Noun-Verb Asymmetry in Tshivenda Vowel Hiatus Resolution

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712078

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i. PLAGIARISM DECLARATION

I hereby declare that this dissertation is my original work. All outside sources have been acknowledged. It has not been previously submitted, in part or entirety, to any institution of higher learning.

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Signature Date

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iii. ABSTRACT

Languages employ different repair strategies to maintain their preferred phonological structures. This study examines repair strategies employed in Tshivenda to resolve vowel hiatus as well as to maintain the minimal Prosodic Word (PWord) size. To do so, evidence was collected from previous academic works (Poulos, 1975, 1990; Westphal, 1946), dictionaries, articles and descriptive grammars, learning handbooks, as well as educational YouTube videos. In Tshivenda nominals, a sequence of two adjacent vowels (vowel hiatus) is resolved by means of glide formation, secondary articulation, and vowel elision. In verbs, however, vowel hiatus is maintained. Evidence gleaned from the imperative, passive, and reduplicated forms suggest that Tshivenda maintains a minimally disyllabic Prosodic Word structure. Optimality Theory (Prince and Smolensky, 2004) and its sub-theory, Co-Phonology Theory (Inkelas and Zoll, 2007), were employed as the main theoretical frameworks to analyse the data. Further insights were gleaned from Feature Geometry (Clements and Hume, 1995). Thus, this study aims to present a comprehensive account of vowel hiatus resolution and minimality effects in Tshivenda. The structural features of Tshivenda are compared to those of other Bantu languages to situate it within the broader field of Bantu phonology, thereby providing a small but significant contribution to Southern Bantu phonological typology.

iv. LIST OF SYMBOLS AND ABBREVIATIONS

LIST OF SYMBOLS

//	Phonemic transcription
→	Is realised as/becomes
[]	Phonetic transcription
.	Syllable boundary
*	Unacceptable form
V:	Long vowel

LIST OF ABBREVIATIONS

1pl	First person plural
1sg	First person singular
2pl	Second person plural
2sg	Second person singular
3pl	Third person plural
3sg	Third person singular
C	Consonant
CL	Class
CG	Consonant glide
CON	Constraint
CONS	Consecutive marker
DIM	Diminutive
DEVERB	Deverbative affix
EVAL	Evaluate
FG	Feature Geometry
FUT	Future tense

FV	Final vowel
GEN	Generator
GF	Glide formation
INF	Infinitive
IMP	Imperative
LD	Labial dissimilation
N̩	Syllabic nasal consonant
N	Nasal consonant
NC1, 2, 3, …	Noun Classes
NEG	Negative
NP	Nominal phrase/Noun phrase
OC1, 2…	Object concord
OCP	Obligatory Contour Principle
OT	Optimality Theory
P	Passive marker
PRE	Present tense marker
POSS	Possessive particle
PROROOT	Pronoun root
PST	Past
PSTEM	Prosodic stem
PWORD	Prosodic word
RED	Reduplicant
SA	Secondary articulation
SC1,2…	Subject concord
SPE	Sound Pattern of English

STAB	Stabaliser
SUFFIX	Suffix material
TAM	Tense, aspect, mood
TNS	Tense marker
UG	Universal Grammar
V	Vowel

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CHAPTER 1: INTRODUCTION

1.1. Introduction

Vowel hiatus has long been a subject of considerable theoretical and empirical inquiry. Matthews (2014) describes vowel hiatus as the existence of a sequence of two vowels (V) occurring in two separate syllables (hereafter represented by $V_1.V_2$). Southern Bantu languages such as chiShona (Kadenge and Simango, 2014; Harford, 1997; Mudzingwa and Kadenge, 2011), Xitsonga (Vratsanos and Kadenge, 2017), and Nguni languages (Aoki, 1974; Khumalo 1987; Sibanda, 2009) amongst others, generally do not allow vowel hiatus within a Prosodic Word (PWord); and in the instances where it occurs, some repair strategy is employed to repair it. In these Bantu languages, vowel hiatus is prohibited in all word categories.

This is not the case for Tshivenda. What makes Tshivenda unique is that $V_1.V_2$ sequences are only avoided in nominals and are tolerated in verbs. For example, in the diminutive of 'person' /mut^{h}u-ana/ → [mu.t^{hw}a.na], the unacceptable $V_1.V_2$ sequence created between the diminutive suffix /-ana/ and the stem-final vowel is resolved through secondary articulation (labialisation) while in the verbal construction [mu.ɳ.a u.a.mu.βo.na mu.sa.ʤi] 'the man sees the woman', vowel hiatus in the verb is not resolved. Throughout this dissertation, full stops indicate syllable boundaries.

This dissertation aims to provide a comprehensive analysis of both the instances where hiatus is resolved and the instances where hiatus is tolerated. Previous studies of Tshivenda have focused on the morphology and syntactic structure of the language (Poulos, 1975, 1990;

Westphal, 1946). In the existing literature on Tshivenda, hiatus resolution has been mentioned in passing. This is the empirical gap in knowledge that this study aims to address.

The first aim of the study is to discuss the resolution strategies Tshivenda uses to avoid hiatus in nominals, that is, nouns, diminutives, and absolute pronouns. The second aim is to identify contexts where hiatus is tolerated and to explain the phenomenon. Included in this discussion is the influence of morphology on the patterns of hiatus resolution as well as the effects of minimality requirements by examining the imperative, passive, and reduplicated forms. As Vratsanos (2018) correctly states, outside of the field of linguistics, the word 'Bantu' carries severe negative racial connotations. However, the use of the word 'Bantu' throughout this study is strictly academic and indicates the language family in question.

1.2. Problem Statement

Just like societies, every human language has a set of 'rules' or constraints which shape its realisation. When a morphosyntactic or phonological context is created that does not adhere to these rules, some repair strategy is usually triggered to ensure that the structure adheres to the language's preferred structures. These processes are known as 'repair strategies' (Kager, 1999). This study aims to describe these strategies in relation to the avoidance of vowel hiatus in Tshivenda nominals.

Analytical insights gleaned from Optimality Theory (henceforth, OT) were utilised to account for hiatus resolution and nonresolution in Tshivenda. Co-Phonology, a variant of OT, was used to account for the asymmetries between nominals and verbs in relation to hiatus resolution in Tshivenda. Since OT is computational in nature, Feature Geometry (henceforth, FG) was employed to provide a visual representation of the processes discussed. In other words, FG aided OT by providing diagrams that illustrated each constituent and the processes involved, whereas OT provided the basis for arguments as to why one output was preferred over another.

Like most Bantu languages, Tshivenda is an agglutinative language (Ziervogel, Wentzel, and Makuya, 1972; Poulos, 1990). The process of affixation inevitably results in the occurrence of potential vowel hiatus in Bantu languages, including Tshivenda. Where a $V_1.V_2$ sequence is created by affixation in nominals, the three major repair strategies employed are: glide formation, secondary articulation, and vowel elision.

Examples (1) and (2) below illustrate the process of glide formation; the vowels /u/ and /i/ associated with the noun classes 1 and 4, respectively, change into the corresponding semi-vowels [w] and [j]. Here, the vowel loses its moraicity and becomes the onset for the V_2. Glide formation is a common repair strategy used by Bantu languages to resolve vowel hiatus (see, for example, Rosenthall, 1997; Mudzingwa and Kadenge, 2014b; Casali, 1995, 1997, 1998; Mtenje, 2016; Ström, 2013).

1. /u-aŋga/ → [waŋga]
NC1-mine ‘mine’ (Muṱheiwana, 2000, p. 5)

2. /i-o-ne/ → [jone]
NC4-PROROOT-SUFFIX NC4.3PS (Poulos, 1990, p. 95)

Secondary articulation occurs when V_1 in the $V_1.V_2$ sequence is preceded by a consonant, as illustrated in examples (3) and (4). Glide formation is avoided in this instance because it would result in consonant clusters (complex onsets) such as [lw] and [bw] which are prohibited in Tshivenda (Poulos, 1990) and many other Bantu languages (Mudzingwa, 2010). Moreover, in Tshivenda, this process only occurs when the initial vowel (henceforth V_1) is labial – i.e. /u o ɔ/. If V_1 is coronal /i e ɛ/ it is typically elided since Tshivenda does not allow palatalized consonants[1]; this mirrors the avoidance of palatalized consonants in iKalanga (Kadenge and Chebanne, 2017), Xitsonga (Vratsanos and Kadenge, 2017) and in Nguni languages (Khumalo, 1987; Sibanda, 2009).

3. /ɳŋu-ana/ → [ɳŋʷana]
Sheep-DIM ‘small sheep/lamb’ (Poulos, 1990, p. 83)

4. /lu-o-ne/ → [lʷone]
NC11-PROROOT-SUFFIX NC11 3PS (Poulos, 1990, p. 95)

In nominals, when the above strategies fail, vowel elision applies. This is when all features of a vowel are lost completely, leaving no trace of its original existence. In Tshivenda, V_1 is targeted for elision over V_2, as observed in other Bantu languages (Mudzingwa, 2010; Casali, 2011). V1 elision is shown in (5) and (6) below.

5. /tʰaβa-ana/ → [tʰaβana]
Mountain-DIM ‘small mountain’ (Poulos, 1990, p. 83)

[1] Only non-nasal bilabial and alveolar stops can be palatalized (See Table 1)

6. /kʰali-ana/ → [kʰalana]

Clay Pot-DIM ‘small clay pot’ (Poulos, 1990, p. 84)

In Tshivenda, vowel hiatus in verbs can occur within the MacroStem (7) and across the Inflectional Stem and MacroStem (8). While this is not unique, the asymmetry observed in Tshivenda has yet to be investigated and accounted for.

7. /-sɛ-a/ → [-sɛ.a]

Laugh-FV ‘to laugh’ (Poulos, 1975, p. 2)

8. /ndi-ḓɔ-amb-a/ → [ndi.ḓɔ.a.mba]

NC1.FUT.speak.FV ‘I will speak’ (Poulos, 1990, p. 249)

In addition to examining the asymmetrical application of vowel hiatus resolution strategies, this study examines Prosodic word (PWord) minimality in Tshivenda. PWord minimality refers to the smallest possible size an acceptable word can take (Prince and Smolensky, 2004). These requirements are language specific, for example, in English, monosyllabic words such as *fed* [fɛd], *lip* [lɪp], and *sow* [səʊ] meet the language’s minimality requirements and are, therefore, acceptable words. In Bantu languages, for example, the common minimal size of a well-formed PWord is disyllabic or bimoraic (Downing, 2005).

Like Xitsonga (Vratsanos and Kadenge, 2017), chiNdau (Mutonga, Mabugu, Mukaro, and Mugari, 2018), isiNdebele (Downing, 2000), Kikerewe (Odden, n.d.), and chiZezuru

(Mudzingwa, 2010; Downing and Kadenge, 2015), Tshivenda requires a PWord to be minimally disyllabic (Poulos, 1990), as shown in (9) and (10) below. PWord minimality requirements, like the resolution of vowel hiatus, are linked to the well-formedness of the syllable and word. This study aims to demonstrate and explain the strategies employed by Tshivenda to ensure minimality is adhered to and how these compare to other Bantu languages.

9. /i-l̰̂-a/	→	[il̰̂a] or [il̰̂ai]	***c.f.***	u l̰̂a
STAB-eat-FV		‘eat!’		‘to eat’
10. /a^{m}b-a(-i)/	→	[a^{m}ba] or [a^{m}bai]	***c.f.***	u amba
Speak-FV(-IMP)		‘speak!’		‘to speak’

(Ziervogel et al., 1972, p. 11)

OT and Co-Phonology Theory are used to provide a formal account of vowel hiatus resolution as well as minimality effects in Tshivenda. In doing so, the reason for a certain strategy to be triggered (like in nominals) or blocked (like in verbs) is attributed to the separate rankings of the same set of constraints. The use of OT and co-phonology differentiates this study from previous phonological works done on Tshivenda such as Nemakhavhani (2002), Poulos (1975, 1990), and Madiba (1994) which are largely descriptive.

