Malawi (Chancellor College) for their contributions through the provision of materials, criticisms and validation/authentification of the contents of this research and for also contributing in one way or another to the completion of this study: Professor Pascal. J. Kishindo, Professor Al. D. Mtenje, Professor Femi Abodunrin, Mr. Winfred Mkochi and Mr. Kondwani Msaka as well as Ms. Atikonda Akuzike Mtenje, from Mzuzu University.

The following people also deserve special mention: My mother Mrs. Joyce Sabao (‘Snr’), all my siblings (Sam, Tafadzwa, Linda and Ashley), my beloved uncle Mr. Brian Muzemba and family, Mr Joseph Kasayira and family (for the welfare and encouragements), Mr. Casper Kamunda and family (for friendship shared, the beers and relationships built!), Mr. Shepherd Mugezi (for abusing your computer!), Professor Wiseman Magwa (for all those books!), Dr. William Zivenge and Mr Enerst Jakaza (for the encouragements).

Lastly, and most importantly, to two very important people in my life at present: the best (and probably the only one!) of my best friends, Ms. Asante Lucy Mtenje and my daughter Bethel Joyce Takudzwa for all the patience, 'the pushes' and most of all, for making me believe in life, love and myself!

The part(s) played by all the above mentioned people in the compilation of this thesis is immense and invaluable. All errors, shortcomings and half-truths that lie herein in this thesis are entirely mine, and not in way of my supervisor(s) nor of any of the persons mentioned above.

ABSTRACT

This thesis argues for context and vowel-feature conditioned repair of hiatal configuration in selected Bantu languages. Bantu languages by and large phonologically and/or phonetically repair vowel hiatus configurations arising from both phonological and morphophonological concatenations. This research makes a comparative cross-linguistic analysis of the repair strategies of vocalic hiatus configurations in three Bantu languages (Chichewa, Chitumbuka and Ndebele). The phonologies of these Bantu languages seem to largely favour an analysis that does not permit the surface realisation of clusters of segments of the form VV (vowel-vowel clusters). Observing such an analysis, which this research argues to be largely ONSET motivated/triggered and the featural properties of the phonological structures of the languages under study, their reactions to such disprefered vowel clusters and their phonotactics are here examined within the framework of Optimality Theory (OT) Prince and Smolensky (1991, 1993), McCarthy and Prince (1999), Archangeli (1997) and Kager (1999). Repair strategies for such configurations such as glide formation, consonantal and/or glide insertions, final vowel deletion and coalescence are discussed. The analysis adopted here implicates that the resolution of these disprefered configurations arises from incompatibilities in the features of the vowels straddling a word boundary. It argues that these repair strategies are largely motivated by language internal constraint ranking systems which in Bantu languages seem to largely prefer the preservation of [-] features over [+] features i.e. the ranking [-F']»[+F'][1].

[1] By [-] features/[-F'] we refer to features such as [-high], [-low], [-back], [-round] etc while by [+] features we refer to features such as [+high], [+low], [+back], [+round] etc.. The thesis established here is that there seems to be an inherent motivation within the languages, in the resolution of hiatal configurations, for the preservation of the [-]

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LIST OF ABBREVIATIONS*

***NB**: The list does not include the definitions/description of all the constraints used in this thesis. These are defined and explained where they are mentioned for the first time in the body of the thesis.

1p – 1st Person Plural Marker

1s – 1st Person Singular Marker

2p – 2nd Person Plural Marker

2s – 2nd Person Singular Marker

3s – 3rd Person Singular Marker

Adj – Adjective

C – Consonant

CC – Consonant Cluster

Cl. – Class (Noun Class Prefix)[2]

CON – Constraint(s)

CV – Consonant and Vowel (Syllable)

CVC - Consonant-Vowel-Consonant (Syllable)

CVV - Consonant-Vowel-Vowel (Syllable)

DPVE – Demonstrative Pronoun Vowel Elision

EV – Epenthetic Vowel

EVAL - Evaluator

FV – Final Vowel

FVT – Final Vowel Truncation

G – Glide

GEN- Generator

Inf – Infinitive (Prefix)

IV – Initial Vowel

N - Noun

[2] e.g. Shona Cl.3 refers to Noun Prefix /mi-/ of Class 3 as in /miti/ 'trees'

Neg –Negative/Negation

NP - Noun Prefix

OM - Object Marker

OT - Optimality Theory

Prep – Preposition

Pres Cont – Present Continuous Tense Marker

PSSR – Preferred Syllable Structure Rule(s)

Pst Tns – Past Tense Marker

RP – Recent Past Tense

SM - Subject Marker

Syll – Syllable

V – Vowel

Vrb - Verb

VV–Vowel Cluster

Chapter 1

General Introduction

1.0. Area of Investigation

The purpose of this study is to examine and make a comparative cross-linguistic analysis of the phonological processes that result from vowel hiatus resolution (and non-resolutions!) in Bantu languages (with specific reference to Chichewa, Ndebele and Chitumbuka). Vocalic hiatus here refers to instances where two vowels occur adjacently/heterosyllabically in the input forms of the languages' generative grammars. These processes include among others, elision, epenthesis, glide insertion, glide formation as well as coalescence. The study area for this research is thus Generative Linguistics. The study explores Optimality Theory, henceforth (OT) in Generative Linguistics, in particular, how constraint interaction and ranking (a part of the theory's underpinnings) can be used to explain the occurrence of the phonological processes mentioned above.

Every language presents evidence of sets of universally determined forms of syllabic, phonological, morphological and syntactic constructions within the framework of its generative grammar. The syllabic make-up and output forms assumed by either lexical or functional words in every language are not at all haphazard outcomes but subject to universally determined restrictions and a ranking of constraints operational within the particular language.

Linguistic research is centered on two central objectives; the determination of language universals (common elements in all languages) and language variations (the range and type of variations between languages (Archangeli, 1998). The latter concern forms the basis of this research, as it attempts to make a comparison of the range and types of similarities and/or variations of the morphophonological behaviour(s) presented by these Bantu languages in similar vowel/vocalic hiatus situations/contexts.

Because language is not haphazard but rather a complex and well organised system of signs, sounds and signals, there are always systematic attempts at uniformity in the construction of, as well as the final output forms of, words within any given language. Given the production process of such, we can analyse successfully the trends and patterns of the language's restrictions and constraints. In other words the production of words in any language follows a systematic pattern that eliminates the possibilities of a language ending up without 'form'.

Linguistic studies and analyses thus attempt to find such evidence to show that there are patterns to be studied, and then figure out the nature of the patterns and subsequently the determination of formal classifications and characterisations of the patterns. When finding a pattern, the concern is not simply to question 'does this pattern exist?' but also, 'how does this pattern interact with other patterns in the language?' and at similar contexts, 'how does the pattern compare with similar patterns in other languages? (Archangeli, 1998)

Optimality theory (Prince and Smolensky, 1991), used as a blueprint and basis for this research analysis posits that the final output form in a language is achieved, not by the selection of

‘something’ (form) that is correct in all absoluteness, but something that is optimal, that is to say what the language views as the best option from a pool of possible outcomes, and one that inflicts the least violations of the constraints that the language ranks highly.

The assumption here is that, for every output form, the optimal candidate would not have been the only one possible output form, but there would have been several other suboptimal ones from which it eventually emerges as the best candidate. Guided by constraint rankings (discussed in detail in chapter 3), languages select and universally determine the range of output forms resulting from almost similar morphological or syntactic boundaries.

Adopting Optimality Theory, this research aims at analyzing these morphophonological restrictions and variations of words within Bantu languages, with a basic assumption that the languages disprefer vowel/vocalic hiatus configurations and thus universally eliminate them by employing any one of the several means discussed herein, which include elision, epenthesis, glide formation/ dissimilation and coalescence.

1.1 Research Background

The research studies languages within the Bantu language family. The word ‘Bantu’ refers to languages that are largely spoken in African communities south of the Sahara. The term has no political or ethnic connotations whatsoever, and merely refers to Southern African languages such as Shona, Zulu, Xhosa, Chichewa, Ndebele, Chitumbuka, Shangana, Sena, Hwesa, Sipede, Suthu, Yao, Tswana, Sesotho and Nambya etc (Chigwedere, 1987). The term is thus merely a

linguistic label reserved for a group of languages exhibiting marked similarities in structure and vocabulary, both of which are presumed to derive from a common ancestry.

The term was first used, and probably coined by a 19th century philologist named Dr. Wilhelm Heinrich Immanuel Bleek sometime between 1857 and 1858, who had been impressed by the recurrence of the root /-ntu/ in the languages of Southern Africa as found in such examples of words such as /chintu/ 'thing' /muntu/ 'person' (Chewa), /umuntu/ 'person' (Ndebele/Zulu/Suthu/Xhosa) etc (Silverstein 1993 [1968], Chigwedere, 1987). Bleek noticed certain recurrent patterns among widely distributed languages of the African continent and he happened upon the composite term 'Bantu' to name both the languages and their speakers. The prefix /ba-/, the so called Class 2 prefix is the plural marker for most of the nouns with human referents in these languages. The stem /*-ntu/ names representatives of the class, hence the term 'Bantu' is conveniently translated to 'people/persons' (Zulu *'abantu'*, Sotho *'batho'*, Tsonga *'vanhu'*, Shona *'vanhu'*, Ndebele *'abantu'* etc) (Mesthrie 2002).

How are these similarities possible within the languages? The assumption here is that these languages are 'fragments' (dialects) of an earlier language which have become mutually unintelligible due to geographical separation and undergoing uncoordinated developments over time, and thus a synchronic grammatical structural study of them would describe them as different languages (which they are in any case). Despite them not being mutually intelligible, and being different languages, they exhibit striking similarities that suggest a development from a common ancestor, which, while we cannot attest, we can diachronically hypothetically infer to and speculate on of its existence and structure.

A precise count of the languages is not possible but their number is conservatively reckoned to be about four hundred. Some 250 million people speak one or more Bantu languages as mother tongues today (Herbert and Bailey, 2000). The original homeland of the languages is generally accepted as lying in the Cameroon-Nigerian borderland (Greenberg, 1963: Chigwedere, 1987). In general, a homeland is the area in which the greatest concentration of linguistic diversity in the group is located or where its nearest relatives are found (Nurse, 1997). Thus, the claim is that the pre-Bantu community was a segment (or series of communities) of some Benue-Congo speaking area.

Following the traditions of historical linguistics, the term 'Bantu' is reserved for the hypothetical ancestor languages of the modern day descendents distributed throughout the subcontinent. Ideally, it should be possible to trace the development of these languages back to a common ancestor called Proto Bantu. 'Proto' is the term used to describe a common parent language, that is to say, a language which likely has no written documents or living speakers to confirm or verify established data, in which case we can only speculate on its structure by analyzing or inferring from its 'daughters'- 'daughters' being direct or assumed descendents or contemporary manifestations of the unattested language established through the diachronic process of *reconstruction*. This process is done through a thorough analysis of similarities in the phonological and morphological structures of lexical items within two or more languages with the view to establish if they are cognates[3] – similar words found in two or more languages that

[3] Cognates are similar words occurring in two or more language that share a number of linguistic properties which can either be phonetic or morphological but above all semantic, evidence which can be argued to be a pointer to a common origin/ancestor. It is such words that are important in historical linguistics, especially genetic classifications of language (c.f. Sabao, 2005).

can be hypothesized to descend from a similar ancestor and can be used as evidence of genetic relatedness of the languages in which they occur.

Often such a comparison also takes into account even the similarities in syntactic structures of grammatical construction within languages as well as the amount of semantic properties shared between lexical items in two or more different languages. Let us consider **1** below,

1.	***Shona***	***Pedi***	***Tsonga***	***Venda***	***Zulu***	***Chewa***[4]	***Gloss***
	-péra	-féla	-hela	-fhélá	-phéla	*maliza	'end/finish'
	-papú	*leswafo	-hahu	fhafhú	-iíphaphú	-papu	'lung'
	-pára	-fála	-hala	-fhálá	-phála	-pála	'scrape'

(Adapted from Mesthrie, 2002 and modified)

Based on the above examples, we note that one of the major striking features is the manner in which there seems to be regular sound correspondences in the above words extracted from several Bantu languages, a phenomenon which exists in much of the inherited lexical material in these Southern African Bantu languages.

On this note, we note that the lexical items from the languages presented in **1** do not only share similar structural patterns and phonetic qualities but also semantic properties thus qualifying them as cognates. It should therefore be highly likely that since the languages in question exhibit vast similarities in terms of constructional patterns especially in verbal and noun formatives, and

[4] There are variations in the spelling of the name for the language, with some authorities preferring to call it just Chewa while others call it Chichewa. It is also in some literature referred to as Chinyanja

acknowledging that they might not necessarily exhibit the same morphological and phonological reactions to vocalic hiatus contexts since vocabulary is language specific, hypothetically they should present some universal reactions to hiatal configurations.

1.2. Brief socio-historical backgrounds of the study languages

In order to fully appreciate the structure of any language(s), a socio-historical background of the language(s) in question is important. This section attempts to give brief historical backgrounds of the languages under study. The main motivation in doing this is to attempt to locate the languages' geographical space (where the languages are spoken) as well as the diversity of their speakers/users and uses. This is important especially in attempting to understand dialectical variations that could be now manifest in the 'clusters' of current speakers due to diachronic and/or synchronic reasons.

1.2.1. Ndebele/IsiNdebele

The term Ndebele has come to be used to refer to both the language and the people who speak it. Ndebele (also often referred to as isiNdebele) is a Southern Bantu language belonging to the Nguni cluster (Zone S, according to Guthrie's 1967 classifications). The cluster includes other languages such as Zulu, Xhosa, Transvaal Ndebele (often referred to as South African Ndebele) all spoken in South Africa, as well as Swazi/SiSwati[5], spoken in Swaziland and South Africa (Hadebe, 2006). In this thesis however, the term 'Ndebele' is used to refer to the Zimbabwean variety of the language and the South African variety shall be referred to as South African

[5] SiSwati is the Swazi term for Swazi language

Ndebele. In Zimbabwe, the Ndebele language is largely spoken in the western as well as southern parts of the country.

According to Hadebe (2006) and Cope (1993), the history of the language and its people dates back to the period around 1820 when the people who are currently referred to as the 'Zimbabwean Ndebele' broke away from the then powerful Zulu kingdom (presently the KwaZulu-Natal province in South Africa). According to Hadebe, the initial breakaway group was provisionally referred to as the Khumalos because their then leader, Mzilikazi, was a descendent of the Khumalo clan. Around 1837, the breakaway group allegedly entered what is currently Zimbabwe and settled in the western and southern parts of the country known in contemporary Zimbabwe as the Matebeleland[6] Province.

Viewed as just a dialect of Zulu, Ndebele for a long time was largely neglected in the areas of research in favour of Zulu. This however does not come as a surprise especially considering that the present day Ndebele speaking people of Zimbabwe and the Zulu speaking people of South Africa share a lot, that is, almost the same languages. Their languages are mutually intelligible), and they share some common historical experiences and various cultural practices and beliefs (Cope, 1993, Hadebe 2006).

Interesting to note at this point, is that despite the Ndebele people and the Ndebele language having evolved independently of the other Nguni dialects, research has indicated that most

[6] The word *'Matebele'* which was used to refer to all raiding Nguni dialects and means 'warriors with long shields', was according to Appleyard (1847) probably borrowed from the Sotho people who were part of the people assimilated by the Khumalos in the area around the present day Gauteng province of South Africa during their breakaway from the Zulu empire.

people of Ndebele descent still identify themselves with Zulu history, culture and language (Hadebe 2006).

1.2.2. Chichewa

Chichewa is a Bantu language (Zone 8 in the unit N31b, in Guthrie's 1967 classifications) largely spoken in Malawi. It has been the official language of Malawi since 1968 (Kanerva, 1986). Again, the term 'Chewa' is used interchangeably to refer to both the language and its speakers. The dictionary meaning of the word Chewa is that it is 'a member of the Bantu-speaking people of Malawi'. The Chewa, also known as the Cewa or Chichewa is an African culture that has existed since the beginning of the first millennium, A.D. They are primarily located in Zambia, Zimbabwe, Tanzania and Mozambique with the bulk of the population in Malawi[7]. The Chewa originated in the country of Zaire, but they emigrated to northern Zambia and central Malawi where they now live.

The ancestors of the Chewa originated in Malambo, a place in the Luba area of Zaire, from where they emigrated into northern Zambia, and then south and east into the highlands of Malawi. They migrated to Malawi in the fourteenth or fifteenth century. The Chewa chiefs have been the traditional rulers of Central Malawi for many years. The Chewa established their first kingdom around the year 1480. The central area for the Chewa people is Lilongwe, Dowa, and Ntchisi, with many more living in Mchinji, Kasungu, Ntcheu, Salima, Nkhota Kota, and Dedza. As the Chewa are the largest ethnic group in Malawi, some are scattered throughout the country, but they live primarily in the Central Region. There are two large Chewa clans, the Phiri and the

[7] Hachipola (1998)

Banda. The Phiri are associated with the kings and aristocracy, the Banda with healers and mystics.

Their language, Chichewa is also known as C(h)inyanja) The prefix chi- means "the language of" so that "Chichewa" means "language of the Chewa tribe", and hence the language is also known simply as Chewa. Chichewa is one of the two official national languages of the Republic of Malawi, the other being English, and as Chinyanja is one of the seven official tribal languages of Zambia, where it is spoken mostly in the Eastern Province and in Lusaka. It is also spoken in Mozambique, especially in the provinces of Tete and Niassa, as well as in Zimbabwe where, according to some estimates, it ranks as the third most widely used local language, after Shona and Ndebele. The countries of Malawi, Zambia, and Mozambique constitute the central location of Chichewa

Chichewa can also be classed as a Shona dialect as some scholars in the region point out (Hachipola 1998). As a group, they have a strong historic link to the Nyanja, Bemba and Yao people as well as the ancient Shona Empire (who can point their earlier origins to Mashonaland. The ancient Shonas who temporarily dwelt in Malambo, in the DRC, eventually shifted into northern Zambia, and then into Malawi. The Chinyanja language, Chichewa or Chewa, emerged as a distinct tongue in the sixteenth century, according to scholars (www.wikipedia.com). In Zambia, where Chewa is also spoken by other tribes like the Ngoni and the Kunda, the more neutral name c(h)inyanja, "language of the lake" (referring to Lake Malawi), is hence used instead. In the twentieth century, the Chewa vocabulary and grammar is similar with Shona dialects, which are spoken in Zimbabwe, especially ChiZezuru and ChiManyika.

Chichewa speaking people in Zimbabwe are thus largely people of Malawian, Mozambican and at times Zambian origin. There is a tendency among non-native speakers of the language in Zimbabwe to confuse Chichewa with other Malawian and Mozambican originating languages such as Yao and Tumbuka. Respondents in research interviews however have made a distinction between Chichewa speakers and speakers of the other 'related' languages as well as between the 'original' Chichewa spoken in Malawi and the variety spoken in Zimbabwe. Many of the current speakers of the language in Zimbabwe are descendents of migrant labourers from Malawi and Mozambique. The reasons for the migrations were largely socio-economic.

According to Hachipola (1998), as early as 1909, recruiting agencies operating within Zimbabwe (then known as Rhodesia) were contracted to recruit labour from Malawi (then known as Nyasaland) to work in plantations, commercial farms and mines in Southern Rhodesia. There seems however to be no accurate figures of the number of Chichewa speakers within the country today. Hachipola also notes that despite being recognized as an official minority language[8] in Zimbabwe, no effort has been made to develop literature locally in this language and other minority languages such as (Chi-)Nyanja and Yao.

In distinguishing between the variety of Chichewa spoken in Zimbabwe and the original Chichewa spoken in Malawi, speakers interviewed were largely in agreement that the local variety was 'diluted' due to sociological reasons, chief among them contact with other Bantu

[8] Hachipola (1998) defines a minority language as a Zimbabwean language other than Shona and Ndebele since Shona and Ndebele were made official indigenous languages after Doke's (1931) recommendations.

languages. When two cultures meet, one cannot talk of an innocent separation. The languages are bound to diffuse and borrow from each other.

This thus gives rise to the systematic morphological process of lexical borrowing. Respondents in this regard preferred to refer to the local variety as ‘diluted’ while referring to the variety spoken in their mother country as ‘deep’ Chichewa. From discussions carried out during the interviews, the researcher discerned that the Zimbabwean Chichewa is invariably different from the one spoken in Malawi or Mozambique. For the purposes of the study, the terms ‘Diluted Chichewa’ and/or Chichewa2 will be used to refer to the Zimbabwean variety of the language whilst the term ‘Chichewa’ will be referent to the original variety spoken in Malawi.

1.2.3. Chitumbuka

Very little is known about the actual history of the Chitumbuka people (Phiri, 1980). Chitumbuka is a Bantu language spoken in the northern parts of Malawi. In terms of Guthrie (1967)’s classification, the language is classified as N20 (Group 20 of Zone N). While there seems to be no recent estimates of the population speaking the language, Vale (1972) estimated an approximation of 550 000 speakers in 1972. The word ‘Chitumbuka’ is used to refer to the language whilst the speakers are known as the Tumbuka. The Tumbuka people are believed to have been the oldest group that occupied the Northern Malawi regions. The Tumbuka are thus largely settled in North and Central Malawi as well as in Zambia in the Isoka and Lundazi regions.

Most of the records currently in existence that try to trace the origins of the Tumbuka people were drawn up by missionaries as well as Portuguese explorers. One of the explorers, Laçerda marks the Tumbuka people as living in the Lwanga valley while David Livingstone another explorer of British origins states that all the speakers he spoke to in the Kasungu area were Tumbuka speaking, thus he marked the area as Tumbuka area (Phiri, 1980). Originally confined to the northern areas of the country, the Tumbuka speaking people have in the past two centuries spread southwards into neighbouring Zambia. The speakers have recently also been found in some settlements in Mozambique, particularly Eastern Mozambique (Hachipola, 1998).

Despite an invasion by the Ngoni peoples from South Africa in the 19th century, the Tumbuka people managed to preserve their cultural life. Intermarriages with the Ngonis eventually saw the gradual withering of the Ngoni values and culture and not that of the Tumbuka.

The language has several dialects, among them Phoka, Siska, Mzimba and Henga. According to Vail (1972) however, dialectical variations within the language are not so pronounced and are largely restricted to slight phonetic variations and differences in lexis. This, Vail (1972) and Phiri (1980) attribute largely to the early standadisation of the language by missionaries through bible making and school book publications. Moreso, unlike many other languages, Tumbuka has a widely accepted general form and does not suffer from profound dialectical splitting (Vail, 1972).

In contrast to Guthrie's classification of the language in Zone N, Vail (1972) proposes a reclassification of the language to Zone M which has language such as Bisa and Bemba which

share a ‘closer practical affinity’ with Chitumbuka. He argues that Guthrie’s classification overlooks a lot of ‘practical criteria’[9].

1. 3. Objectives of the study

This study seeks to explore vocalic hiatus resolution (and non-resolution if any) in the aforementioned Bantu languages; the major objectives of the study are:

- To describe the phonological and morphological processes governing and/or resulting from hiatus resolution in the study languages.
- To account for these processes from a generative linguistics point of view.
- To make a cross linguistic analysis of the similarities and/or differences in these languages’ reactions to similar/almost similar phonological and morphological boundaries presenting vowel/vocalic hiatus configurations.
- To account for the phonological processes (languages’ reactions to vowel hiatus) within the explications of Optimality Theoretic Constraint Rankings.

1.4. Justification of Research

1.4.1. Empirical justification

To the best of the researcher’s knowledge, not much research has been done on comparative analyses of the resolution of hiatal configurations in Bantu languages, in particular phonological and morphological processes resulting from hiatus resolution mechanisms.

[9] It is quite unfortunate that other than just mentioning this, Vail does not elaborate further on this so called ‘practical criteria’.

Research on hiatus resolution mechanisms have been done on other African and Bantu languages such as Shona (Coalescence - Harford, 1997), Etsako (Elision – Casali, 1997) Luganda (Glide formation and Elision – Rosenthall, 1997) and Ndebele (Elision and Coalescence – Hadebe 2002: Kadenge, 2007: Sibanda, 2009) but little has been done in terms of comparative analyses within the Bantu language family. This research therefore, the researcher believes, should mark a starting point in the study of another area of Comparative Bantu Generative Linguistics. The researcher would also like to believe that the research will immensely contribute towards the documentation of Bantu languages especially those that seem to be understudied such as Ndebele and Chitumbuka

Phonological and morphological studies are essential to understand the languages' behaviours and to facilitate more studies and documentation on Comparative Generative Linguistics. The researcher is of the opinion that this kind of cross-linguistic study has not been accorded due attention by scholars in the past. This study thus discusses pertinent phonological processes such as coalescence, elision, epenthesis, glide formation as well as dissimilation. It also seeks to make classifications as regards rules (be they syntactic, grammatical or otherwise) governing the occurrence of each of the resolution mechanisms and make a comparative linguistic analysis.

The scope of this study therefore, is important to those interested in studying phonological and morphological operations, processes and reactions to vocalic hiatus contexts in Bantu languages, as well as Bantu morphology and phonology in general.

It is thus anticipated that the study will add to the oasis of pedagogical sources on Bantu linguistics especially phonological and morphological processes in generative linguistics as well as represent a point of departure for further studies on non-descriptivist comparative Bantu phonology and morphology.

According to Sabao (2005)[10], in the Shona language, hiatal configurations are resolved through elision, coalescence and glide formation (morphophonemic change). Based on the generative data discussed therein, the genetic classification of languages and while acknowledging that every language presents evidence of universally determined forms of syllabic, phonological, morphological and syntactic constructions, this research seeks to make a comparative cross linguistic analysis of other Bantu languages regarding the phenomena observed for the Shona language.

Based on the theoretical underpinnings of OT, this study attempts to argue based on the genetic classification assumption that the syllabic make up, morphophonological qualities as well as output forms assumed by either lexical or functional words in these languages are subject to universally determined restrictions and the ranking of a set of estalishable constraints within the languages' phonological, morphological, syntactic and grammatical patterns/processes.

In other words, the major research assumption here is that at similar morphophonological boundaries in the input forms, there are attempts at uniformity in the construction of as well as the final output forms of words within each of the given languages. We are thus supposed to be

[10] This observation is however not originating from Sabao (2005). Also see Fortune (1955, 1980), Doke (1931), Fivaz (1966, 1970), Mkanganwi (1973, 1995). However, unlike Sabao (2005), all the above discuss these processes from a descriptivist point of view.

able to analyse successfully the trends and patterns of the language's restrictions and constraint ranking hierarchy, as well as making a general cross-linguistic empirical data informed comparative conclusion that encompasses all the Bantu languages under study.

Adopting Sabao's (2005) arguments for the Shona language's reactions to vocalic hiatus, whose basis assumption and conclusion is that the language does not, save for one combination (Harford, 1997), tolerate vowel/vocalic hiatus contexts and thus universally eliminates them through either elision, glide formation/dissimilation and coalescence as a blueprint, this study also constructs a hierarchy of vowel/vocalic hiatus resolution methods/mechanisms within the three Bantu languages on the basis of the input-output forms relationship and analysis.

1.3.2 Theoretical Justification

Generative Linguistic enquiries have been guided and informed by theoretical analyses, evaluation and general conceptualization of collected linguistic evidence/data. This has arguably been so mainly because of the flexibility of theoretical considerations to linguistics. Furthermore theoretical considerations of linguistic data have always tended to accord the linguists the room to flexibly and exhaustively analyse any language.

This has come to be so because of the realisation that theories provide an in-depth guide to procedure, assessments and analysis of linguistic evidence under study and analysis. The researcher believes that OT provides the best theoretical framework within which to analyse the optimal output data among the suboptimal candidates for analysis.

It is also the researcher's belief that there is a high likelihood that such data analysed in such manner (through theoretical guidelines, rather than mere descriptions or through trial and error methodologies) will yield more explanatory analyses of data yielding in the languages.

There are a number of theories that the researcher could have employed in this study such as Autosegmental and Metrical Phonology (c.f. Goldsmith, 1990), Lexical Phonology and Morphology (c.f. Ngunga, 2000) and/or Feature Geometry. The researcher opted for Optimality Theory, in order to exploit the theory's explanatory potential, in particular constraint interaction in generative phonology, because it accounts for the syllable, phonological and morphological structures and merger processes which form the crux of this study.

Constraint Interaction, an aspect of Optimality Theory's blueprint for the analysis of phonological and morphological processes and operations provides more insightful explanations on the syllabicity of segments and phonological as well as morphological operations of language; hence it captures more insightfully the complexities of phonological analyses. Furthermore, this aspect of the theory provides a structural interpretation of the possible phonological and morphological patterns that could result from the 'collision' of vowels in hiatus contexts within Bantu languages.

Furthermore, Optimality Theory addresses the research concerns more directly. This is not to say that the others could not, but that OT is more explanatory in its analysis. The decision to adopt it as a blueprint was largely informed by the realisation that the theory could be the best as it captures (in a way that explains) even the slightest of difference in language behaviours-language variations.

The major strength of Optimality Theory lies in its assumption that there is a set of universally ranked constraints in all languages and that differences between languages therefore only come about through the languages' ranking of these universal constraints. (These strengths of the theory will be discussed in depth in Chapter 3 of the study). It is also the researcher's belief that the presentation of research findings also becomes comparatively easy when using the Optimality Theory constraint ranking tabulations. This is so because these clearly show the possibilities as well the constraint violations and 'respects' in rankings - reflected in the final output forms (which are also indicated on the tabulation of results).

The theory's constraint rankings analysis of data in languages also examines various patterns of vowel hiatus, the various vowel hiatus resolution mechanisms, the sub-optimal candidates, the general rules governing the languages' selection of resolution mechanisms regards the vowel-vowel combinations and eventually the final optimal output. The analysis of these patterns in the ranking of these universal constraints as they present themselves within the study languages forms another major component of this study.

1.5. Research Methodology

Methodology in research is the range of approaches used in the collection of empirical evidence in a bid to draw conclusions on a chosen phenomenon. It is the instruments used for the establishment of the existence of an assumed phenomenon. It is thus data that are used as a basis for inferential interpretation or for explanation and prediction.

For the purposes of this research, a descriptive/qualitative approach was seen befitting as it describes and analyses phenomena without experimental manipulation and data are collected in terms of words and not numbers. The major research data collection resource however, due to the limited availability of published literature on the languages covering the specific research goals of this study was the elicitation of relevant data from native speakers of the research languages.

The major research tools for this research were largely desk/library research and fieldwork where interviews were conducted with native speakers of the language as well as questionnaires distributed. Students at the two institutions (Midlands State University and University of Malawi – Chancellor College) who are also native speakers of the study languages formed the primary source of research consultants.

1.5.1 Data Collection

In order to yield a comprehensive cross linguistic analysis of the vocalic hiatus resolution mechanisms in the languages, considerable amounts of data were collected through interviews with native speakers of the languages as well as through fieldwork at some points in the carrying out of the study. Some of the interviews were tape recorded others, due to inadequacy of resource were not. The failure to record some of the interviews was complemented by transcriptions of data during the interviews.

Part of the fieldwork involved traveling to Malawi and staying among the speakers of the original Chichewa. This had the advantage of encouraging dialogue which generates more

natural responses from the respondents. Responses thus are not mechanical as they would be in cases where a language consultant is employed. Most of the data collected especially for Chichewa and Chitumbuka were collected from students at the University of Malawi - Chancellor College.

For technical purposes informants were asked to respond to a set of research specific questions. To some extent, questions were made to overlap with socio-cultural matters that were intimate to the informants as this encouraged a freer environment to interact and to collect data without creating an 'artificial environment'. Freer and more flexible questioning techniques encourage informants to give more natural responses and thus increase the degree of objectivity of collected data.

The other major source of data was desk/library research. This included the perusal of other academic publications as well as theses that dealt with phonological processes within the languages. The major handicap found in these theses was that they largely seemed descriptivist in their analysis of these phonological processes relevant to the current study. It is hoped that the current study will be able to fill this grey area that the descriptivist analysis of data creates.