1.3. Objectives of the Dissertation

The objectives of this dissertation are four-fold:

- To identify and describe the asymmetrical behaviour of vowel hiatus resolution strategies in Tshivenda. Specifically, the study aims to examine the repair strategies employed to resolve vowel hiatus in nominals and to provide an account of the tolerance of vowel hiatus in verbs

- To identify and describe minimality effects in Tshivenda

- To provide a formal OT and co-phonology analysis of repair strategies in Tshivenda; and,

- To provide, a small but significant, contribution to the phonological typology of Southern Bantu languages by situating the findings of this study within the wider field of Bantu phonology.

1.4. Justification for the Dissertation

Compared to other Bantu languages, the phonology of Tshivenda has largely been ignored. Most of the detailed and 'atheoretical' studies conducted on the Tshivenda language are no less than 40 years old (c.f. Poulos, 1975; Westphal, 1946; Ziervogel et al., 1972).

The most recent studies, however, typically focus on loanwords (Madiba, 1994), tonology (Cassimjee, 1986; Reynolds, 1996), and other phonological, syntactic, and morphological aspects of the language. These include, but are not limited to, vowel harmony (Kula, 1997); palatalization and labialisation (Nemakhavhani, 2002); the consecutive marker (Makwarela, 1992); and the proverb (Mafenya, 1994). While there is no doubt that these studies provide invaluable insights into Tshivenda, there remains a clear gap that this dissertation aims to fill. In doing so, this study aims to add to the ever-growing knowledge of cross-linguistic differences in terms of how hiatus is resolved in Bantu languages.

The asymmetries found in Tshivenda are not widely seen in the Bantu languages that are close to it such as chiShona, iKalanga, and the Nguni languages. Moreover, the dissertation provides a formal analysis of vowel hiatus resolution and minimality in Tshivenda using OT and Co-Phonology Theory which has not been presented in previous literature on the language. For this reason, this study is expected to be of interest to Bantuist phonologists.

1.5. Structure of the Dissertation

The following details the structure of this dissertation:

CHAPTER 2 LITERATURE REVIEW – a survey of the existing literature on the Tshivenda language alongside a discussion of vowel hiatus resolution in other Bantu languages. This allows for the study to be situated within the larger body of the phonological work on the Bantu languages.

CHAPTER 3 BACKGROUND OF TSHIVENDA – this chapter concerns itself with the formal aspects of the Tshivenda language. Specifically, the genetic affiliation of the language, as well as its main morpho-syntactical and phonological structures.

CHAPTER 4 METHODOLOGY – this chapter discusses the theoretical framework and data collection methods utilised in this study.

CHAPTER 5 VOWEL HIATUS RESOLUTION – a theoretical analysis of hiatus resolution is presented. The results are further compared to what obtains in other Southern Bantu languages to highlight the similarities and differences between the languages.

CHAPTER 6 PROSODIC WORD MINIMALITY – the penultimate chapter details with minimality effects in Tshivenda. Again, minimality requirements in Tshivenda are compared to what obtains in other Bantu languages.

CHAPTER 7 CONCLUSION – this chapter concludes the study and briefly outlines areas that may require further exploration.

1.6. Summary of Chapter

This chapter introduced the study. It explained and contextualised key concepts that are used in this study. The main objectives of the dissertation were presented and were followed by some justification of the study. Thereafter, the general structure of the dissertation was presented. The following chapter presents a review of studies that are related to this one. The aim of this chapter is to expose the gap in knowledge that this study seeks to fill.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The main purpose of this chapter is to provide a survey of the existing literature focusing on the phonological accounts of vowel hiatus resolution in Bantu languages. Vowel hiatus resolution in Bantu languages is an attested phenomenon and, as such, it has been the topic of many Bantuist phonologists' works (Casali, 1995, 1996, 1997, 2011; Kadenge, 2010; Kadenge and Simango, 2014; Lee, 1999; Aoki, 1974).

A review of related studies presented in this chapter couches the current research within the broader context of existing studies on vowel hiatus resolution in Bantu languages. First, I present a review of existing studies on the Tshivenda language in general; the purpose of which is to identify the gaps in existing knowledge that this research aims to fill. This is followed a review of the literature on vowel hiatus resolution in Bantu languages as well as aspects of Prosodic Word minimality effects.

2.2. Existing Research on Tshivenda

Tshivenda has been the topic of a relatively small number of studies, especially with work on its phonological system scarce. The two main linguists who contributed to the documentation and description of the language are Westphal (1946) and Poulos (1975, 1990). Westphal's

(1946) master's dissertation on the Tshivenda language was the first of its kind. It provides a descriptive overview of the language's phonetic, syntactic, and morphological system.

Poulos's (1975) master's dissertation, on the other hand, explores in detail, the morphology of the verb. Following this, Poulos (1990) presents a descriptive account of the language in the form of a linguistic survey. Both Poulos's (1975) dissertation and his subsequent book (1990) are descriptive works that mention the phonological processes discussed in this study such as vowel elision, glide formation, and secondary articulation (examples (11) through (13)), in passing. In these works, Poulos (1975 and 1990) does not explore the processes nor does he attempt to provide a formal analysis. These studies provide extensive examples and serve as the proverbial backbone for the current study.

11. vhatukana vha.o tuwa → vhatukana **vho** tuwa

'the boys have left'

12. mmbwa a i.o ngo luma ṅwana → mmbwa a **yo** ngo luma ṅwana

'the dog did not bite the child'

(Poulos, 1990, p. 216)

13. mulanbo-ana → mulam**bw**ana

'small river'

(Poulos, 1990, p. 83)

Most of the works done on Tshivenda consist of unpublished Master of Arts dissertations. A popular topic examined by scholars is that of the syntax and morphology of the verb. Museṱha (2000) gave a generative syntax account of the reflexive verb. Other areas examined are the construction of motion verbs (Ramovha, 1996), the construction of the passive verb (Raphalalani, 1997), causative constructions (Mmbulaheni, 1997), and the adjective (Muṱheiwana, 2000).

Attention has also been given to ideophones (Malima, 1993), as well as the consecutive form (Makwarela, 1992). Besides dissertations, Tshivenda is not widely discussed by recent scholars. These works typically focus on the language's rich syntax (Maḓadzhe, 2000; Du Plessis, Musehane, and Visser, 1995) and tonology (Cassimjee, 1986).

The most recent phonological study focused on two processes – palatalization and labialisation (Nemakhavhani, 2002). This master's dissertation examines two specific phonological processes from a generative linear (SPE) and a non-linear or autosegmental (FG) approach. Nemakhavhani (2002) considers various factors which influence these processes such as phonetic, morphonological, historical, dialectical, and sociolinguistic factors. The study demonstrates that during affixation processes, palatalization occurs with the passive /-w-/ (14), causative /-i-/ (15), and diminutive /-ana/ affixes (16); while labialisation occurs with the passive (17) and diminutive affixes (18) (Nemakhavhani, 2002). However, the processes discussed are not solely the result of hiatus resolution. In other words, Nemakhavhani (2002) does not pay attention to hiatus resolution, which is the focus of the current study.

14. tapa → tapwa	'be flicked away'	[tˈapʲa]
15. vhandana → vhandanya	'cause to clap'	[βandaɲa]
16. rambo → rambwana	'small bone'	[rambʲana]
17. ḓisa → ḓiswa	'bring (passive)'	[ḓisʷa]
18. phulu → phulwana	'small ox'	[pʰulʷana]

(Nemakhavhani, 2002, p. 26-30)

While this study is not focused on palatalization, the process of secondary articulation illustrated in examples (14) and (16) is examined. This study aims to explore secondary articulation from the viewpoint of resolving vowel hiatus. The dissimilatory palatalization process illustrated in examples (14) and (16) mirrors that which occurs in Xitsonga (Vratsanos and Kadenge, 2017) and Nguni languages (Sibanda, 2009; Kotzé and Zerbian, 2008) where labial consonants cannot be labialised. This is discussed further in Chapter 5.

In summary, it is noteworthy that there is a wealth of untapped knowledge regarding Tshivenda's phonological system. Where there is existing literature, it is descriptive or is couched in a theoretical framework that cannot fully explain the processes. Since the major descriptive work is more than 40 years old, it may prove to be out of date.

2.3. Descriptive and Theoretical Accounts of Vowel Hiatus Resolution in Bantu

As mentioned earlier, vowel hiatus resolution is widely attested in Bantu languages and there exists a rich body of work on this subject. In this section, I provide a detailed overview of this

work alongside examples to illustrate the various processes. Bantuist phonologists (such as Rosenthall, 1997; Mtenje, 2016; Kadenge and Simango, 2014 amongst others referenced below) have observed that glide formation, secondary articulation, coalescence, and vowel elision appear to be the most commonly employed strategies to avoid vowel hiatus.

Rosenthall (1997), for example, surveys four African languages – Luganda, Etsako, Yoruba, and Kimatuumbi – investigating the strategies employed to avoid vowel hiatus. Paying specific attention to the processes undergone by the prevocalic vowel (i.e. V_1 in the $V_1.V_2$ sequence) (Rosenthall, 1997). Using OT, Rosenthall (1997) states that the re-syllabification of the prevocalic vowel through strategies such as glide formation, epenthesis or elision maintains the syllable's structural integrity.

Similarly, Casali (1997) surveyed 68 Niger–Congo and 19 non-Niger–Congo languages to argue for an empirical generalisation about the behaviour of the prevocalic vowel. Using OT as well as other linear and non-linear theoretical approaches, Casali (1997) argues that V_1 in the $V_1.V_2$ sequence appears to be elided more often than V_2. However, Casali (1997) comments on the historical motivating factors that may have affected this generalisation. Those being the effects of speech production, or the acoustic qualities some speech sounds have on the realisations (Casali, 1997).

Moreover, Casali (2011) argues that prosodic or morphosyntactic boundaries may also influence whether hiatus is tolerated or not. Senturia (1998) states that other motivating factors can be minimality requirements, the status of a morpheme (lexical/functional), speech

production, vowel length, stress or tone. Of these structural requirements, the current study aims to explore only the influence of the prosodic and/or morphosyntactic boundaries and the status of the morpheme on the occurrence of hiatus resolution. Kadenge (2010), Mudzingwa (2010) and Mudzingwa and Kadenge (2011), for example, argue that, in chiShona, different morphosyntactic domains trigger different hiatus resolution strategies.

Casali (1995) conducted an OT analysis of glide formation as a hiatus resolution strategy in Niger–Congo languages. The following generalisations about hiatus resolution processes are presented as follows (Casali, 1995, p. 1):

19. Vowel Elision: $CV_1.V_2 \rightarrow CV_2(:)$

20. Glide Formation: $V_1.V_2 \rightarrow CGV_2(:)$

21. Coalescence:

Ca.i	→	Ce(:)	Ca.u	→	Co(:)
Ce.i	→	Ce(:)	Ce.u	→	Co(:) or $C^{j}o(:)$
Co.i	→	$C^{w}e(:)$	Co.u	→	Co(:)

What this illustrates is that, according to Casali (1995), when one strategy (for example, coalescence) fails, a different one (such as vowel elision) is triggered. The above generalisations appear *a priori* to hold true for Southern Bantu languages (see Mudzingwa, 2010; Sibanda, 2009; Kadenge and Simango, 2014).

Harford (1997) provides a descriptive account of vowel coalescence in chiShona. What is interesting is that, like Casali (1997), Harford (1997, p. 82) suggests that exceptions to the expected patterns may be relics of a different system whose rules once applied but are no longer productive or do not operate currently. This thought may aid in the explanation of why, in Tshivenda, only certain types of morphemes avoid vowel hiatus.