1.5.2 Informants

For the purposes of this study, the major sources of informants were students at the two institutions (Midlands State University and University of Malawi Chancellor College) who are also native speakers of the research languages. Other speakers of the languages who were not students were also consulted. In some instances especially corroboration of data, non students

with knowledge of the languages were also consulted. The choice of native speaker informants falls in line with Crystal's (1987) observation that in almost every research into language, the best informants are native speakers as they provide natural utterances for analysis as well as other kinds of information about the language. This is so because their language is not conscious and monitored but is subconscious and natural.

The selection of informants was done on a voluntary basis. Because of the restrictions that the research field posed for proper sampling, (random, stratified or otherwise), data were thus collected from as many consultants per language as possible and the data obtained from one consultant was corroborated with that from other informants for purposes of authentification.

It should be noted that in the process of data corroboration, informants were not notified about the source of the data that the researcher sought corroboration on, as this was likely to create conflicts of interests between speakers/consultants (in cases were there seemed to be discrepancies in terms of the data given), and thus compromise the integrity of collected data. Data collection from consultants was done through oral interviews some of which were tape recorded.

1.6. Organisation of the study

The research study is organised in the manner that Chapter 2 constitutes the literature review while Chapter 3 gives an overview of and introduction to the research's theoretical underpinnings (Theoretical Framework). As such, Chapter 3 will provide an overview and discussion on Optimality Theory, in particular constraint interaction and ranking, thus laying the

necessary grounding for the analysis that follow in the following chapter. The major focus of the discussion in this chapter is the grounding of the major theoretical tenets that are directly relevant to this particular study. Chapter 4 deals with the presentation of research findings (Data Analysis), in particular the identification of vowel hiatus contexts in the languages under study and the resultant resolution mechanisms resulting from constraint interactions and constraint rankings. It also discusses the comparative linguistic phonological and morphological processes resulting from hiatus resolution in the study languages observing any similarities and differences. Chapter 5 is the conclusion of the study.

Chapter 2

Literature Review

2.0 Introduction

The thrust of this thesis as has been defined in the previous chapter, is to make a comparative cross-linguistic analysis of vowel hiatus resolution mechanisms in Bantu languages within Optimality Theory's Constraint Interaction and Ranking framework. In order to fully explain these mechanisms and how they resolve vocalic hiatus contexts, the researcher must be acquainted with the concepts of what vowels, vowel/vocalic hiatus, hiatus resolution as well as constraint interaction and rankings are. This chapter reviews the relevant literature that defines what vowels, vowel/vocalic hiatus, vocalic hiatus resolution, constraint interaction and constraint ranking are. As mentioned in the previous chapter, the languages under study belong to the Bantu family.

Languages that descend from the same ancestral language can be observed to behave in the same manner in a number of respects, though of course linguistic research has indicated that this is not always the case as some of the characteristics and behaviours are language specific. Taking cognisance of this, literature on other languages (Bantu and others) will be reviewed in order to shed more light on the linguistic aspects under study.

The first section of this chapter will review literature on the definitions of vowels and vocalic hiatus contexts. From the various definitions culminating from all the literature reviewed, working ones for the purposes of this study will be selected.

Since the area of investigation is somewhat an understudied one (considering that there is little or no literature known to the researcher on cross linguistic comparisons of the phenomena under investigation), the researcher will also endeavour to review published literature on vocalic hiatus resolution strategies in other languages (Bantu and non-Bantu) as this presents a good starting point for establishing the analytical goals of the current study.

2.1 On the terms vowel and vowel/vocalic hiatus

'Vowel Hiatus' (Latin "yawning") is the occurrence of heterosyllabic sequences of vowels within words and/or morphological structures and/or boundaries (Siptar, 2003). It is the separate pronunciation of two adjacent vowels, sometimes with an intervening glottal stop. Vowel hiatus can also refer to the failure of two vowels straddling a word boundary to coalesce, for example by elision of the first or second vowel (Siptar, 2003: Mtenje, 1980: Ola and Pulleyblank, 1998).

Vowel hiatus refers to the occurrence of adjacent phonologically independent vowels within a word or morpheme, but more precisely at a morphological boundary. Vowel hiatus, is the occurrence of two or more vowels which stand as individual syllables adjacently (Sabao 2005). In order to say we have a vowel/vocalic hiatus situation/context, the two vowels, apart from occurring adjacently in an input or output form, must be independently pronounced and should also have 'separate and independent' phonological qualities (Sabao 2005). We thus should guard

against the tempting assumption of mistaking the orthographic occurrence of adjacent vowels as hiatus because hiatus is a phonological phenomenon and not an orthographic one.

Vowels that at times seem to be occurring adjacently are in actual fact not. This is so because they could either be single long vowels as in (4a) or vowels that seem to be adjacent but in fact have a phonological dissimilator as in (4b). There is also the danger of mistaking diphthongs as vowel sequences that are hiatus presenting as in (4c). Consider the following examples.

4. (a) *mu- unga* [mu:ŋga] / [mu^{w}uŋga] 'a thorn tree'

Cl3 thorn

(b) mu- roor- a [muro^{w}ora] / [muro:ra] 'daughter in law'

Cl1 marry TV

(c) mu - ana [mwana] 'child'

Cl1 child

Notice that there is a variation between long voweling and dissimilation[11] in the pronunciations of 4(a) and 4(b). This probably arises from dialectical variations within the language.

[11] This is the resolution of hiatus through the phonological insertion of a consonant sound. It differs from ***epenthesis*** in that the former normally involves the orthographic insertion of a consonant/vowel between adjacent vowels/consonants to break up a cluster. Both processes are discussed in detail in 2.2.

2.2. Vowel hiatus resolution mechanisms[12]

Literature on, and other studies reviewed in this study seem to suggest that most of the world's languages as well as most of the languages within the Bantu family, to which the study languages trace a genetic origin, do not prefer vocalic hiatus configurations. In the same vein, most of the world's languages, disallow hiatus, avoiding it either by deleting (elision) or assimilating the other vowel (coalescence, glide formation), or by adding an extra consonant in between adjacent vowels in order to 'break' the hiatus (epenthesis). Some languages disallow the occurrence of hiatal configurations altogether, others prevent some hiatuses from arising by various means but let others surface or resolve them in some surface-phonological manner (Siptar, 2003)

Strategies of avoidance of hiatus include *elisio* (elision of final vowel), *prodelisio* (elision of initial vowel, but this is somewhat rare) and *coalescence* (merging the adjacent vowels). Other strategies include shortening of final long vowels, maybe in connection with a process of *coalescence,* or the transformation of vowels (or final diphthong components) into semivowels (e.g. /ai/ → /aj/, /au/ → /aw/). This latter process is sometimes also at work in the English pronunciation of the Latin word "hiatus" (sometimes pronounced with a distinct /y/ sound between the first two syllables). The Classical Latin word *hiātus* was pronounced /hi.a:.tus/ and originally meant "gaping" (Siptar 2003)

Other resolution strategies to hiatal configurations include heterosyllabification. This is a process where the solution to a hiatal configuration is to leave the vowel sequence unchanged and

[12] This section explains the hiatus resolution mechanisms in general. This however is in preparation for a discussion on constraint driven resolution in Chapter 3. The chapter will make use of the examples given here illustrating how the resolution of hiatus in the examples discussed here can be explained in terms of Optimality Theory's Constraint Ranking system.

syllabify the two vowels into separate syllables (Casali, 1996). Many languages do not however readily tolerate such kinds of adjacent heterosyllabic vowels. In this regard, in languages which do not, a vowel sequence may be subject to any one of several possible hiatus resolution strategies discussed above and diphthongization.

Diphthongization (Diphthong Formation), which is the syllabifying of the two vowels at a V+V context into the nucleus of a single syllable while recognised as a resolution strategy in many languages however, does not seem to frequently occur as a resolution mechanism within many of the languages in the Bantu family. This stems from the realization that the phonemic inventories of many Bantu languages do not have diphthongs and that the languages seem to always attempt at the production of monophthongal surface forms. The phenomenon is not as prevalent as it is in other language families. Bantu phonology is often restrictive on this phonological process.

2.2.1. Coalescence

To coalesce is to come together to form one whole. Vowel coalescence is a phonological phenomenon in which adjacent vowels cause each other to change and sometimes shorten (Harford, 1997). It is the replacement of a vowel sequence by a third and neutral vowel, which shares the qualities of both the original vowels (Casali, 1997). Crystal (1980) on the other hand defines it as a term used in linguistics, especially historical studies, to refer to the coming together of linguistic units that were originally distinguishable.

As a vowel hiatus resolving strategy in Bantu languages, coalescence refers to the merging of two adjacent vowels in a *VV context (a phonological vowel sequence context) into a third vowel that derives its phonological qualities from those of both the two coalescing vowels.

Vowels that coalesce come as a result of morphophonological processes in generative grammar when they come to be adjacent to each other because the morphemes they belong to have been joined at a morphological boundary or because they occur at the end and the beginning of adjacent words (Harford, 1997).

Schematically represented, this phenomenon would see the merger of **V_1** (for the first vowel in a vowel sequence) and **V_2** (for the second vowel in the series) resulting in a neutral **V_3** (for the third vowel which is the resultant merger vowel from the V_1-V_2 coalescence process) (Casali, 1996). The resulting vowel needs as a matter of necessity to retain the shared qualities between the two coalescing vowels and as such does not randomly and discriminately occur but is universally determined by the language.

In pursuit of this observation, we can argue that the vowel combination in any given vowel sequence determines the resultant vowel. In other words, there is need for uniformity in all cases where the same set of vowels occurs adjacently. The current research tries to answer whether this 'uniformity' is observed.

The resultant vowels in coalescence should in instances where the same set of vowel occurs at the same morphological boundary be similar. In other words, we must be able to systematically project that such and such vowels occurring in sequence at a given boundary coalesce to produce such and such a given vowel. We must be able to formally classify the rules by means of uniformly defined parameters.

For example, Doke (1943) argues that, in many Bantu languages, as a general rule, the sequences of vowels in V+V contexts resolved through coalescence are generally and frequently resolved as in **5** below,

5. (a) a + a = a[13]

(b) a + i = e

(c) a + u = o

2.2.1.0 Coalescence triggers

Coalescence is triggered within many languages (Bantu and others), among them Shona and Chichewa, by epenthetic vowels (used especially in the disyllabification of monosyllabic words) as well as diachronically attested for initial vowel[14] (pre-prefix vowel) within the Bantu family languages, evidence of which still presents itself in such languages as Ndebele /***u***muntu/ 'person', Zulu /***u***muntu/ 'person', Sotho /***a***batho/ 'people' and Xhosa /***a***bantu/. We can, based on this evidence in these languages, argue that based on the languages' shared genetic descendancy, we can hypothetically attest for this initial vowel even in the other Bantu languages where it does not appear in the surface forms.

2.2.1.0.1 Epenthesis as a trigger for coalescence

The process of vowel coalescence is triggered by the nature of the phono-morphological/ morphophonological boundary at which the adjacent vowels occur. Harford (1999) argues that in

[13] See Harford (1997) for a more insightful presentation of this Dokean thesis.
[14] The examples of such initial vowels in the Bantu languages are those in italics and boldface in the immediately following examples.

Shona, coalescence can also be triggered by, depending on the boundary, the epenthetic /i/[15] resulting from the disyllabification process. The language has a systematic dispreference for monosyllabic words and thus inserts an epenthetic /i/ to ensure that words have at least two syllables. Consider example **6** below.

6. (a). i- zvo

EV-these/those

'these/those' (Demonstartive/Pronoun) (Harford 1999).

(b). i- we

EV-you

'you' (Pronoun) (Harford 1999).

(c) i- go

EV-wasp

'wasp' (Noun)

(d) i- mbwa

EV-dog

'dog' (Noun)

(e) i- tsva

EV-new

'new' (Adjective)

[15] Epenthesis itself is also a vocalic hiatus resolution mechanism that involves the phonological as well as orthographic insertion of a consonant between two adjacent vowels inorder to break up the vowel cluster. See 2.2.2 for a full discussion of this process.

Now let's consider an example at the functional word-lexical word boundary (preposition-noun/pronoun boundary) resulting in coalescence in **7**. We can argue here that the change in the vowel results from coalescence between the prepositional vowel and the epenthetic vowel /i/ that results from the disyllabification process discussed in **6** found in the nouns and pronouns but does not often occur in the surface forms of the other dialects of the language such as Karanga[16] in which monosyllabic words are often tolerated.

Following the observations made by Harford (1997), I here argue that it is the epithetic vowel that triggers coalescence. The epenthetic vowel is argued to be the 'trigger' because it is its presence that causes the phonological change of the vowel that precedes it. The epenthetic coalescence trigger, which is argued to be the cause for coalescence is in italics, while the vowel resulting from the coalescence of the epenthetic vowel and the initial vowel of the following morpheme is in boldface.

7. (a). n*a*- *i*- zvo

with EV these (Pronoun)

n- **e**- zvo

'with these' (/na/ 'by, with, and')

(b) n*a*- *i*- go

by EV wasp (noun)

n- **e**- go

[16] Evidence of this can be found in such monosyllabic words as */she/* 'king' as in */**She** vavuya./* 'the king has come/arrived', as well as */tsva/* 'new' as in */shangu **tsva**/* 'new shoes'. While such forms are ungrammatical in the other dialects of the language, in this particular dialect (Karanga, spoken in Central Zimbabwe) they are recognized as well-formed structures. This discussion is accounted for in Harford (1997 and 1999).

‘by/and a wasp’

Note that the resultant coalescing vowels in these examples are concomitant to the schema suggested by (Harford 1997) and Doke (1943), which stipulates the resolution in the manner prescribed in **5**. Morphological boundaries often associated with this kind of coalescence are the functional word-lexical word boundary (as in **7**), lexical word-functional word boundary, as well as the lexical word-lexical word boundary. [For functional purposes, lexical words are those in the ‘major categories’ such as Nouns, Adjectives, Pronouns and Verbs while functional words are those in the ‘minor categories’ whose functions are to qualify or modify the lexical words. These include Prepositions, Class noun prefixes and agreement morphemes, Inflections (verbal) and Complementisers (Harford 1999, Myers 1995).]

Let us now consider the examples in **8** and **9** that illustrate this phenomenon at the other morphophonological boundaries.

8. (a). *ku- end-* ***e-*** *pi*

inf go FV where

‘to go where?’

(b) *a- chi- bv-* ***e-*** *pi*

1SM Pres Cont come from FV where

‘Where does / was s/he coming from?’

(c) *v- a- pind-* ***a-*** *mo*

2SM RP get into FV there/inside

‘they got into/inside there’

(d) *v- a- pind- **e**- mo

2SM RP get into FV there

‘they got into/inside there’

(e) v- a- bv- **a**- ko

2SM RP come from FV there

‘they returned from there’

(f) a- end- **a**- zve

1SM/RP go/went FV again

‘s/he went there again’

(g) *v- a- bv- **e**- ko

2SM RP come from FV there

‘they returned from there’

In the above example, (8a) and (8b) illustrate coalescence at the lexical word-functional word boundary in which again the coalescence trigger is the epenthetic vowel which is the initial vowel (IV) of the locative /[*i*]- *mo*/ (functional word) that coalesces with the final vowel (FV) of the verb (lexical word) that precedes it. Notice however that in 8(c) the FV of the verb does not coalesce. Following Harford’s (1997, 1999) observations regards this, this study proposes that such an example is abstract and cannot be resolved by coalescence because epenthesis does not take place.

Instead, the result however, is cliticisation[17] (in which the locative /-mo/ no longer stands as a monosyllable but becomes phonologically dependent on the preceding lexical word). This dispreference of coalescence and election of cliticisation by the language at such a boundary also occurs with other morphemes/locatives such as /*[*i*]- *ko*/ and /*[*i*]- *zve*/ as exemplified in **8**(e) and **8**(f), respectively.

However, there is also the possibility of arguing for coalescence at the morphological boundary in **8**(e). This will be in line with the argument made for the flexibility of interchange explained for **8**(c) and **8**(d) by which we can also consider **8**(g) as a variation of **8**(e) and one in which coalescence does in fact occur.

Based however, on examples **8**(d) and **8**(g), which are regarded as ungrammatical in terms of the well-formedness constraints of 'standard' Shona (which basically is the Zezuru dialect), but are in other dialects of the language grammatical, we could propose and/or observe that, though not universally occurring cross-dialectically, epenthesis and subsequently coalescence does take place at such a boundary and with such word combinations. This is so because forms such as these are not viewed as ungrammatical in some of the language's dialects

Harford (1997) also presents evidence that indicates that the epenthetic /i/ is also a trigger for vowel coalescence at the lexical word-lexical word boundary. Consider in this regard the following examples in **9**.

[17] Cliticisation is a process where a syntactically independent element becomes phonologically dependent on a neighbouring word (Harford 1997). Crystal (1980) defines cliticisation as a term used in GRAMMAR to refer to a FORM that resembles a word but which cannot stand on its own as a normal utterance, being dependent upon a neighbouring word in the construction.

9. (a) *Ndi- n**é** mota*

1s have a car

‘I have a car’’

(b) **Ndi- na mota*

1s have a car

‘I have a car’

(c) *A- n**e** mombe*

3s has cattle

‘S/he has cattle’

(d) **A- n**a** mombe*

3s has cattle

‘S/he has cattle’

Comparing **9**(a) and **9**(b), Harford (1997) argues that the vowel of the preposition */n**a**-/* coalesces to an */e/* when followed by the nouns of Class 9. Harford (1997) argues that in cases like these, the standard prepositional affix */na/* takes the form of a quasi verb and thus coalesces with the subject noun class marker for Class 9. The form that **9**(b) and **9**(d) represent is ungrammatical in the language.

Despite this, we still must be able to explain the change in the prepositional vowel from */a/* to */e/*. The same goes for examples **9**(c) and **9**(d) with **9**(c) conforming to the same grammatical requirements as **9**(a) and **9**(d) flouting them in the same manner as **9**(b) does.

Observe however that when the form is negative, we could argue that there is no coalescence that takes place and the forms that are grammatical are the ones that do not coalesce. It becomes a reverse of the examples in **9**.

10. (a) **ha- ndi- n**é** mota*

neg 1s have car

'I don't have a car''

(b) *ha- ndi- na mota*

neg 1s have car

'I don't have a car'

(c) **ha- a- n**e** mombe*

neg 3s have cattle

'S/he doesn't have cattle'

(d) *ha- a- n**a** mombe*

neg 3s have cattle

'S/he doesn't have cattle'

However, insofar as we have argued that the forms that we have generally referred to as ungrammatical surface forms are acceptable in other dialects of the language, the same goes for the forms represented by examples **10**(a) and **10**(c). They, while rendering themselves as ungrammatical, are however in the other dialects of the language such as Ndau and Manyika, acceptable.

2.2.1.0.2. The initial vowel as a trigger

Many Bantu languages' nouns have initial vowels that, if not a reduplication/copy of the noun prefix vowel[18], are representative of the noun class subject marker (SM). Most of these languages with noun surface forms exhibiting this characteristic are part of the Nguni cluster. These are represented by Ndebele */**u**mu**u**ntu/* 'person', Xhosa */**u**mu**u**ntu/* 'person', Zulu */**a**ba**a**ntu/* 'people' and Sotho */**a**ba**a**tho/* 'person'. This phenomenon also seems to overlap even to/with lexically borrowed forms, which the languages also prefix with this initial vowel as in such forms as */**i**mali/* 'money' (Ndebele), */**i**tshelete/* 'money' (Zulu and Xhosa), */**i**plasi/* or */**i**fama/* 'farm' (Xhosa) (Silverstein, 1993 [1963]: Mesthrie, 2002)

Based on this evidence of the lexical forms of some of the languages within the Bantu language family as well as knowledge of the shared genetic descendence by the Bantu languages, we thus can hypothetically discern that the presence of the initial vowel can possibly be traced back to Proto Bantu. We are thus able to argue that its absence in the contemporary surface forms of the other daughter languages can be due to diachronic changes within the several fragments of the proto language.

Other generative linguistics processes such as vowel coalescence seem to confirm such hypothetical claims. This initial vowel may also be responsible for triggering vowel coalescence in many of the languages within the language family (Harford 1997, Dube 1999). Harford (1997) observes that at the juncture of the preposition ***/na/*** and a following nominal, coalescence occurs

[18] In cases where the initial vowel reduplicates the prefix vowel, both are marked in boldface and in the loanwords, the initial vowels argued to be inserted by the languages as part of the attempt to preserve the lexical structures of the languages by making the borrowed words match the existing forms are also marked in boldface.

and may have been triggered by this initial vowel which seems to be now extinct in other languages such as Shona. Compare the coalescence[19] process that occurs with the Shona language whose surface forms do not exhibit the initial vowel either phonetically or orthographically (**12)** and Zulu and Ndebele[20] in **11** that do both.

11. (a) **la- i- nkomo*

with 9SM cattle

*l- **e-** nkomo*

'with the cattle' (/la-/ 'with/and/by)

(b) **la- um- ntwana*

with 1SM child

*l- **o**- mntwana*

'with a child'

(c) **la- aba- ntu*[21]

with 2SM people'

*l- **a**- bantu*

'with the people'

Notice how the resolution of hiatus that we argue to be triggered by the initial vowel also conforms to the coalescence vowel combination and result schema suggested by Doke (1943), Harford (1997) and Wald (1973) that is discussed in **2.2.1.**[22]

[19] Again here the coalescing vowel is in boldface.
[20] Within the language, the standard prepositional prefix for 'by/with/and' is **/la-/**.
[21] Some scholars would argue that the resolution of this vowel cluster, i.e. the one in which the two vowels are identical is not done by coalescence but either through elision of either the first or the second vowel in the sequence. See section 4.2 for a further discussion on this.

Based on such Ndebele evidence (which also manifests in other Bantu languages, especially those of Nguni descent)[23], Harford (1997) citing a similar kind of change in the prepositional vowel, thus argues that, though not present in the surface forms of the language, the initial vowel in noun and other lexical formatives is the trigger of coalescence in Shona (the vowel that is the result of coalescence is in boldface). (Examples are from Harford, 1997 and Sabao 2005).

12. (a) *na- munhu* (Class 1) — *n**e**munhu* 'by/and/with a person'

(b) *na- vanhu* (Class 2) — *n**e**vanhu/ n**a**vanhu/n**o**vanhu* [24] 'with people'

(c) *na- miti* (Class 4) — *n**e**miti* 'with trees'

(d) *na- mapadza* (Class 6) — *n**a**mapadza / n**e**mapadza* 'with hoes'

(e) *na- chingwa* (Class 7) — *n**e**chingwa* 'and bread'

(f) *na- zvikoro* (Class 8) — *n**e**zvikoro* 'and/with schools'

(g) *na- mbwa* (Class 9) — *nembwa* 'by/and/with a dog(s)'

(h) *na- pwere* (Class 10) — *n**e**pwere* 'by/and/with kids'

(i) *na- rukova* (Class 11) — *n**e**rukova/n**o**rukova* 'by/and/with the river'

(j) *na- kachira* (Class 12) — *n**a**kachira/n**e**kachira* 'by/and/with a cloth'

(k) *na- tumombe* (Class 13) — *n**e**tumombe* 'by/and/with weak cattle'

(l) *na- uchi* (Class 14) — *n**e**uchi / n**o**uchi* 'and/with honey'*

(m) *na- kumusha* (Class 15) — *n**e**-/n**o**kumusha* 'by/and/with the village'

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[22] Here I refer to the schema discussed in 2.2.1, which suggests that in a vocalic hiatus context, resolution should manifest as: /a/ + /a/ = /a/, /a/ + /u/ =/o/ and /a/ + /i/ = /e/.

[23] Such examples are discussed in detail in 4.3.

[24] Notice however the occurrence of either /a/ or /e/ as the resultant vowel from the coalescence of vowels at the /a + a/ boundary. Diachronic evidence however signifies a preference of the /e/ over the /a/ in current forms of the languages. This however is the reverse with the other Bantu languages such as Ndebele in which there is a perpetual preference of the /a/ as well as in which the occurrence of /e/ in such a context renders the form ungrammatical.

(n) *na- pamba* (Class 16) *n**e**pamba/ n**a**pamba* ‘by/and/with home’

(o) *na- kumba* (Class 17) *n**e**kumba/ n**o**kumba* ‘by/and/with home’

(p) *na- svimbwa* (Class 19) *n**e**svimbwa* ‘by/and/with a small/weak dog’

(q) *na- zimbwa* (Class 21) *n**e**zimbwa* ‘by/and/with a big a dog’

Whilst some scholars have argued that the kind of hiatus resolution that yields, at a boundary where identical vowels are adjacent**,** a vowel that is identical to both the said coalescing vowels (as in the case of the vowel variation in Classes 2,6,12 and 16[25]) is not sufficient to argue for a case of coalescence as it may well pass for elision, evidence in other languages point otherwise.

Baković (2003) argues that in Chicano Spanish (a variety of Spanish spoken in South Texas), in hiatus resolution, sequences of identical vowels are simplified to a single vowel. Despite seeming evidence of either first or second vowel deletion, Baković argues that based on analysis internal grounds, the sequences are resolved through coalescence.

13. *Coalescence of identical vowels in Chicano Spanish*[26]

(a) *lo- odio* [l**o**ðjo] ‘hate him’

(b) *era- asi* [eɾ**a**si] ‘it was like that’

(c) *se- escapo* [s**e**skapo] ‘escaped’

(d) *tu- uniforme* [t**u**niforme] ‘your uniform’

(Baković, 2003)

[25] I would think that this kind of coalescence is only manifest with the language’s lexical formatives whose noun class subject/object marker is /a/.

[26] These examples will be further discussed in the next chapter.

There seems to be no noticeable trigger for coalescence in the above examples other than the mere occurrence of adjacent vowels. We can therefore thus conclude, in light of Baković's (2003) observations, that it is a mere dispreference of V+V contexts that triggers it. In other cases however of vocalic hiatus involving different vowels, the language elects a different resolution strategy (either elision or glide formation)[27]. This choice between the use of either of the two can be argued to be determined by the vowel height patterns of the vowel sequence, with the language electing glide formation in a sequence in which V_1 is a high vowel and elision in a sequence in which the V_1 is a low vowel and is also a word-final vowel[28].

2.2.2. Glide formation and Dissimilation

Crystal (1980) defines glides and glide formation as terms used in phonetics to refer to a transitional sound as the vocal organs/cords move towards or away from an articulation. An example is the [j] heard in the pronunciation of words such as 'tune' [tʲu:n]. Diphthongs are also sometimes referred to as gliding vowels. Glide Formation, here is used exclusively to refer to a process in which the first of the two adjacent vowels surfaces as a semivowel (Casali, 1996). In general it refers to the change of the phonological qualities of a vowel and its assumption of *'consonancy'* [consonant features] in order to break up a hiatus complex (Sabao, 2005). In many studies, it has emerged as a hiatus resolution mechanism in many of the world's languages (Rosenthall 1997, Baković 2003, Casali 1996, Cabre and Preto 1998).

Glide formation is influenced and conditioned by a host of conditions, most of which are featural ones. For example, in Chicano Spanish, in a vowel sequence, if the initial vowel is high [+high],

[27] The discussion on this follows in sections 2.2 and 2.3
[28] See the next two sections for this discussion.

it becomes a glide of the vowel that it precedes. The basic rule in this kind of hiatus context in the languages is: **/i/→[j]** and **/u/→[w]** (Baković, 2003). The result is the elimination of vocalic hiatus and the replacement of the sequence with a rising-sonority diphthong.

14. *Gliding of high vowels*

(a) *m**i** **u**ltima* [mi**ju**ltima] /i_1#u_2/→[j_1u_2] ‘my last one’

(b) *m**i** h**e**bra* [m**je**βra] /i_1#e_2/→[j_1e_2] ‘my thread’

(c) *m**i** **o**bra* [m**jo**βra] /i_1#o_2/→[j_1o_2] ‘my deed’

(d) *m**i** **a**rbol* [m**ja**ɾβol] /i_1#a_2/→[j_1a_2] ‘my tree’

(e) *t**u** **h**ijo* [t**wi**xo] /u_1#i_2/→[w_1i_2] ‘your son’

(f) *t**u** **e**poca* [t**we**poka] /u_1#e_2/→[w_1e_2] ‘your time’

(g) *s**u** ll**o**mero* [s**wo**mero] /u_1#o_2/→[w_1o_2] ‘your Homer’

(h) *t**u** **a**lma* [t**wa**lma] /u_1#a_2/→[w_1a_2] ‘your soul’

(Baković, 2003)

In line with this kind of vowel height triggered glide formation, interesting to note however is that in instances where the first vowel in the sequence is a mid vowel in Chicano Spanish, coalescence and not glide formation takes place instead.

15. *Coalescence of mid + high vowels*

(a) *s**e** h**i**nca* [s**i**ŋka] /e#i/→[$i_{1,2}$] ‘kneels’

(b) *com**o** **u**vitas* [kom**u**βitas] /o_1#u_2/→[$u_{1,2}$] ‘like grapes’

(Baković, 2003)

Glide formation often surfaces too, as a hiatus resolution mechanism in languages that only have monophthongal surface vowels. Many Bantu languages fall within this category. Often, the first vowel in the underlying sequence often surfaces as the glide for its counterpart (Rosenthall, 1997). Glide formation in many such languages often comes about as a result of prevocalic vowel distribution, and in a bid to ensure that the languages must always have monophthongal surface forms, such processes as glide formation occur. This could be best explained by considering the possible existence of a constraint that militates against the occurrence of diphthongs, an 'Avoid Diphthong' constraint. Luganda data (Rosenthall, 1997) exhibits this kind of pattern.

16. (a) /*m**u***+***o**yo*/ [m^{w}**o**:yo] /u_1#o_2/→[$^{w}{}_1$o:$_2$] 'heart'

(b) /*m**u***+***i**ko*/ [m^{w}**i**:ko] /u_1#i_2/→[$^{w}{}_1$i:$_2$] 'trowel'

(c) /*l**i***+***a**to*/ [l^{y}**a**:to] /i_1#a_2/→[$^{y}{}_1$a:$_2$] 'boat'

(d) /*k**i***+***u**ma*/ [k^{y}**u**:ma] /i_1#u_2/→[$^{y}{}_1$u:$_2$] 'metal object'

(Rosenthall, 1997)

Luganda evidence (Rosenthall 1997, Clements, 1986) also indicates the realisation of the resolution resultant monophthongal vowel as a long vowel. While the resolution of hiatus through the systematic gliding of V_1 at the noun prefix-noun stem boundary in the language ensures the realisation of monophthongal surface vowels it produces a subsequent vowel lengthening of the surface vowel as illustrated in **16** above.

Clements (1986) attributes this kind of distribution in Luganda to 'rules' that disprefer surface vowel sequences in the language. The result is that the high vowels in the sequences undergo glide formation. The lengthening of the surface vowel is thus due to attempts at maintaining the number of V-slots (vowel slots) while guarding against the occurrence of surface vowel sequences (Clements 1986, Hayes 1989). This reaction is referred to as compensatory lengthening of the non-high and is caused by Glide Formation and Vowel Deletion (Clements 1986).

Etsako, while exhibiting a distribution in prevocalic vowels similar to that of Luganda as well as eliminating hiatus in a similar way, however does not present evidence of compensatory V-slot preservation. Hiatus resolution driven compensatory vowel lengthening does not occur in the language (Elimelech 1976, Pulleyblank 1994). Unlike Luganda Etsako disprefers long monophthongal surface vowels and thus vowels in the language are typically short.

17. (a) /*alok**ui***/ [alok^{w}i] /u_1#i_2/→ [$^{w}{}_1i_2$] 'chameleon'

(b) /*o**θie***/ [oθ^{y}e] /i_1#e_2/→ [$^{y}{}_1e_2$] 'king'

(c) /*d**u a**kpa*/ [d^{w}akpa] /u_1#a_2/→ [$^{w}{}_1a_2$] 'carry a cup'

(Ola and Pulleyblank,1998)

Shona on the other hand, in some instances dictated by variations in morphological boundaries, also undertakes glide formation and morphophonemic change to break up vowel clusters. The existence of allomorphs for noun class prefixes in the language forms the basis for arguing for

the case of glide formation/'morphophonemic change' conditioned by a dispreference of vocalic hiatus (Sabao 2005).

Fortune (1985) points to evidence that support the case for the existence of glide formation/dissimilation-influenced prefixal allomorphs within Bantu languages. Technically defined, this phenomenon denotes the 'change' of the initial vowel (V_1) at the prefix-stem boundary into a dissimilating consonant or rather, a more consonant-like vowel. This results again from the resolution of vocalic hiatus morphological contexts.

Fortune (1985) thus concurs that there are allomorphs of almost all the noun prefixes in the [Shona] language(s). The allomorphs are a result of the operation of one or other of the morphophonemic changes which take place in Shona when certain shapes come together; for example, when a **CV** [(consonant and vowel)] noun prefix and a vowel commencing noun stem are constituents. The morphophonemic changes result in morphemes having phonologically different forms which can be shown to be the result of their phonological environment.

Rosenthall (1997) accounts for the occurrence of this phenomenon for the Class 3 noun in Luganda, and argues that the noun prefix vowel **/-u-/**, when confronted with a vowel commencing/onsetless noun stem, phonologically and morphologically changes into a dissimilating **/-w-/** or a glide. Evidence in Shona also points to the occurrence of such a resolving mechanism in the language. Consider example **18.**

18. (a) *m**u**-* + *-**a**na* [m**wa**na] /u_1#a_2/→[w_1a_2] 'child'

*Cl*1 child

(b) *m**u**-* + *-**o**yo* [m**wo**jo] /[m^{w}ojo] /u_1#o_2/→[w_1o_2] ‘heart’

*Cl*3 heart

(c) *t**u**-* + *-**a**na* [t**wa**na] /u_1#a_2/→[w_1a_2] ‘tiny children’

*Cl*13 - Ptiny child

(d) *h**u**-/ (h)**u**-*+ *-**a**na* [h**wa**na] /u_1#a_2/→[w_1a_2] ‘like small children’

*Cl*14 - small child

(Extracted from Sabao, 2005)

We note that the noun classes 1, 3, 13 and 14 prefixes within the language present this kind of evidence of this type of articulatory change of the word-final consonant (the prefix vowel) in the face of an adjacent vowel – in a vowel hiatus context. Such evidence is presented below in **19**. The noun prefixes listed are in their base forms.

However, unlike in Luganda, there is no compensatory lengthening in the surface vowel forms in Shona and while in Luganda there is orthographically ‘covert glide insertion’, in Shona there is an orthographic as well as phonetic transformation of the IV in the vowel sequence. We notice however that there seems to also be an attempt at the realisation of monophthongal surface forms. Also consider examples in **16** as regards this.

The question that inevitably arises culminating from the realisation that in the given examples in **18**, the IV /-u-/ turns into a dissimilating /-w-/ in the face of a vowel is one on the description of the noun prefixes of the Shona noun classes as discussed above. We could describe in terms of

Fortune's (1985) observation, the prefixes as interchangeable and exhibiting allomorphy especially in hiatus prevention as represented below.

19. *Noun Class*	*Noun Prefix(es)*
1	mu-/ *mw*-
3	mu-/ *mw*-
13	tu-/ *tw*-
14	hu-/ u-/ *hw*-

We could in this case also point out that the occurrence of either of the allomorphic prefixes as is in the case of Luganda (Rosenthall1997), is largely dependent on the stem's initial vowel that is, the quality of the vowel in the onsetless[29] noun stem. In other words the characteristics of this vowel define and dictate which prefixal morph takes precedence over all the others

Of course, there are variations in the prefixal allomorphs that trigger change. For example, Class 1 variation in prefixal interchangeability from /-u-/ to /-w-/ is triggered by the presence of the vowels /-a-/ and /-e-/ as in the case of the nouns /m*w***a**na/ 'child' and /m*w***e**ni/[30] 'visitor', respectively (Sabao, 2005). However, despite these variations, as a general rule we can posit that this dissimilation phenomenon, also occurring in Luganda, is prevalent in Shona as amply demonstrated by the prefixal allomorphs. To this end, we can thus linguistically represent this as [V→[w] /____V], thus to say /-u-/ turns into a /-w-/ in the face of a vowel.

[29] Onset refers to when syllabic forms/syllables begin with a consonant. Onsetless-*ness* therefore is when a syllable begins ***not*** with a consonant but a vowel.

[30] This form is acceptable in the Manyika dialect of the language but is considered ungrammatical in the other dialects of the language i.e. Zezuru, Karanga, Korekore and Ndau.

In other words this means that the prefixal vowel /-u-/ assumes more consonant like qualities preceding a vowel/in the face of another vowel (the stem's initial vowel). Given this kind of evidence Sabao (2005) argues that the occurrence of the prefixal allomorphic variation that is conditioned by the presence of another vowel, as earlier on assumed, occurs to eliminate vowel/vocalic hiatus.

Phonetic studies (Fortune, 1985: Sabao, 2005) have also indicated that the Shona language employs two major phonetic consonant dissimilators; the [y] and the [w]. The choice of which of the phonetic consonant dissimilators is used to break up vowel clusters is determined largely by the vowel cluster combination, (though at times morphological boundaries also dictate the choice).

Though not conclusive, the examples below present evidence on the choice of the dissimilating phonetic consonant determined by the vowel combinations at the V+V morphological boundaries. While variations/differences between morphological boundaries could present possibilities of change in dissimilator consonant choice, I would propose that, as a general rule, the evidence in the lists stands.

20. *(a) Phonological Dissimilator [^{y}] in Hiatus Contexts*

V+V	***Examples***		
/-a-+-e-/	/***v**ae**n**da*/	[va^{y}enda]	/a$_1$#e$_2$/→[a$_1$^{y}e$_2$] 'they have gone'
/-a-+-i-/	/*zv**ai**ta*/	[zva^{y}it á]	/a$_1$#i$_2$/→[a$_1$^{y}i$_2$] 'it has happened'

/-e-+-i-/	/nd***ei***mwe/ [nde^{y}imwe]	/e$_1$#i$_2$/→[e$_1$^{y}i$_2$]	‘it’s the only one’
/-i-+-a-/	/nd***ia***ni?/ [ndi^{y}ani?]	/i$_1$#a$_2$/→[i$_1$^{y}a$_2$]	‘Who is it?’
/-i-+-e-/	/t***ie***nde/ [ti^{y}ende]	/i$_1$#e$_2$/→[i$_1$^{y}e$_2$]	‘lets go’
/-i-+-i-/	/t***ii***te/ [ti^{y}ite]	/i$_1$#i$_2$/→[i$_1$^{y}i$_2$]	‘so that we do’
/-o-+-e-/	/v***oe***nda/ [vo^{y}enda]	/o$_1$#e$_2$/→[o$_1$^{y}e$_2$]	‘they are going’
/-o-+-i-/	/t***oi***tei?/ [to^{y}ite^{y}i]	/o$_1$#i$_2$/→[o$_1$^{y}i$_2$]	‘what do we do?’
/-u-+-e-/	/m***ue***ni/ [mu^{y}eni]	/u$_1$#e$_2$/→[u$_1$^{y}e$_2$]	‘visitor’
/-u-+-i-/	/m***ui***pi/ [mu^{y}ipí]	/u$_1$#i$_2$/→[u$_1$^{y}i$_2$]	‘evil doer’

(Sabao, 2005)

(b) Phonological Dissimilator [^{w}] in Hiatus Contexts

V+V	***Examples***		
/-a-+-o-/	/t***ao***na/ [ta^{w}ona]	/a$_1$#o$_2$/ → [a$_1$^{w}o$_2$]	‘we have seen’
/-a-+-u-/	/v***au***ya/ [va^{w}uya]	/a$_1$#u$_2$/ → [a$_1$^{w}u$_2$]	‘they have come’
/-e-+-o-/	/zv***eo***se/ [zvé^{w}óse]	/e$_1$#o$_2$/ → [e$_1$^{w}o$_2$]	‘for all of it’
/-e-+-u-/	/ch***eu***ka/ [ché^{w}uka]	/e$_1$#u$_2$/ → [e$_1$^{w}u$_2$]	‘look/turn around’
/-i-+-o-/	/nd***io***ne/ [ndí^{w}óne]	/i$_1$#o$_2$/ → [i$_1$^{w}o$_2$]	‘so that I see’
/-i-+-u-/	/nd***iu***ye/ [ndi^{w}uye]	/i$_1$#u$_2$/ → [i$_1$^{w}u$_2$]	‘so that I come’
/-o-+-o-/	/mur***oo***ra/ [muro^{w}ora]	/o$_1$#o$_2$/ → [o$_1$^{w}o$_2$]	‘daughter in-law’
/-o-+-u-/	/v***ou***ya/ [vo^{w}uya]	/o$_1$#u$_2$/ → [o$_1$^{w}u$_2$]	‘they now come’
/-u-+-e-/	/m***ue***ni/ [m^{w}eni]	/u$_1$#e$_2$/ → [?$_1$^{w}e$_2$]	‘visitor’
/-u-+-o-/	/m***uo***nde/ [mu^{w}onde]	/u$_1$#o$_2$/ → [u$_1$^{w}o$_2$]	‘fig tree’

/-u-+-u-/ /***muu****nga*/ [mu^{w}unga] /u_1#u_2/ → [$u_1^{w}u_2$] ‘thorn tree’

(Sabao, 2005)

Compensatory vowel lengthening is also attested in Shona hiatus resolution. This often results from the phonological interchange on whether the language elects dissimilation or vowel lengthening in the resolution of sequences of similar vowels (Mtenje, 1980: Rosenthall, 1997). In other words there seems to be an option at some phonological and/or morphological boundaries for the resolution of hiatal configurations through either long voweling or dissimilation. Consider the following example as evidence of that interplay/variation.

21. (a) *mu- unga* [mu:ŋga] / [mu^{w}uŋga] ‘thorn tree’

3NP- thorn

(b) mu- roor- a [muro:ra] / [muro^{w}ora] ‘daughter in law’

1SM- marry TV

Notice however that this kind of compensatorily lengthened monophthong does not appear in the surface forms of the language and is only realised in the physical pronunciations which are somehow dialectically determined and variant. Otherwise the surface forms continue to be ‘hiatus presenting’ monophthongal vowels.

2.2.3 Elision

With respect to vowel elision, there are two obvious choices; deletion of the first (leftmost) vowel within the sequence as in 22(a) or the last (rightmost) vowel as in 22(b) below.

22 (a) Etsako (A Niger-Congo language - *Casali, 1996, 1997*)

/dɛ/ + /akpa/ → /dakpa/ */ε_1#a_2/→ [a_2]* 'buy a cup'

buy cup

(b) Swedish *(Lass, 1984)*

/flik:a/ + /ɛn/ → /flik:an/ */a_1#ε_2/→ [a_1]* 'the girl'

girl the

These strategies of avoidance of hiatus are also known as *elisio* (elision of final vowel hereinafter referred to as V_1 - elision) which involves the deletion of the word-final vowel (which is also the first vowel in the vowel sequence at a morphological boundary), as well as *prodelisio* (elision of initial vowel hereinafter referred to as V_2 - elision) which involves the deletion of the word-initial vowel (which is also the second vowel in the vowel sequence at a morphological boundary). Cross-linguistic studies have yielded the conclusion that many languages do not tolerate vowel hiatus and that where hiatus would arise in such languages through morphological or syntactic concatenations, it is typically eliminated (Casali 1997, Pulleyblank 1998).

Other than the methods already discussed above, one other very common means of resolving hiatus is to elide one of the adjacent vowels (Casali, 1997). In such situations, the choice of which vowel gets elided is not randomly chosen but is subject to a systematic determination which conforms to the dictates of the language's phonological, morphophonological and syntactic classifications. Cross-linguistic studies have also observed that the choice of the vowel

to be elided is universally determined in conformity to the *ranking of constraints*[31] (Casali 1996a, Sabao 2005).

In this regard, cross-linguistic studies have revealed that the prime mover in any analysis of hiatus resolution is the constraint ONSET (Pulleyblank 1998, McCarthy 1993, Borroff 2003, Rosenthall 1997). Rosenthall (1997) proposes that vowel deletion in Yoruba is driven by the desire to avoid the realisation of onsetless surface syllable structures.

23. (a) *owó kí owó* [owók**ó**wó] /i_1#o_2/→[o_2] 'any money/bad money'

(b) *ọmọ kí ọmọ* [ọmọk**ọ**mọ] /i_1#o_2/→[o_2] 'any child at all/bad child'

(c) *ní oko* [l**ó**ko] /i_1#o_2/→[o_2] 'at the farm'

(Ola and Pulleyblank, 1998)

Rosenthall (1997) argues that such evidence of vowel deletion/elision seem to be motivated by nothing more than a dispreference for onsetless surface syllables. Recent research would argue however that this is an inadequate syllable based account and that deletion driven by a deliberate avoidance of hiatus independent of onset violations (Pulleyblank 1998, Borroff 2003).

Deletion, however, occurs only when the morpheme supplying V_1 + V_2 is monosyllabic as in the cases in **23**. However, even if the conditions proposed by Rosenthall to eliminate onsetless syllables are met, in hiatal configurations, both vowels in a V_1 + V_2 sequence are retained when the morpheme supplying V_1 has two or more syllables (Ola and Pulleyblank, 1998). Consider **24.**

[31] This is discussed in detail in Chapter 3.

24.	***Hiatus tolerated***	***Assimilation OK***	***Deletion BAD***	***Gloss***
	(a) *lábẹ̀ òkúta*	*lábó òkúta*	**lábókúta*	'under the stone'
	(b) *gbàgbé̩ ọ̀mọ*	*gbàgbé̩ ọ̀mọ*	* *gbàgbómọ*	'forget child'
	(c) *jáde opó*	*jáde opó*	* *jádopo*	'come out of mourning'
				(Ola and Pulleyblank, 1998)

In the above examples, assimilation occurs instead. This is in line with the observation made above in **23** that deletion only takes place when the morpheme supplying the leftmost vowel monosyllabic. Deletion or any other onset driven hiatus resolution mechanisms such as coalescence and epenthesis are systematically blocked and surface forms that delete become unacceptable. The choice on whether to delete or not is determined by patterns of minimality[32], that is to say, the analysis of vowel deletion/retention in hiatal configurations based on the concept of the minimal word.

The choice of which of the vowel is elided is in a V_1 - V_2 context can also be defined by the morphological boundary at which the vowel sequence occurs, that is to say, whether it occurs at a prefix-root, root-suffix or lexical word-lexical word boundary. It is therefore possible at this point to assume that at a similar boundary, the choice of the vowel to be elided is universally determined in a bid to preserve phonetic and morphological salience and uniformity (Casali 1996a, Clements 1986, Sabao 2005).

Evidence from Chicano Spanish indicates that considerations on the choice of eliding either V_1 or V_2 can also be made on the basis of vowel height (Baković, 2003). Word-final low vowels are

[32] This if discussed in detail under Constraint Interaction and Ranking in section 3.3

always deleted if they occur before *any* word initial vowel (Hutchinson 1973, Reyes 1976, Schane 1987).

25. *Deletion of low vowels in Chicano Spanish*

(a) *l**a** **i**glisia*	[liɣlesja]	/a_1#i_2/→[i_2]	‘the church’
(b) *pag**a** **E**vita*	[paɣ**e**βita]	/a_1#e_2/→[e_2]	‘Evita pays’
(c) *cas**a** **hu**milde*	[kas**u**milde]	/a_1#u_2/→[u_2]	‘humble home’
(d) *niñ**a** **o**rgullosa*	[niŋ**o**ɾɣujosa]	/a_1#o_2/→[o_2]	‘proud girl’

(Bakovic, 2007)

This pattern resembles patterns in many Bantu languages such as Luganda and Etsako. For example, in Luganda, hiatus resolution is consistent with a bipartite distribution in prevocalic vowels in which high initial vowel glide, low vowels delete in hiatal contexts.

26. *Deletion of low vowels in Luganda*

a) *k**a** + **o**to*	[ko:to]	/a_1#o_2/→[o:$_2$]	‘fireplace’
(b) *l**a** + **i**lo*	[li:lo]	/a_1#i_2/→[i:$_2$]	‘affectionate’

(Rosenthall, 1997)

27. *Deletion of low vowels in Etsako*

(a) *d**ɛ** **a**kpa*	[dakpa]	/$ɛ_1$#a_2/→[a_2]	‘buy a cup’
(b) *ses**e** **a**kpa*	[sesakpa]	/e_1#a_2/→[a_2]	‘make a cup’

(Casali, 1997)

In both examples, V_1 elision is attested. Important to note, however, is that Etsako has the same distribution of prevocalic vowels as has Luganda, in which non-high vowels are deleted. Elimelech (1976) argues however that the only difference is that the surface vowels in Etsako are short, which is consistent with the fact that the language only contains short monophthongal surface vowels.

Notice also that, as in the case with glide formation, surface form vowels resulting from hiatus driven deletion in Luganda have vowel lengthening as compared to Etsako which does not (cf. **16** and **17**). This could again be due to the preservation of V-slots in the surface forms.

Although both V_1 and V_2 elision is attested in many Bantu languages, the choice of the vowel to be elided can also be argued to owe much to languages making great effort to preserving material that is auditorily salient. We can also further argue that the choice of the vowel that elides is governed by phonological and morphological restrictions within the language.

These restrictions, however, at times present seemingly contradicting evidence that cannot be readily explained but could, arise in direct response to functional considerations within the language as well as dialectical variations (Sabao 2005). The choice of which vowel in the sequence to elide is also determined by the morphological boundary at which the hiatal condition occurs i.e. does it occur at a boundary between two lexical words, a lexical word and a functional word, a functional word and a lexical word, a prefix and a root et cetera (Casali 1997, Sabao 2005).

2.3. Summary

Many languages do not tolerate hiatal configurations and thus attempt to eliminate them by some or all of the resolution mechanisms discussed above that include glide formation, coalescence, epenthesis and elision. The choices of resolution mechanisms that languages elect to resolve hiatal contexts are not randomly arrived at but systematically and uniformly chosen based on the restrictions and rules governing the phonological as well as morphological rules operational within given languages. Morphological boundaries and morphophonological constraints/ restrictions operational within languages play an integral part in the determination of the resolution mechanism selected. In a nutshell, the resolution strategies discussed in this chapter can be schematically summated as in **28** as follows:

28. Heterosylabification: $CV_1+V_2 > .CV_1.V_2.$

Vowel Elision: $CV_1+V_2 > .CV_2(:).$ or $.CV_1(:).$

Coalescence: $CV_1+V_2 > .CV_3(:).$

Glide Formation/Dissimilation: $CV_1+V_2 > .CGV_2(:).$

Epenthesis: $CV_1+V_2 > .CV_1.CV_2.$

Diphthong Formation: $CV_1+V_2 > .CV_1V_2.$

(Adapted from Casali, 1996)

In these schematizations of the resolution mechanisms, the parenthesized colon indicates that Vowel Elision, Glide Formation, and Coalescence may occur with or without compensatory lengthening, depending on the particular language.

Chapter 3

Theoretical Framework

3.0 Introduction

The previous chapter examined and reviewed various aspects such as vowels, vowel hiatus and vowel hiatus resolution mechanisms. Literature, especially on vocalic hiatus resolution has been reviewed. The chapter noted that many of the world's languages do not tolerate vowel hiatus and thus eliminates such contexts by employing some and/or all the resolution mechanisms discussed and reviewed therein that include elision, epenthesis, dissimilation, epenthesis, glide formation and coalescence.

This chapter lays the foundation for analysis of data by laying down the major theoretical principles that will be used in the analysis of collected data. The researcher here seeks to explain the major theoretical underpinnings of Optimality Theory as a theory of phonology and highlight its saliency and relevance to the analysis of data in this study. The chapter thus is based on Optimality Theory (Kager 1999, Archangeli, 1996, Prince and Smolensky 1991, 1993, McCarthy and Prince 1993a,b, Zuraw, 2000) as well as to a large extent Constraint Interaction in Generative Grammar (Prince and Smolensky, 1991).

The researcher thus, in this chapter, seeks to explain the major and study relevant tenets of the theory in a bid to explicate how, in OT theoretic terms, grammars are means to resolve conflicts

and how different languages handle the morphophonologically complex situations that vocalic hiatus contexts represent differently/similarly.

The discussion in this chapter thus will centre on explaining the nature of the relationship that exists between Optimality Theory's constraints and the input-output relationships of a language's generative grammar, i.e. how the final output/surface forms of any language's grammar can be argued to be determined by the ranking of a set of universal constraints. In line with this, the chapter also discusses how such a constraint ranking system can be used as a means to a fuller understanding of, and to explain the resolution of grammatical phonological complexities such as vocalic hiatus within given languages by giving evidence of how the surface forms resulting from hiatal configurations are a result of this ranking system.

The last section of this chapter forms the conclusion in which the researcher will discuss the strengths of the research's theoretical underpinnings and some of the weaknesses.

3.1 Optimality Theory- An Overview

Optimality Theory is a theory of generative grammar whose conception can be argued to have been influenced by the realisation of the shortcomings of rule-based phonological and morphophonological theories (Zuraw 2000, Kawahara 2001). It deviates from rule based phonological theories as well as other principle based theories such as the ***Principles and Parameters Theory*** (Wexler and Culicover, 1980, Hyams, 1986, Dresher and Kaye 1990) [as well as ***Lexical Phonology and Morphology*** (c.f. Ngunga, 2000)], which while suggesting that there are no rules, believe in the existence of principles that take slightly different forms in

different languages by stipulating a specification of the range and types of forms that a particular principle can take. A particular given specification of such a kind is known thus as a *parameter*.

In reference to this, within the frameworks of the Principles and Parameters Theory, for example, with reference to UG, the assumption is that a language learners' task is determining the values of a set of universally available binary choices, each corresponding to an inviolable property of the target output grammar.

In contrast, as Kager (1999) propounds, OT assumes that UG defines a set of universal and violable *constraints* as well as *principles* by which these constraints interact. It further argues that since this is the case, then grammars are essentially diverse rankings of these universal constraints thus the acquisition of language must therefore simply be defined as the acquisition of a language specific hierarchy of universal constraints.

For example, in the treatment and explanation of the elimination of vocalic hiatus contexts through elision, Rule Based Theories would argue that the choice of the vowel that gets elided is not determined by contextual factors and is not predictable, but is simply a matter of which of the two equally available options is selected by the language. In fact, within the Rule Based Theoretical frameworks, the possibility that the choice of the vowel to be elided might be predictable seems to never have been seriously explored (Casali, 1996, Prince and Smolensky, 1991).

However, within OT, we are able to establish, as shall be discussed in detail below, that the choice is predictable and determined by the morphological boundary at which such a hiatal configuration occurs within the language as well as to a large extent, the hierarchical ranking of a set of universal constraints (and their interaction) within the language. This is in line with the observation that, within OT, the particular resolution strategy adopted to eliminate hiatal configurations in any given language will depend on the relative ranking of a series of constraints which favour or disfavour particular strategies.

For example, while rule based theories and frameworks would account for linguistic patterns through the sequential application of transformations to lexical entries, in OT the output is instead chosen through competition with other possible candidates. UG provides a set of highly general well-formedness constraints. These are often conflicting and are operative within individual languages. This is so because OT is a framework in which the emphasis is not on the derivational sequence by which an input is transformed into a surface form, but rather on a set of violable constraints which determine the well-formedness of output forms (Beckman, 1995).

The key assumption of OT thus, is that grammars are means to resolve conflicts between *universal constraints*. More precisely, the theory is premised on the conviction that the grammar (surface forms) of any individual language are a specific selection from many possible possibilities in structure of output forms that result from the ranking a set of universal and violable constraints (Archangeli 1997, Prince and Smolensky 1991).

In other words the theory's major assumption is that, for any given input form within any language, the language's grammar is able to generate, deriving from the given input, an infinite set of possible surface forms known as *suboptimals/candidates*. It is from this candidate set that the language's grammar selects the best candidate (which is also known as the *optimal* candidate) that is the eventual surface form of the language's grammar.

The main idea of OT is that the observed forms of language arise from the *interaction* between *conflicting constraints*. (In OT terms, a constraint is a 'rule/requirement that an output form within any grammar has to satisfy (Kager 1999, Prince and Smolensky 1991, Zuraw 2000). Since there can be many constraints and these conflict with each other (Archangeli 1997, Kager 1999), the constraints are violable[33] and the highest ranked constraints have the largest say in determining the optimal output form (Prince and Smolensky 1991, Zuraw 2000).

To this end, as a generative linguistics phonological theory, OT is premised on the realization that the output forms of every language are not automatically and predictably defined but are subject to ranking of constraints and restrictions in the phonological, morphological and syntactic constructions and rules governing the particular language. In other words, the underlying assumption is that we have a set of constraints, which are applicable to all languages indiscriminately, and it is the differences in the hierarchical rankling of these constraints that gives rise to language variations[34]. The general conviction in this vein therefore, is that

[33] Violability of constraints means respecting the grammatical demands of one constraint over those of another. This thus means that the constraint/requirement which is given 'less respect' and whose grammatical dictates are not honoured or honoured below those of another is said to have been violated.
[34] Language variation being the range and types of differences possible between languages.

differences between languages must therefore be due to different rankings of a single set of universal constraints (Kager 1999, Prince and Smolensky 1991).

The argument here is that every output form in whatever language violates some constraints to avoid violating others that are more highly ranked by the language. As Archangeli (1999) states that, the violation of a constraint is however, not at all a direct cause of ungrammaticality, nor is the satisfaction of all constraints essential to the output of the grammar. Far from it, the satisfaction of all constraints is a 'linguistic impossibility', as this would negate the idea of a systematic and universally determined and defined phonological, morphological as well as syntactic system in a language. Otherwise, this would pose an impediment to the learnability of that language, as it would present haphazard natures of constructing words.

A very important component/aspect of OT crucial to the argumentations of this study, in this regard is the *Learning Algorithm*[35] (Tesar and Smolensky 1993, Prince and Smolensky 1991). The algorithm makes it possible for one to deduce and construct a hierarchy of constraints for a given language on the basis of the given input and output forms. This is so because a *hierarchical constraint ranking system*[36] is the best explanation of the relationship between inputs and outputs in grammar and is thus the basis from which the analyses of this study are to be argued from.

[35] The algorithm is further discussed in 3.4.

[36] OT argues that the satisfaction of constraint in any given input-output configuration is subject to a non-haphazard ranking of constraints in which the language sets parameters on which constraints uniformly take precedence over others in given configurations. This ultimately results in the creation of a hierarchy of constraints. (See sections 3.2 and 3.3 for a further discussion on this).

A hierarchical constraint-ranking schema of a given language is deductible from observing, not instances of constraint satisfaction in grammatical inputs, but those of constraint violation. When we are able to recognise the constraint that a given output form violates by observing its given input form, we are able to assume that it does so in order that it satisfies a higher ranked constraint, which we can on the basis of the given input-output forms, recognise.

3.2. Input-Output Relationship in Grammar

Within the theoretical framework of OT, there are basically three components that explain the relationship between input and output in grammar; **GEN** (for Generator) which generates a list of all possible candidates (suboptimals) based on a given input form, **CON** (for Constraints) which provides the criteria (violable constraints/hierarchical constraint ranking schema) used to decide between candidates and **EVAL** (for Evaluator) which is the selectional mechanism used by languages to arrive at an optimal output form from the candidate set generated by GEN.

All languages as part of Universal Grammar (UG) provide well-structured forms of the language's representation for inputs. This part of the language's vocabulary is a collection of linguistically well-formed objects (Archangeli, 1997). This is so because of the fact that inputs do not at all comprise of non-linguistic objects. As such, the main constituents of the input are the GEN and EVAL.

The GEN is the creative component/aspect of linguistic inputs because of its flexible nature to be able to delete, add and rearrange things without restrictions. It is the functional aspect of

language that generates an infinite set of possible candidates for every word formation in a language. It is the role of the GEN to supply the candidates for analysis.

Apart from generating this set of candidates at any given phonological and/or morphological boundary, GEN also has the function of indicating correspondences between the inputs and outputs in grammar. This is so because as a fixed part of UG, GEN contains information about the representational primitives and their irrevocable relations.

On the other hand EVAL is the mechanism with which a language selects the optimal candidate from the candidate sets created by the GEN. For the purposes of this research, the Evaluator is the one responsible for the selection of the hiatus resolution mechanism to be employed at different phonological and morphological boundaries. EVAL largely assesses these possibilities through a universal determination that is dictated by the languages' restrictions in generative linguistic situations i.e. the ranking of constraints set by each language.

In determining these, the evaluator takes stock of the constraints that a language 'can violate' and thus, is responsible for the 'preservation' and ranking of constraints that the language holds dear. In this regard, the input-output relationship thus makes use of the GEN and EVAL as its selectional mechanism.

OT also assumes, as earlier on mentioned, that these three components are universal to all languages indiscriminately and that differences in grammars reflect differences in the hierarchical rankings of the universal constraint set, CON, by the different languages in question.

The operations within grammar of these three components can be represented schematically as in ***Fig. 1*** overleaf, which illustrates the final output selection process at a hiatal configuration occurring functional word – lexical word boundary (Preposition + Noun) in the Shona language. (The example, used here for illustration, is drawn from example **12** from the previous chapter and is used here to illustrate how the resolution of vocalic hiatus by coalescence is explained through the theoretical underpinnings of OT.)

It is important to mention at this point that while GEN creates a potentially infinite set of suboptimal candidates, only the most relevant candidates are presented here for the sake of convenience. The candidates considered more 'wilder' are `eliminated by the lower ranked constraints and therefore do not appear on the tableau. We thus cannot possibly represent all the possible outcomes from this hiatal configuration because, as earlier on mentioned, they are infinite. Let us now consider the evidence from *Fig 1*.