Kadenge (2010) uses the generative CV phonology model of syllable structure (Clements and Keyser, 1983) to account for hiatus resolution in chiZezuru, a variety of chiShona. CV phonology argues that the syllable consists of three tiers (Clements and Keyser, 1983). The first tier contains the syllable node, σ, the second tier contains C and V elements, and the final tier contains the phonological segments (Clements and Keyser, 1983). In chiZezuru, not only are the three strategies presented by Casali (1995) employed, but a fourth one is introduced, namely, glide epenthesis, where a glide (CG) is inserted into the second syllable acting as an onset for V_2:

22. Glide epenthesis: $V_1.V_2 \rightarrow V_1.CGV_2$

Mudzingwa and Kadenge (2011) compared, using OT, hiatus resolution in chiKaranga and Nambya, other dialects of chiShona. They note that glide formation, secondary articulation, and vowel elision are the most common repair strategies in this language (Mudzingwa and Kadenge, 2011). These processes occur in the same morphological environments in both languages; namely, across class prefix + nominal stem, and across noun/adjective stem +

diminutive suffix (Mudzingwa and Kadenge, 2011). These results are observed, as expected, in other dialects of chiShona, namely ChiHwesa and ChiManyika (Mvundura, 2015).

Likewise, Kadenge and Simango (2014) compare Nsenga and chiShona using OT. The argument that hiatus resolution is triggered by phonological and morphosyntactic conditions is found to hold true in these languages (Kadenge and Simango, 2014). Kadenge and Simango (2014) found that, in Nsenga, hiatus is tolerated across the Inflectional Stem and Macro Stem boundary, as shown in example (23) where the hiatus that is created between the OC and the onsetless verb stem vowel is tolerated (Kadenge and Simango, 2014, p. 117). In Tshivenda verbs, hiatus is tolerated in all contexts – across and within the Prosodic stem boundaries, as shown later in this study.

23. /si-u-ka-ni-on-a/ → [su.ka.ni.o.na]

NEG-SC-FUT-OC-see-FV 'you (sg) will not see me'

Aoki (1974) examined resolution strategies in isiXhosa from a generative account. Specific focus is given to the nature of vowel 'contraction' or coalescence (Aoki, 1974). The findings of which align with the generalisations given in (19) through (22) above.

Lee (1999) presented an OT analysis of vowel hiatus in siSwati. Lee (1999) finds that in nouns where hiatus occurs V_1 (apart from /o/ and /u/) is elided; /o/ and /u/ are only elided when they are preceded by a labial consonant (Lee, 1999, p. 174). In the infinitive form, the vowel /u/ in the prefix /ku-/ is turned into a glide when the vowel of the verb stem is not round:

24. /ku-akha/ → [$k^{w}ak^{h}a$] ‘to build’ (Lee, 1999, p. 176)

Moreover, in possessives (/-i-/ or /-u-/), a homorganic glide is formed to ensure hiatus is avoided:

25. /umfati-u-ami/ → [umfatiwami] ‘my woman’ (Lee, 1999, p. 177)

If the possessive takes the form /-a-/, V_1 and the possessive is elided:

26. /emanti-a-ami/ → [emantami] ‘my water’ (Lee, 1999, p. 178)

Finally, in the demonstrative form – /le-/ + noun stem – the sonority of the vowel determines which strategy occurs (Lee, 1999, p. 180).

Sibanda (2009) examines vowel processes in Nguni languages (isiNdebele, isiZulu, isiXhosa, and siSwati), using OT. One process not explicitly mentioned is glide deletion. Sibanda (2009) states that when glide formation is expected to occur but is not found, it has been deleted. In other words, the process does occur but because the output violates some other phonological constraint, the glide is deleted. Specifically, Sibanda (2009, p. 41) states that palatalized consonants are prohibited, hence the [j] is elided (as seen in example (27)). Similarly, labialisation of a bilabial is prohibited, leading to the glide being elided, as shown in example (28) (Sibanda, 2009, p. 42).

27. si-ona → syona → sona ‘it is spoiling’

28. bu-ona → bwona → bona ‘it is spoining’

More recently, Vratsanos and Kadenge (2017) used OT to examine hiatus resolution in Xitsonga. Like Sibanda’s (2009) findings, in Xitsonga, processes such as the labialisation of an already labial consonant and palatalization of a velar consonant are blocked (Vratsanos and Kadenge, 2017). Vratsanos and Kadenge’s (2017), as well as Lee and Burheni’s (2014), findings fall into place within the larger work of hiatus resolution in Bantu languages. That is, Xitsonga behaves in a similar fashion to other Bantu languages. Tshivenda does not fully conform to the processes seen in neighbouring languages. It is the aim of this study to describe and formally analyse the features that distinguish Tshivenda from other Bantu languages in relation to hiatus resolution.

Another Bantu language that exhibits hiatus resolution is Chichewa, which is mainly spoken in Malawi but is also found in Zambia, Zimbabwe, and Mozambique (Downing and Mtenje, 2017). Downing and Mtenje (2017), for example, give a theory-neutral account of the language including processes of hiatus resolution. In Chichewa, hiatus is maintained across word boundaries but resolved elsewhere (Downing and Mtenje, 2017). In other words, when there is hiatus across word boundaries that include main lexical categories like nouns and verbs, no resolution strategy is employed. For example, *mwanà a-kuú-dyá* ‘the child is eating’ is not realised as **mwan’ akudya* vis-à-vis *ti-a-bweélá* → *tabweélá* ‘we have come’ where hiatus is resolved word-internally (Downing and Mtenje, 2017, p. 106, 104). What this shows is that in Chichewa, hiatus resolution is not solely reliant on phonological rules, as morpho-syntactic rules play a crucial role. As mentioned earlier, the non-resolution of hiatus across main lexical categories is also observable in Tshivenda, for example, *munna u-a-mu-vhona musadzi* ‘the

man sees the woman' is not realised as **munn' u-a-mu-vhona musadzi* (Ziervogel et al., 1972, p. 24).

In Mtenje's (2016) doctoral thesis, the grammars of three dialects of the Nyakyusa language spoken in Tanzania and Malawi are presented; namely, Cisukwa, Cindali, and Cilambya. The study presents a descriptive account of the phonological and morpho-syntactic systems (Mtenje, 2016). What Mtenje (2016) found is that glide formation occurs when there exists a $V_1.V_2$ sequence between the prefix + noun stem (29) and prefix + verb root (30). Secondary articulation, along with compensatory lengthening, occurs when this sequence of vowels appear between the noun class prefix + noun stem (31), noun class agreement marker + stems *-ane*, *-ako* and *-awo* (32) through (34), infinitive prefix *ku-* + V-initial verb root (35) and subject prefix + tense marker (36).

29. /u-a-l-ile/ → [walile] 'you are'

30. /u-a-ŋw-ile/ → [waŋwile] 'you have drunk' (Mtenje, 2016 p. 76)

31. /i-fi-eni/ → [if^{j}e:ni] 'forehead' (Mtenje, 2016, p. 79)

32. /i-lu-wa-li-*ane*/ → [iluwa l^{j}a:ne] 'my flower'

33. /i-fi-nama fi-*ako*/ → [ifinama f^{j}a:ko] 'your legs'

34. /i-N-busi si-*awo*/ → [imbusi s^{j}a:wo] 'their goats' (Mtenje, 2016, p. 81)

35. /u-ku-ikal-a/ → [uk^{w}i:kala] 'to sit'

36. /tu-a-pij-ite/ → [t^{w}a:pijite] 'we cooked' (Mtenje, 2016, p. 82)

A final strategy employed is that of deletion; this occurs when secondary articulation fails (for example, when /i/ is preceded by a palatal consonant), when V_1 is /a/, when V_1 is /u/ and V_2 is /o/, as well as instances where there are more than two consecutive vowels.

37. /βa-a-is-a/ → [βiːsa] 'they have come' (Mtenje, 2016, p. 92)

Mtenje (2016) further discusses the prosody of these dialects. What is noticeable is that, unlike Chichewa where there exists the tone doubling rule which causes the tone to spread, in these dialects, there is no such spreading and the existence of two high tones is explained by Mtenje (2016) as being underlyingly successive.

Mtenje (2007) investigates, using the Co-Phonology Theory, the asymmetry seen in Cindali, Cinyika, and Citonga of Malawi. Specifically, Mtenje (2007) examines hiatus resolution strategies (or lack thereof) seen in the reduplication processes in Cindali and Cinyika, as well as the derivational and inflectional processes in Citonga. Mtenje (2007) argues that there exist two co-phonologies (A and B) in Cinyika and Cindali which govern the basic form and the reduplicated form, respectively (Mtenje, 2007). This accounts for the lack of hiatus resolution across the base and reduplicated forms, as shown in (38) and (39) below.

38. Cinyika: /a-andi-a-[um-e/ → [aːndume-ume] 's/he will dry'

39. Cindali: /ti-[u-ly-e/ → [tulye-ulye] 'you will eat' (Mtenje, 2007, p. 38)

Vowel hiatus in the base form is resolved using vowel elision, while hiatus is maintained between the base and reduplicated form vowel (Mtenje, 2007). Mtenje (2007) postulates that in Co-Phonology A, to avoid onsetless syllables (which are highly dis-preferred), V_1 in the $V_1.V_2$, as well as V_1 and V_2 in the $V_1.V_2.V_3$ sequence are elided. In Co-Phonology B, on the other hand, onsetless syllables are preferred, thereby blocking elision.

Similarly, in Citonga, Mtenje (2007) argues that Co-Phonology A which governs derivational forms favour the integrity of the vowels blocking elision and/or coalescence:

40. /to-esy-a/ → [tolesya] ‘cause to take’

41. /sani-a/ → [saniya] ‘find’ (Mtenje, 2007, p. 42)

To resolve vowel hiatus in Co-Phonology A, /i/ or /y/ are inserted, maintaining the features of the underlying vowels. However, in Co-Phonology B, which governs the inflectional forms, the features of the underlying input consonants are favoured (42). Thus, to resolve vowel hiatus in Co-Phonology B, vowel elision and subsequent compensatory lengthening occur (Mtenje, 2007).

42. /to-a/ → [to:] ‘take’ (Mtenje, 2007, p. 42)

Another language where asymmetry of vowel hiatus resolution is noticed is Ciyao (Tanner, 2007; Ngunga, 1997). Tanner (2007) conducts an OT analysis of this asymmetry, comparing it to Casali’s (1996) doctoral dissertation on isiXhosa’s asymmetric use of coalescence to resolve vowel hiatus. Unlike Casali’s (1996) findings on isiXhosa, Tanner (2007) states that vowel hiatus resolution in Ciyao is context insensitive – that is, coalescence occurs between prefix + root, root + suffix, and root + infix but is prohibited when V_1 is mid or high. For example, when /e/ precedes /i/ elision occurs (43), and when /i/ precedes /e/, /i/ is formed into the glide /j/ (44); however, if V_1 is /a/, coalescence occurs (45) through (46).

43. /sele-im-e/ → [seleːme] ‘slid’ (Tanner, 2007, p. 18)

44. /mi-esi/ → [mʲeːsi] ‘moons’ (Tanner, 2007, p. 21)

45. /ma-uŋgu/ → [moːŋgu] ‘pumpkins’ (class 6)

46. /ma-iso/ → [meːso] ‘eyes’ (class 6) (Ngunga, 1997, p. 25)

Unlike in Tshivenda, Ngunga (1997) states that, in Ciyao, vowel hiatus is resolved across words when V_2 is /a/ (to indicate word boundaries the half square bracket ([) is used):

47. /a-jiːm-i-[apo/ → [ajiːmʲ[aːpo] ‘they (class 2) stopped over there’

48. /a-cukuːlu-[apo/ → [acukuːlʷ[apo] ‘they (class 2) thanked over there’

(Ngunga, 1997, p. 28)

In Kikamba, a Bantu language spoken in Kenya, when vowel hiatus occurs, the vowels coalesce (amongst other strategies), but occasionally they remain unchanged. Roberts-Kohno (1995) investigates this phenomenon using OT. Roberts-Kohno (1995) argues that the two V segments are, in fact, not root adjacent (-V.V-) but are separated by an ‘empty’ root node (C˙˙) that functions as an onset (-V.C˙˙V-). This context blocks repair strategies from occurring because the CV structure is maintained. According to Roberts-Kohno (1995), the empty root node does not have a surface realisation despite it having an underlying one. This argument solely rests upon the fact that in the situations where repair strategies occur, there is no empty root node acting as the *de facto* onset.

Most recently, Gunnink (2018) presented the grammar of Fwe, a Bantu language of Zambia and Namibia. One such aspect that is discussed in this descriptive grammar is hiatus resolution. Like Tshivenda, Fwe allows V-only syllables. To maintain this structure, Gunnink (2018) argues that repair strategies are blocked. Like Tshivenda, Fwe allows hiatus between verbal affixes and verb roots, as shown in (49) and (50) below.

49. /ku-ur-a/ > *kùùrà* 'to buy'

50. /ndi-ura-á/ > *ndìúrà* 'I buy' (Gunnink, 2018, p. 56)

Gunnink (2018) notes that not resolving hiatus occurs most often when $V_1.V_2$ are the same. Hiatus is also permitted within lexical items in Fwe such as *ndàànò* 'message' (Gunnink, 2018, p. 57). This is also seen in Tshivenda, for example, *ndau* 'lion', *ndou* 'elephant', *baudu* 'bolt', *ndaedzo* 'command, order'. However, in Tshivenda, hiatus is resolved in all nominals across morpheme boundaries. In Fwe, as noted by Gunnink (2018), hiatus is maintained between nominal prefixes and vowel-initial nominal stems, for example, /mu-ono/ > *mùònò* 'snoring' (Gunnink, 2018, p. 56). Gunnink (2018) further notes that repair strategies to resolve hiatus such as glide formation, V_1 deletion, consonant epenthesis, and vowel coalescence are employed in Fwe.

In chiNdau, like Tshivenda, vowel hiatus is tolerated in some contexts and resolved in others (Mutonga, 2017). As seen in examples (51) through (57), the expected strategies – glide formation, secondary articulation, and vowel elision occur in nominals (Mutonga, 2017). In verbs, gliding occurs within the inflectional stem, across subject +TAM boundaries (as seen in (54)); secondary articulation occurs within inflectional stems (55); vowel elision occurs when

V_1 is preceded by a consonant and across subject + TAM boundaries (56); and coalescence occurs at the post-lexical level (57) (Mutonga, 2017). The symbol (=) represents the clitic boundary.

51. /i-ose/	→	[jose]	‘all’	(Mutonga, 2017, p. 4)
52. /mu-amuna/	→	[mʷamuna]	‘husband’	(Mutonga, 2017, p. 5)
53. /i-ri-o/	→	[iro]	‘that one’	
54. /u-a-rʲ-a/	→	[warʲa]	‘s/he ate’	(Mutonga, 2017, p. 6)
55. /mu-o-tor-a/	→	[mʷotora]	‘take’	
56. /ti-a-rʲa/	→	[tarʲa]	‘we ate’	(Mutonga, 2017, p. 7)
57. /na=i-ni/	→	[neni]	‘with me’	(Mutonga, 2017, p. 9)

While vowel hiatus is maintained in all contexts within the Tshivenda verbal domain, in chiNdau, non-resolution is selective. Mutonga (2017) states that vowel hiatus resolution is blocked across the inflectional stem and the macro-stem boundary as well as in select nominal domains. For example, vowel hiatus is tolerated across the subject marker + object marker + stem (58), relative marker + tense marker (59), copulative affix + noun class 2a (60), demonstratives (61), and possessive pronouns (62).

58. /ta-a-kon-a/	→	[ta.a.ko.na]	‘we managed them’	(Mutonga, 2017, p. 11)
59. /zą-a-rowa/	→	[zą.a.ro.wa]	‘which s/he bewitched’	(Mutonga, 2017, p. 13)
60. /ⁿdi-a-mojo/	→	[ⁿdi.a.mojo]	‘it is Mr Mojo’	(Mutonga, 2017, p. 14)
61. /ᵑge-apa/	→	[ᵑge.a.pa]	‘it is this place’	(Mutonga, 2017, p. 15)

62. /ᵑe-ake/ → [ᵑge.a.ke] ‘they belong to him/her’

(Mutonga, 2017, p. 16)

Mutonga (2017) argues that hiatus is tolerated in order to satisfy morphological requirements. This faithfulness to the morphological form over phonological rules is the motivational force behind the tolerance of vowel hiatus in these domains (Mutonga, 2017). Mutonga (2017) further states that, in chiNdau, faithfulness constraints are ranked higher than markedness constraints in domains where vowel hiatus is not resolved. This is also true for verbs in Tshivenda, as seen in Chapter 5.

Perhaps one of the most intriguing examples of hiatus resolution in Bantu languages is presented by Liphola (2001). Liphola’s (2001) study presents a descriptive as well as an autosegmental analysis of Shimakonde, a Bantu language spoken in Tanzania and Mozambique. In Shimakonde, Liphola (2001) argues that hiatus resolution strategies such as glide formation, vowel coalescence, and vowel fusion can be obligatory or optional. That is, in some places maintaining hiatus is acceptable. For example, glide formation is said to be obligatory when the word is disyllabic but is optional in longer words (Liphola, 2001). This is seen in the word for ‘to eat’ which is realised as *kw-eénga* and not **ku-énga* (Liphola, 2001, p. 90), while the word for ‘to destroy’ can be realised as both *kw-áádúúla* and *ku-á.dúúla* (Liphola, 2001, p. 89).

Liphola (2001) explains exceptions by presenting optional rules which do not provide a definitive answer that accounts for the asymmetry. However, Liphola (2001) states that hiatus within nouns is the result of a consonant that was once present in the proto-forms of the

language but has since been elided. In other words, there is an empty C node that allows vowel hiatus to be tolerated (Roberts-Kohno, 1995). This is echoed by Ström (2013) when discussing word-internal $V_1.V_2$ sequences in Ndengeleko, a Bantu language spoken in Tanzania.

This dissertation does not adopt this viewpoint; rather, this study is of the view that the asymmetry is the result of the existence of co-phonologies that have separate constraint rankings. Ndengeleko does present the expected hiatus resolution strategies such as glide formation when V_1 is a high vowel, as in example (63) below.

63. *mwáámbo* > /mu-ambo/ 'song' (Ström, 2013, p. 112)

Like Tshivenda, Ndengeleko maintains hiatus in a specific context – V_1 must not be a high vowel and V_2 must not be the same as V_1 (Ström, 2013). For example, in *a-é-ka lwáála* 'she laughs (a laugh)' and *ne-óbey-a* 'I will lose' there is no change to the original form (Ström, 2013, p. 110). However, if V_1 is associated with the 3rd person subject marker *a-* or 1st person subject marker *ni-*, assimilation occurs (64) and (65). If hiatus resolution were solely determined by phonological factors, V_1 in example (65) would undergo glide formation since Ström (2013) asserts that in this language, glide formation occurs when V_1 is high. Much like Ndengeleko, Tshivenda's hiatus resolution also relies more on the lexical category than phonological rules.

64. /a-e-andik-a ø-balua/ → *eeándika balúa* ‘s/he will write letter(s)’

65. /ni-a-a-bang-ike ba-ana/ → *naabángike báána* ‘I beat the children’

(Ström, 2013, p. 108)

Kula (2002) and Hamann and Kula (2015) briefly mention vowel hiatus resolution in Bemba, spoken in Zambia. Like Tshivenda, vowel hiatus is tolerated in certain contexts. In Bemba, hiatus of two short vowels is not tolerated. However, if the sequence of vowels is $V_{:1}.V_2$, hiatus is maintained (Kula, 2002; Hamann and Kula, 2015), as illustrated in (66) and (67) below.

66. /a-la-iβ-a/ → [ale:βa] ‘s/he steals’

67. /a-la:-is-a/ → [ala:isa] ‘s/he will come’

(Hamann and Kula, 2015, p. 66)

What can be gleaned from the above subsection is that the asymmetry seen in Tshivenda is not unique. This asymmetry is noticed in other Bantu languages; however, it is unique compared to the languages of Southern Africa – such as the Nguni languages. The subsequent subsection deals with the literature on the PWord minimality and minimality effects with specific reference to Bantu languages.

2.4. Prosodic Word Minimality

Every language has requirements about the minimal length of an acceptable and well-formed PWord (McCarthy and Prince, 1994). As mentioned earlier, this study formally examines PWord minimality in Tshivenda. As mentioned, in Bantu languages, the minimal size of a well-formed PWord is usually disyllabic (Downing, 2005; Park, 1995; Kadenge and Mathangwane, 2017) and Tshivenda is no exception.

Kadenge and Mathangwane (2017) use OT and co-phonology to account for the asymmetrical minimality requirements in iKalanga. They argue for two co-phonologies – one for verbs and pronouns which are minimally disyllabic, and one for nouns and adjectives which can be monosyllabic.. Kadenge and Mathangwane (2017) state that verbs and pronouns belong to a co-phonology that enforces disyllabicity while nouns and adjectives do not (as they allow monosyllabic words). One instance where disyllabicity is enforced is in the formation of imperatives. Example (68a) demonstrates the epenthesis of *i*- before a monosyllabic verb stem as compared to example (68b) which is multisyllabic and does not undergo epenthesis. In example (69), to satisfy minimality requirements, the pronoun is augmented using a stabilising vowel *i*.

68. a.	/i-f-a/	→	[ifa]	***c.f.***	kufa
	STAB-die-FV		‘die!’		‘to die’

b. /bon-a/ → [bona] ***c.f.*** kubona

see-FV ‘see!’ ‘to see’

(Kadenge and Mathangwane, 2017, p. 133)

69. /i-bo/ → [i.bo]

STAB-they ‘they’

(Kadenge and Mathangwane, 2017, p. 139)

Monosyllabic nouns and adjectives, on the other hand, are acceptable and do not undergo augmentation, as illustrated in example (70a) and (70b).

70. a. dzu ‘eagle’ *idzu

b. bi ‘ugly/bad’ *ibi (Kadenge and Mathangwane, 2017, p. 141-142)

Hyman, Inkelas, and Sibanda (2009) provide an OT as well as Co-Phonology analysis of verb-reduplication in isiNdebele. They state that reduplicated stems are stems in themselves but remain faithful to the features of the base stem (Hyman et al., 2009). However, the reduplicated stem is subject to a minimality constraint – the minimal length of a PWord – which is not applied to the base form (Hyman et al., 2009). The reduplicated form is strictly required to be disyllabic to conform to the morphological well-formedness (Hyman et al., 2009).

Examples (71) and (72) below, demonstrate that the suffixation of *-yi* serves to satisfy the bi-syllabic requirement of the Ndebele reduplicated stem (Hyman et al., 2009). Example (73) illustrates how segment elision is utilised to satisfy this requirement. As Poulos (1975) states, in Tshivenda, $CV_1.V_2$ is the minimal size of a verb stem that can and will be reduplicated without augmentation (example (74)). Whereas, CV_1 cannot be reduplicated and an auxiliary verb is used instead (Poulos, 1975). However, in nominals, to adhere to minimality constraints, the noun class prefix is affixed (Poulos, 1990). These processes and their implications are discussed in Chapter 6.

71. dl-a	→	[dl-a-yi]+dl-a	'eat!'	
72. lw-a	→	[lw-a-yi]+lw-a	'fight!'	(Hyman et al., 2009, p. 9)
73. nambith-a	→	[nambi]+nambith-a	'taste'	(Hyman et al., 2009, p. 3)
74. OC-rw-a	→	[sokou]-OC-rw-a	'just hitting'	(Poulos, 1975, p. 65)

Downing (1999) provides an OT analysis of siSwati and Kinande to provide further evidence for minimality effects. Specifically, Downing (1999) argues that in siSwati, where the Morphological word is monosyllabic or V-initial, imperatives will augment the base with a suffix or prefix, respectively, to satisfy minimality – as seen in examples (75) and (76). A similar process is presented in the Prosodic Stem where the inclusion of /i/ in the passive *-iw-* which also serves to satisfy minimality (as seen in (77) and (78)) (Downing, 1999). This process is not seen in Tshivenda verbs; examples (79) and (80) show that the extension is not altered.