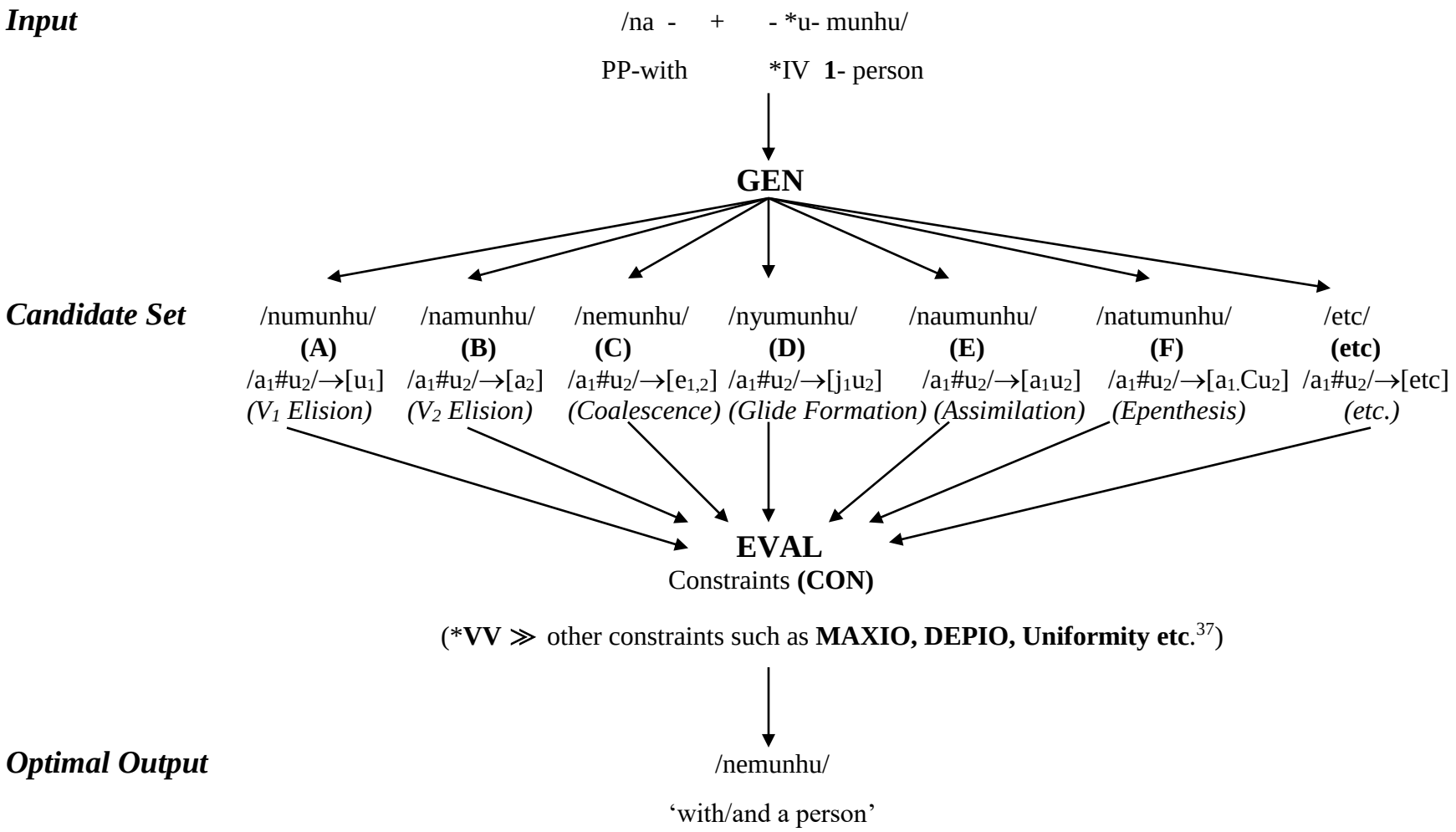


Fig. 1: A schematic of OT.

[37] *VV, MAXIO, DEPIO and Uniformity are the constraints that militate against the occurrence of vowel sequences, impress the need for the identity between input and output, argue that segments in the output should have corresponding values in the input respectively and discussed in detail in 3.3 and Chapter 4.

Based on the evidence represented in the diagram, we are thus able to argue that elision, coalescence, glide formation/ dissimilation and any other form of hiatus resolution processes used to eliminate hiatal configurations in languages, discussed in the previous chapter, thus arise out of the ultimate need to honour higher ranked constraints in a language, in other words, the high ranking of vowel hiatus (*VV)[38] as a constraint, over and above other constraints that the other losing suboptimal candidates represent. Based on this, it becomes possible to assume that grammars are essentially language specific hierarchies of constraints (Kager, 1999). This thus underlies the key assumption of OT that constraints are violated in any given output form because they are dominated by some constraint(s).

To sum it up, EVAL has a regulatory role in language creation while GEN has the creative role. For the given input, */na-+-[*u]munhu/*, GEN creates a candidate set of potential outputs (*A,B,C,D,E,F*…), EVAL selects, from the candidate set, the best/optimal candidate and in doing this, EVAL makes uses of the language's hierarchy of ranking of constraints from the universal set, CON. To this end, differences between constraint rankings by different languages result in different patterns, thus giving rise to systematic variations between languages.

3.3. Constraint Interaction and Ranking

Defined, a constraint is a structural requirement that may either be satisfied or violated by an output form. It is a rule that an output form within any grammar has to satisfy. A form satisfies a constraint if it fully meets the structural requirements of the constraint while any form not meeting this requirement violates it (Kager, 1999, Zuraw 2000). Crystal (1981) on the other hand

[38] *VV is a constraint that prohibits the phonological occurrence of adjacent vowels.

defines a constraint as a term used, especially in generative grammar, to refer to a condition that restricts the application of a rule to ensure well formedness in the output structures. This kind of definition however can prove to be really problematic as it does not define the term within the limits or framework of OT.

While the application of constraints as defined within the theoretic framework of OT cuts across virtually all sub-disciplines of linguistics, that is phonology, morphology, semantics and syntax, there are basically two broad categorizations of constraints within the theoretical framework of OT and these are ***Faithfulness*** and ***Markedness***[39].

Faithfulness constraints are those that favour the identity of the input and the output, i.e. that the input and the output are and must be identical. These are constraints that chiefly militate against any processes that result in differences between the input and output such as elision and epenthesis. Kager postulates that from a functional view, these are constraints that protect the lexical items of a language from the 'eroding power' of markedness constraints and thereby limit the distance between the input and the outputs and in the process restrict the variability of the shape of lexical items. They are thus constraints that attempt to enforce similarities between the input and the output, for example, requiring that all input consonants appear in the output, or that all morphosyntactic features in the input are overtly realized in the output (Archangeli, 1997, Zuraw, 2000, Kager, 1999). These are thus constraints that basically militate against almost all the hiatus resolution mechanisms discussed in the previous chapter.

[39] Kager (1999) differentiates markedness and faithfulness constraints by arguing that the latter are not pure output constraints since they take into account both the input and the output while the former simply considers or takes into account only the input.

Examples of such constraints are Dependency Input-Output (DEP-IO), a constraint that requires that all segments in the input should have representative equivalents in the output forms. The constraint is a DON'T INSERT constraint and thus militates against epenthesis. For example, in Fig. 1, candidate *(f)* violates this constraint because it inserts the consonant */-t-/* to break up a vowel cluster. Another such constraint is Maximum Input-Output (MAX-IO), a constraint that militates against the deletion of input segments in the surface form. It is in other words a DON'T DELETE constraint. Candidates *(a)* and *(b)* on the chart violate this constraint through V_1 and V_2 elision respectively.

As part of Universal Grammar, all languages of the world share a lot of common properties. However, there are some grammatical properties that are peculiar to specific languages and do not overlap over the cross-linguistic divide. These, because they are restricted to a particular language in comparison to other languages, are said to be ***marked*** properties of the particular language. ***Markedness***, in its general sense, in this regard thus refers to an analytical principle referent to contexts in which pairs of linguistic features seem to be in opposition and are given different values of positive *(marked)* and negative *(unmarked)*. In the most basic terms, the distinction between *Marked* and *Unmarked* thus refers to the presence versus the absence of a particular linguistic feature within the grammar of a given language.

Markedness constraints are thus those that require that the input forms of any language's grammar meet some structural well formedness conditions (Kager, 1999, Crystal, 1980). Such requirements, as a matter of necessity often take the form of prohibitions of certain kinds of phonological structures that include among others, the prohibition of particular types of segments

and syllable structures. For example a *marked* phonological quality would be that of syllable structures in the Shona language which *must* contain vowels as well as should never end in a consonant. Syllables within the language also do not allow certain given consonant clusters.

Markedness constraints thus, are those that attempt to enforce well-formedness of the output itself, prohibiting structures that are difficult to pronounce, produce and comprehend, such as complex consonant structures as well complex vowel strings. *Markedness* and *Faithfulness* constraints are always in conflict, such that the ranking of constraints – which differ from language to language – determines the outcome. For example, while languages such as Chicano Spanish, Shona and Luganda might eliminate vowel clusters by elision, coalescence, epenthesis, glide formation and dissimilation despite the resulting violation of *Faithfulness* constraints, other languages might choose to retain all the input vowels and not 'repair' the hiatal configurations, thus in the process violating *Markedness* constraints.

3.4. Outputs as Results of a Hierarchical Constraint Ranking System

An output form only becomes optimal if it incurs the least constraint violations. Analysis of the suboptimal candidates would reveal that constraints are always inextricably and intrinsically in conflict. In fact, one of the essential proposals of OT is that every logically possible output form in any languages' grammar will systematically inevitably and necessarily violate at least some constraint. What determines the best output form out of all the other suboptimal candidates is the least costly violation of the universal constraints. Grammars to this end are said to be able to regulate these conflicts between these universal constraints, in order to select the 'most harmonic' or 'optimal' output form (Kager 1999).

Languages thus in this regard are systems of conflicting forces. These forces are embodied by constraints, each of which makes a requirement about some aspects of grammatical output forms. Constraints are typically conflicting, in the sense that satisfying one constraint implies the violation of another. Given the fact that no form can satisfy all constraints simultaneously, there must [therefore] be some mechanism selecting forms that incur less constraint violations from the others that incur more serious ones.

Regards this, the implications are that the selectional mechanisms of the most appropriate (optimal) candidate (the one eventually adopted) from among the host of the other suboptimal candidates would entail a hierarchical ranking of universal constraints, such that higher ranked constraints have priority over lower ranked ones.

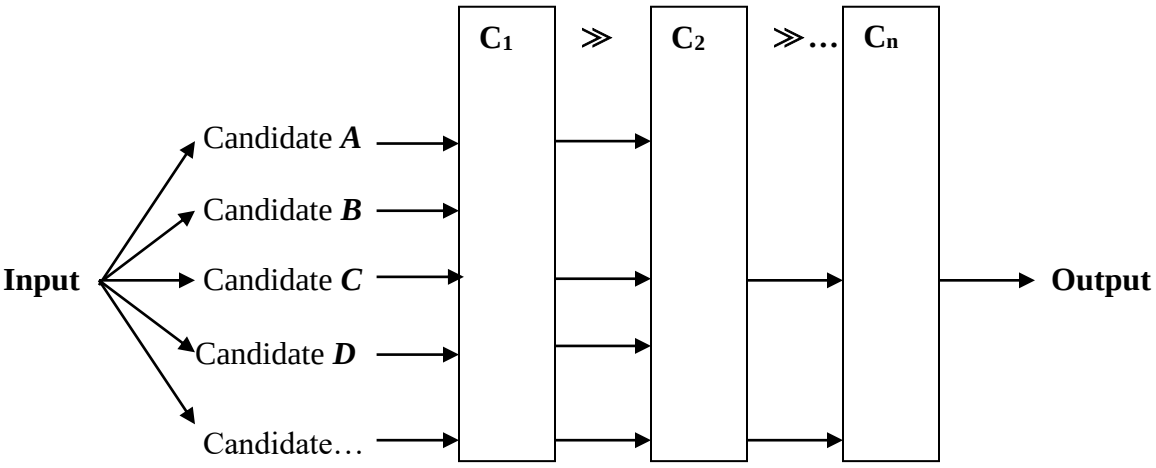
The hierarchical ranking of constraints in a given language is deductible from the observation of violation of constraints. All constraints are said to be strictly ranked and violable. Because they are ranked, constraints are generally violated in the grammatical forms of language. Violability[40] has significant consequences not only for the classification of the mechanisms of description of linguistic processes, but also for the construction of a theoretical explication of these processes. This means that a candidate violating a higher ranked constraint cannot redeem itself from elimination by satisfying a lower ranked constraint(s).

[40] Violability means that the optimal candidate need not satisfy all constraints.

It is important to also note that constraints are not numerically weighted, and thus lower ranked constraints 'cannot gang up on a higher ranked constraint' (Zuraw, 200). In this regard, a candidate ***x*** that satisfies a constraint $\boldsymbol{C_n}$, the highest ranked constraint and violates all the other constraints relevant to the applicable boundary of analysis takes precedence over candidate ***y*** even if candidate ***y*** satisfies all the other constraints that ***x*** violates but goes on to violate the single most important one that ***x*** satisfies.

Another way of describing this is from observing that, for example, in ***Fig 1***, the represented role of the EVAL is that of choosing, from the subset of candidates generated by the GEN, the candidate that best satisfies the top-ranked constraint. In doing this, EVAL, in the selection of the optimal candidate, considers that the candidate ***x*** is optimal if and only if, for any constraint that prefers another candidate ***y*** to ***x***, there is a higher ranked constraint that prefers ***x*** to ***y***.

In other words, the hierarchical ranking of constraints takes strict cognisance of the 'value' of given constraints over others and thus eliminates those candidates that, despite satisfying 'all' the other constraints, violates a higher ranked one. This means that even if we have a candidate ***a*** that satisfies all other constraints but violates a single constraint that is ranked highly by the language, it can be usurped by a candidate ***b*** as the optimal candidate even if ***b*** violates more constraints than ***a*** as long as it satisfies the single most valuable constraint in the language. Such a hierarchical ranking system can be schematically represented as in ***Fig 2*** below;



(Adapted from Kager, 1999)

Fig 2: The hierarchical constraint ranking based input-output schema

The schema represents a hierarchical based 'possible output(s) elimination' process by which selection of the optimal candidate is done through the hierarchical ranking of constraints ***C_1, C_2, C_n…*** each of which has the potential to eliminate some suboptimal candidates until a point is reached where we only have one candidate having survived the elimination.

This kind of ranking system, within the theoretical explications of OT is explained through what Kager (1999) refers to as the '*constraint demotion algorithm*', which is also part of the Tesar and Smolensky (1993) developed *Learning Algorithm*. We have noted earlier on in this section that the hierarchy of constraint ranking is deducible from observing, not instances of constraint satisfaction but those of violation. The basic idea behind such a conviction is the idea that we assume that because we are able to realize a constraint that has been violated on the basis of given input and output forms, we are able to assume that the constraint(s) violated was violated because there must be some other dominating constraint that dominates it.

Within the algorithm, we are able to recognise such dominating constraints by comparing the eventual surface form with all the other suboptimals by pairing each of the suboptimal candidates with the optimal one. For each instance of pairing of the optimal candidate and any one suboptimal, we note the constraint(s) violated by each of the two that is not violated by the other and vice versa. We then, from evidence observed from this cross linguistic comparison, work out the constraint hierarchy which pairs the attested form as the optimal form to a given input. The central assumption of this principle is that we start at a point where we simply have a set of constraints that are not ranked against each other or with respect to each other. All the universal constraints in the universal set are therefore at this point undominated as represented by the set below.

35. ***Initial state of constraint set and of the constraint hierarchy***

{C_1, C_2, C_3 , C_4, C_n …}

From this initial level, the algorithm begins to reorganize the constraints in terms of how they are ranked in a language's grammar thus gradually developing a hierarchy of constraint ranking. This process, as Kager (1999) explains, is only allowed if there is evidence that points to the violation of a constraint in the optimal form from which we can deduce why it violated that particular constraint. The process, as explained earlier above, thus is done through the demotion and not promotion of a constraint below another constraint. Demotions are however minimal in the sense that a constraint is demoted immediately below the highest-ranking constraint that induces its violation in the output form. Such a demotion process is schematized below.

36. ***Initial state of constraint set and of the constraint hierarchy***

{C_1, C_2, C_3 , C_4, C_n …} *(Universal constraints - unranked at this stage)*

The demotion algorithm reranking process[41]

Demote C_2 below C_4	***Demote C_3 below C_4***	***Demote C_1 below C_3***
{C_1…C_3, C_4…C_n}	{C_1…C_3, C_4…C_n}	{C_1…C_3, C_4…C_n}
≫	≫	≫
{C_2}	{C_2 , C_3}	{C_2 , C_3}
		≫
		{C_1}

Consider the following example, extracted from example **11** from the previous chapter taken from Zulu at a functional word-lexical word boundary which has an input */la-i-nkomo/*. Consider the few of the infinite possible output forms discussed in **37** below;

37. ***Input*** **-** */la- i- nkomo/*

with - **9**SM- cattle

(a) *l**e**nkomo* /a_1#i_2/→ [e_3] ‘Coalescence’

(b) **l**a**nkomo* /a_1#i_2/→[a_1] ‘V_1 Elision’

(c) **lainkomo* /a_1#i_2/→[a_1i_2] ‘Faith/Assimilation’

(d) **latinkomo*[42] /a_1#i_2/→[a_1.Ci_2] ‘Epenthesis’

} Candidates

[41] The reranking structure is adapted from the schema suggested by Kager (1999).

In the example we note that candidate *(a)* is the optimal candidate in the language. This is explained within the constraint ranking framework as follows; the languages hierarchy of constraint ranking ranks *VV highly. Candidate *(c)*, the most faithful preserves a vowel cluster thus in the process violating the *Markedness* constraint *VV, candidate *(b)* has deleted a segment and candidate *(d)* has inserted a segment and thus they violate the *Faithfulness* constraints DON'T DELETE and DON'T INSERT (MAX and DEP) respectively. In terms of the description of the hierarchy of constraints we thus can represent this as **VV ≫ DON'T DELETE ≫ DON'T INSERT***.** The highest ranked constraint here is the *VV. EVAL in this regard, from the list of candidates first eliminates candidate (c) because it violates *VV. The second elimination would look at candidate (d) which while honouring *VV violates DEPIO by inserting a segment. Finally EVAL eliminates candidate (b), which deletes a segment from the lexical/root word, and which despite respecting the constraint *VV, violates MAXIO and the remaining candidate (a) becomes optimal. In the same vein lets consider example **38** below which represents the output selection in a hypothetical mini language for the input */elt/***.**

38. ***Input*** /elt/

(a) [*elit*]
(b) [*elt*]
(c) [*el*]
(d) [*elti*]

} Candidate Set

[42] The epenthetic /-*t*-/ used here as way of vowel sequence resolution exemplification is only hypothetical and does not occur within the Ndebele language.

Note that each of the four output candidates is flawed in its own unique way. Candidate *(b)*, the most faithful of the candidates, has a consonant cluster thus violates the markedness constraint *CC, candidates *(c)* and *(a)* have deleted and added a segment respectively. The candidates thus violate the Faithfulness constraints DON'T DELETE and DON'T INSERT respectively. Candidate *(d)* on the other hand has added a segment without breaking the consonant cluster and thus violates both DON'T INSERT and *CC.

Within the framework of OT, the standard expositional device for representing hierarchical constraint interaction and ranking systems is the tableau. ***Fig. 3*** represents such a device for the representation of example **38**.

Input: */elt/*	***CC**	**DON'T DELETE**	**DON'T INSERT**
(a) ☞ [elit]			*
(b) [el]		*!	
(c) [elt]	*!		
(d) [elti]	*!		*

Tableau 1

In the construction of the tableaux, constraints are arranged across the top of the tableau in dominating order. Constraint violations are marked with the asterisk mark *****, and blankness in a cell indicates total success of the candidate on the given constraint. The symbol ☞ points to the optimal candidate in which the fewest lowest violations occur, while the exclamation mark (**!**)

indicates the crucial failure of each suboptimal candidate (the constraint whose violation is fatal to the candidate), in other words, the exact point where it loses to the other candidates due to a 'fatal violation' of higher ranked constraints. Cells that do not participate in the selection/decision are shaded.

Shaded areas may also be used to indicate constraints that are irrelevant in the decision due to the violation of a higher constraint. Where a tableau contains two constraints that are not being ranked against each other in the decision over a candidate set or the ranking between them is not (or not yet) crucial, dotted lines are used to separate them. Ranking of constraints in a hierarchical order is also indicated by the left to right ordering of the constraints' columns across the top on the tableaus. The highest ranked constraint appears on the leftmost side of the constraint columns and the lowest ranked is at the rightmost side. In light of the foregoing, we could thus present a tableau that also explains/represents the selection mechanism of the optimal candidate in the given example **37** as follows;

Input:***/la-i-nkomo/***	***VV**	**MAX-IO**	**DEP-IO**	**UNIFORMITY**
(a) ☞ [lenkomo]				*
(b) [lankomo]		*!		*
(c) [lainkomo]	*!			
(d) [latinkomo]			*!	*

Tableau 2

The constraints discussed in the tableau above can be further explained as such**,**

39. MAX-IO: All segments in the input should have corresponding segments in the output.

DEP-IO: All segments in the output should have corresponding segments in the input.

Uniformity: The input and output should be identical. Two segments that are distinct in the input should not be merged into a single segment in the output.

In OT constraint ranking terms/frameworks, based on the evidence in **37** and **38**, we can argue that the particular manner in which hiatal configurations are resolved in a variety of contexts largely depends on the relative ranking of a series of constraints that favour or disfavour particular outcomes (that become ungrammatical not because they are ungrammatical in the absolute sense, but that they are not optimal.). The main explanatory burden of grammatical complexity resolution processes thus falls on the constraints themselves and the apparatus that govern their interaction.

3.5. Further examples and more constraints

>From the basic explanation and illustration that we carried out above, this section gives further expositions of the other constraints relevant in both the explanation of constraint interaction and ranking vocalic hiatus induced repair strategies as well as giving an insight into some of the constraints central to the presentation of research data in the next chapter. This section thus draws more examples from those given in Chapter 2 as evidence of the existence of the hierarchical constraint ranking system as well as giving a brief preview of the general constraints

relevant to the explanation of the resolution strategies discussed in the previous chapter. The section is not conclusive in doing this but only gives a synopsis of some of the major constraints generally associated with the resolution of hiatal configurations. Others will be highlighted and discussed as they occur in other contexts discussed in depth in the next chapter.

3.5.1. Further examples and constraints

In doing this, we shall try to extract examples from the literature review that represent different resolution mechanisms and thus explain the constraint(s) that each of them violate. In the process we will thus be able to bring to the fore new constraints that have not been discussed earlier in the chapter to prepare ourselves for more constraints in the next chapter.

3.5.1.1.1. Elision

Referring back to example **25** from Chapter 2, we try to explain more constraints involved in the resolution of hiatal configurations. In the example, the input */**la i**glisia/* which occur at a functional word-lexical word boundary (determiner-noun boundary) in Chicano Spanish, transforms into the surface output [liɣlesja] as represented by the following schematic representation:

40. *l**a i**glisia* [liɣlesja] /a_1#i_2/→[i_2] 'the church'

The resolution therefore is the elimination of the vowel sequence through elision of the V_1 in the vowel sequence. The language had the possibility of eliding the second vowel in the sequence

but elected the first as indicated in **40** above. In the process it violates the constraints MAX, (MAXIO) in order to preserve the demands of the higher ranked constraint MAXLEX. This constraint privileges lexical as opposed to functional words/morphemes.

41. MAXLEX: Every input segment in the lexical word or morpheme must have a corresponding segment in the output.

This transformational process can be represented in a tableau as follows.

Input:***/la-iglisia/***	***VV**	**MAXLEX**	**MAXIO**
(a) ☞ /l<a>igilia/ c<v_1>V_2C [liɣlesja]			*
(b) /la<i>gilia/ cv_1<V_2>C ***[laɣlesja]		*!	*

Tableau 3

We note that, despite the fact that both the examples satisfy the constraint *VV and thus successfully eliminate the vowel sequence which is disprefered by the language, (a) which deletes V_1 becomes optimal because the language has a constraint (MAXLEX) which has a

preference for deletion that does not delete segments of the lexical word, something which (b) does and thus causes a fatal violation which eliminates it.

3.5.1.1.2. Glide Formation

Regards the occurrence of glide formation/insertion as a resolution mechanism, we refer back to example **16(a)** from Luganda, in which in the vowel sequence, the high vowel occurring as V_1 surfaces as a glide for the V_2. This is also characterized by the lengthening of the second vowel in the sequence. While eliminating the hiatal configuration as is evidenced in **42** below, in doing so, the language violates the constraints *CG and NLV (Avoid Glide and No Long Vowel) respectively.

42. /*m**u***+***o***yo/ [m^{w}**o**:yo] /u_1#o_2/→[$^{w}{}_1$o:$_2$] ‘heart’

The occurrence of surface forms with glides and long vowels follows from the surface violations of *CG and NLV, violations which are compelled by the need to satisfy higher ranked constraints, which in this regard is *VV as represented in *Tableau 4* below.

Input:/mu+oyo/	***VV**	**DEP-IO**	**NLV**	***CG**
(a) ☞[m<^{w}>oyo] /u_1#o_2/→[$^{w}{}_1$o:$_2$] /m^{w}o:yo/			*	*!
(b) [m<^{w}>oyo] /u_1#o_2/→[$^{w}{}_1o_2$] /m^{w}oyo/		*!		*!

Tableau 4

43. *CG: Avoid complex [Cw] and [Cy] onsets.

NLV: Avoid long vowels.

Despite inserting a glide in the same manner as (a) does (b) is eliminated because it does not undergo compensatory vowel lengthening like (a) does. The language would have (a) as the surface form because in having a surface long vowel, it maintains the V-Slots (Vowel Slots), something which (b) does not do which is a condition/characteristic that the language prefers. This discussion, largely made in Chapter 2 would propose that despite the dispreference of vowel sequences, the high vowel undergoes gliding (Glide Formation) and thus reassociates itself with the onset. The reason why we have the process yielding a long surface vowel is due to the second vowel in the hiatal configuration reassociating to the V-slot of the high vowel that has assumed consonancy.

3.5.2. General constraints related to vocalic hiatus and hiatus resolution

Within the framework of Optimality Theory, the particular resolution strategy adopted in a given language will depend on, as earlier on implicitly mentioned, not only the nature of the morphological boundary at which the configuration occurs, but also the relative ranking of a series of constraints which favour or disfavour particular strategies (Casali, 1996, Sabao, 2005). In the examples in the discussions that follow, we will attempt to describe the constraints which, in their analysis as well as the larger analytical concerns of this study, are primarily relevant to the major questions and concerns of the current study. The analysis largely follows guidelines made previously in Casali (1996), Rosenthall (1994), and McCarthy and Smolensky (1999).

As a first approximation, as adapted from Casali (1997), we may identify each of the possible hiatus resolution mechanisms and their subsequent output forms with the particular constraint violation(s) they entail as follows[43];

44. ***Hiatus Resolution Strategy*** ***Constraint(s) Violated***

Heterosyllabification	ONSET
Epenthesis	DEP(IO), IDENT(IO)
Diphthong Formation	NODIPH
Vowel Elision	MAX,MAXIO,MAXLEX,MAXROOT,NLV
Glide Formation	*CG,NLV

[43] The summation of the constraint violation was originally adapted form Casali (1996) and was modified to suit the current study.

In light of these approximations, and the discussion of examples above we can argue that the basic idea here is to try and explicate how the resolution of hiatal configurations that take place in the examples are more explicitly explained through the explications of the theoretical underpinnings of OT, in particular, though the interaction and ranking of constraints.

3.6 Conclusions

The chapter sought to give an exposition that the resolution of hiatal configurations in languages is due to the interaction and ranking of constraints. It discussed the principles of constraint interaction and argued that constraints are always in conflict and that the reason why a language has variations in terms of the resolution mechanism it adopts at a given phonological/morphophonological boundary is because of differences in the ranking of constraints dictated by the language at such configurations that such boundaries represent. In light of the discussion in this chapter, the following are very important issues to note.

Within the theoretical framework of OT, the ranking and re-ranking of constraints assesses the faithfulness of the output to the input. The relationship between the input and the output in any given morphophonological environment should be measured in terms of correspondence. Rosenthall (1998) defines this phenomenon as a relationship between the elements and/or features of a string (S_1) and of another string (S_2).

The correspondence argument accounts generally for the faithfulness of segment relations between inputs and outputs, i.e. that every segment in the input must have a correspondent in the surface form (output) and vice versa.

This however, the chapter has discussed is not always true as the conflicts between constraints often militates against the similarity of inputs and outputs, a phenomenon which arises from the need to rank other constraints above the maximum representational constraints. The chapter also endeavored to lay a ground for the analysis of data to follow in the next chapter but discussing general constraints associated to the resolution of hiatal configurations.

Chapter 4

Data Presentation and Analysis

4.0. Introduction

This chapter sets to present the research findings and their analysis as set out to be studied in the previous chapters. In this regard, the thrust of the chapter is to identify hiatal configurations in the study languages as well and discuss how these are also resolved within the theoretical framework of OT as established in the previous chapter (Chapter 3). The researcher thus sets to identify morphophonological boundaries at which such vowel sequence configuration occur morphologically and/or phonetically and making a cross linguistic comparison of the resolution mechanisms adopted at similar/almost similar boundaries within the four languages.

The chapter seeks to argue through the presentation of data indicating hiatus resolution strategies in the study languages that the resolution of hiatal configurations within the languages can be best explained through the explications of Optimality Theory. It seeks to present evidence that the resolution strategies adopted by the language to resolve vowel sequences that could arise either through phonological as well as morphophonological concatenations are subject to a constraint ranking system – a system discussed in detail in the previous chapter. To this end, the chapter thus seeks to present evidence that the constraints discussed to be operational in the languages are functionally related in their primacy to eliminate vowel sequences.

The chapter is thus divided into five sections. The first section presents a discussion on vowel sequence resolution in Chichewa. The second section discusses Ndebele resolution mechanisms. The third section is a discussion on Chitumbuka. The fourth section is a synoptic comparative commentary on the resolution mechanisms within the four languages. It is this section that discusses any observed similarities in hiatal configuration patterns as well as of resolution mechanism selection. It is thus this section that largely forms the core of the research objectives as enunciated in Chapter 1 – the cross linguistic comparison of vowel hiatus resolution in Bantu languages. The fifth section is the conclusion of the chapter.

Important to note at this point here is that, despite numerous scholarly research and arguments to the contrary, the analysis of hiatus vocalic repair in this research is primarily ONSET driven and as such the constraints used in the analysis of data in this chapter are generally syllable structure constraints. The study analyses vocalic hiatus resolution from a syllable structure analysis as well as featural and segmental preservation points of views.

4.1. Identification and resolution of vowel sequences in Chichewa

This section identifies morphological as well as phonological boundaries at which vowel sequences occur within Chichewa. It also discusses the resolution of such hiatal configurations through different phonological processes discussed in Chapter 2. It also attempts to discuss how these can be argued to be resolved through the ranking of constraints within the explications of OT.

4.1.0. Chichewa vowel and syllable structure(s)

Chichewa, like many Bantu languages, is a five vowel phoneme system language. This thus means that there are basically no underlying long vowels in the language and where they do occur, they are only manifest as result from phonological processes such as coalescence and elision. The language thus, can also be argued to have a systematic dispreference for vowel sequences. Despite their occurrence in Underlying Representations (UR), they are in most instances eliminated and thus do not surface in the Phonetic Representations (PR) or the surface forms.

This thus translates to the language employing phonological and/or phonetic rules that prevent vowel sequences resulting from either morphological processes, word derivation processes or regular flow of natural speech in URs from appearing in the PRs (Mtenje, 1980). Important however to note is that these rules apply uniquely, unless otherwise stated, across morpheme boundaries. Since all these constraint governed 'rules' are primarily motivated by the need to eliminate vowel sequences they are thus regarded as functionally related.

There are also basically no true diphthongs in Chichewa. The absence of diphthongs in a language is due to the constraint **NODIPH** ranked as an undominated constraint. The presence however of long vowels in a language follows from surface violations of the constraint NLV (No Long Vowel) compelled by the satisfaction of higher constraint, which in this case is *VV (no vowel sequences).

The vowels of Chichewa can be represented diagrammatically as in Fig. 2 below[44]. The diagram illustrates a comparison between the places articulation of Chichewa vowels compared to cardinal vowels which in the diagram are marked 1 to 8 as reflected on the IPA chart.

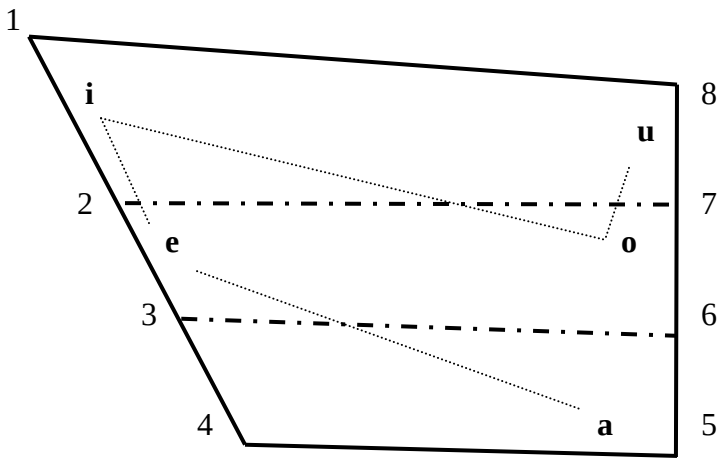


Fig. 2: Chichewa Vowel Chart

Both the two front vowels, the high /i/ and the mid /e/ in Chichewa seem to closely match their equivalent cardinal vowels 1 and 2 in the same manner that two back vowels, the high /u/ and the mid /o/ also match the cardinal vowels 7 and 8. The low vowel /a/ in Chichewa is a back vowel.