75. -pha	→	pha-ni	‘give!’	
76. -akha	→	y-akha	‘build!’	(Downing, 1999, p. 76)
77. -pha	→	-ph-iw-a	‘was given’	(Herman, 1996, p. 47)
78. -em̯ul-a	→	-em̯ul-w-a	‘was uncovered’	(Herman, 1996, p. 48)
79. ane-a	→	ane-is-a	‘cause to hang out to dry’	(Poulos, 1975, p. 63)
80. sim-a ‘plant’	→	sim-uw-a	‘sprout’	(Poulos, 1975, p. 48)

2.5. Summary of Chapter

This chapter presented a review of studies that are related to this dissertation. What is shown is that the existing literature on Tshivenda does not make explicit reference to either hiatus resolution or PWord minimality effects, leaving a gap in knowledge which this study aims to fill. While Tshivenda does not adhere to the strict avoidance of hiatus as compared to other Bantu languages discussed above, the asymmetries are not completely unique. As seen in languages like Fwe, chiNdau, Bemba, Kikamba, as well as Nsenga, hiatus is tolerated in some situations but resolved in others.

CHAPTER 3: BACKGROUND OF TSHIVENDA

3.1. Introduction

In this chapter, a brief history and status of Tshivenda is presented alongside some structural aspects of the language. This chapter focus on the phonemic inventory, syllable structure, and some morphosyntactic characteristics of Tshivenda, as background to the analysis of repair strategies in this language.

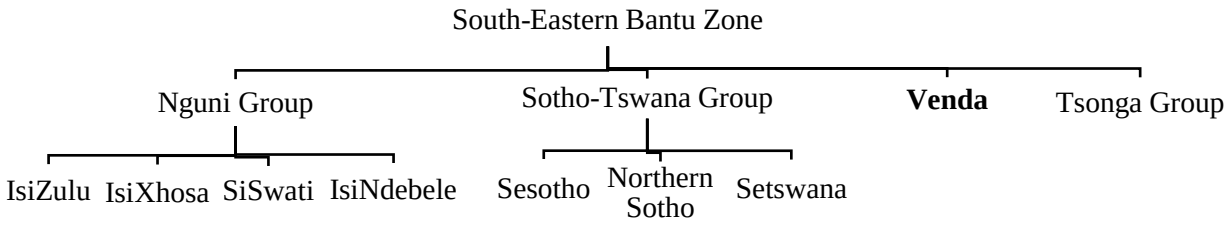
3.2. History and Status of Tshivenda

The first interesting aspect of Tshivenda[2] lies in its classification. Although it is classified within the Southern Bantu language family, it is classified as a 'lone' language (see Figure 1, below). This means that it has no 'daughter' languages.

Scholars such as Westphal (1946, p. 2) argue that Tshivenda, at some point in history, originally belonged to the chiShona group. The split would, therefore, have occurred as the result of modification when the Tshivenda speaking people migrated south and encountered other languages (Westphal, 1946). Poulos (1990) argues that a second interesting aspect of Tshivenda is that although it does share features with languages in its family, it is not mutually intelligible with them.

[2] Also called Venda

Figure 1: Doke's Classification of South-Eastern Bantu Languages (1967, adapted from Van der Merwe and Le Roux, 2014, p. 4)



What perhaps could explain modern linguists' lack of interest in Tshivenda is that it is the first language (L1) of only 2.4% of South Africans (Statistics South Africa, 2012). This makes it the second least spoken Southern Bantu Language in South Africa, closely followed by isiNdebele at 2.1% (Statistics South Africa, 2012). Tshivenda is most commonly spoken by those in Limpopo as well as in neighbouring areas of Zimbabwe (Poulos, 1990). In what follows, the structural features of the language are briefly discussed.

3.2.1. Language Standardisation

While Sociolinguistic processes such as language standardisation are out of the scope of this dissertation, it is worth noting its effect on languages. Milroy (2001) states that standardisation institutionally imposes uniformity upon a language. As Madiba (2000) argued, prior to the arrival of Christian missionaries in Southern Africa, one standard version of Tshivenda did not exist and nor was it necessary. However, a standardised version of Tshivenda and its orthographic representation was developed by the missionaries (and subsequent Apartheid State institutions such as the Native Language Committees and Language Boards) for political purposes (Madiba, 2000). Madiba (2000) states that the individuals involved in the

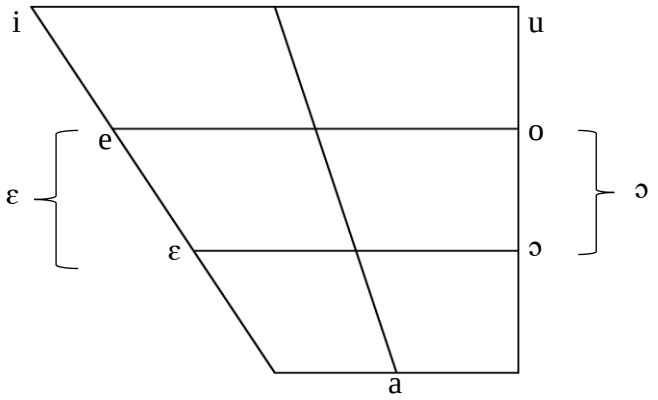
standardisation of Tshivenda did not have the linguistic expertise needed to accurately capture the language without changing its form. Consequently, Madiba (2000) argues that the orthographic representation of Tshivenda is flawed. Further investigation into the effects of standardisation is required in order to uncover whether this process has influenced the phonological behaviour of Tshivenda.

3.3. Phonemic Inventory

3.3.1. Vowels

Tshivenda has a vowel inventory of 5 simple vowels /i u ɛ ɔ a/ (Poulos, 1975, p. 1-2; Westphal, 1946, p. 4-5; Ziervogel et al., 1972, p. 6-7). The raised allophones [e] and [o] are, according to Poulos (1975, p. 2), only realised when the vowel in the preceding syllable is [+high]. That is, when the vowel in the preceding syllable is /i/ or /u/ the raised allophones are realised; the allophones [ɛ] and [ɔ] are realised elsewhere. Since this rule does not affect the study, it is not applied and the forms [ɛ] and [ɔ] are employed. Finally, in Tshivenda, there is the diphthong [ou] but, according to Poulos (1990), it is heavily restricted; it is particularly noticeable in prefixes like the tense prefix *-khou-* (Poulos, 1990, p. 505). This explains why diphthongisation is a not a viable hiatus resolution strategy in Tshivenda.

Figure 2: Vowel Inventory (adapted from Westphal, 1946, p. 4; Poulos 1975, p. 2; Poulos, 1990, p. 504)



3.3.2. Consonants

Tshivenda's complex consonant inventory is mapped out by Poulos (1975, p. 3), Ziervogel et al. (1972, p. 6-10), and Westphal (1946, p. 6) as follows (the phonemes in parentheses indicate sounds that only occur in combination with the homorganic sounds shown):

Table 1: Consonant Inventory (adapted from Poulos, 1975; Westphal, 1946; Nemakhavhani, 2002)

	Bilabial	Labial-dental	Dental	Alveolar	Labio-alveolar	Pre-palatal and Palatal	Velar	Glottal
Plosive	pˈ b pʰ bʲ		t̪ˈ d̪ t̪ʰ	tˈ d tʲˈ dʲ tʰ			kˈ g kʰ	
Nasal	m	(ɱ)	n̪	n		ɲ	ŋ	
Trill				r				
Flap				ɾ				
Fricative	ɸ β	f v		s z	ʂ ʐ	ʃ ʒ	x (ɣ)	ɦ
Affricate		pfʰ bv pfʰ		tsˈ dz tsʰ	tʂˈ dʐ tʂʰ	ʧˈ ʤ ʧʰ		
Approximant	w		l̪	l		J	w	

Tshivenda does allow pre-nasalisation of consonants; during pre-nasalisation, when the nasal consonant (N) comes into direct contact with a non-homorganic, non-nasal consonant, a compound will be formed (Poulos, 1990). This process is blocked when the non-nasal consonant shares the same place of articulation as N – they are homorganic (Poulos, 1990). Instead, the non-nasal consonant will undergo some change. Madiba (1994, p. 123) states that these consonants are /β, ɸ, f, v, l, s, z, r, ʂ, ʐ, ʃ, ʒ, ɦ/ (Madiba, 1994, p. 123):

81. N + fhola → pholo ‘healing’ [ɸ] → [p^h]

82. N + swaya → tswayo ‘signs’ [s̪] → [ts̪]

83. N + ramba → thambo ‘invitation’ [r] → [t^h]

A formal analysis of processes such as these is beyond the scope of this dissertation. Other processes that occur in Tshivenda, but which are beyond the scope of this study, include the processes whereby a sound is modified and changed into a corresponding palatal. For example, this occurs when the causative morpheme /-i-/ is suffixed onto a verb root which ends with a consonant (but before the final vowel) (Nemakhavhani, 2002, p. 27):

84. tagana → tanganya ‘meet’ [tˈaŋgaɲa]

85. vhandana → vhandanya ‘clap’ [βandaɲa]

It is important to note that this process is not related, in any way, to the following vowel. As Nemakhavhani (2002) notes, this process is attributed to the interaction between the vowel and the preceding consonant. Nemakhavhani (2002) also describes the process of labialisation which is discussed in detail in Chapter 5.

3.4. Syllable Structure

The Tshivenda syllable takes a similar form to those of other Southern Bantu languages. That is, the syllable must always end on a vowel and, therefore, is said to be open (Poulos, 1990). Furthermore, syllable stress is not significant, but tone is (Poulos, 1990; Ziervogel et al., 1972). Tshivenda is said to have two tones – high (H) and low (L) (Westphal, 1946; Poulos, 1990).

The syllable in Tshivenda can take the following forms (Westphal, 1946; Poulos, 1975, 1990; Madiba, 1994; Ziervogel et al., 1972):

i) Vowel only (V)

A permissible syllable can take the form of a single vowel (Poulos, 1975, p. 10):

86. amba	V.CV	'speak'	[a.mba]
87. -anea	V.CV.V	'hang' (clothing)	[a.nɛ.a]
88. -itea	V.CV.V	'become done'	[i.tɛ.a]

ii) Consonant and vowel (CV)

A second permissible structure is CV where the syllable never has a coda (Poulos, 1975, p. 2-10):

89. -sea	CV.V	'laugh'	[-sɛ.a]
90. -sia	CV.V	'leave behind'	[-si.a]
91. -vhalea	CV.CV.V	'be legible'	[βa.lɛ.a]

iii) Nasal only (Ṇ)

Finally, instances where a nasal is syllabic are found in Tshivenda:

92. munna	CV.Ṇ.CV	‘man’	[mu.ṇ.a]	(Muṯheiwana, 2000, p. 54)
93. nngu	Ṇ.V	‘sheep’	[ṉ.u]	(Poulos, 1990, p. 83)
94. nn̰du	Ṇ.CV	‘house/hut’	[ṇ.d̰u]	(Muṯheiwana, 2000, p. 141)

In verbal constructions, the order taken by these forms is not restricted as long as the word ends with the terminal vowel /-a/. For example, a verb may have one of the following structures:

- V.CV
- CV.CV,
- CV.V.CV
- V.V.CV.V
- V.CV.Ṇ.V, amongst others (Poulos, 1990)

The extensive affixation in verbs creates multiple opportunities for vocalic hiatus to occur and the hiatus is acceptable in Tshivenda. This is remarkable and makes the language unique compared to most of the languages in the same family such as chiShona (Mudzingwa, 2010) and Nguni dialects (Sibanda, 2009) that have an absolute ban on vocalic hiatus.