The distinctive features of these vowels as represented on the above chart are as follows (**NB**: The features diagram also supplies redundant values);

[44] Note that the symbols /a/, /e/ and /o/ on the vowel chart are representative of the vowels /ɑ/, /ɛ/, /ɔ̀/ respectively, represented as they are on the vowel chart(s) for typographic convenience.

	i	**e**	**a**	**o**	**u**
BACK	-	-	+	+	+
HIGH	+	-	-	-	+
LOW	-	-	+	-	-
ROUND	-	-	-	+	+

Like many other Bantu languages, the syllables of Chichewa are basically of the canonical CV form. Of course other structures such as the V(CV**)** do occur but often than not, they do so word initially. The unmarked syllable structure/type in Chichewa thus, is the CV and all syllables in the language are open. Word initial vowels are the only instance in which single vowels can occur as autonomous syllables. The typical syllable structures of the language are as in such forms as those in **45 (a)** and **(b)** below:

45. (i) ***V (CV) structure***

a) a.na ‘children’

b) o.na ‘see’

c) i.ka ‘put’

d) u.ka ‘rise’

e) u.za ‘tell’

(ii) ***CV structure***

a) ba.ba ‘father’

b) pi.ta ‘go’

c) dzu.ka ‘wake up’

d) bwe.ra ‘come’

e) chi.tu.pa ‘passport’

The structure of the language’s syllables show constraints that disallow vowel sequences. Accordingly, a number of different but functionally related constraints are [identifiable] as operating on vowel sequences, producing as their outputs, structures that no longer contain them (Mtenje 1980, Casali 1996). This is to say that the constraints and/or rules involving the phonological occurrence of vowel in the language militate against the realisation of hiatal configurations in the surface forms of the language’s grammar.

In this regard, resolutions of these configurations through deletion, glide insertions and coalescence are thus employed ‘to destroy VV sequences when they appear in the phonetic representations (surface forms).’ (Mtenje, 1980)

The resolution of hiatal configurations in the language is thus chiefly necessitated by the need to preserve the canonical syllable structure, a phenomenon that Kissberth (1970) and Mtenje (1980) attribute to ‘Phonological Conspiracy’[45]. In line with this, any vowel that finds itself juxtaposed next to another vowel by either morphological and/or morphophonological processes of word derivation or by regular flow of speech produces in the language a disallowed vowel sequence (Mtenje, 1980).

[45] ‘Phonological Conspiracy’ was originally identified by Kisseberth (1970) as a set of rules that serve the same purpose: to rid the surface forms of the language of certain undesirable (marked) configurations

4.1.1. Glide formation/Insertion in Chichewa

A major hiatus resolution strategy in Chichewa is glide formation and/or glide insertion (Glide Epenthesis, according to Mtenje, 1980). This phonological process occurs across many morphophonological boundaries within the language. Causes for glide formation are diverse, ranging from linguistic (morphophonological) to extralinguistic concatenations. Mtenje (1986) and Mkochi (2007) argue that there is a rule called Glide Formation or Vowel Disyllabification.

In this instance, a high vowel is changed into a glide when it is followed by another vowel (which in most instances is a non-high vowel). This is in line with the [u→w/vowel] rule established as also occurring in Shona (cf. example **18** in section **2.2.2**). The second vowel in turn gets compensatorily lengthened. Examine the following data:

46. (a) m***u***- ***a***- bwel- a [mwa:bwela] /u_1#a_2/→[w_1a_2] 'You have come'
2s- RP-come-FV

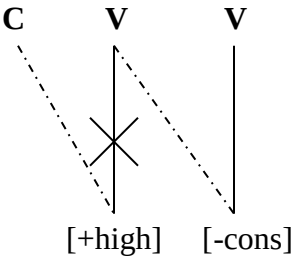
(b) k***u***- ***i***p- a [kwi:pa] /u_1#i_2/→[w_1i_2] 'to be bad'
inf-bad-FV

(c) k***u***- ***e***nd- a kwe:nda] /u_1#i_2/→[w_1e_2] 'to walk'
inf-walk-FV

The glide formation exemplified in **46** above and their resultant long vowels are created by the process schematized in **47** below in which the high vowel [u] assumes consonant like features (labio-velar to be precise) in the face of another vowel. The high vowels thus undergo glide

formation, through which process the high vowels get 'semi' (re-)associated to the onset.

47.



Glide formation in Chichewa

This kind of glide creation also referred to as morphophonemic change; (c.f. Fortune, 1985 and Sabao, 2005) thus can also be argued to result from a need to preserve the feature [+round] of the V_1 (the input [u]). This is so because the glide [w] formed agrees in rounding with its input segment. This resultant lengthening of the surface vowel (which is actually V_2 in the configuration), results from attempts to maintain V-slots. This translates to a violation of the constraint No Long Vowel (NLV) ordered by the higher ranking of FAITH-V (Faithfulness to vowel segments).

48. FAITH-V: All vowels positions in the input should be preserved in the output.

Input: /k**u-e**nd-a/	**FAITH-V**	**NLV**
(a) ☞/kwe:.nda/		*
(b) /kwe.nda/	*!	

Tableau 5

In the process, such a violation of NLV results in the satisfaction of MAX-IO by preserving all the segment slots of the input in the output. Glide formation by nature also invariably violates the constraint *CG. This is also the case with this data. Glide formation of this nature in Chichewa thus results from the desire to eliminate onsetless syllables. The resolution of hiatal configurations through glide formation thus results from a higher ranking of ONSET over *CG, a ranking that disprefers the surfacing of heterosyllabic vowels. Such a raking is as follows:

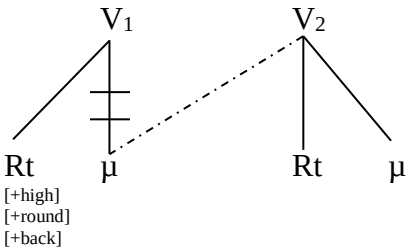
49. ONSET: *[$_{\alpha}$V: Syllables must have onsets

Input: /k**u-i**mb-a/	**ONSET**	*CG	**IDENT-IO**
(a) ☞/kwi.mba/		*	*
(b) /ku.i.mba/	*!		

Tableau 6

Glide formation in Chichewa occurs thus when the V_1 has the features [+high] and/or [+round] and or [+back]. The first vowel in the sequence with the mentioned features thus surfaces as a glide in a bid to preserve the original vowel features as well as maximize segmental identity between the input and the output. This happens through the process schematized below in **50** in which the V_1 (which has the features [+high] and/or [+round] and or [+back]) undergoes delinking with its associated mora, by which process which is mora preserving, attaches to V_2. V_1 however maintains its attachment to the root node thus preserving articulatory features.

50.



Glide formation: /u/→/w/ in Chichewa.

We thus can argue that glide formation here is motivated the need to preserve articulatory as well as featural identity between the input and the output. This is in line with the observation that the glide formed is identical in features to the initial vowel as it retains its [+high], [+back] and [+round] features. Glide formation here is elected because it maximizes featural as well as articulatory identity. In the process it also successfully eliminates the disprefered hiatal configuration. Consider the following tableau.

Input:/k**u-e**.nda/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT[±low]**	**IDENT(μ)**	**UNIFORMITY**
(a) /ku.e.nda/	*!					
(b)☞/kwe:.nda/					*	**
(c) /ke:.nda/		*!	*(!)		*	**
(d) /ku:.nda/		*!	*(!)		*	**

Tableau 7

Here we note that glide formation is conditioned by a ranking that demands the preservation of all features of the vowels in the sequence. In light of this we observe that candidate (a) is in fatal violation of ONSET as it heterosyllabifies the vowels and thus is eliminated. Candidates (c) and

(d), which could be showing either coalescence (symmetric fusion) or elision, are in fatal violation of PARSE[+high] and PARSE[-high] respectively. This is so because (c) fails to preserves the [+high] feature of the [+high, -low] prefix vowel /u/ while (d) fails to preserve the feature [-high] of the [-high, -low] of the V_2 vowel /e/. Both also fail to preserve the features of backness of both of the initial vowels, i.e. (c) fails to preserve the [+back] feature of the initial vowel /u/ while (d) fails to preserve the [-back] feature of the input vowel /e/. Both these features are covered under the constraint PARSE[F']. This thus gives rise to the higher ranking of PARSE[F'] (PARSE[±back]) above IDENT[±high] and IDENT[±low] constraints.

Both however manage to preserve the [-low] feature, a feature shared by both of the initial vowels. Candidate (b) despite a violation of IDENT(μ), due to the changes in mora count, manages to maximize featural and articulatory identity and thus emerges as the optimal candidate. We can thus argue that IDENT must therefore be the lowest ranked of the constraints here.

We argue for the elimination of (c) and (d) on the basis of them having deleted a segment of the input in the output. The reason why l argue here for a ranking of PARSE[F'], MAX-IO» IDENT[±high],IDENT[±low] is because we notice that this kind of ranking takes a little twist when both the vowel share the same [+high, -low] features as is the case with the /u/ + /i/ in example **46 (b).** Consider the following tableau.

Input:/k**u**-**i**pa/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT[±low]**	**IDENT(μ)**	**UNIFORMITY**
(a) /ku.i.pa/	*!					
(b)☞/kwi:.pa/					*	**
(c) /ki:.nda/		*!			*	**
(d) /ku:.pa/		*!			*	**

Tableau 8

We argue that the resolution of the hiatal configuration here is not condition by height feature violations as both candidates (c) and (d) manage to preserve the [+high, -low] features of both the initial vowels. The difference in backness, i.e. that the V_1 has the feature [+back] while V_2 has the feature [-back] is also relevant here as in the other examples involving vowels dissimilar in height such a feature is material in determining the optimal output. We again note that coalescence and/or elision represented by candidates (c) and (d) are in fatal violation of the PARSE[±back] feature (again accommodated in PARSE[F']) as they violate the [+back] as well as [-back] features of the input vowels /u/ and /i/ respectively. Again here IDENT(μ) must be the least ranked of constraints as the optimal candidate violates it (together with *CG of course!).

The conclusion I would draw here is thus that glide formation in Chichewa is conditioned by the need to preserve segmental identity and thus deletion of segments and features is not allowed. Gliding/glide formation thus, is aimed at the preservation of the places as well as features of both vowels thus maximizing segmental, featural and articulatory identity.

I also observe here, in line with Casali's (1997) observation that vowel that glide in Chichewa must not just have the feature [+high] but also the feature [+round] and/or [+back]. In this regard, we note that unlike in other Bantu languages such as Chitumbuka, the vowel /i/ occurring in a V_1 position does not necessarily surface as a glide unless it is part of some underlying form (c.f. Mtenje, 1980). This could be due to the fact that, despite having the feature [+high], it does not have either of the features [+round] and [+back]. The vowel /i/ thus in most cases when it occurs as a prefix final vowel and V_1 in a sequence elides (c.f. example **59**).

Within OT, this kind of glide formation in Chichewa can also be explained and analysed in terms of the distribution of prevocalic vowels (c.f. Rosenthall, 1997). Because it is invariably in violation of *CG, glide formation in Chichewa in this regard can be argued as resulting from the interaction of constraints that dictate that all syllabic nuclei are monopthongal and thus prevocalic high vowels occurring in V_1 position in hiatal configurations (as is the case with the [u] in the examples in **46**) get parsed non-moraically as in **50** above.

Phonology is mainly concerned with the surface form. As such, while we accept that there is clear evidence that the glide is derived, it could not be realized at the surface level as a vocalic nucleus. The fact is that there is a glide formed to break the VV cluster. Sometimes a glide is inserted (epenthetic glide) as we see in the following examples in **51** in which a glide is inserted word medially/internally in order to avoid onsetless syllables i.e. to avoid heterosyllabification of adjacent vowels.

51. (a) ku- dand***au***l- a /ku.dá.nda.^{w}ú.la/ /a_1#u_2/→[$a_1^{w}u_2$] 'to complain'

inf-complain- FV

(b) za- m***a***- ***u***lendo /za.ma.^{w}u.le.ndo/ /a_1#u_2/→[$a_1^{w}u_2$]‘about journeys’

about- PL- journey

(c) wa- kh***au***r- a /wa.kha.^{w}u.ra/ /a_1#u_2/→ [$a_1^{w}u_2$] ‘you have suffered’

you- suffer- FV

(d) s***au***k-a /sa.^{w}u.ka/ /a_1#u_2/→[$a_1^{w}u_2$] ‘[to be] poor’

poor- FV

(e) m***a***- ***u***la /ma.^{w}u.la/ /a_1#u_2/→ [$a_1^{w}u_2$] ‘witch doctors’

1p- witch doctor

While this kind of phonological dissimilation could be argued to be glide insertion or dissimilation, I would propose considering it as diphthongisation. The articulatory features of the sequence could be argued to seem to point to that. However based on the evidence that also argues for the non-existence of true diphthongs in Chichewa as well as the PRs of the words, I would thus label it as glide epenthesis. This is however again violation of DEPIO necessitated by a higher ranking of ONSET in a bid to eliminate hiatuses. This we can illustrate as below:

Input: /s**a-u**ka/	**ONSET**	**DEPIO**	**IDENT-IO**
(a) ☞/sa.^{w}u.ka/		*	*
(b) /sa.u.ka/	*!		

Tableau 9

As explained earlier on, apart from glide formation, Chichewa also employs glide epenthesis to resolve intervocalic contexts. In this instance, in Chichewa, glides are inserted by a phonological rule in intervocalic environments. They do not thus appear in the underlying representation (inputs) but only surface in the output forms as means to block vowel clusters.

52.	(a)	k***u*- *o***na inf- see	/kuwona/	/u_1#o_2/→ [u_1***w***o_2]	‘to see’
	(b)	k***u*- *i***ka inf- put	/kuyika/	/u_1#i_2/→ [u_1***y***i_2]	‘to put’
	(c)	k***u*- *u***mba inf- mould	/kuwumba/	/u_1#u_2/→ [u_1***w***u_2]	‘to mould’
	(d)	k***u*- *e***nda inf- walk	/kuyenda/	/u_1#e_2/→ [u_1***y***e_2]	‘to walk’

Glide Insertion/Epenthesis in Chichewa is primarily in violation of DEP-IO and IDENT-IO. The primary motive in the insertion of a glide is again an attempt at the surface realisation of non-vowel sequences presenting surface forms. Mtenje (1980) argues however that this homorganic glide insertion in the surface forms is not easily and readily explained to be strictly hiatal configuration resolving motivated as it could also be attested in the underlying forms. It can also be controversially dismissed as non-epenthetic.

Arguing that glide insertion here is motivated again, by the need to eliminate onsetless syllables as well as destroy VV structures, such a ranking that gives rise to the realization of the surface forms in **52** can be summarized as in the tableau below.

Input: /k**u-o**n-a/	**ONSET**	**DEP-IO**	**IDENT-IO**
(a) /ku.o.na/	*!		
(b) ☞/ku.wo.na/		*	*

Tableau 10

Gliding only occurs when the two vowels at the configuration boundary are different whereas similar vowels coalesce. The glide only occurs when there are contiguous vowels and the glide which is either of the two phonemes **/y/** and **/w/** must agree in rounding with the second of the vowels in the vowel sequence.

On the other hand, Glide Insertion/Epenthesis I would argue, is motivated by the need to preserve the features of both initial vowels of the input as the following tableau illustrates.

Input:/k**u-o**.na/	**ONSET**	**PARSE[F']**	**IDENT[±high]**	**IDENT[±low]**	**DEP-IO**	**UNIFORMITY**
(a) /ku.o.na/	*!					
(b)☞ /ku.wo.na/					*	**
(c) /ku:.na/		*!	*(!)	*		**
(d) /ko:.na/		*!	*(!)			**

Tableau 11

We observe here that candidate (a), the most faithful is eliminated because it violates ONSET. Candidate (c) not only deletes a segment but fails to preserve the [-high] feature of V_2. Candidate (d) fails to preserve the [+high] feature of input V_1. The two candidate, (c) and (d) thus violate PARSE[F'] as they both fail to preserve all the features of both the input vowels. They also both violate MAX, MAX-V and DEP-IO and therefore get eliminated. Both vowels are however similar in backness, both containing the feature [+back]. The optimal candidate (b) violates, by inserting a segment, IDENT-IO. The constraint therefore must be the least ranked at such contexts in the language.

Despite the seeming variation in either glide formation or glide epenthesis at similar morphophonological concatenations, I still can't conclude as to what conditions such choices in variation. In the absence of a plausible explanation I would believe dialectical variations could account for this. This however is subject to investigation.

4.1.2 Coalescence in Chichewa

One of the commonest morphophonological boundaries at which hiatal configurations occur in Chichewa is the lexical word-functional word boundary, especially the preposition-noun/pronoun boundary. Coalescence in many languages takes any or all of the three basic form which are; the two vowels which are different merging into an intermediate quality vowel (a third vowel that shares the characteristics of both the original vowels) or the merging of identical short vowels into a long vowel, or else the two vowels are replaced by a single instance of them, either short or long. The commonest of the three within Chichewa phonology, especially at the functional

word-lexical word boundary is the second as indicated by the data in example **54** below. This kind of coalescence indicated in **53** is in line with the rule established in Mtenje (1980) which is given below:

53.

$$\begin{bmatrix} +\text{syll} \\ -\text{cons} \end{bmatrix}_1 \quad \begin{bmatrix} +\text{syll} \\ -\text{cons} \end{bmatrix}_2 \quad \rightarrow [+\text{long}]\ \text{ø}_1$$

In line with the phonological propositions of the above rule, we consider the following examples

54.	(a)	z***a*** **-** ***a***na	/za:na/	/a_1#a_2/→[a:$_{1,2}$] ‘for children’
		for- children		
	(b)	nd***i-*** ***i***we	/ndi:we/	/i_1#i_2/→[i:$_{1,2}$] ‘its you’
		its - you		
	(c)	k***u-*** ***u***za	/ku:za/	/u_1#u_2/→[u:$_{1,2}$] ‘to tell’
		inf - tell		
	(d)	k***u-*** ***u***ka	/ku:ka/	/o_1#u_2/→[u:$_{1,2}$] ‘to rise’
		inf - rise		
	(e)	nd***i-*** ***i***wo	/ndi:wo/	/i_1#i_2/→[i:$_{1,2}$] ‘its them’
		its – them		

Coalescence is always invariably in violation of the constraints IDENT and IDENT-IO, constraints which militate against the merger in the output of segment initially independent in the input. The violation of the two constraints in many cases, as is with the Chichewa data above, is

motivated by the need to preserve the higher ranked constraint ONSET, thus result form the ranking hierarchy ONSET»IDENT-IO, IDENT »Uniformity.

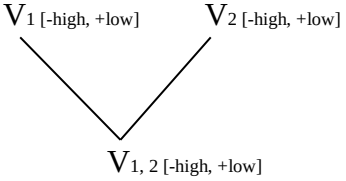
I here argue that coalescence here is ONSET driven as it seems to be, among other reasons, primarily motivated avoiding the surface realisation of heterosyllabic vowels in the output forms as the following tableau would show:

Input: /k**u-u**z-a/	**ONSET**	**IDENT**	**IDENT-IO**	**UNIFORMITY**
(a) ☞ /ku:.za/		*	*	*
(b) /ku.u.za/	*!			

Tableau 12

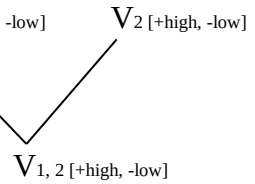
This kind of coalescence, the fusion of identical vowels, referred to by Bakovic (2007) as 'Identity Coalescence' or 'Coalescence under identity', results in no changes in vowel quality taking place. This is ensured/evidenced by the fact that the output correspondents, indexed to a single output segment, remaining faithful to their respective input correspondent in featural identity since they were identical in the input. For example, coalescence in example **54** (a) is expressed as in **55** (a) while that in examples **54** (b) – (e) as in **55** (b).

55. (a)



(Fusion of identical vowels /a+a/→/a:/ *in Chichewa)*

(b)



(Fusion of identical vowels /i+i/→/i:/ *and /or* /u+u/→/u:/ *in Chichewa)*

As a hiatus resolution mechanism, coalescence, driven by the need to prevent the surface realisation of onsetless syllables, is also always invariably in violation of, in addition to IDENT-IO(F) which stipulates that input and output segment must have identical specifications for given features, a constraint UNIFORMITY, which disprefers a situation in which two segments that are distinct in the input are merged as a single segment in the output. This again is in a bid to militate against the violation of the higher ranked constraint, ONSET.

56. IDENT-IO(F) : Corresponding input and output segments should bear identical specifications for a feature F.

Consider the following tableau in which similar low vowels [a + a] merge/coalesce into an identical low but long vowel [a:].

Input: /z**a-a**na/	**ONSET**	**MAX-V**	**DEP-IO**	**IDENT-IO**	**IDENT-IO(F)**	**UNIFORMITY**
(a) /za.a.na/	*!					
(b)☞/za:.na/				*		**
(c) /za.na/		*!			*	**
(d) /za.wa.na/			*!	*		**

Tableau 13

57. MAX-V: All vowel segments in the input should have corresponding segments in the output.

The constraint **IDENT-IO(F)** is however not violated in the Chichewa data discussed above. Coalescence in Chichewa only occurs with identical vowels and thus the resultant vowel maintains the featural qualities of both the initial vowels. Because identical vowels coalesce into a long vowel identical to the two initial vowels, the lengthening of the resultant vowel ensures that vowel places are preserved – some form of segmental identity between the input and the output.

Candidate (a) fails to eliminate the VV sequence thus gets eliminated, candidate (c) despite eliminating the sequence and preserving the featural qualities of the initial vowels deletes a segment (if we argue for this to be elision) or fails to maintain segmental identity by not maintaining the V-slots (if we argue for this to be coalescence with no compensatory lengthening), candidate (d) eliminates the hiatal configuration but however inserts a segment and

thus violates DEP-IO which is a high ranked constraint. Candidate (b) thus is the optimal candidate in that, not only does it eliminate the hiatal configuration, it does so in a manner that maximizes segmental identity as well as maintaining featural identity.

In line with this thesis, also consider the occurrence of the same kind of coalescence in Chichewa, this time however with similar high vowels.

Input:/k**u-u**za/	**ONSET**	**MAX-V**	**DEP-IO**	**IDENT-IO**	**IDENT-IO(F)**	**UNIFORMITY**
(a) /ku.u.za/	*!					
(b)☞/ku:.za/				*		**
(c) /ku.za/		*!			*	**
(d) /ku.wu.za/			*!	*		**

Tableau 14

Again we note that, because the similar vowels merge into an identical long vowel, they manage to preserve the featural qualities of both the initial vowels as well as that the vowel places are also preserved through the surface realisation of a long vowel (compensatory lengthening) which is in violation of the constraint NLV.

Again we note that the same constraint ranking based suboptimal candidate elimination process as that used in the analysis of the fusion of identical low vowels in Tableau 13 Chichewa also applies here despite the fact that in this current context identity coalescence takes place between

identical high vowels. (See the discussion above regarding constraint ranking and suboptimal elimination).

The most interesting thing to note is that the conditions that are considered suitable for coalescence are also the same for gliding as well as glide and/or consonantal epenthesis (c.f. example **54** *(c)* and *(d)* above). The question is why is glide insertion blocked in these cases?

The answer lays in the possibility of a requirement/constraint that orders vowel coalescence over glide epenthesis. But still, why? This happens when applying coalescence before glide insertion bleeds glide insertion. Again, despite this explanation, the question that still remains unanswered is: What conditions this ordering? Casali (1996) also observes this problem in qualifying the rule ordering.

The paradox really lies in the attempt to distinguish between conditions that order coalescence before glide formation and vice versa. This is problematic to ascertain especially so considering that the root initial vowels in both circumstances in which either glide insertion or coalescence occurs, occur after the same infinitive prefix /ku-/ as exemplified in **58** below (as well as in examples **52** and **54** for glide insertion and coalescence respectively).

58. (a) *Coalescence*

ku- uza /ku:.za/ ‘to tell’

inf- tell

(b) *Glide insertion*

ku- uka /ku.wu.ka/ ‘to rise’

inf- rise

I would however propose that despite the general rule that a high vowel in a V_1 position turns into a glide in the face of another vowel, if the other vowel (V_2) turns out to be also a high vowel similar in featural qualities with the V_1, then gliding is blocked and coalescence takes place as illustrated in **58** *(a)* above. The function of vowel coalescence is to reduce the potential V+V configuration to the canonical CV syllable structure.

4.1.3 Deletion/Elision in Chichewa

Like in most Bantu languages, Chichewa presents evidence of both V_1 and V_2 elision. This is largely a result of phonological rules in Chichewa that stipulate that a vowel deletes when followed by another vowel at a morphological boundary c.f. Kentowicz and Kisseberth (1977, 1979) and Mtenje (1992). The most common mode of deletion however is V_1 elision. This normally takes place when the fist vowel in the sequence belongs to a functional word at a functional word-lexical word boundary. In most instances, the vowel that elides through V_1 deletion is a prefix vowel, which in the following example is a negation prefix. Consider the following examples in example **59**.

59. (a) s***i*** - ***u*** - pita /supita/ /i_1#u_2/→[u_2] ‘you will not go’

neg-you-go

(b) s***i*** - ***u*** - funa /sufuna/ /i_1#u_2/→[u_2] ‘you don’t want’

neg-you-want

(c) s***i*** - ***u*** - dya /sudya/ /i_1#u_2/→[u_2] ‘you will not eat’

neg-you-eat

(d) s***i*** - ***u*** - lira /sulira/ /i_1#u_2/→[u_2] ‘you will not cry’

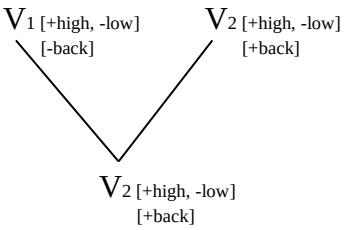
neg-you-cry

(e) s***i*** - ***u*** - lemba /sulemba/ /i_1#u_2/→[u_2] ‘you will not write’

neg-you-write

In the above examples we can argue that the rule is to delete the vowel in the negative prefix vowel when it is followed by a subject marker which commences in/with a vowel. This form of vowel elision, which results in the high front prefix vowel [i] eliding, because it deletes the final vowel of the first prefix morphemes, has been referred to by Mtenje (1980, 1986, 1992) as “Final Vowel Truncation”. This rule is also applicable to an almost similar morphological boundary at which the vowel that gets elided becomes the morpheme final vowel, especially those of bound morphemes.

I would here also argue that deletion in the contexts discussed/illustrated in **59** is not conditioned by vowel height but by backness. This is so because in the examples, both the vowels are high vowels. What elides in this case is the non back vowel [i] in the face of the back [u]. This can be schematized as in **60** below

60. 

(Deletion of non-back vowels in /i+u/→/u/ *contexts in Chichewa)*

In making a case for this kind of elision accounted for in **59** and **60** above, Mtenje (1980) proposes a rule that systematically elides the vowel of the negative prefix if it is followed by another vowel. In this regard a ranking of PARSE[F']-lex » PARSE[F']-1seg (a constraint which militates against the deletion of features of a prefix/word consisting of a single segment) and PARSE(F') should be used to account for the deletion above as follows;

61. PARSE[F']-1seg: Preserve all the features of single segment morphemes/words.

Input: /s**i-u-**pita/	**ONSET**	**PARSE[F']-lex**	**PARSE[F']-1seg**	**PARSE[F']**
(a) ☞/s<i>u.pi.ta/				**
(b) /si.<u>pi.ta/			*!	**
(c) /si.u.pi.ta/	*!	*		**

Tableau 15

In making such a case, he notes that the negative prefix vowel does not elide if the negation prefix is affixed to consonant commencing words. He considers examples similar to those given in **62** below;

62. (a) si - pano /sipano/ ‘it’s not here’

neg - here

(b) si - munthu /simunt^{h}u/ ‘it’s not a person’

neg - person

(c) si - wanga /siwanga/ ‘it’s not mine’

neg - mine

(d) si - konko /sikonko/ ‘it’s not there’

neg – there

In reaching such a conclusion, Mtenje (1980, 32) notes thus, that; “Since the vowel **/i/** of the [the negative prefix] **/si/** did not delete when it was followed by a consonant, as in the data above [as in **62**], its deletion in the... [other] set of data [as in **59**] where it occurred before another vowel must have therefore been triggered by the presence of that vowel (i.e. the subject prefixes **/a/** and **/u/**).

The evidence here thus exponentially suggests the motivation behind such an elision process could be largely due to a systematic attempt by the language to eliminate vowel sequences from appearing in the PRs. Mtenje (1980), to this end, thus concludes that ‘this rule must therefore be sensitive to the Chichewa syllable structure constraint and is a PSSR [Preferred Syllable Structure Rule]”

The data occurring in Chichewa in vowel elision resolved configurations presents similar morphological boundaries at which glide formation often surfaces as the resolution mechanism adopted to eliminate vowel sequences. However, note that in the examples, the language actually elects to resolve the hiatal configurations through deletion/elision.

The question that quickly comes to mind is: Why does elision take place here instead of glide insertion? The answer probably lies in the assumption that there is a constraint(s) that orders deletion first to block/eliminate the environment for glide formation/insertion. But still why do we find such a constraint ordering at particularly this boundary? What is so peculiar about the morphological boundaries represented by the example that trigger the ordering of such a constraint(s), in other words, the higher ranking of *CG ≫MAX,MAXIO etc. I would propose the existence of some language internal rules that bleed deletion in favour of gliding.

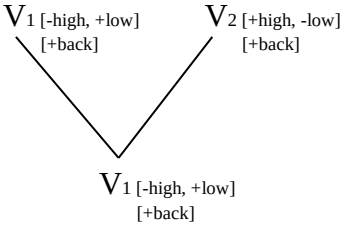
Apart from the type of elision discussed above (V_1 Elision), there is also evidence of V_2 elision in Chichewa. This is most noticeable at the lexical word - functional word boundary. Such kind of a boundary is the noun - demonstrative boundary. The vowel that elides in such circumstances is the initial vowel of the demonstrative, which in this case is the V_2 in the sequence. Mtenje (1980) refers to this kind of elision as Demonstrative Vowel Elision (DVE) or what l would propose to call Demonstrative Pronoun Vowel Elision (DPVE).

Consider the following examples in **63** largely extracted from Mtenje (1980).

63.	(a) mwan***a*** + ***u***yu child – this/that	/mwənəyu/	/a_1#u_2/ → [a_1]	‘that/this child’
	(b) nyumb***a*** + ***i***yi house - this	/nyumbayi/	/a_1#i_2/ → [a_1]	‘this house’
	(c) deng***a*** + ***i***li roof - this	/dengali/	/a_1#i_2/ → [a_1]	‘this roof’
	(d) anth***u*** + ***a***wa people – these	/ant^{h}uwa/	/u_1#a_2/ → [u_1]	‘these people’

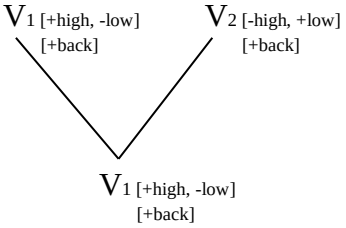
The kind of elision that occurs here in **63** can be schematized as follows:

64. (a)



(Deletion of high vowels in /a+u/→/a/ *contexts in Chichewa as in* **63**. *a - c)*

(b)



(Deletion of low vowels in / u + a /→/u/ *contexts in Chichewa as in* **63.** *d)*

Based on the data presenting in deletion contexts at the DPVE contexts, we can not argue for vowel height ordered elision as both low and high vowels delete. The conclusion I reach from observing the data is that of position sensitive deletion. We observe that at the root/lexical word - functional word boundary, there is elision of the functional word initial vowel. This is not height sensitive elision but could be motivated by an attempt to preserve materials of the lexical word, possibly a higher ranking of a MAXLEX constraint. This can also be analysed as resulting from a higher ranking of a PARSE[F']-lex » PARSE[F']-[$_m$ »PARSE[±high] in other words, a ranking that like MAXLEX militates against the deletion of features of the lexical word vowel as illustrated in Tableaux 16 and 17 below.

65. **PARSE[F']-[$_m$:** All features of a [bound] morpheme initial segment must be preserved.

Input: /deng**a-i**li/	**ONSET**	**PARSE[F']-lex**	**PARSE[F']-[$_m$**	**PARSE[±high]**	**PARSE[F']**
(a) ☞ /de.nga.<i>li/			*	*	**
(b) /de.ng<a>i.li/		*!		*	**
(c) /de.nga.i.li/	*!				

Tableau 16

We note that candidate (a) is the optimal candidate because while deleting the functional word vowel, it preserves all the material/segments of the lexical word and thus not violating the higher ranked constraint PARSE[F']-lex. Candidate (b) is eliminated due to deletion of lexical word

material while candidate (c) heterosyllabifies the adjacent vowels and in the process violates ONSET and thus fails to eliminate the disprefered hiatal configuration.

Also notice that in the examples, both the vowels at the configuration are similar in backness and that the resultant vowel maintains the featural qualities of the root/lexical word final vowel i.e. the resultant vowel maintains the height of the root/lexical word final vowel.

Now we can compare this Chichewa evidence with evidence from Shona[46] c.f. Sabao (2005) given in **66** below, in which a similar phenomenon, i.e. DPVE occurs.

66. ***DPVE in Shona***

(a) mwan***a*****- *u***yu child- this	/mwənəyu/	/a_1#u_2/ → [a_1]	‘this child’
(b) munh***u*****- *u***yu person- this	/munhuyu/	/u_1#u_2/ → [u_1]	‘this person’
(c) mit***i*****- *i***yi trees- these	/mitiyi/	/i_1#i_2/ → [i_1]	‘these trees’
(d) momb***e*****- *i***yi cow- this	/mombeyi/	/e_1#i_2/ → [e_1]	‘this cow’
(e) vanh***u*****- *a***va people- these	/vanhuva/	/u_1#a_2/ → [u_1]	‘these people’

[46] Other scholarship would however argue that when occurring in Shona, this process is not DPVE but cliticisation. See Harford (1997) for such an argument.

Because the determination of the choice of vowel to elide in the above examples id not dictated by the height of the two vowels forming a sequence, we could argue that it is motivated by a high ranking of constraints that dictate the preservation of the features of the lexical word, i.e. a high ranking of a IDENT[F']-lex/PARSE[F']-lex constraint. This could be a constraint that preserves the height, backness and rounding features of the V_1 in the sequence - lexical word final vowel.

Input: /vanh**u-a**va/	**ONSET**	**PARSE[F']-lex**	**PARSE[F']-[$_m$**	**PARSE[±high]**	**PARSE[F']**
(a) ☞/va.nhu.<a>va/			*	*	**
(b) /va.nh<u>a.va/		*!		*	**
(c) /va.nhu.a.va/	*!				

Tableau 17

Again here, as in the DPVE contexts discussed for Chichewa above, the same kind of ranking hierarchy applies in which regard we note that candidate (a) is the optimal candidate because while deleting the functional word vowel, it preserves all the material/segments of the lexical word and thus not violating the higher ranked constraint PARSE[F']-lex. Candidate (b) is eliminated due to deletion of lexical word material while candidate (c) heterosyllabifies the adjacent vowels and in the process violates ONSET and thus fails to eliminate the disprefered hiatal configuration.

This kind of elision can be said to be in line with Watkins' (1937) observation that; "When a final vowel is followed by an initial vowel of a different kind, the final vowel is usually elided" (Watkins, 1937:10 as cited by Mtenje, 1980:31).

In line with this observation, it could also be noted that while at such a boundary at which different vowels are adjacent elision occurs, in instances where the two vowels straddling a morphological boundary are similar in height and rounding, coalescence then takes place. Consider in line with this observation the examples discussed in the argument for coalescence in Chichewa (c.f. section 4.2.1 example **54**).

In order to unequivocally argue for vowel elision at the boundaries discussed above, we need to present evidence that what indeed takes place here is elision and not merely cliticisation (c.f. section 2.2.3 example **26.a**). Cliticisation occurs only when the vowel of the suffix is an epenthetic one that is a result of the process of disyllabification and respect for morphological rules that determine that a minimal word should be at the least bi-syllabic, a phenomenon that is also referred as 'minimal word' (c.f. Harford: 1997, Sabao: 2005). This is largely a characteristic of Bantu morphology (c.f. Pulleylbank & Ola Orie: 1998 and Harford: 1997)

4.2. Identification and resolution of vowel sequences in Ndebele

This section identifies morphological as well as phonological boundaries at which vowel sequences occur within Ndebele. It also discusses the resolution of such hiatal configurations through different phonological processes discussed in Chapter 2 and how their occurrence in hiatal configurations resolution mechanisms be explained through the ranking of constraints within the explications of OT.

4.2.0. Ndebele vowel and syllable structure(s)

Ndebele, also, like many other Bantu languages is a five vowel phoneme system. The quality of *e* and *o* in Ndebele appears to match cardinal vowels 3 and 6, **[e]** and **[o]**, fairly closely, rather than numbers 2 and 7, **[e]** and**[o]**, in most environments. There are no underlying long vowels in the language and neither are there long vowels that occur as a result of phonological processes such as elision and coalescence and/or other phonetic processes. Unlike in most Bantu languages, in Ndebele, there is no compensatory lengthening of vowels in either URs and/or PRs resulting from attempts to preserve V-slots after phonological processes of deletion or merger of juxtaposed vowel[47]. There are also no diphthongs in Ndebele. The vowels of Ndebele can be represented diagrammatically as below. The diagram illustrates a comparison between the places articulation of Ndebele vowels compared to cardinal vowels which in the diagram are marked 1 to 8 as reflected on the IPA chart.

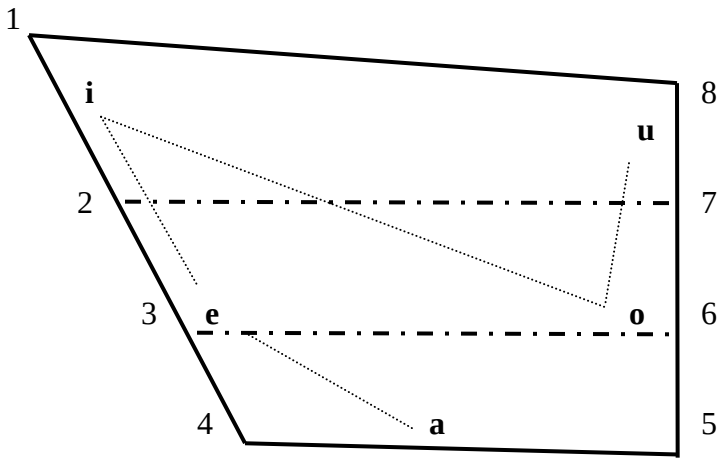


Fig. 3: Ndebele vowel structure

[47] *c.f.* Sections 2.2 and 4.1 for a discussion of this phenomenon.

The low vowel /a/ in Ndebele seems to match the cardinal vowel, the low central /a/ whereas the mid front vowel /e/ and mid back vowel /o/ are articulated lower than their cardinal vowel equivalents, vowels 2 and 7 and also lower than those of other Bantu languages such as Chitumbuka and Chichewa. The distinctive features of these vowels as represented on the above chart are as follows (**NB**: The features diagram also supplies redundant values);

	i	**e**	**a**	**o**	**u**
BACK	-	-	-	+	+
HIGH	+	-	-	-	+
LOW	-	-	+	-	-
ROUND	-	-	-	+	+

The basic syllable structure in Ndebele is the canonical CV syllable. It however can be argued that the basic structure could also be the V(CV) structure in light of the fact that most nouns in the language begin in a vowel since the language still has the IV (initial vowel) or pre-prefix as part of both is phonetic and orthographic inventories. This IV the same as the one whose existence we argued to be diachronically attested in the Shona language and which triggers coalescence (*c.f.* 2.2.1.0.2).

67. (i) ***V(CV) structure***

a) a.kha ‘build

b) e.nza ‘do’

c) i.nja ‘dog’

d) o.ma ‘get dry/get thirsty’

e) u.ba.ba ‘father’

(ii) ***CV structure***

a) ma.ma ‘mother’

b) we.na ‘you’

c) mi.na ‘me’

d) lo.khu ‘this;

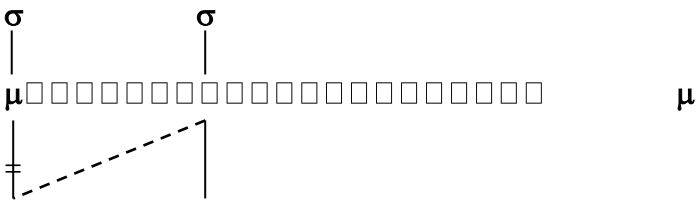
e) dhlu.la ‘to pass by’

4.2.1. Glide formation in Ndebele

Glide formation is another major hiatus resolution strategy in Ndebele. The most commonest example of contexts in which such a process occurs is when the high vowel [u] of the infinitive prefix /uku-/ ‘to’ in Ndebele juxtaposed with vowel commencing verbal forms undergoes glide formation. We differentiate this process of glide formation in Ndebele with that discussed in the Chichewa data in that, in the former it does not result in a compensatorily lengthened resultant vowel as does in the latter (c.f. example 46). The glide formation in Ndebele is again similar to the process that we discussed in Shona and Chichewa as morphophonemic change and is in line with the same [v→w/vowel] rule that we have argued to be in operation in both Shona and Chichewa.

The rule that governs gliding in Ndebele as is with other Bantu languages is that a [+high, -low] vowel looses a mora (or glides) before another vowel. The second vowel in the sequence can be low, mid or high. Such a process is schematized as in **68** below:

68. *Gliding of high vowels in Ndebele*



Again l would argue that this process is triggered by language-internal phonological and/or morphophonological rules that disprefer the surfacing of vowel sequences in the PRs of the language. Not only does the language disprefer such hiatal configurations phonetically, it also seems to disprefer their occurrence in its orthographic forms. Let's consider the following examples in **69.** Again, we note that as with coalescence, in Ndebele glide formation does not result in long surface vowels. This again is in 'disregard' for place maintenance and thus in violation of IDENT-IO and UNIFORMITY.

69. (a) uk***u***- ***e***nza [ukwenza] /u_1#e_2/→ [w_1e_2] 'to do'

inf- do

(b) uk***u***- ***a***kha [ukwakha] /u_1#a_2/→ [w_1a_2] 'to build'

inf- build

(c) uk***u***- ***a***la [ukwala] /u_1#a_2/→ [w_1a_2] 'to refuse'

inf- refuse

(d) uk***u***- ***e***sula [ukwesula] /u_1#u_2/→ [u_1w_2] ‘to wipe/rub’

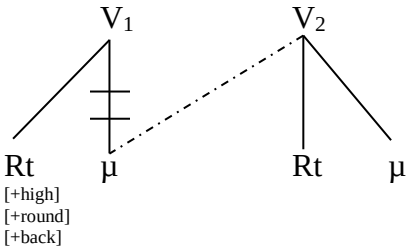
inf- wipe/rub

(e) uk***u***- ***a***zi [ukwazi] /u_1#u_2/→ [u_1w_2] ‘to know’

inf- know

Again, as in Chichewa and Chitumbuka, this kind of glide formation in which the high vowel [u] turns into a glide [w] in the face of all the other vowels except the mid back vowel [o]can be schematized as below:

70.



Glide formation: /u/→/w/ in Ndebele.

This again, as in Chichewa and Chitumbuka, happens through this process in which the V_1 (which has the features [+high] and/or [+round] and or [+back]) undergoes delinking with its associated mora, by which process which is mora preserving, attaches to V_2. V_1 however maintains its attachment to the root node thus preserving articulatory features. In other the process and its resultant vowels

We note that, like in other languages glide formation in Ndebele, if argued to be ONSET driven is also invariably in violation of *CG as well as IDENT-IO as illustrated below;

Input: /uku-enz-a/	**ONSET**	*CG	**IDENT-IO**
(a) ☞/ukwe.nza/		*	*
(b) /uku.e.nza/	*!		

Tableau 18

We thus can argue that what really conditions and motivates glide formation here is the need to preserve segmental identity as well as featural identity between the input and the output. This is evidenced by the fact that the resultant glide is featurally identical to the initial vowel as it retains its [+high], [+back] and [+round] features. Glide formation here is elected above other possible resolution strategies because it maximizes featural as well as articulatory identity while in the process also successfully eliminating the disprefered configuration. Let's examine the following tableau.

Input:/uk**u-e**.nza/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT[±low]**	**IDENT(μ)**	**UNIFORMITY**
(a) /u.ku.e.nza/	*!					
(b)☞/u.kwe.nza/					*	**
(c) /u.ke.nza/		*!	*(!)		*	**
(d) /u.ku.nza/		*!	*(!)		*	**

Tableau 19

Here we note that candidate (a) is in fatal violation of ONSET due to heterosyllabification and thus is eliminated. Candidates (c) and (d), which could be showing either coalescence

(symmetric fusion) or elision, are in fatal violation of PARSE[+high] and PARSE[-high] respectively. This is so because (c) fails to preserves the [+high] feature of the [+high, -low] prefix vowel /u/ while (d) fails to preserve the feature [-high] of the [-high, -low] of the V_2 vowel /e/. Both however manage to preserve the [-low] feature, a feature shared by both of the initial vowels. They however both get eliminated because, as with Chichewa data, they fail to reserve the [+back] and [-back] features of the input vowels respectively. Candidate (b) despite a violation of IDENT(μ), due to the changes in mora count manages to maximize featural and articulatory identity.

If however, the same infinitive prefix is juxtaposed with a vowel /o/ commencing verbal form, elision of the V_1 (the prefix final vowel) and consonantal epenthesis instead of glide formation/insertion variably occur. Consider the following example in which the former process (V_1 elision) occurs in **71** (a) and the latter (epenthesis) in **71** (b);

71. (a) uk***u***- ***o***ma [ukoma] /u_1#o_2/→ [o_2] ‘to dry/get thirsty’
inf- dry/thirst

(b) uk***u***- ***o***na [uku***b***ona] /u_1#e_2/→ [u_1***b******e***o_2] ‘to see’
inf- see

I am not sure why, despite the conditions for elision being also satisfied by **71** (b) in as much as they are satisfied by **71** (a), epenthesis and not elision takes place. In the absence of such an explanation I would propose the existence of some language internal phonetic rule or at the least

an oversight on the part of Ndebele orthographers and/or a shortcoming on the part of consistency within both the language's orthography and/or its phonological rules.

[I am however made to understand[48] that the correct way of writing as well as pronouncing the word for 'see' in Ndebele is not 'ona' but 'bona' [vona] and the variety of 'ona' [ona] used in the above example is only possible in South African languages like Suthu and Zulu, which share genetic descendency with the Zimbabwean variety of Ndebele under study here.

In this regard, I am informed that the process that occurs at such a boundary in the other languages is then elision and not epenthesis as follows:

72. uku- ona /ukona/ 'to see'

inf- see

(V_1 elision in Zulu and/or Xhosa)

When the word occurs in Zimbabwean Ndebele as /ukona/ as in the above example, it does not mean 'to see' but rather 'to make mistakes',

73. uku- ona /ukona/ 'to make mistakes'

inf- make mistake

[48] This 'revelation' comes from social discussions with first language speakers of the language. It does not have scholarship backing and thus should not be viewed as conclusive and binding, but rather as an observation in obitur.

We therefore can thus argue for V_1 elision, precisely for this one example as opposed to consonantal epenthesis.]

The form of consonantal epenthesis exemplified in Ndebele by example **71** (b) also occurs at the same preposition – noun boundary that is discussed for coalescence in **76**. The reason why coalescence doesn't take place here as it does in **76** is because of the presence of the plural marker vowel /o/. Coalescence at such a boundary in Ndebele only takes place if the noun that provides V_2 commences in the initial vowels /i/, /u/ and /a/ (c.f. **76**). If the nouns begins with the vowel /o/, which could either be a plural marker or an agreement morpheme, consonantal epenthesis and not coalescence takes place. Consider the following examples in **74** regards that;

74. (a) l***a*- *o***- mama [la***b***omama] $/a_1\#o_2/\rightarrow [a_1\boldsymbol{b_e}o_2]$ 'with mothers'

with/by/and- *pl*- mother

(b) l***a*- *o***- mangoye [la***b***omangoye] $/a_1\#o_2/\rightarrow [a_1\boldsymbol{b_e}o_2]$ 'with cats'

with/by/and- *pl*- cat

Epenthesis in the above contexts is triggered by the presence of the mid back vowel /o/ juxtaposed with the low vowel /a/ of the prepositional prefix. We also can argue that this happens because the V_2 is not only a single segment morpheme but also a plural marker. This is so in light of the realisation that when those same words occur in the singular forms, coalescence and not epenthesis occurs. Compare **75** (a) and **75** (b) below:

75. ***(a) Coalescence with singular forms***

(i) la- umangoye $[a_1\#u_2]\rightarrow[o_3]$ /lomangoye/ 'with/and/by a cat'

with/and/by-1s-cat

(ii) la- umama $[a_1\#u_2]\rightarrow[o_3]$ /lomama/ 'with/and/by a mother'

with/and/by-1s-mother

(b) Epenthesis with plural forms

(i) la- omangoye $[a_1\#o_2]\rightarrow[a_1 b o_2]$ /labomangoye/ 'with/and/by cats'

with/and/by-1s-cat

(ii) la- omama $[a_1\#o_2]\rightarrow[a_1 b o_2]$ /labomama/ 'with/and/by mothers'

with/and/by-1s-mother

We can account for this kind of epenthesis as follows:

Input:/l**a-o**.ma.ma/	**ONSET**	**PARSE[F']**	**PARSE[F]-1seg**	**IDENT-IO**	**DEP-IO**	**UNIFORMITY**
(a) /la-o.ma.ma/	*!					
(b)☞/la-bo.ma.ma/				*	*	**
(c) /lo.ma.ma/		*!		*	*	**
(d) /la.ma.ma/		*!	*(!)	*	*	**

Tableau 20

We observe here that candidate (a) is eliminated because it violates ONSET (preserves the vowel sequence), candidate (c) not only deletes a segment but also deletes a single segment (the plural

marker morpheme /o/). The problem is that such kind of deletion renders it impossible to distinguish this form from the singular form (c.f. **75** (a) above). Candidate (d) also deletes a segment and thus violates MAX and gets eliminated. The two candidate, (c) and (d) thus also violate PARSE[F'] (because (c) fails to preserve the [+low] feature of the input vowel /a/ while candidate (d) fails to parse the [-low] feature of the input vowel /o/) as well as PARSE[F]-1seg, MAX, MAX-V and DEP-IO and therefore get eliminated. The candidates thus het eliminated for a violation of PARSE[F']

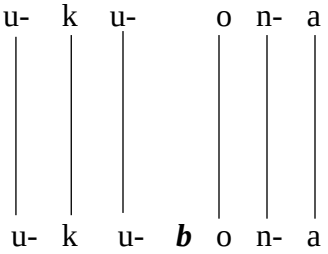
This kind of consonantal epenthesis is evidence of the key observation that epenthesis and syllabification are inextricably connected (Selkirk 1981, Ito 1986, 1989). Epenthesis is largely motivated towards the elimination of onsetless syllables. Accordingly, an epenthetic segment thus is an empty structural position whose presence is required by the 'language specific syllable template' (Archangeli 1999). This syllabic make up blueprint dictates whether or not an onset is obligatory/necessary as exemplified by the examples in **75** above in which we can argue that the language's syllabic blueprint dictates the repair of ONSET in word medial syllables.

Kager (1999) proposes that such kind of epenthesis exemplified by the consonant /b/ insertion as discussed above is necessitated by 'an imperfect match between the input segments and the template'. The mismatch here arises from the realization of a vowel sequence in the UR which do not have an intervening consonant whereas the syllable blueprint obligates an onset.

Epenthesis, any form of epenthesis, involves the violation of faithfulness constraints. This is so because the epenthetic segment containing output diverges from the input by the presence of an

epenthetic segment, one that 'is not sponsored by the lexical representation'. A schematic representation of the violation of DEP-IO through epenthesis is as follows:

76.



As a hiatus resolution mechanism, epenthesis here is triggered by the higher ranking of the constraint ONSET over DEP-IO.

This kind of ranking is illustrated by tableau X below, containing only the two constraints ONSET and DEP-IO which functionally differ in the presence versus the absence of the epenthetic consonant respectively**.**

Input: /uku-on-a/	**ONSET**	**DEP-IO**
(a) ☞/u.ku.bo.na/		*****
(b) /u.ku.o.na/	*!	

Tableau 21

Epenthesis in this regard can be argued to have been primarily motivated by the desire to eliminate onsetless syllables. NB: Because Ndebele is an IV using language, I observe that the IV always surfaces as an onsetless syllable and that the constraint ONSET only thus applies

exclusively to word medial/internal syllables. Onsetless syllables are only allowed initially, but input hiatus cannot surface in the output. This in itself is a problem for an ONSET analysis, since only in word medial position is the ONSET violation repaired.

Bearing in mind that this discussion culminated from a discussion on glide formation in the language, we would also consider, that since in the same boundary, when the other vowel occur after the infinitive prefix /uku-/ glide formation occurs, the fact that in the same occurrence the occurrence of /o/ triggers epenthesis is an indication of a higher preference for epenthesis over glide formation is evidence of a higher ranking of ONSET above *CG. This ranking is illustrated in the tableau below.

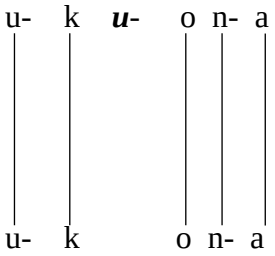
Input: /uku-on-a/	**ONSET**	*CG	**DEP-IO**
(a) ☞/u.ku.bo.na/			*
(b) /u.kw.o.na/		*!	
(c) /u.ku.o.na/	*!		

Tableau 22

Also, as indicated in the example, despite the fact that candidate (b) also still does not also violate ONSET, it fails to be the optimal candidate. The reason could be that in the environment under discussion, the occurrence of the /o/ must have triggered a rule that orders epenthesis over glide formation. I would again propose language internal constraints that militate against the occurrence of such complex onsets.

In the same vein we also consider example **71** (a) in which deletion and not glide formation occurs as is ordinarily supposed to. While I am still not sure why in the environment **71** (a) deletes and **71** (b) epenthesises, I would again propose as in **71** (b) that in **71** (a) deletion is triggered by the same desire to eliminate onsetless syllables. In many a language, elision is largely onset driven (c.f. Pulleyblank 1998). A failure to delete in this regard violates ONSET. The resolution of the vowel sequence through elision violates MAX-IO. A schematic representation of such a violation is as follows:

77.



This can also be illustrated as in the tableau below:

Input: /uku-om-a/	**ONSET**	**MAX-IO**
(a) ☞/u.ko.ma/		***!**
(b) /u.ku.o.ma/	*!	

Tableau 23

Again the tableau contains only the two constraints describing what occurs in deletion environments. And because we observe this kind of deletion occurring in an environment that normally dictates glide formation, we observe that there must be a constraint ranking system that

orders deletion above glide formation in the vowel /o/ occurring environments. We represent such a constraint ordering as below:

Input: /uku-on-a/	**ONSET**	*CG	**MAX-IO**
(a) ☞/u.ko.ma/			*
(b) /u.kw.o.ma/		*!	
(c) /u.ku.o.ma/	*!		

Tableau 24

I would maintain that I am still not sure why there is a variation between epenthesis and deletion in the examples discussed above. However a comprehensive discussion on deletion as hiatus resolving in Ndebele follows in 4.1.3.

4.1.2. Coalescence in Ndebele

Like with other Bantu languages such as Shona, Zulu and Chichewa, at the functional word-lexical word boundary involving prepositions and nouns, Ndebele resolves vowel sequences through coalescence. This also occurs within the Dokean parameters enunciated in Chapter 2 (cf. section 2.2). The most interesting thing to note however is that unlike in Shona, Ndebele, at such a boundary, confronted with a /a+a/ sequences, opts for the coalesced vowel /a/ which is non-preferred in Shona contemporarily/synchronically (as Shona would prefer a variation of the /e/ and the /o/ c.f. example **12)** but which we can argue to have been attested for within Shona diachronically. Consider the following examples in **78**.

78. (a) l***a***- ***u***mu- nthu [lomunthu] /a_1#u_2/→ [o_3] ‘with/by/and a person’

with/by/and- 1-person

(b) l***a***- ***u***m- ntwana [lomntwana] /a_1#u_2/→ [o_3] ‘with/by/and a child’

with/by/and- 1-child

(c) l***a***- ***u***m- fana [lomfana] /a_1#u_2/→ [o_3] ‘with/by/and a young person’

with/by/and- 1-young man/person

(d) l***a***- ***a***ba- ntu [labantu] /a_1#a_2/→ [a_3] ‘with/by/and a people’

with/by/and- 2-people

(e) l***a***- ***a***ba- fazi [labafazi] /a_1#a_2/→ [a_3] ‘with/by/and women’

with/by/and- 2-women

(f) l***a***- ***a***ma- siko [lamasiko] /a_1#a_2/→ [a_3] ‘with/by/and nations’

with/by/and- 4-nations

(g) l***a***- ***i***- ndlu [lendlu] /a_1#i_2/→ [e_3] ‘with/by/and a house’

with/by/and- 10-houses

(h) l***a***- ***i***- nkomo [lenkomo] /a_1#i_2/→ [e_3] ‘with/by/and cattle’

with/by/and- 10-cattle

(i) l***a***- ***i***- nja [lenja] /a_1#i_2/→ [e_3] ‘with/by/and a dog(s)’

with/by/and- 10- dog

Coalescence in Ndebele does not result in a compensatorily lengthened surface vowel. As a repair strategy in this regard invariably violates a constraint MAX-IO, which demands the preservation of all input vowel segments in the output. The constraint NLV which lengthens the surface vowel in a bid to maintain V-slots and in the process preserve segmental identity is thus ranked high in the language. In fact it must be ranked higher than MAX-V which aims at segmental identity as we observe that the output vowels are not compensatorily lengthened. Consider the following tableau in this regard:

Input: /l**a-i**nja/	**ONSET**	**NLV**	**MAX-V**	**MAX-IO**
(a) ☞/le.nja/			*	
(b) /le:.nja/		*		*

Tableau 25

Despite the fact that both candidates eliminate the hiatal configuration, and thus do not violate ONSET, candidate (b) gets eliminated because of its failure to preserve segmental identity and place.

This kind of coalescence in Ndebele (which is also height coalescence) can be described as being asymmetric, that is to say, sequences of /V_1 + V_2/ resolve differently depending on the feature specification of the two vowels: sequences of low + low vowels merge into a similar low vowel (as in examples **78** *(d) – (f)*), low + high vowel sequences result in a mid vowel (as in examples

78 *(a)* - *(c)* and **78** *(g)* – *(i)*). The resultant vowel, it should be noted agrees in rounding and/or backness with the second vowel of the sequence.

Asymmetric coalescence[49] can be distinguished from another form of coalescence called symmetric coalescence in that in the latter the resultant vowel from the vowel merger does not rely on the serial ordering of the vowels ion the sequence whereas in the former it does. In symmetric coalescence, the same vowel combinations will yield similar resultant vowel, for example, according to Tanner (2007), in the language Afar sequences of /u+e/ and /e+u/ would yield the coalesced vowel [o] irrespective of their differences in ordering.

Regards this, we observe that a change/reversal in the serial ordering of the vowels would yield or rather, trigger the ordering of other repair strategies before coalescence. For instance, while we note that the vowel sequence of the low [a] and the high back [u] would trigger coalescence, with the coalesced vowel being the mid [o], if the sequence is reversed i.e. the high back [u] occurring in V_1 position before a low [a], the high vowel undergoes gliding as in the following examples:

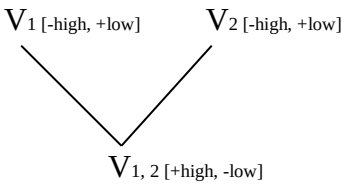
79.(a)	uku- azi	/ukwazi/	'to know'
	inf- know		
(b)	uku- akha	/ukwakha/	'to build'
	inf- build		

NB: *An in-depth discussion of this process has been done in section 4.1.1. of this chapter.*

[49] For a more insightful discussion on these different kinds of coalescence, see Tanner (2007).

We can, in line with such a thesis, summate the asymmetric coalescence that takes place in **78** *(d) – (f)* as follows:

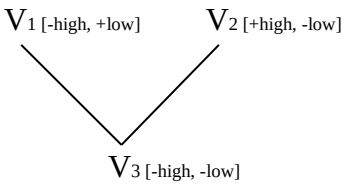
80.



(Fusion of identical vowels /a+a/→/a/ in Ndebele)

Whereas that which occurs in the remainder of all the other examples in **78** as follows:

81.



(Fusion of dissimilar vowels /a+u/→/o/ and /a+i/→/e/ in Ndebele)

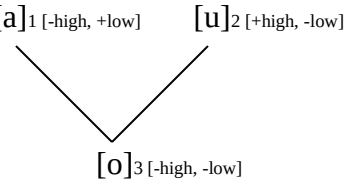
The resolution of vowel sequences through coalescence reflected in the above examples (**78)** and schematized as above (in **80** and **81**) result from a higher ranking of ONSET as well as a subsequent violation of the lower ranked IDENT-IO, MAX-IO and UNIFORMITY as exemplified below.

Input: /l**a-i**nja/	**ONSET**	**IDENT-IO**	**UNIFORMITY**
(a) ☞/le.nja/		*	*
(b) /la.i.nja/	*!		

Tableau 26

The ranking here is thus ONSET»IDENT-IO, MAX-IO. We also note that unlike in other Bantu languages in which hiatus resolution results in lengthening of the resultant vowel in a bid to preserve place (V-slots), in Ndebele the coalescence vowel is typically short. This is because, as earlier highlighted, there are no underlying and/or long vowels in the language. The non-occurrence of such long vowels in resolved contexts thus, as indicated in Tableau 26, is in violation of IDENT-IO and UNIFORMITY and fails to maximize segmental identity between input and output as well as articulatory features.

We also note in this regard that coalescence in the language is height sensitive, position sensitive and place sensitive. It is some form of segmental fusion in which two segments in the input correspond to a single segment in the output. Coalescence thus in line with this thesis yields resultant vowels whose features are dictated by a higher ranking of IDENT(-F) over IDENT(+F) in which equation (F) represents the vowel articulatory features [high] and [low]. I note, for example, from the example in Tableau 26 that despite the V_2 having the feature [+high], the resultant coalesced mid vowel [e] has articulatory feature [-high] also a feature of the V_1 as indicated in **82** below.

82. 

(Fusion of low vowel /a/ and high /u/ into mid vowel /o/ in Ndebele)

This kind of coalescence argued for here to be conditioned by the ranking of IDENT(-F) over IDENT(+F). In this regard, there is a constraint ranking hierarchy that would violate constraints aimed at preserving all segments of the lexical word, especially the [+high] feature and/or other features of the lexical word initial vowel in a bid to preserve the feature [-high] and or other features of the prefix (functional word) final word vowel. The constraints used in determining the surface form from the inputs are PARSE[-high], PARSE[+high]-lex, PARSE[F']-lex and PARSE[F'].