Finally, in Tshivenda, monosyllabic verb stems are permitted as seen in the words ‘fa’ (die), ‘d̰a’ (come), ‘l̰a’ (eat), ‘rwa’ (hit), ‘fha’ (give), ‘tswa’ (steal) (Nemakhavhani, 2002; Ziervogel

et al., 1972). However, as shown in Chapter 7, these monosyllabic verbs are disyllabified in the imperative form.

3.5. Aspects of Morphosyntactic Structure

Much like many other Southern Bantu languages, Tshivenda is an agglutinative language. Specifically, as Westphal (1946) notes, Tshivenda nouns belong to classes, each class marked with a singular and plural prefix. Not only that, but other pronominal forms exist – such as the subject, object, possessive, and relative markers (Poulos, 1975, 1990; Westphal, 1946; Van Warmelo, 1989). Table 2, below, represents the noun class prefixes and the allomorphs in their orthographic form:

Table 2: Noun Class Prefixes of Tshivenda (adapted from Van Warmelo, 1989; Poulos, 1975, 1990; Westphal, 1946, Ziervogel et al., 1972)

Class		**Allomorph**	**Class**		**Allomorph**
1	*mu-*	*m-, nw-,*	**2**	*vha-*	
1a	*Ø*		**2b**	*vho-*	
3	*mu-*	*m-*	**4**	*mi-*	
5	*li-*	*Ø-, i-*	**6**	*ma-*	
7	*tshi-*	*tsh-*	**8**	*zwi-*	*zw-*
9	*N-*	*n-, m-, ŋ-, n̂-, Ø-*	**10**	*dziN-*	*dzin-, dzim-, dziŋ-, dzin̂-, dziØ-*
11	*lu-*	*lw-*			
14	*vhu-*	*h-*			
15	*u-*	*h-*			
16	*fha-*	*fh-*			
17	*ku-*	*kw-*			
18	*mu-*				
20	*ku-*				
21	*d̂i-*				

Concord markers are also important in Tshivenda, as shown in Table 3 below.

Table 3: Concord Markers of Tshivenda (adapted from Van Warmelo, 1989; Poulos, 1975, 1990; Westphal, 1946, Ziervogel et al., 1972)

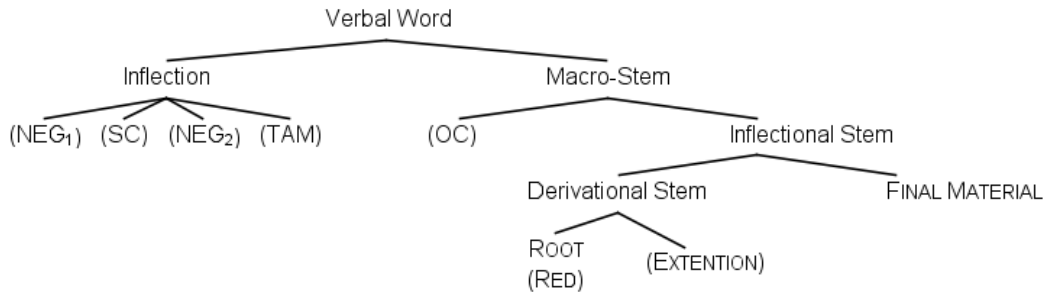
	Subject	**Object**	**Possessive**
1sg	*ndi-/nd-*	*n-*	*-nga*
2sg	*u-/w-*	*u-*	*-u*
1pl	*ri-/r-*	*ri-*	*-shu*
2pl	*ni-/n-*	*ni-*	*-nu*
3 pers:			
Cl 1	*u-/a-/Ø-*	*mu-*	*wa-, -we*
Cl 2	*vha-/vh-*	*vha-*	*vha-, -vho*
Cl 3	*u-/w-*	*u-*	*wa-*
Cl 4	*i-/y-*	*i-*	*ya-*
Cl 5	*li-/l-*	*li-*	*la-*
Cl 6	*a-/Ø-*	*a-*	*a-*
Cl 7	*tshi-/tsh-*	*tshi-*	*tsha-*
Cl 8	*zwi-/zw-*	*zwi-*	*zwa-*
Cl 9	*i-/y-*	*i-*	*ya-*
Cl 10	*dzi-/dzo-*	*dzi-*	*dza-*
Cl 11	*lu-/lw-*	*lu-*	*lwa-*
Cl 14	*vhu-, hu-/h-*	*vho-*	*ha-*
Cl 15, 16, 17, 18	*hu-/h-*	*hu-*	*ha-*
Cl 20	*ku-/kw-*	*ku-*	*kwa-*

When these elements are involved in the process of affixation, the phonological processes this study aims to investigate occur.

As mentioned earlier, another environment where affixation occurs extensively is verbs. The verb in Tshivenda is formed as follows (seen in Figure 3, below): (NEG$_1$) + (SC) + (NEG$_2$) + (TENSE/ASPECT/MOOD) + (OC) + ROOT + (REDUPLICATED ROOT) + (EXTENSION) + (FINAL

MATERIAL) where parentheses indicate that the morpheme is optional (adapted from Poulos, 1975, 1990).

Figure 3: The Tshivenda Verb (adapted from Poulos, 1990; Westphal, 1946; Downing and Kadenge, 2015)



Previous studies on Bantu languages (Mudzingwa and Kadenge, 2011; Kadenge and Simango, 2014; Downing and Mtenje, 2017, amongst others) have shown that different morphosyntactic domains trigger different hiatus resolution strategies. Mudzingwa and Kadenge (2011), for example, demonstrate that hiatus resolution strategies are employed within the morphological environments: class prefix + nominal stem, and nominal stem + diminutive suffix. This appears to be true for Tshivenda nominals and this is discussed in detail below.

3.6. Summary of Chapter

This chapter briefly discussed some background details of Tshivenda. Structural features of this language that were described in this chapter include its phonemic inventory, syllable structure, and morphosyntax. Chapter 4, below, is concerned with the methodology of the study.

CHAPTER 4: METHODOLOGY

4.1. Introduction

This chapter discusses the methodological approaches that were utilised in this study. First is a description and justification of data collection methods, and second is a discussion of the major theoretical frameworks that were employed to analyse the data.

4.2. Sources of Data

This study relied on data collected from various academic studies such as dictionaries, articles and descriptive grammars, learning handbooks, as well as educational YouTube videos (Nevhutalu, 2015a, 2015b, 2016a, 2016b, 2016c).

The earliest study from which data was sourced is Westphal's (1946) master's dissertation on the phonetics, phonology and syntax of Tshivenda. This study is one of the few sources that has phonological transcriptions informed by Westphal's time with the Tshivenda informant. While the dissertation is not exhaustive, Westphal (1946) does provide an outline of the various morphosyntactic features of Tshivenda.

This was supplemented with Poulos's (1975, 1990) extensive work on Tshivenda. Poulos's (1975) master's dissertation provides an in-depth description of the morphological structure of Tshivenda. Poulos's (1975) study is a rich source of data for this study.

Following his dissertation, Poulos (1990) published a linguistic survey in which he presents a comprehensive overview of the structural features of Tshivenda. This linguistic survey presents extensive data, some of which is given as examples in this study. Another source of data is Van Warmelo's (1989) Tshivenda–English dictionary. The data gleaned from this dictionary was useful as it clearly presents the grammatical information of the words and phrases as well as their English equivalents.

Other studies from which data was gathered are Nemakhavhani's (2002) dissertation whose phonological description of the language (see Chapter 2) provides clear examples of the processes discussed in this study. Some examples came from Mụ̑theiwana's (2000) analysis of the morphosyntactic processes of Tshivenda adjectives. In addition to these sources, Ziervogel, Wentzel, and Makuya's (1972) handbook, which serves as a learning tool for beginners to the language, and Gershkoff's (2012) grammar guide, used to familiarise Peace Corps volunteers with the language during training, were utilised. Apart from Nemakhavhani (2002), these sources did not provide any valuable insights into the phonological processes of the language and, as such, their use was limited to a small number of examples.

The two major scholars – Westphal (1946) and Poulos (1975, 1990) – who have made invaluable contributions to the understanding of Tshivenda have remained one of the primary sources of data for many studies. As such, the data collected runs the possibility of being out-dated. Furthermore, since the only data source that consistently provides phonological transcription is Westphal's (1946) dissertation, the examples not included in the Westphal (1946) study were phonologically transcribed using the data elicited from the four first language (L1) speakers of Tshivenda. A small number of new examples were elicited from the speakers; however, these examples are adaptions of existing data where a noun or pronoun is

replaced, or the tense is altered. The following section details the verification methods used to authenticate the data.

4.3. Data Verification

To ensure that the data was correct, four first language (L1) speakers of Tshivenda were contacted. The reason to include four speakers was to minimise the possible effect the individuals' accents or voice qualities had on the pronunciation of the words and phrases. Participants were identified and recruited using social media platforms such as Facebook and Twitter, as well as personal communications.

To verify the data, an elicitation list in English that the informant would verbally translate was created (see Appendix 3). It was important that the list was in English to ensure that the translations elicited were as unbiased as possible. The participants were asked to translate sentences/phrases as well as single words into Tshivenda. The elicitation list was as comprehensive as possible to eliminate the chance of conformation bias. Conformation bias is when the sample is selected based on an existing hypothesis (Sarniak, 2015). To achieve this, the elicitation list contained almost 200 words and phrases, some adapted to avoid problematic connotations, as well as different grammatical forms (for example, different tense markers were elicited).

Unfortunately, all participants were not willing to be recorded when translating the data orally, so translations had to be transcribed during the interview. This list (see Appendix 3) was sent to the participants to confirm the accuracy. Three participants were from Limpopo and one

from Mpumalanga and were between the ages of 19 and 30. All four of the participants elected to communicate over the phone as they were not based in Gauteng. Ethical clearance was obtained from the University of the Witwatersrand and all procedures were followed (See Appendix 1, 2, and 5).

4.4. Theoretical Framework

Optimality Theory (OT) and Feature Geometry (FG) were employed to analyse data in this study. As Scheer (2011) notes, OT is a theory of constraint interaction and is, therefore, computational. While OT provides a solid base, there is a gap in the traditional thoughts which fails to account for the asymmetrical behaviour seen in Tshivenda. This calls for the support of Co-Phonology – a variant of OT which can account for this behaviour. Furthermore, FG is used to not only show processes but also to justify constraints.

4.4.1. Optimality Theory

OT has become the leading theory in contemporary linguistics, particularly in the field of phonology. Prince and Smolensky (2004) first introduced this theory as one which aims to explain the language capacity of humans. They argue that the grammars of all possible languages are couched within the same set of constraints set out within a Universal Grammar (UG) (Kager, 1999). Hence, UG contains every possible constraint that holds some sort of markedness value, and which is inherently violable (Kager, 1999).

Constraints, according to Kager (1999, p. 9), are structural requirements that the output form must conform to for it to be the optimal choice (as described below). Hence, the markedness

value (which governs constraints) refers to the extent to which a linguistic structure is preferred (that which is unmarked) or dis-preferred (that which is marked) (Kager, 1999).

OT grammar contains several components: the lexicon which contains the original, unchanged underlying forms of the language, generate (GEN), constraint (CON), and evaluate (EVAL) (Kager, 1999). GEN, as the name suggests, generates an infinite number of output candidates from an input. These will be evaluated by EVAL according to the CON which contains the set of universal constraints held cross-linguistically. Below is a representation of the structure of OT grammar according to Prince and Smolensky (1993, p. 4):

a. GEN (input) = {output1, output2… $output_n$}

b. EVAL (out1, C1››C2…) = optimal candidate

As mentioned, the idea of markedness is central to this theory; however, a second idea is important to consider. This is the idea of faithfulness; faithfulness requires the output form to have retained a number of phonological features as its input counterpart, as opposed to markedness, which refers to structural requirements (Kager, 1999).