Such being the case, we argue that the output forms here are as a result of the ranking of PARSE[-high] »PARSE[+high]-lex as illustrated below;

$[a_1\#i_2]\rightarrow[e_3]$ **Input:** /l**a-i**nja/	**ONSET**	**PARSE[-high]**	**PARSE[+high]-lex**	**PARSE[F']-lex**	**PARSE[F']**
(a) /l<a>i.nja/		*!			*
(b) /la.<i>nja/			*	*!	*
(c) ☞/le.nja/			*		*
(d) /la.i.nja/	*!				

Tableau 27

83. **PARSE[-high] :** Preserve an input feature [-high] of either the root or affix in the output.

PARSE[+high]-lex: A feature [+high] present in the input lexical (root) morpheme must be parsed in the output.

PARSE[F']-lex: Other features[50] of the root morpheme vowel must be parsed in the output.

PARSE[F']: Preserve an input feature [F] in the output.

In line with the argument that we have established so far, i.e. that deletion (and at times other asymmetric repair strategies) is conditioned by a higher ranking of feature [-high] over features [+high], we observe in the above tableau, that candidate (a) violates the undominated constraint PARSE(-high) and thus gets eliminated. Candidates (b) and (c) have almost identical violations in the table except that candidate (b) fails to preserve, in line with the established [-F] » [+F], the [-F] feature, i.e. the feature [-back] of the input vowel [i] and thus again gets eliminated.

In the same manner that we have coalescence taking place at morphological boundaries involving the preposition /la-/ and a vowel commencing noun/verbal form, the same process also occurs when a hiatal configuration occurs involving the instrumental prefix /nga-/ and a vowel commencing noun. In such circumstances, the Dokean thesis' prescribed outcomes as well as the merger rules described in **80** and **81** above also apply. Consider the following examples in **84** below.

[50] These other features of the vowels represented here by [F'] include such features as [+round], [+back], [+front], [+low] etc.

84. (a) ng***a*- ***a***manzi [ngamanzi] /a_1#a_2/→ [a_3] ‘with water’

with- water

(b) ng***a*- ***i***litshe [ngelitshe] /a_1#i_2/→ [e_3] ‘with a stone’

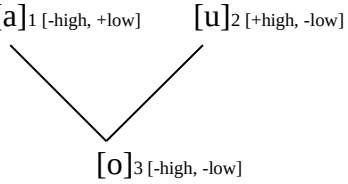
with- stone

(c) ng***a*- ***u***mlomo [ngomlomo] /a_1#u_2/→ [o_3] ‘with the mouth’

with- mouth

Again the process as that which occurs with the prepositional prefix + stem boundary applies, thus;

85.



(Fusion of low vowel /a/ and high /u/ into mid vowel /o/ in Ndebele)

This process, at the surface level is also motivated by the need to eliminate disprefered vowel clusters, in the process incurring the violations represented below;

Input: /ng**a-u**mlomo/	**ONSET**	**IDENT-IO**	**UNIFORMITY**
(a) ☞/ngo.m.lo.mo/		*	*
(b) /nga.u.m.lo.mo/	*!		

Tableau 28

We observe here, as is with the examples above and below, that the features of the coalesced vowels result from a ranking of the PARSE[-F] »PARSE[+F] as well as that of IDENT[-F] » DENT[+F].

Again the same kind of coalescence also occurs at the boundary between the possessive concord /wa-/ 'of' and a vowel commencing noun. The possessive concord in Ndebele is formulated by merging together the particle /-a-/ with the subject concord of the noun in question. The process of coalescence here again yields the same vowel patterns as those hypothesized by Doke (1943) and discussed above. For evidence of this consider the following examples in **86** below.

86. (a) w***a*****- *a***bafazi [wabafazi] /a_1#a_2/→ [a_3] 'the women's'
of- 3women

(b) w***a*****- *i***nkazana [wenkazana] /a_1#i_2/→ [e_3] 'for the girl/the girl's'
of- girl

(c) w***a*****- *u***mfana [womfana] /a_1#u_2/→ [o_3] 'the young man's'
of- young man

In the above examples of coalescence in Ndebele i.e. examples **78, 85** and **86**, we again observe that the sequences of low + high vowels that occur at word-internal morpheme boundaries are realized as mid vowels, with the backness and rounding of the resulting vowel corresponding to the rounding of the second vowel in the sequence. This second vowel is again the IV or the lexical word initial vowel.

Input:/w**a**-umfazi/	**ONSET**	**PARSE[-high]**	**PARSE[+high]-lex**	**PARSE[F']-lex**	**PARSE[F']**
(a) /w<a>u.m.fa.zi/		*!			*
(b) /wa.<u>m.fa.zi/			*	*!	*
(c)☞/wo.m.fa.zi/			*		*
(d) /wa.u.m.fa.zi/	*!				

Tableau 29

Again, as with the other examples discussed above, the same asymmetry rules, the same ranking hierarchy applies i.e. deletion is motivated by a higher ranking of feature [-high] over features [+high], we observe in the above tableau, that candidate (a) violates the high ranked constraint PARSE[-high] and thus gets eliminated. Candidates (b) and (c) have almost identical violations in the table except that candidate (b) fails to preserve, in line with the established PARSE[-F] » PARSE[+F], the [-F] feature, i.e. the feature [-back] of the input vowel [i] and thus again gets eliminated.

Casali (1996) deals with this kind of asymmetric coalescence evidenced here in Ndebele and discussed above, specifically positing that it arises when both feature-sensitive and position-sensitive constraints are active in the evaluation of output candidates; that is, the feature specification [-high] must be preserved in preference to [+high], otherwise all features of the V_2 are to be preserved (c.f. Casali, 1996 and Tanner, 2007).

4.1.3. Elision/Deletion in Ndebele

Elision of V_1 is also a major hiatus resolution mechanism in many languages. While in other languages the choice of whether V_1 or V_2 occurs is subject to differences in morphological boundaries at which the vowels sequences occur as well as language internal morphosyntactic concatenations, in Ndebele there seems to be only instances of V_1 elision. In languages in which there is a choice of which vowel to elide it is largely depended on the featural qualities of the combination of vowels that would be straddling a word boundary.

While there is, in many languages, evidence to attest for the occurrence of both elisions of the first and of the second vowels in the sequences, there seems to be, in Ndebele, a higher occurrence of V_1 elision. This mostly happens when the vowel supplying V_1 is a low vowel, in most instances, the low vowel /a/ when it precedes a mid vowel. As such, the low vowel /a/ only deletes in the face of the vowels /e/ and /o/ whose features are [-high, -low]. Such kind of deletion rule is schematized as in **87** below.

87. ***Vowel Deletion Rule in Ndebele***

$$\begin{matrix} V & & V \\ [+low] & \rightarrow & \emptyset \; / \_\_\_ \; [-high, -low] \end{matrix}$$

The rule illustrates that a [+low] vowel is deleted before a mid [-high, -low] one.

We note that deletion only happens when the low vowel is juxtaposed with mid vowel. In contexts in which the same [+low] vowel is juxtaposed with the high vowels /u/ and /i/ with the

features [+high, -low] as well as a similar low vowel /a/ with the features [-high, +low], coalescence takes place. (See section 4.1.2 for such a discussion). This happens because the [-high, +low] features of /a/ and those of the mid vowels ([-high, -low]) conflict and there is no compromise vowel in between as in the case of the contexts in which the [-high, +low] vowel /a/ is juxtaposed with [+high, -low] high vowels /i/ and /u/ where the compromise is a mid vowels /o/ and /e/.

An example at which such a rule applies in Ndebele is with tense markers. At the boundary involving the present continuous tense prefixes /ngiya-/ 'I do' and /uya-/ 'he does', as well as the recent past/past tense prefixes /nga-/ 'I did' and /wa-/ 'he did' and a vowel verb (a verb whose stem begins in a mid vowel), elision of the first vowel in the sequence, the [+low] /a/ occurs in preservation of the mid vowels. Sibanda (2009) explains that this kind of deletion occurs mainly when there is incompatibility of the features in a sequence of two or more vowels.

Tenses in Ndebele are quite regularly formed and where the final vowel of the tense marker is juxtaposed with the initial vowel of the mid vowel commencing verb, the general rule that applies is that the vowel which immediately precedes the verb stem is elided. Consider the following examples in **88** below.

88. (a) ngi- ya- enz- a [ngiyenza] /a_1#e_2/→ [e_2] 'I do'

1s-Pres Cont- do- FV

(b) u- ya- enz- a [uyenza] /a_1#e_2/→ [e_2] 'He does'

2s- Pres Cont- do- FV

(c) ka- ngi- enz- i [kangenzi][51] /a_1#e_2/→ [e_2] 'I am not doing'

neg- 1s- do- FV

(d) k- a- enz- i [kenzi] /a_1#e_2/→ [e_2] 'He is not doing'

neg- 2s- do- FV

We note that in Ndebele, like coalescence and glide formation, elision does not result in a surface long vowel. This again is in violation of place maintenance constraints. Again if we were to argue that deletion is syllable structure conditioned and primarily motivated to eliminate onsetless syllables, elision of this kind is in violation of the faithfulness constraints MAX-V and MAX-IO. We illustrate this as in the tableau below.

Input: /ka-enzi/	**ONSET**	**MAX-V**	**MAX-IO**
(a) ☞/ke.nzi/		*	*
(b) /ka.e.nzi/	*!		

Tableau 30

Observe that the faithful candidate (b) violates ONSET and the constraint *VV thus gets eliminated. The optimal candidate, despite a violation of MAX-V and MAX, because it deletes an input segment and also fails to preserves the V-slots of the input in the output, eliminates the vowel sequence, thus wins. At the surface we thus can argue for the existence in Ndebele of a

[51] I however have been made aware through personal communication that this form is as a result of extralinguistic constraints. It results arguably from fast speech patterns and the 'proper resolution' of the hiatal configuration represented by the morphophonological boundary here is achieved through glide insertion. See example **91** for an illustration.

ranking system that would rather delete a segment than preserve a VV sequence, an ONSET»MAX ranking.

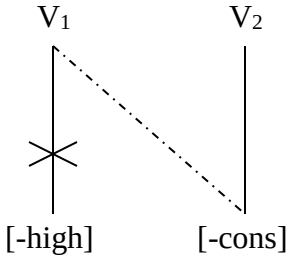
Sibanda (2009) also provides the following examples to illustrate the form of elision discussed as well as exemplified above;

89. *Deletion of the low vowel /a/ when followed by a mid vowel in Ndebele*

(a)	a- enza	[enza]	‘they are doing’
	6SM- do		
	a-ona	[ona]	‘they are spoiling’
	2SM- spoil		
(b)	be-sa-enza	[□besenza]	‘while they are still doing’
	Prog Pref-2SM-do		
	be-sa-ona	[besona]	‘while they are still spoiling’
	Prog Pref-SM-spoil		
(c)	ba-onke	[□bonke]	‘all’
	2SM-all		
	ba-odwa	[bodwa]	‘only them, alone’
	2SM- alone/only		

Elision of this kind, can also, within the explications of OT be explained through an analysis of the distribution of prevocalic vowels. In this regard non-high ([-high]) prevocalic vowels occurring in V_1 in a sequence delete. Such a process can be schematized as in **90** as follows;

90.



Deletion in Ndebele

Elision in Ndebele is thus explainable through the ranking system that subordinates the [-F'] constraints below the [+F] ones, in this case the ranking of IDENT[+F] below IDENT[-F]. We observe in line with such an observation, the following tableau.

Input:/b**a-o**dwa/	**ONSET**	**IDENT [-high]**	**IDENT [-low]**	**IDENT [+high]**	**IDENT [+low]**	**PARSE[F']**	**UNIFORMITY**
(a) /ba.o.dwa/	*!						
(b)☞/bo.dwa/					*	*	**
(c) /ba.dwa/		*!				*	**

Tableau 31

We observe in line with the thesis I have established above, i.e. the IDENT[-F]»IDENT[+F] that candidate (c) violates a constraint IDENT[-high] thus gets eliminated. On the other hand, candidate (b) despite a violation of an IDENT[+low] constraint is selected to be the optimal candidate. This is so because the constraint it violates a [+F] constraint which accordingly is ranked below the [-F] constraint group that it satisfies is ranked low in the language. Both the two candidates violate PARSE[F'] constraint though. Candidate (a) for the obvious violation of ONSET through heterosyllabification of vowels also gets eliminated.

Interesting however to note is example **88** (c) which seems to be an exception to the rule that elides low vowels in the face of mid vowels because the V_1, which also suffers from the V_1 elision rule is not a low vowel but a high vowel /i/ with the features [+high, -low]. Consider the following tableau regards such an observation.

Input:/kang**i-e**nzi/	**ONSET**	**IDENT [-high]**	**IDENT [-low]**	**IDENT [+high]**	**IDENT [+low]**	**PARSE[F']**	**UNIFORMITY**
(a) /ka.ngi.e.nzi/	*!						
(b)☞/kangenzi/				*		*	**
(c) /kanginzi/		*!				*	**

Tableau 32

I observe here again that still, the same constraint ranking applies. We note that despite the fact that the vowel supplying V_1 is a high vowel, the optimal candidate still emerges the one which in the process of vowel sequence elimination through deletion does not violate an IDENT[-F]. Violations of IDENT[+F] are tolerated in the language.

In line with this we observe that candidate (c) gets eliminated because of a violation of the feature [-high] of the input vowel /e/. On the other hand, candidate (b), the optimal candidate despite a violation of the [+high] feature of the input vowel /i/ emerges as the optimal candidate. This is so because it does not violate ant [-F] constraints. Candidate (a) for a violation of ONSET and *VV gets eliminated too.

As earlier on footnoted, personal communication has directed me to a different analysis of the example analysed in the tableau above. The resolution of the vowel sequence should ordinarily be through glide epenthesis and not elision. This is so because the features of the vowels at the morphological boundary point towards conditions that favour that kind of repair strategy (c.f. example in Chichewa and Chitumbuka). In this regard the resolution of hiatus here should be achieved as follows;

91. ka- ngi- enz- i [kangiyenzi] /a_1#e_2/→ [e_2] 'I am not doing'
neg- 1s- do- FV

The resolution through elision, while seeming to be in line with the IDENT[-F']»IDENT[+F'] constraint ranking hierarchy used for the analysis of elision data as highlighted above is a result of extralinguistic constraints governing language use and speech patterns. This however is not a conclusive argument and warrants further independent research.

Elision in Ndebele therefore can be argued to be motivated by both the need to eliminate vowel sequences as well as is ONSET driven. As such, it occurs through a ranking system that aims at preserving the [-F'] features over the [+F'] features. This ranking hierarchy also successfully predicts the selection of optimal candidates in coalescence in the language as we also not that coalescence occurs in cases where there is a vowel sequence /a/ with the features [-high, +low] and either of the high vowels /i/ or /u/ both with the features [+high, -low].

We note that the resultant vowels from the mergers of the vowels are the mid vowels /e/ and /o/, both with the features [-high,-low] which preserve the [-F] above the [+F] by failing to parse the [+low] and [+high] features of the input low and high vowels respectively. Thus in the process justify the constraint ranking hierarchy of IDENT[-F']»IDENT[+F'].

4.3. Identification, resolution of vowel sequences in Chitumbuka

This section identifies morphological as well as phonological boundaries at which vowel sequences occur within Chitumbuka. It also discusses the resolution of such hiatal configurations through different phonological processes discussed in Chapter 2 and how these can be explained to be resolved through the ranking of constraints within the explications of OT.

4.3.0. Chitumbuka vowel and syllable structure(s)

Like Chichewa and other Bantu languages, Chitumbuka is a five vowel phoneme system language. It resembles most Southern Bantu languages (Doke 1954, 54). All of the five Chitumbuka vowels [i, a, e, o, u] are typically short. There are twenty six (26) consonants in the language. There are also no true diphthongs in Chitumbuka. This again I would argue is because of a dispreference of complex nuclei. We observe in line with this argument that in conditions suiting diphthongization, the language would prefer the creation of complex onsets through gliding over that of complex nuclei through diphthong formation.

The following diagram illustrates a comparison between the places articulation of Chitumbuka vowels compared to cardinal vowels which in the diagram are marked 1 to 8 as reflected on the IPA chart.

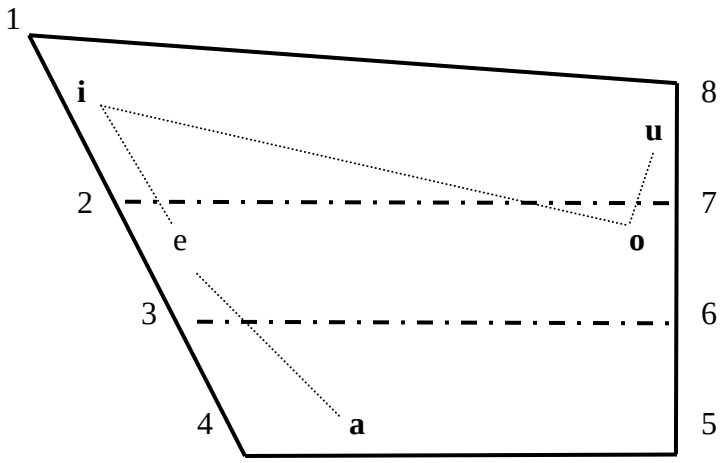


Fig. 4: Chitumbuka vowel structure

Chitumbuka vowels are articulated slightly lower than their cardinal vowel equivalents. This applies specifically to both the front vowels, the high /i/ and mid /e/ as well as the two back vowels, the mid /o/ and high /u/. The four vowels are articulated lower than their equivalents, cardinal vowels 1, 2, 7 and 8. The low vowel /a/ in Chitumbuka is articulated slightly more to the front than its cardinal vowel equivalent. The distinctive features of these vowels as represented on the above chart are as follows (**NB:** The features diagram also supplies redundant values);

	i	**e**	**a**	**o**	**u**
BACK	-	-	-	+	+
HIGH	+	-	-	-	+
LOW	-	-	+	-	-
ROUND	-	-	-	+	+

In the language, syllables basically assume the V, C, and the canonical CV structure. The V structure like in Chichewa and many other Bantu languages only occurs word initially as in the example **92** below:

92. ***V.CV structure***

(a) a.ma.ma	V.CV.CV	'mother'
(b) a.βo	V.CV	'them'
(c) a.na	V.CV	'children'
(d) u.yu	V.CV	'this one'

The syllable structure C only occurs rarely and occurs as a syllabic nasal in which the morpheme /mu/ may be realised as /m/ symbolised as /m'/ (cf. Vail, 1972). This is evident in such words as those in example **93** below:

93. ***C.CV structure***

(a) mu.lo.nda	[m'.lo.nda]	'watchman'
(b) /mu.ka.nda	[m'.ka.nda]	'bead'
(c) /mu.nji.li/	[m'.nji.li]	'warthog'
(d) /mu.M.zi.mba/	[m'.M.zi.mba]	'in Mzimba'

The canonical CV syllable structure is the commonest. In this regard, the V-slot in the structure is always filled by a vowel whereas the C-slot can be filled by either C, Cw, Cy, NC or NCw.

94. ***CV structure***

(a) to.pa ‘we are afraid’

(b) chi.fu.kwa ‘reason’

(c) ta.yi.ma ‘we have stopped’

(d) chi.so.po ‘worship’

(e) pu.la.ni ‘pound’

Again, as with most Bantu languages, the syllables of Chitumbuka are largely open and CV, consisting of an onset (consonant) and a peak (vowel). The language also exhibits evidence of constraints that militate against the occurrence of vowel sequences. While this could be due to the desire to preserve the Canonical CV syllable structure, it could also be resulting from the desire for the elimination of onsetless syllables**.**

4.3.1. Glide Formation/Epenthesis in Chitumbuka

Chitumbuka is also another language that seems to disprefer complex nuclei. As such, it avoids dipthongisation in preference for glide formation. Complex onsets are thus preferred over complex nuclei. There are basically two glides in Chitumbuka and these are the /y/ and /w/ phonemes. Glide formation in the language takes the forms of insertion (glide epenthesis) and morphophonemic change.

In Chitumbuka, on the morphophonological level, /mw-/ is an allomorph of the prefixal allomorph /mu-/ where the prefix /mu-/ occurs before the vowels /i, e, a/. In such instances, the rule [u → w/vowel] discussed as morphophonemic change in Shona and Luganda examples in

Chapter 2 (c.f. examples 16 and 18) occurs. This phonological and/or morphological change of the noun prefix vowel **[u]** to a dissimilating **/w/** or a glide /ʷ/ results from a juxtaposition of vowels at a morphological boundary and motivated by the need to eliminate vowel sequences while in the same process maximizing segmental, featural and articulatory identity as exemplified in **95** below:

95. (a) m***u***- ***i***mb-i [mwi.mbi] /u_1#i_2/→[w_1i_2] 'singer'

1NP- sing- FV

(b) m***u***- ***e***zi [mwe.zi] /u_1#e_2/→[w_1e_2] 'month, moon, menses'

3NP- moon/month

(c) m***u***- ***a***na [mwa.na] /u_1#a_2/→[w_1e_2] 'child'

1NP- child

As with Chichewa and Ndebele, such a process is, because of the need to preserve the above highlighted features i.e. identity between the input and the output, always in violation of *CG as well as other faithfulness constraints such as UNIFORMITY and IDENT(μ). Because it also occurs with no compensatory lengthening of the surface vowel, the process also violates other faithfulness constraints like MAX-IO and MAX-V(place). These however as is evidenced by the available data must be lowly ranked by the language. We consider in line with the foregoing, the following tableau.

Input:/m**u-a**na/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT[±low]**	**IDENT(μ)**	**UNIFORMITY**
(a) /mu.a.na/	*!					
(b)☞/mwa.na/					*	**
(c) /ma.na/		*!	*(!)	* (!)	*	**
(d) /mu.na/		*!	*(!)	* (!)	*	**
(e) /mo.na/		*!	*(!)	* (!)	*	**

Tableaux 33

Again, we note, as with the case with the other two study languages as well as other Bantu languages, that the most faithful of candidates (a) eliminates itself by preserving the vowel sequence. Candidates (c) and (d) fail to preserve the features of the other input vowels that they delete. Candidate (e) on the other hand which represents symmetric coalescence gets eliminated because for one, Chitumbuka coalescence is asymmetric (conditioned by the serial ordering of vowels in the sequence) and also because if fails to preserve some features of either of the vowels.

Candidate (b) while in violation of IDENT(μ) because of a loss in mora count (due to the V_1 attaching itself to the prefix consonant) still emerges the optimal candidate. This is so because, since the glide formed is identical in features to the vowel that forms it, it manages to preserve features of both input vowels in the output as well as maximizes articulatory identity. Gliding thus, in Chitumbuka, is largely motivated by such factors as articulatory as well as feature preservation.

The analysis of the /w/ phoneme, according to Vail (1972) is however somehow complex in Chitumbuka. It can be used to as an off glide, an epenthetic glide or can surface as a full consonant morpheme occupying a C position in the canonical CV structure of Chitumbuka syllables. In this regard, consider the following examples in **96** extracted from Vail (1972).

96. (a) ku- wil-a /ku.wi.la/ 'to swallow'
inf- swallow-FV

(b) ku- vil-a /ku.βila/ 'to boil'
inf- boil- FV

The same /w/ also functions as a euphonic glide (consonantal epenthesis segment) between vowels in intervocalic contexts (breaking vocalic hiatus contexts). The /w/ phoneme associated with such a phonological phenomenon is described phonemically by Vail (1972) as an off glide. Consider the following examples in **97** largely extracted from Phiri (1980)**.**

97. (a) /u.a.na/ → /wa.na/ 'childhood'

(b) /mi.se.u/ → /mi.se.wu/ 'roads'

(c) /ma.u.si.ku/ → /ma.wu.si.ku/ 'nights'

On the other hand, despite the fact that it can occur in Chitumbuka as a full consonant capable of filling the C-slot on the canonical CV syllable structure, the phoneme /y/ like the phoneme /w/ also occur in intervocalic contexts as a euphonic optional glide. This can either be intervocalically (especially when V_2 in the configuration is /i/, /e/ or /a/) or word initially.

Consider the following examples in **98** in which there is hiatal configuration at the functional word- lexical word boundary (infinitive /ku-/ and a vowel commencing verb).

98. (a) k***u***- ***i***mb- a /ku.yi.mba/ /u_1#i_2/→[u_1 ***y*** i_2] 'to sing'
inf- sing- FV

(b) k***u***- ***i***m- a /ku.yi.ma/ /u_1#i_2/→[u_1 ***y*** i_2] 'to stand'
inf- stand- FV

(c) k***u***- ***e***nd- a /ku.ye.nda/ /u_1#i_2/→[u_1 ***y*** i_2] 'to walk'
inf- walk- FV

(d) k***u***- ***a***mb- a /ku.ya.mba/ /u_1#i_2/→[u_1 ***y*** i_2] 'to start'
inf- start- FV

(e) k***u***- ***o***ch- a /ku.wo.cha/ /u_1#i_2/→[u_1 ***w*** i_2] 'to roast'
inf- roast- FV

We must observe however that the choice of whether the glide inserted is the /y/ or the /w/ phoneme is not subject to random decision but is influenced by the features of the V_2 in the configuration. This is so as we observe that the glide inserted is identical in backness with the V_2 i.e. the glide /w/ is inserted when the V_2 is has the feature [+back] as is the case with **98** (e) above in which the vowel /o/ on V_2 position has the features [+back] and the /y/ phoneme is inserted when the vowel supplying V_2 has the feature [-back] as is the case with the rest of the examples in **98**, in which all the vowels in V_2 position are non-back vowels.

We note thus that glide insertion here, invariably in violation of DEP-IO and UNIFORMITY is motivated by the need to eliminate the hiatal configuration as well as preserve the featural integrity of both the input vowels. Consider the following tableau.

Input:/k**u-i**mba/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT [±low]**	**MAX-V**	**DEP-IO**	**UNIFORMITY**
(a) /ku.i.mba/	*!						
(b)☞/ku.yi.mba/						*	**
(c) /ku.mba/		*!					**
(d) /ki.mba/		*!					**
(e) /kwi.mba/					*!		**

Tableau 34

We observe that glide insertion here is conditioned by a ranking of PARSE[F'] above DEP-IO. The language would rather insert a segment than delete one. Because both vowels share the features [+high, -low], the candidates (c) and (d) despite deletion are still not in violation of the PARSE[±high] and PARSE[±low] constraints, we can argue that they get eliminated for failing to parse other features of the vowel they delete, in this regard the feature [±round] (incorporated in PARSE[F']). This is so because (c) fails to parse the [-back] feature of the input vowel /i/ while candidate (d) fails to preserve the [+back] feature of the input vowel /u/. I would argue that candidate (e) despite satisfying the featural and articulatory preservation demands of the language gets eliminated because it fails to preserve place (V-slots to be precise) and thus is in violation of IDENT(μ) as well as MAX-V.

We also observe that in Chitumbuka, the same conditions that give rise to this kind of glide formation/morphophonemic change rule application also give rise to another form of glide insertion. In this regard, we observe evidence from Phiri (1980) who observes that the above examples that yield the glide formation discussed above can also yield glide epenthesis in the following manner as in **99**[52]**.**

99. (a) ku- enda [kwenda] or [kuyenda] 'to walk/go'

(b) ku- imba [kwimba] or [kuyimba] 'to sing'

Or elision in the following manner indicated in **100** below;

100. (a) ku- ovwila [kovwila] or [kuyovwila] 'to help'

(b) ku- ocha [kocha] or [kuyocha] 'to burn'

In the instances that elision occurs, it is V_1 elision (the deletion of the prefix final vowel). This can be argued to be due to the existence of a constraint MAXLEX that dictates the preservation of all segments of the lexical words. See section 4.3.3 for a detailed discussion on this. I would observe however at this point that these variations could be due to dialectical variations or at last some 'extralinguistic constraints'[53] in language use.

As part of this morphophonological process, on a morphological level, the phoneme /**my-**/ is an allomorph of /**mi-**/ and /**vy-**/ is an allomorph of /**vi-**/. These morphophonemic variants occur only

[52] The constraint ranking hierarchies for the variation if either glide formation and glide insertion are represented in tableaus 33 and 34 respectively.
[53] See Mtenje (1992) for a discussion of such kinds of linguistic behaviours.

in environments in which the traditional phoneme of prefixal morphemes /mi-/ and /vi-/ are brought intervocalically with/together with stems that commence in vowels. This we can argue, occurring only in hiatal configuration is a change that is triggered by the need to eliminate vowel sequences. We consider the following examples in **101.**

.

101. (a) m***i-*** ***o***to [myo.to] /i_1#o_2/→ [y_1o_2] ‘fires’

4NP- fire

(b) m***i-*** ***u***lu [myu.lu] /i_1#u_2/→ [y_1u_2] ‘heaps of dry stalks’

4NP- heap of stalks

(c) v***i-*** ***e***ya] [vye.ya] /i_1#e_2/→ [y_1e_2] ‘body hairs’

8NP- body hair

(d) v***i-*** ***a***ka [vya.ka] /i_1#a_2/→ [y_1a_2] ‘years’

8NP- year

` **(Examples here are largely taken from Vail, 1972)*

Gliding of this nature results primarily from an ONSET driven repair to vowel sequences. The resultant complex onsets comprising of a consonant + glide is invariably in violation of the constraint *CG (which militates against the surface realization of complex onsets). Gliding here thus results from a bid to maximize segmental identity between the input and the output. Because we observe from the data that if the V_1 contains features that can be contained in a glide i.e. [+high] and/or [+round] it undergoes gliding. This ensures the maintenance of its features.

To this end, the resultant surface form from such morphological concatenations result primarily from a high ranking of ONSET above *CG as illustrated in the tableau below.

Input: /v**i-e**ya/	**ONSET**	***CG**
(a) ☞/v.ye.ya/		*
(b) /vi.e.ya/	*!	

Tableau 35

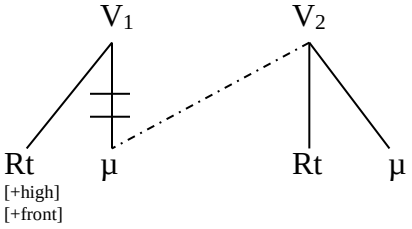
Based on such evidence in Chitumbuka, we can argue that in a bid to preserve the canonical syllable structure (CV), as well as maximize segmental identity between the input and the output, if the V_1 (which in most cases is the prefix vowel) contains the features that can be contained in a glide i.e. the features [+high] and/or [+round] it glides.

However, we note that, as with many other Bantu languages, vowels that glide in Chitumbuka are only those that occur in V_1 position preceding all other vowels except the mid back vowel [o] (at which boundary elision and not gliding takes place). If the vowels with the feature specifications that can be contained in glides occur in V_2 position, other repair strategies take precedence We also note here that in Chitumbuka the vowel that glides does not necessarily need to have the feature [+back] as is the requirement with other languages[54]. We thus in line with this thesis can argue for some form of asymmetric approach to glide formation in the language.

[54] C.f. Ndebele and Chichewa in which the vowel /i/ even though occurring in V_1 position does not undergo gliding because, despite having the features [+high, -low], it has the feature [-back] and not [+back] as does the vowel /u/ that glides in the languages.

This form of gliding in Chitumbuka can be observed to be similar to that which occurs in Ciyao/Yao (another Malawian language largely spoken in the southern parts of the country) in which as Tanner (2007) expresses it, the initial high vowel (V_1) which is normally the prefix vowel (plural noun prefix in most instances as well as in the examples above) undergoes delinking with its associated mora, which in the process of attempting mora preservation, attaches to V_2. The V_1 however continues to maintain its attachment to the root node. In doing this, there is the preservation of articulatory features as well as V-slots (bearing in mind that the glide formed is a semi vowel). Such a process is schematized as follows;

102.



(Gliding of high prefix vowels in Chitumbuka)

Within OT, such kind of gliding as schematized above and exemplified in **101** and can be argued to be primarily motivated by the need to avoid hiatuses as well as place feature maintenance. In the case of the Chitumbuka data in question, as illustrated in **101** we observe that its motivation is the elimination of intervocalic contexts as well as the elimination of onsetless syllables. This is in respect to a high ranking of both *VV and ONSET respectively.