These constraints are in constant conflict because if you are to satisfy one, you will inevitably violate another. Kager (1999) states that there are no exclusive constraints that refer to the input only; however, faithfulness constraints consider both the input and the output.

An OT analysis is presented using a tableau, as seen in Tableau (i) below. In OT tableaux, constraints are placed in the first row; a solid line (and [››]) represents domination, while a dashed line (and a comma) represents equally-ranked constraints. The input form is placed in the first cell prior to the constraints. The output candidates are placed below the input. These candidates are subject to the EVAL which subjects them equally to the constraints. A fatal violation is marked using (*!), a non-fatal violation with (*), and the optimal candidate with the pointer (☞).

Constraint Ranking: Constraint A, Constraint B ›› Constraint C ›› Constraint D

Tableau i: Optimality Theory Exemplar

Input	*Constraint A*	*Constraint B*	*Constraint C*	*Constraint D*
	Highest-ranked			Lowest-ranked
a. Candidate$_1$	*!			*
b. Candidate$_2$		*!	*	
c. ☞ Candidate$_3$				**

*Analysis***:** Candidate$_1$ fatally violates *Constraint A* and Candidate$_2$ fatally violates *Constraint B*, and are, therefore, eliminated. Candidate$_3$ non-fatally violates the lowest-ranking constraint to best satisfy higher-ranking constraints and is, therefore, the optimal candidate.

4.4.1.2. Co-Phonology

Languages are said to have one specific ranking of constraints and the typological variation between languages is the result of the different rankings of the same constraints (Kager, 1999). This classical OT approach cannot explain the variation observed within a language (Kadenge and Mathangwane, 2017). Therefore, this study draws from a version of OT called 'Co-Phonology'.

Inkelas and Zoll (2007) state that in this theory, diversity within a language is explained by associating morphological constructions with different phonological grammars, more specifically, different constraint rankings. This means that in a language there can be multiple co-existing, separate phonological systems. Inkelas and Zoll (2007) go on to argue that Co-Phonology successfully predicts what phonological effects will happen during the formation of a word. Inkelas and Zoll (2007, p. 137) say that the main phonology has a 'master ranking' of constraints. This master ranking is partial since there is no one ranking for the language. From the master ranking, there exist smaller co-phonologies with their own rankings or partial rankings (Inkelas and Zoll, 2007). This allows for the explanation of exceptions within a co-phonology.

Scheer (2011) further argues that these co-phonologies are permanently distinct 'mini-grammars' that exist in parallel within one larger phonology. Figures 4 and 5, below, represent two different ways of visualising the Co-Phonology model proposed by Inkelas and Zoll (2007, p. 137) as well as Scheer (2011, p. 402). Both representations encompass the same idea that

there can exist separate phonological systems – that is, separate constraint rankings – within one larger language. Scheer's (2011) representation ensures that the idea that the phonologies act in parallel is represented clearly. Furthermore, since Figure 4 resembles syntactic diagrams, Scheer's diagram (2011) clarifies that it is not syntactic in any way.

Figure 4: Co-Phonology Representation (adapted from Inkelas and Zoll, 2007, p. 137)

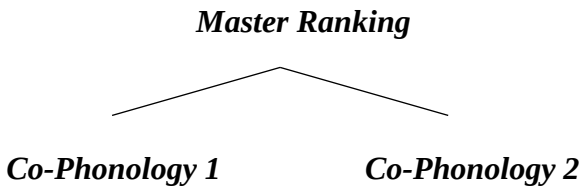
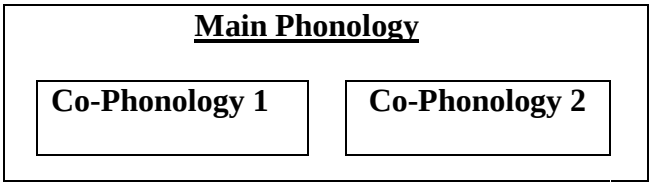


Figure 5: Co-Phonology Representation (Scheer, 2011, p. 402)

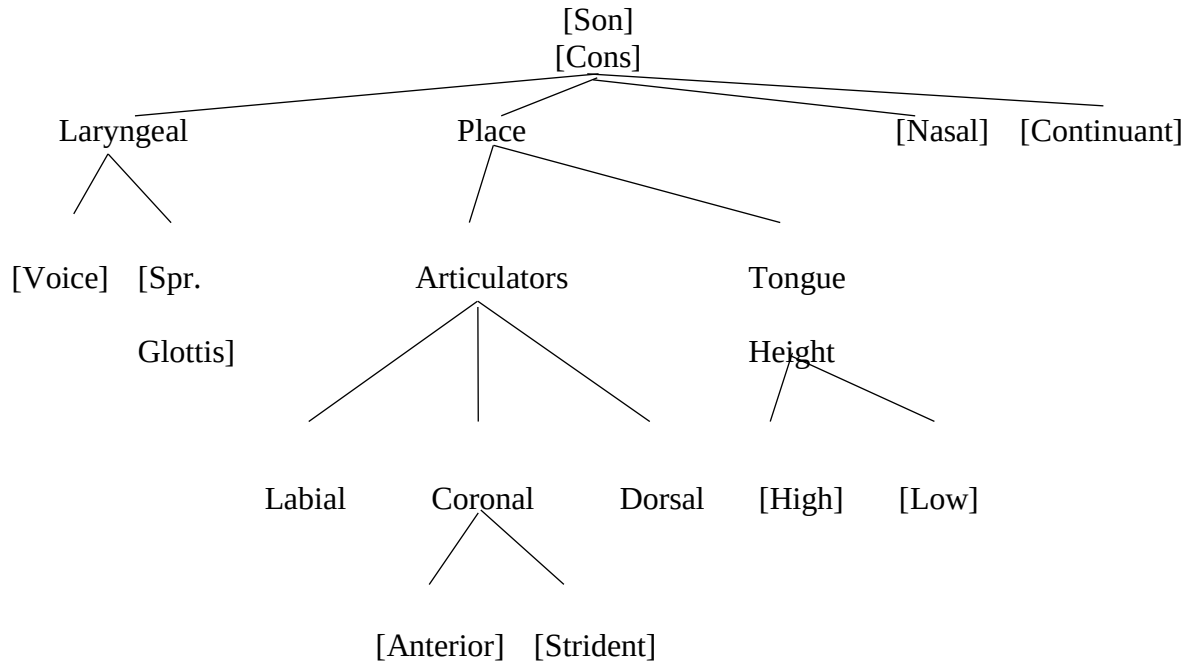


This dissertation argues that nominals belong to Co-Phonology Na and Co-Phonology Nb and verbs belong to Co-Phonology V. Each Co-Phonology has access to the constraints within the main phonology – such as those governing the syllable structure. However, they differ only in the ranking of these constraints. In Co-Phonology Na, hiatus is resolved and constraints relating to the avoidance of hiatus are ranked higher. By contrast, Co-Phonologies Nb and V, hiatus is not resolved and these same constraints that mitigate against hiatus are ranked lower since verbs allow hiatus, as seen in Chapter 5.

4.4.2. Feature Geometry

FG is an autosegmental model (Clements and Hume, 1995) where phonological segments are hierarchically organised within a tree whose terminal node represents a feature value of the phonological unit (Clements and Hume, 1995). Halle (1995) states that this feature tree formally represents the distinctive features of phonological items. FG asserts features are shared universally (Clements and Hume, 1995). Since FG visually represents phonological process, as mentioned above, this theory is useful to uncover what is occurring and the segments involved in this change. Figure 6 below illustrates the hierarchical ordering of the features.

Figure 6: FG Model of Clements and Hume (adapted from Clements and Hume, 1995)



4.5. Summary of Chapter

This chapter presented both the methods of data collection and data analysis that were utilised in this study. The sources of data were discussed along with the methods of data verification. OT and FG constitute the analytical framework that informs data analysis in this study. The following chapter presents an analysis of the noun-verb asymmetry in Tshivenda hiatus resolution.

CHAPTER 5: VOWEL HIATUS RESOLUTION

5.1. Introduction

The aim of this chapter is to present a formal analysis of the asymmetrical employment of vowel hiatus resolution strategies in Tshivenda. The chapter starts with a description and formal analysis of hiatus resolution strategies in nominals. This is followed by an analysis of the tolerance of hiatus in verbs.

Since Tshivenda is a Southern Bantu language, the behaviour of vowel hiatus resolution in this language is compared to what obtains in related Bantu languages such as chiShona and its dialects (Kadenge, 2010; Kadenge and Chebanne, 2017; Kadenge and Simango, 2014; Mudzingwa and Kadenge, 2011; amongst others referenced above) as well as Xitsonga (Vratsanos and Kadenge, 2017).

5.2. Hiatus Resolution in Nominals

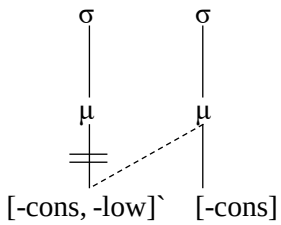
As previously discussed, a heterosyllabic sequencing of vowels – $V_1.V_2$ – is not tolerated in Tshivenda nominals. This is a widely attested phenomenon in Southern Bantu languages like chiShona and its dialects (Mudzingwa and Kadenge, 2011; Kadenge, 2010; Simango and Kadenge, 2014; Mvundura, 2015), Xitsonga (Vratsanos and Kadenge, 2017), as well as the Nguni languages siSwati (Lee, 1999), isiZulu, isiXhosa (Sibanda, 2009) and isiNdebele (Sabao, 2015).

In this subsection, I discuss the strategies employed by Tshivenda to avoid this illicit sequence. Following Mudzingwa and Kadenge (2014), nominals refer to nouns, pronouns, possessives, and diminutives. The main strategies employed to resolve hiatus in Tshivenda are glide formation, secondary articulation, and elision. In what follows, a formal analysis and discussion of these strategies is given.

5.2.1. Glide Formation

Matthews (2014) defines glide formation as the process whereby a linguistic unit is created, or formed, by another linguistic unit. Here, the unit that is formed is a glide, which phonetically resembles a vowel but, because of its position in the syllable, functions as a consonant (onset) (Matthews, 2014). Therefore, it is the process whereby a vowel is turned into a glide – also called a semivowel – to avoid hiatus (Mtenje, 2016). In FG terms, the vowel is disconnected from its mora and becomes nonsyllabic, as shown in Figure 7, below. Figure 7 shows that although glide formation results in mora loss, it preserved the V-Place and root node of the input vowel.

Figure 7: FG Representation of Glide Formation (adapted from Sibanda, 2009)



In Tshivenda possessives, when V_1 is preceded by a consonant and is a high vowel, it is realised as a glide. The resultant glide is dependent on the labial feature of the input vowel – /u/ becomes the labio-velar glide [w] and /i/ becomes the palatal glide [j]. Rosenthall (1997) asserts that

glide formation is the only repair strategy that is sensitive to vowel height. Furthermore, glide formation of high V_1 is widely attested in Bantu languages (see Rosenthall, 1997; Mudzingwa and Kadenge, 2014b; Casali, 1995, 1997, 1998; Mtenje, 2016; Ström, 2013).

Examples (95) through (100), below are possessives and absolute pronouns where the vowels in the prefixes of noun classes 1 and 3, as well as 4 and 9, undergo glide formation.