Input:/v**i-e**ya/	**ONSET**	**PARSE[F']**	**IDENT [±high]**	**IDENT [±low]**	**IDENT(μ)**	**UNIFORMITY**
(a) /vi.e.ya/	*!					
(b)☞/v.ye.ya/					*	**
(c) /ve.ya/		*!	*(!)		*	**
(d) /vi.ya/		*!	*(!)		*	**

Tableau 36

The most faithful of candidates (a) eliminates itself by preserving the vowel sequence. Candidates (c) and (d) fail to preserve some features of the other input vowels that they delete i.e. (c) fails to preserve the [+high] feature of the input vowel /i/ while (d) fails to parse the [-high] of input /e/. Candidate (b) while in violation of IDENT(μ) because of a loss in mora count emerges the optimal candidate. This is so because the glide formed is identical in features to the vowel that forms and thus it preserves the height, rounding as well as backness features of both input vowels in the output. In the process it also maximizes articulatory identity.

What is evident in Chitumbuka glide formation, as is with Chichewa and Ndebele glide formation as well as is indicated by the tableau above, is that despite evidence of a ranking of IDENT[+F] above IDENT[-F], glide formation here avoids the violation of both these sets of constraints by maintaining the featural identity of all input segments. Rather, we observe that the language elects to violate moraic identity in preference of articulatory as well as featural identities.

4.3.2. Coalescence in Chitumbuka

Like most Bantu languages, Chitumbuka also employs coalescence as a vowel sequence resolution mechanism. Coalescence in Chitumbuka largely occurs when a vowel is juxtaposed to another vowel of the same quality. In such a scenario, the two vowels merge into a corresponding vowel of the same height. As in Chichewa and other languages such as Etsako and Chicano Spanish, this process of coalescence in Chitumbuka is also characterised by the lengthening of the resultant vowel – compensatory lengthening[55]. This occurs in a bid to preserve the V-slots. This again results from the high ranking of MAX-IO. The rule that thus, applies here again is the;

103. $V_1V_2 \rightarrow V_{1,2}$ [+long]

Or, as Mtenje (1980) (c.f. 4.1.2) expresses it,

104.

$$\begin{bmatrix} +\text{syll} \\ -\text{cons} \end{bmatrix}_1 \quad \begin{bmatrix} +\text{syll} \\ -\text{cons} \end{bmatrix}_2 \quad \rightarrow [+\text{long}]\ \text{ø}_1$$

In this same vein, we consider the following examples in **105** below;

105. (a) won***a*** **-** ***a***po [wona:po] $/a_1\#a_2/ \rightarrow [a:_{1,2}]$ ‘look there’

look - there

[55] An interesting observation indicates that what we argue to be compensatory lengthening here could otherwise be also penultimate lengthening. I believe such an observation warrants further investigation.

(b) n***a*** - ***a***kulu [na:kulu] /a_1#a_2/ → [a:$_{1,2}$] ‘with [my] brother’

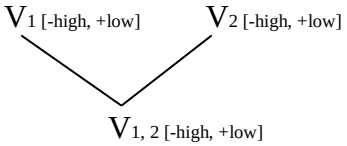
with - brother

(c) n***a*** - ***a***wiske [na:wiske] /a_1#a_2/ → [a:$_{1,2}$] ‘with his/her father’

with - father

Again, the same rule that applies to Chichewa coalescence (c.f. example **49**) also applies here, in which the output segment, the long vowel resulting from the fusion/coalescence of identical vowels maintains the featural qualities of the initial two input vowels. The output segments remain faithful to their respective input correspondents in featural identity since the input segments are identical in the input. In this regard, this form of coalescence in Chitumbuka, exemplified in **105** above, is summarised as in example **106** below.

106.



(Fusion of identical vowels /a+a/→/a:/ in Chitumbuka)

Coalescence in Chitumbuka, again, as is with other languages such as Chichewa, Ndebele and Shona is also invariably in violation of the constraints IDENT and IDENT-IO, constraints which militate against the merging of segment initially independent in the output. The violation of the two constraints in many cases, (as is with the Chichewa data), is again motivated by the need to preserve the higher ranked constraint ONSET, thus result form the ranking hierarchy ONSET»IDENT-IO (IDENT) »Uniformity.

I here would again argue that coalescence in Chitumbuka is among other reasons like feature maintenance is ONSET driven. Among other reasons, it seems to be primarily motivated at avoiding the surface realisation of heterosyllabic vowels in the output forms as the following tableau would show:

Input: /n**a-a**kulu/	**ONSET**	**IDENT**	**IDENT-IO**	**UNIFORMITY**
(a) ☞ /na:.ku.lu/		*	*	*
(b) /na.a.ku.lu/	*!			

Tableau 37

Interesting to note at this point regards coalescence in Chitumbuka is that the phonological process is in line with the Dokean (1943) thesis on coalescence in Bantu languages which was discussed in Chapter 2 and which summarises that when vocalic hiatus contexts are resolved through coalescence, they result in the vowels summarised as;

107. /a + a /→ [a]

/a + i /→ [e]

/a + u /→ [o] (c.f. example **5**)

As is with Chichewa and Ndebele, motivated by the need to prevent the surface realisation of onsetless syllables, coalescence is also always invariably in violation of, in addition to IDENT-IO(F), UNIFORMITY, which disprefers a situation in which two segments that are distinct in the

input are merged as a single segment in the output. This again is in a bid to militate against the violation of the higher ranked constraint, ONSET.

We consider the following tableau in which similar low vowels [a + a] coalesce into a featurally identical low but long vowel [a:].

Input: /z**a-a**na/	**ONSET**	**MAX-V**	**DEP-IO**	**IDENT-IO**	**IDENT-IO(F)**	**UNIFORMITY**
(a) /na.a.ku.lu/	*!					
(b)☞/na:.ku.lu/						**
(c) /na.ku.lu/		*!			*(!)	**
(d)/na.wa.ku.lu/			*!	*		**

Tableau 38

Because we argue for ONSET and feature/segmental preservation driven coalescence candidate (a) fails to eliminate the VV sequence thus gets eliminated, candidate (c) despite eliminating the sequence and preserving the featural qualities of the initial vowels deletes a segment (if we argue for this to be elision) or fails to maintain segmental identity by not maintaining the V-slots (if we argue for this to be coalescence with no compensatory lengthening), candidate (d) eliminates the hiatal configuration but however inserts a segment and thus violates DEP-IO which is a high ranked constraint. Candidate (b) thus is the optimal candidate in that, not only does it eliminate the hiatal configuration, it does so in a manner that maximizes segmental identity as well as maintaining featural identity at the expense of violating the lower ranked constraint UNIFORMITY.

Coalescence in Chitumbuka is also largely similar to coalescence in Ndebele (c.f. **78** *(d) – (f)* in section **4.1.2.**). The only difference between the two languages is that in Ndebele it occurs with no compensatory lengthening as there are no underlying and/or surface long vowels in Ndebele, whereas Chitumbuka has them. We argue thus, that the lengthening of the resultant coalesced vowel is here again motivated by a high ranking of constraints that demand place maintenance. In this regard, the compensatory lengthening of the surface vowel is motivated by a higher ranking of the faithfulness constraints MAX-V(Place) and IDENT-IO(F). This is done in a bid to achieve maximum segmental identity.

4.3.3. Deletion/Elision in Chitumbuka

Elision is another viable option to repairing hiatal configurations in Chitumbuka. Deletion occurs mainly due to incompatibility of the features of the vowels straddling a word boundary. As posited earlier on, one of the boundaries at which elision takes place in Chitumbuka is in intervocalic contexts involving the prefixal allomorph /-u-/ vowel and a vowel commencing stem. As earlier underscored, at such a boundary, there are two possibilities to resolve hiatal configurations, the first being morphophonemic change (glide formation) as discussed in example **76** above as well as deletion of the prefixal allomorph vowel in the face of an onsetless stem.

Deletion however occurs only when the V_2 in the intervocalic context is the non-low vowel /o/ as indicated by example **108** below.

108. (a) ku- ovwila [ko.v.wi.la] ‘to help’

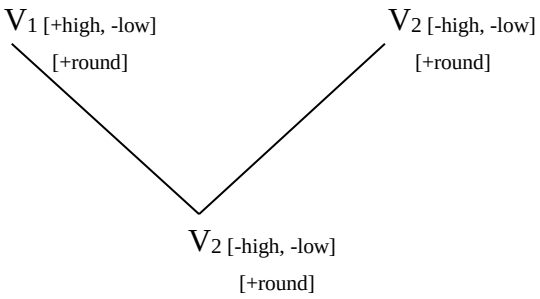
inf- help

(b) ku- ocha [ko.cha] ‘to burn/roast’

inf- burn/roast

The question that arises is what conditions elision or glide formation? That is to say, why does deletion and not glide formation occur here? At first approximation, because of the quality of vowels involved in the two processes I would propose that deletion only takes place at such a boundary if the vowel supplied by the stem has the feature [+back] and is also a non-low vowel as evidenced by the deletion of the [+high, -low] and [+back] vowel /u/ in the face of another high vowel (in the current circumstances the [-high, -low] and [+back] vowel /o/). This process can be schematized as below:

109.



Deletion of high vowels in Chitumbuka

I note this here in light of the observation that in circumstances in with the high back vowel is juxtaposed with the [-high, -low] features containing /e/ glide formation/insertion and not deletion occurs. This is so because the vowel /e/ has the feature [-back] whereas the other mid

vowel /o/ despites also containing the features [-high, -low] has the feature [+back]. Consider the comparison of such in **110** below;

110. (a) ku- ocha [ko.cha] 'to burn/roast'
inf- burn/roast

(b) ku- enda [kwenda] or [kuyenda] 'to walk/go'
inf- go/walk

(c) ku- imba [kwimba] or [kuyimba] 'to sing'
inf- sing

We observe that in all the examples above, all of the vowels supplying V_2 largely have the features [-high, -low] except example (c) in which the vowel /i/ has the features [+high]. We also observe that in line with the foregoing argument, there is vowels deletion in **110** (a) whereas there is glide formation/insertion in **110** (b) and (c). The deletion rule in Chitumbuka thus can be represented as follows:

111. ***Vowel Deletion Rule in Chitumbuka***

V V

` [+high] □ → ø /___ [+back]

*(*The rule stipulates that high vowels delete in the face of back vowels).*

At first approximation, because deletion in Chitumbuka does not result in a compensatory lengthened surface vowel, it is primarily in violation of the faithfulness constraints FAITH-V and

MAX-IO. However, since these violation are subject to a desire to eliminate vowel sequences, we argue that the faithfulness constraints must be ranked lower than the constraints that militate against the surface realization of vowel sequences, in this regard ONSET and *VV. Such a ranking is as follows:

Input: /k**u-o**cha/	**ONSET**	**FAITH-V**	**MAX-IO**
(a) ☞ /ko.cha/		*	*
(b) /ku.o.cha/	*!		

Tableau 39

We observe however that such form of deletion is also conditioned by the same ranking hierarchy that conditions gliding and coalescence in the language as well as in Ndebele too, i.e. the subordination of all [+F] feature constraints below [-F] constraints. We consider the following tableau.

Input:/k**u-oc**ha/	**ONSET**	**IDENT [-high]**	**IDENT [-low]**	**IDENT [+high]**	**IDENT [+low]**	**PARSE[F']**	**UNIFORMITY**
(a) /ku.o.cha/	*!						
(b)☞/ko.cha/				*		*	**
(c) /ku.cha/		*!				*	**

Tableau 40

As is the case with V_1 elision in Ndebele, we observe here again in line with the basic ranking established above, i.e. the IDENT[-F]»IDENT[+F] that candidate (c) violates a constraint

IDENT[-high] thus gets eliminated. On the other hand, candidate (b) despite a violation of an IDENT[+high] emerges the optimal candidate. This is so because the constraint it violates is a [+F] constraint which accordingly is ranked below the [-F] constraint group, constraints that it satisfies as it does not violate both the IDENT[-high] and the IDENT[-low] constraints. Both the two candidates violate PARSE[F'] constraint though as they delete features. Candidate (a) for the obvious violation of ONSET and *VV through heterosyllabification of vowels also gets eliminated.

In the same vein, in line with deletion rule established above, when the same noun prefix morpheme /mu-/ which undergoes morphophonemic change in the face of the vowels /a/, /e/ and /i/ (c.f. example **101**) however occurs before the [+back] vowels /o/ and /u/ elision of the initial vowel (the [+high] prefixal vowel /-u-/) takes place instead of morphophonemic change. Consider the examples in **112** below.

112. (a) m***u***- ovwili [mo.v.wi.li] /u_1#o_2/→[o_2] 'helper'
1NP- help

(b) m***u***- ***u***lu [mu.lu] /u_1#u_2/→ [u_2] 'heap of stalks'
3NP- heap of stalks

The choice to elide l would argue, in line with the ranking system proposed above would thus be represented for the above examples as in the following tableau:

Input:/m**u-o**vwili/	**ONSET**	**IDENT [-high]**	**IDENT [-low]**	**IDENT [+high]**	**IDENT [+low]**	**PARSE[F']**	**UNIFORMITY**
(a) /mu.o.v.wi.li/	*!						
(b)☞/mo.v.wi.li/				*		*	**
(c) /mu.v.wi.li/		*!				*	**

Tableau 41

Candidate (a) here violates *VV and ONSET which are high ranked constraints and causes it to get eliminated. Candidate (c) violates the [-F] feature IDENT[-high] and thus also gets eliminated. Candidate (a) despite a violation of IDENT[+high] is not eliminated because the constraint it violates is ranked below the [-F] constraints.

The analysis used in determining the optimal output in elision contexts above is problematic and fails to predict the deletion process that results on the surface form realized in **112** (b) in which the vowels are identical and both have the similar features, i.e. [+high, -low] as well as [+back]. We observe the following tableau.

Input:/m**u-u**lu/	**ONSET**	**IDENT [-high]**	**IDENT [-low]**	**IDENT [+high]**	**IDENT [+low]**	**PARSE[F']**	**UNIFORMITY**
(a) /mu.u.lu/	*!						
(b)☞/mu.lu/							**
(c) ☹ /mu:.lu/							**

Tableau 42

We observe that it's really not clear as to whether we can say that the process that occurs here is coalescence or it is deletion of a vowel. This is so because both processes, since the vowels in question are identical in features manage to preserve the featural integrity of both input vowels. We argue though now that since elision in Chitumbuka does not occur with compensatory lengthening and identity coalescence does (c.f. example **105**), because the optimal candidate does not result in the surface realization of a long vowel as coalescence represented by candidate (c) does, then it must be deletion and not coalescence and therefore candidate (c) falls away for violation of NLV!!

Here again, the problem one faces is of the incompatibility and non-applicability of the constraint ranking [-F']»[+F] as in this case the two vowels are identical in features. The best conclusion one can reach here is the one established in the earlier stages of this discussion, that is, all vowels with the feature [+back] occurring in V2 and are preserved in the face of a high vowel occurring in V_1which in this case deletes.

The choice to either elide of form a glide is not readily explainable. I would, in the absence of such a ready explanation propose dialectical variation or inconsistencies in the orthography of the language to be the cause of such a variation. This however requires independent research.

4.4. Conclusion

We note, having analysed the data in the sections above that as a general rule, Bantu languages disprefer the occurrence of vowel sequences. In other words, taking a cue form the data analysed for the three languages above, we note that there are 'rules' within the languages, both phonetic and phonological that 'conspire' against the occurrence of such hiatal configurations. We also

note that these ‘conspiring rules’ are largely syllable structure rules that in most cases are aimed at the preservation of the standard canonical CV syllable structure. For our purposes here, we observe that these so called rules are merely conflicts among constraints operational within the individual languages. In other words, we note that the repair of hiatal configurations in the languages, as observed in the discussions above, are due to a system of the interaction and ranking of a set of universal constraints (as enunciated in Chapter 3).

We also note that regards the resolution of hiatal configurations, as shall be further illuminated in the following chapter (which summarises a comparative analysis of the repair strategies discussed in this chapter) that the constraint interactions as well as the hierarchical ranking of constraints system that govern and condition repair strategies here are largely motivated by the need to preserve the [-F’] constraints which are ranked higher than the [+F’] constraints. We conclude thus by observing that in almost all of the resolution of VV sequences discussed in this chapter, there seems to be e desire to preserve the [-] feature(s) if at all any one of the vowels in the sequence(s) contain them. This is done at the obvious violation of the [+] features. Where the feature specifications of both vowels are identical, then identity coalescence takes place.

Chapter 5

Conclusions and Recommendations

5.0. Introduction

This chapter is the conclusion of the current research. As such, it summarises the research findings as set out to be studied in Chapters 1-3 and as presented in the previous chapter (Chapter 4). The chapter sets out thus to discuss whether the research objectives as set out in Chapter 1 have been achieved. In doing this the chapter summates the goals of the research (measured against the obtained and presented data) and presents the synoptic account of vowel sequence repair and repair strategies in hiatal contexts cross linguistically i.e. within the three languages under study here.

The chapter sets out to also conclude on the discussion on the similarities and/or differences in vowel hiatus repair strategies in the languages of study as set out to be studied in the previous chapters. Finally, the chapter presents in a nutshell the shortcomings of this thesis as observed by the researcher at the conclusion of the research. In this regard, it offers suggestions for further research studies that could address any shortcoming that this research could have addressed and /or might failed to address due to a host of factors that include among others resources, time and space. The researcher, all the same, at the conclusion of the current research hopes that despite any shortcomings that could be noted from within the thesis, it will also make a contribution to the pool of research in Bantu languages' phonology. I hope that with all its shortcomings, the

thesis will contribute to the pool of existing knowledge, and be able to open up debate as well as encourage other studies on Bantu phonology.

5.1. General Conclusions

The major general conclusion that we draw from the discussion and analysis of data in this research is that, largely, in Bantu languages sequences of vowels (occurring intervocalically that is) resolve differently depending on language specific internal rules/reasons. Within the explications of OT as enunciated in this thesis, these 'rules' and reasons are to be found within a theory of conflicts among constraints (largely known as *constraint interaction and ranking*). As earlier on mentioned in Chapter 3 these constraints are largely similar and universally apply to all languages.

As such, we argue that differences in the manner in which a given repair strategy is elected over others at hiatal configurations in different languages is evidence of differences in the hierarchical ranking of this set of universal constraints by the different languages in question. Differences in the selection of repair strategies at similar/almost similar morphological boundaries in different languages are also a result of differences in the ranking of this universal set of constraints by the different languages.

However, as a general conclusion we can argue that the choice of which repair strategy a particular language elects over others when confronted with these undesired phonetic and phonological complexes, as observed from the data discussed in the previous chapter, depends largely on the vowel features specifications of the two vowels that would be straddling a word

boundary. Resolutions of vowel sequences are thus in this regard as a result of incompatibilities of the features of the combination of vowels juxtaposed at a word/morphological/morpheme boundary.

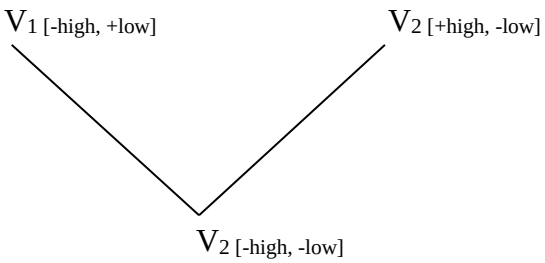
Generally, such configurations are resolved by Coalescence when the two vowels are identical in features (c.f. Ndebele, Chichewa and Chitumbuka), by Glide Formation/Epenthesis if the first vowel in the sequence is a high vowel, which must also contain either of the feature specification [+back] and/or [+round]. This is largely so in Ndebele and Chichewa. However, in Chitumbuka, the other high vowel /i/ which has the feature specifications [-back] as well as [-round] (features in direct contradistinction to the general acceptable feature of glides as enunciated above), also surfaces as a glide in hiatal contexts if it occurs in V_1 position. Nomatter that it occurs in that position, the vowel /i/ never surfaces as a glide in both Ndebele and Chichewa. This is so because in order to turn into a glide in the two languages, a vowel must not only have the feature [+high] but the feature [+back] and/or [+round].

5.1.1. Coalescence

We note, by observing instances in which coalescence occurs in Bantu languages with dissimilar vowels that it is largely asymmetric coalescence, i.e. the resultant surface vowel is determined by the serial ordering of the vowels at the boundary (the feature specifications of the vowels in the VV sequence). It is also observed that in instances where coalescence takes place with dissimilar vowels the sequence of vowels would be that of a low vowel – high vowel and the resultant vowel being a non-high vowel i.e. a mid vowel.

Consider example **113** below which is also extracted from several other examples from Chapter 4.

113.



Coalescence of low + high vowels in Bantu languages.

Such a kind of coalescence which takes place in both Ndebele and Chitumbuka also follows in line with the [-F] » [+F] thesis established above in the sense that the resultant mid vowel neutralizes the [+F'] ([+] features) of both vowels, i.e. the [+low] of the low vowels and the [+high] of the high vowels resulting in a vowel that contains the features specifications [-high] and [-low].

This is explainable by observing that coalescence where coalescence occurs with dissimilar vowels, we note that it only occurs when the vowel supplying V_1 is a low vowel. This is the case in almost all instances of coalescence discussed in this research were coalescence takes place when we have a juxtaposition of the [-high, +low] /a/ and the vowel supplying V_2 being a high vowel, in this case, either the high front vowel /i/ or the back high vowel /u/. We observe this kind of asymmetric behavior from the data that we presented for two of the three languages (Ndebele and Chitumbuka) which yields the results schematized above and represented below in **114** and are in line with the foregoing thesis.

114. a [-high, +low] + u [+high, -low] = o [-high, -low]

a [-high, +low] + i [+high, -low] = e [-high, -low]

We might compare this behaviour with the symmetric calescence exhibited by other Bantu languages such as Yao as exemplified in Chapter 4 as well as discussed by Tanner (2007). In the Yao data, as highlighted in the previous chapter, we observe that coalescence is depended not on the serial ordering of the vowels within the sequence, but merely by the vowel combinations. We also observe that where such kind of coalescence occurs in the Bantu languages discussed in this study except Ndebele, it does so with compensatory lengthening. It does not occur thus in Ndebele because the language does not have neither underlying nor surface long vowels.

The motivation behind compensatory lengthening as argued for in the thesis is largely due to a high ranking of the constraints MAX-IO, MAX-V and PARSE[F'], constraints which militate against the erosion of materials of the input in the output. However in these instances these constraints are largely motivated towards the preservation of V-slots (vowels places). We thus can argue that coalescence in the languages is also governed not only by the need to preserve featural but also segmental identity.

Because coalescence in the languages is also dependent on the feature specification of the vowels in the sequence, we can thus argue that coalescence in the languages which we described as being asymmetric can also be described as height coalescence. This is so as we observe that the sequences of /V_1 + V_2/ resolve differently depending on the feature specification of the two

vowels: sequences of low + low vowels merge into a similar low vowel (as is the case with identity coalescence involving sequences of the low vowel /a/ in all the three languages), high + high vowels merge into a similar high vowel (as is the case with identity coalescence involving sequences of the high back vowel /u/ in Chichewa and Chitumbuka) while low + high vowel sequences result in a mid vowel (as is the case with Ndebele). The resultant vowel, it should be noted agrees in rounding and/or backness with the second vowel of the sequence.

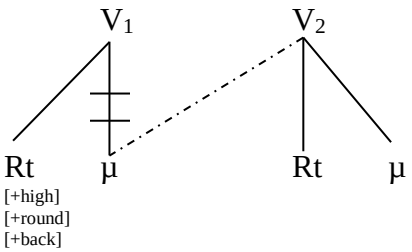
5.1.2. Glide Formation/Epenthesis

As noted in the discussion in the previous chapter as well as highlighted above, we observe that in the three languages under study glide formation/epenthesis occurs mostly in instances where the first vowel in the sequence is a high vowel. To undergo gliding, the high vowel must as a matter of necessity also contain either of the feature specifications [+back] and/or [+round] which are the features of the resultant glide /w/. This is largely so in all the three languages. In order for a vowel to undergo gliding, it should as a matter of necessity contain the features contained in a glide.

The demand by the languages that the vowel contains these features is in line with the need to maintain segmental identity as well as articulatory identity between the input and the output. In doing this, glide formation in the three languages happens through this process in which the V_1 (which has the features [+high] and/or [+round] and or [+back]) undergoes delinking with its associated mora, by which process which is mora preserving, attaches to V_2. V_1 however maintains its attachment to the root node thus preserving articulatory features.

We schematized this in the discussions in the previous chapters and represent this again here as in **115** below:

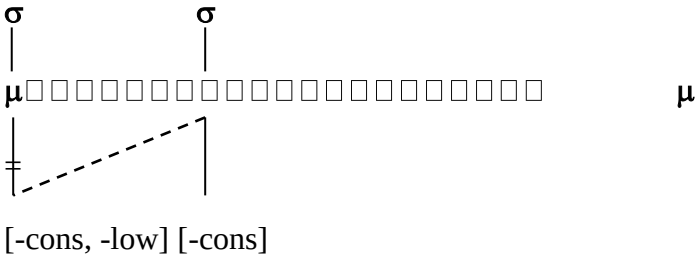
115.



Glide formation: /u/→/w/ in Bantu languages.

This process has also been schematized in Chapter 4 as represented below in **116**. We note that the rule that governs gliding in the languages is that a [+high, -low] vowel loses a mora (or glides) before another vowel. The second vowel in the sequence can be either a low, mid or high vowel.

116. *Gliding of high vowels in Bantu languages.*



We however differentiate the process of glide formation in Ndebele with that discussed in the Chichewa and Chitumbuka data in that, in the former it does not result in a compensatorily

lengthened resultant vowel as does in the latter two languages. We observe that while in the other two languages the process is motivated by the need to preserve both segmental identity as well as featural identity, in Ndebele it is chiefly aimed at only the preservation of featural identity.

Because the language does not have surface long vowels, there is no attempt in Ndebele glide formation to preserve the V-slots and thus the process in the language is invariably in violation of the MAX-V constraint. Glide formation in the three languages as we have observed is similar to the process that we discussed as morphophonemic change and is in line with the same [v→w/vowel] rule that we have argued to be in operation in most Bantu languages. In all the three languages it also preserves articulatory identity.

However, we at this point also take note that in Chitumbuka, the other high vowel /i/ which has the feature specifications [-back] as well as [-round] (features in direct contradistinction to the generally acceptable feature specifications of glides as enunciated above), also surfaces as a glide in hiatal contexts if it occurs in V_1 position.

Nomatter that it occurs in that position, the vowel /i/ never surfaces as a glide in both Ndebele and Chichewa. This is so because in order to turn into a glide in the two languages, a vowel must not only have the feature [+high] but the feature [+back] and/or [+round].

Finally we observe that glide formation in the three languages is feature sensitive as well. There is an apparent attempt at the maintenance of the featural specifications of all the input

material/segments. This is so in line with the observation that the resultant glide is always identical in feature specifications with the V_1, (which is the vowel that glides) i.e. the high back vowel /u/ in all the three languages glides into /w/ while the high front /i/ in Chitumbuka glides into /y/.

5.1.3. Elision

Elision in all the three languages is largely driven by the desire to eliminate the surface realization of heterosyllabic vowels. We observe however that there seems to be a higher prevalence of V_1elision as compared to V_2 cross linguistically. Reasons for this are diverse. However, despite scholarship to the contrary, l would argue that elision in the three languages is primarily largely ONSET driven. While the satisfaction of other constraints is fundamental to the explanation of elision in the languages, there seems to me to be a primacy/primary motivation for the elimination of onsetless syllables.

We observe for example that in Chichewa, vowel deletion is chiefly accounted for by a ranking of PARSE[F']-lex » PARSE[F']-1seg (a constraint which militates against the deletion of features of a prefix/word consisting of a single segment). This is largely at the boundary involving the vowel of the negative prefix when it is followed by a subject marker which commences in/with a vowel. The language thus deletes the negative prefix vowel in a bid to preserve the subject marker which in most cases is a single segment morpheme. This is in line with the observation we highlight at the commencement of the discussion that Chichewa is largely a V_1 eliding language. However, there is also evidence of V_2 elision, that which we argued to be DPVE.

While deletion in some languages such as Ndebele is height conditioned i.e. primarily motivated by the need to preserve the [-F'] (as we observe that in Ndebele there is deletion of low vowels if juxtaposed with non-low vowels containing the features [-high, -low]), this is not the case with Chichewa. Elision in Ndebele is thus explainable through the ranking system that subordinates the [-F'] constraints below the [+F] ones, in this case the ranking of IDENT[+F] below IDENT[-F]. Based on the data presenting in deletion contexts at the DPVE contexts in Chichewa, we can not argue for vowel height ordered elision as both low and high vowels delete.

The conclusion I reach from observing the data is that of position sensitive deletion. We observe that at the root/lexical word - functional word boundary, there is elision of the functional word initial vowel. This is not height sensitive elision but could be motivated by an attempt to preserve materials of the lexical word, possibly a higher ranking of a MAXLEX constraint

While there is deletion of low vowels in V_1 position in Ndebele, in Chitumbuka it is high vowels that get elided in when they occur in V_1 position. This occurs as with Ndebele, at the infinitive prefix – vowel commencing verb boundary. The reason for deletion however remain the same for both languages i.e. the preservation of the [-F'] features. Deletion of V_1 occurring high vowels however only takes place in Chitumbuka if the vowel supplied by the verb/stem has the feature [+back] and is also a non-low vowel as evidenced by the deletion of the [-high, -low] vowel /o/ in the face of another high vowel (in the current circumstances the [+high, -low] vowel /u/)

5.2. Suggestions/Recommendations for further studies

The scope of this research largely focused on the analysis of the resolution of hiatal configurations in Ndebele, Chichewa and Chitumbuka. The researcher notes here that the research focus should have also encompassed and incorporated dialectical variations within all of the three languages under study here. l note here for example, that the pool of data analysed for Chichewa is largely drawn form a dialect of the language spoken in the central regions of Malawi (largely the Ntcheu area to be specific) and while there are attempts made to corroborate collected evidence with the Chichewa spoken in Zimbabwe, there is, l feel, still lack of cross-dialect comparison with the other dialects spoken in Malawi. I am of the opinion that such a study is important and necessary if at all we are to be able to draw holistic phonological and phonetic conclusions on the language.

Such are my sentiments on Chitumbuka as well. Apparently the larger part of the data analysed here is drawn from the dialect spoken in the Mzimba region. Comparisons with other dialects, despite Vail's (1971) assertion that they are no pronounced differences, would have been more interesting an illuminating l would like to think. For the Ndebele language, the data collected was also restricted to the dialect spoken in Zimbabwe. A cross – dialectical comparison with the Ndebele spoken in South Africa as well as other Nguni languages (dialects) should show interesting insights into the phonology of the language. Such forms of cross dialect analyses l believe are crucial to understanding the phonologies of the languages here under study and also to the contribution towards the studies in the unification of dialects.

5.3. Summary and Conclusions

This thesis has attempted to make use of wide range of data collected through both desk research as well as oral interviews to highlight some pertinent conclusions regards the phonologies of the three Bantu languages under study. The thesis largely attempted through the presentation of this data as well as subsequent discussions of the data to present evidence that the syllable structures of the three languages disprefer the surface realization of vowel sequences. We note that where the sequence do occur, constraints operational within the languages (which we equated to and/or referred to as PSSRs) 'conspire' to eliminate them. The processes that ultimately occur to repair such disprefered phonological and/or phonetic complexes, as we have discussed, can take many forms including elision, coalescence, glide formation, glide epenthesis, consonantal epenthesis and diphthongization. We however observe that the resolution of these sequences in the languages discussed herein is guided by the high ranking of constraints that are largely feature sensitive, height sensitive, as well as context sensitive. These conditions largely apply to all the other repair strategies except coalescence which, in all the three languages is argued to be largely asymmetric.

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