95. /u-aŋga/ → [waŋga]
NC1-mine 'mine' (Poulos, 1975, p. 73)

96. /u-awɛ/ → [wawɛ]
NC3-his 'his'

97. /i-aβɔ/ → [jaβɔ]
NC4-their 'theirs'

98. /i-aʃu/ → [jaʃu]
NC9-our 'ours' (Gershkoff, 2012, p. 13)

99. /u-o-nɛ/ → [wonɛ]
NC3-PROROOT-SUFFIX NC3 3sg

100. /i-o-nɛ/ → [jonɛ]
NC9-PROROOT-SUFFIX NC9 3sg (Poulos, 1990, p. 95)

Examples (95) through (100) illustrate that in glide formation, V_1 becomes a glide but retains its [+/-round] feature. The relevant constraints for the analysis are as follows:

101. NOHIATUS
The sequence of two vowels ($V_1.V_2$) is prohibited (Mudzingwa, 2013)

102. MAX-IO(μ)

Every input mora has an output mora correspondent

(Mudzingwa, 2013; Rosenthall, 1997, p. 147)

103. MAX-IO(RT)

Every input root node has an output root node (Mudzingwa, 2010)

104. DEP (DEPENDENCY)

Every input segment has an output correspondent), no epenthesis

(Rosenthall, 1997)

105. ANCHOR-L

The leftmost root node of a morpheme in the input must have an output correspondent (V_2 deletion is prohibited)

(Mudzingwa and Kadenge, 2011)

In Tshivenda glide formation, like in other hiatus resolution strategies, the loss of the mora associated to the V_1 does not result in compensatory lengthening. This is common in languages, like Tshivenda, where vowel length is non-contrastive (Mudzingwa and Kadenge, 2011; Kadenge and Simango, 2014).

The faithfulness constraint, DEP (DEPENDENCY), disallows any form of epenthesis to resolve hiatus. It is attested that in Southern Bantu languages, the vowel that is targeted for elision is typically V_1 (Kadenge and Simango, 2014; Casali, 1997; Mudzingwa and Kadenge, 2011; Casali, 2011; Casali, 1995; Kadenge, 2010). This holds true in Tshivenda where the high-ranking constraint ANCHOR-L ensures V_1 is targeted. These constraints dominate the faithfulness constraints MAX-IO(RT) and MAX-IO(μ), which mitigate against the deletion of a

root node and a mora, respectively. Tableau 1 provides a formal analysis of the vowel hiatus resolution in the example (96) /u-awɛ/ which is realised as [wawɛ] 'his'. The higher ranking of the constraint MAX-IO(RT) over MAX-IO(μ) shows that the candidate that employs glide formation is the optimal output.

106. NOHIATUS, ANCHOR-L, DEP ›› MAX-IO(RT) ›› MAX-IO(μ)

Tableau 1: Glide Formation in Possessives

/u-awɛ/	NOHIATUS	ANCHOR-L	DEP	MAX-IO(RT)	MAX-IO(μ)
a. [u.a.wɛ]	*!				
b. [u.wɛ]		*!		*	
c. [a.wɛ]				*!	*
☞ d. [wa.wɛ]					*
e. [u.wa.wɛ]			*!		

In Tableau 1 above, candidate (106a) is eliminated as it fatally violates the markedness constraint – NOHIATUS. Candidate (106b) resolves the illicit $V_1.V_2$ sequence through the elision of V_2, which fatally violates the high-ranking constraint ANCHOR-L. This high-ranking morpho-prosodic constraint militates against the deletion of V_2. Candidate (106c), on the other hand, employs V_1 elision to resolve hiatus. This is not preferred as it fatally violates the constraint MAX-IO(RT) which mitigates the deletion of a root node. Candidate (106e), fatally violates DEP by inserting [w] to avoid hiatus. While candidate (106d) does violate the low-ranking constraint MAX-IO(μ), it does so to satisfy higher ranking constraints and it is, therefore, the optimal candidate.

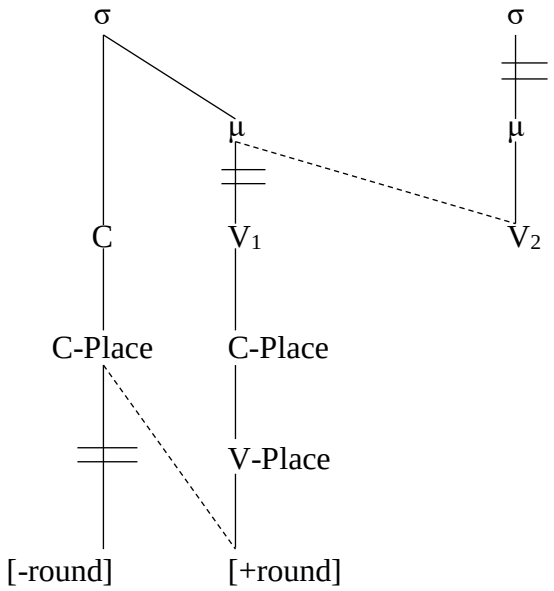
This subsection presented an analysis of glide formation in Tshivenda. The evidence put forward in the above subsection mirrors the findings of glide formation in existing literature on glide formation in Bantu languages like chiShona and ciNsenga (Kadenge and Simango 2014), chiKaranga and Nambya (Mudzingwa and Kadenge, 2011), chiZezuru (Kadenge, 2010), and others (Rosenthall, 1997; Mudzingwa and Kadenge, 2014b; Casali, 1995, 1997, 1998; Mtenje, 2016). That is, when V_1 is /i/ or /u/ and is onsetless, it loses its moraicity and a glide that agrees in the place feature is formed, which becomes the onset for V_2. However, this process cannot account for the instances where V_1 contains an onset.

5.2.2. Secondary Articulation

A second strategy used in Tshivenda to resolve vowel hiatus is secondary articulation. Matthews (2014) defines this process as one whereby two speech sounds are produced simultaneously. In other words, a subsidiary (or secondary) sound is produced along with a more 'dominant' one which has a greater degree of closure or stricture (Matthews, 2014). This is a form of 'feature spreading' (Clements and Hume, 1995), shown in Figure 8, below.

Figure 8 represents the process of secondary articulation in a $C_{[-round]}V_1.V_2$ construction. As with glide formation, V_1 is delinked from its mora to resolve vowel hiatus. Subsequently, V_2 delinks from its syllable and becomes associated with the mora of V_1. V_1 spreads its [+round] feature to the preceding consonant, thereby delinking C from its [-round] feature.

Figure 8: FG Representation of Secondary Articulation (adapted from Nemakhavhani, 2002, p. 46)



Much like glide formation, secondary articulation involves the transformation of the vowel into a glide. The reason glide formation is avoided is that it would result in consonant clusters (complex onsets) such as [lw] and [bj] which are strictly prohibited in Tshivenda (Poulos, 1990). The avoidance of consonant clusters is common in other Southern Bantu languages such as Xitsonga (Vratsanos, 2018), Nambya (Mudzingwa and Kadenge, 2011), chiShona, ciNsenga (Kadenge and Simango, 2014), and isiZulu (Khumalo, 1987).

In Tshivenda, secondary articulation only occurs when V_1 is labial – i.e. /u ɔ/. Examples (107) through (110) illustrate secondary articulation in diminutives. In these examples, V_1 loses it moraicity and spreads the [+round] feature to the preceding onset consonant. Subsequently, V_2 is associated with the mora of V_1.

107. /nd̪u-ana/ → [nd̪^{w}ana]
Hut-DIM ‘small hut’

108. /n̪ŋu-ana/ → [n̪ŋ^{w}ana]
Sheep-DIM ‘small sheep/lamb’ (Poulos, 1990, p. 83-84)

109. /p^{h}ulu-ana/ → [p^{h}ul^{w}ana]
Ox-DIM ‘small ox’ (Nemakhavhani, 2002, p. 28)

110. /tɔlɔ-ana/ → [tɔl^{w}ana]
Kudu-DIM ‘small kudu’ (Westphal, 1946, p. 94)

Secondary articulation also occurs in the 3rd person absolute pronouns of noun classes 11 and 20, as illustrated in examples (111) and (112) below.

111. /lu-ɔ-nɛ/ → [l^{w}ɔnɛ]
NC11.PROROOT.SUFFIX NC11 3sg

112. /ku-ɔ-nɛ/ → [k^{w}ɔnɛ]
NC20.PROROOT.SUFFIX NC20 3sg (Poulos, 1990, p. 95)

In addition to the constraints given in (101) through (105), a constraint that bans complex onsets (113) is required. Example (114) presents the constraint ranking used in the formal analysis of example (106) /n̪ŋu-ana/ which is realised as [n̪ŋ^{w}ana] is analysed in Tableau 2.

113. *COMPLEX
No complex onsets (Mudzingwa, 2013)

114. NOHIATUS, *COMPLEX, DEP, ANCHOR-L›› MAX(RT) ›› MAX(μ)

Tableau 2: Secondary Articulation in Diminutives

/n̪ŋu-ana/	NOHIATUS	*COMPLEX	DEP	ANCHOR-L	MAX-IO(RT)	MAX-IO(μ)
a. [n̪.ŋu.a.na]	*!					
☞ b. [n̪.ŋʷa.na]					*	*
c. [n̪.ŋu.wa.na]			*!			
d. [n̪.ŋwa.na]		*!				*
e. [n̪.ŋu.na]				*!	*	*

In Tableau 2, above, candidate (114a) is not the optimal candidate because it fatally violates one of the highest-ranking constraints, NOHIATUS. Candidate (114c) makes use of consonant epenthesis, which is not the preferred resolution strategy and thereby fatally violating DEP. Candidates (114d) and (114e) fatally violate *COMPLEX and ANCHOR-L, respectively. Candidate (114b) is the optimal candidate as it satisfies all the higher-ranking constraints.

5.2.2.1. Palatalization

Examples (107) through (112) illustrate the process of secondary articulation where V_1 is the labial vowel /u, o, ɔ/ and the preceding consonant is [-round]. However, when the consonant is [+round], labialisation is prohibited and, instead, palatalization occurs (Nemakhavhani, 2002).

Matthews (2014) defines palatalization as a secondary articulation process where a non-palatal consonant is produced with the tongue raising towards the hard palate. Palatalization of non-

palatal consonants is observed in Bantu languages like Nambya (Mudzingwa and Kadenge, 2011), dialects of Nyakyusa (Mtenje, 2016), as well as iKalanga (Mathangwane, 1996).

However, in Tshivenda, palatalization is not triggered by the vowel features. Instead, it is triggered when the onset of the $CV_1.V_2$ sequence already possesses the [+round] feature. In other words, when secondary articulation is triggered and the onset is a labial consonant, labialisation is blocked, thereby triggering palatalization, as illustrated in examples (115)–(117).

115. /mulambɔ-ana/ → [mulambʲana]
River-DIM 'small river'

116. /tʰambɔ-ana/ → [tʰambʲana]
Rope-DIM 'small rope'

117. /rambɔ-ana/ → [rambʲana]
Bone-DIM 'small bone' (Nemakhavhani, 2002, p. 28)

Nemakhavhani (2002, p. 34-35) argues that there are three phonological rules that are applied to the input, as illustrated in example (118). Firstly, glide formation (GF) occurs when V_1 is /u, o, ɔ/ and is preceded by a [+round] consonant (118a). Secondly, the labio-velar glide undergoes labial dissimilation (LD). LD, according to Matthews (2014), is a process whereby two successive sounds change to become less similar. Example (118b) states that when a [+round] onset precedes a labio-velar glide /w/, the glide undergoes LD to form the palatal glide [j]

(Nemakhavhani, 2002). Finally, because complex onsets are prohibited in Tshivenda (Poulos, 1990), secondary articulation (SA) is triggered (118c).

118. a. GF: $C_{[+round]}$ → $C_{[+round]}$ + w /_$V_{1[+high;\ +round]}.V_2$

b. LD: $C_{[+round]}$ → $C_{[+high;\ +round]}$ + j /_w

c. SA: $C_{[+round]}$ + j → $C^{j}_{[+high;\ +round]}$Ø

The three phonological rules, as set out in (118), are applied as illustrated in the Tshivenda words given in (119) and (120). In both examples, the illicit consonant cluster [bw] is formed, which undergoes LD and produces the consonant cluster [bj]; thereafter, secondary articulation is triggered and the optimal [b^{j}] is formed.

119. t^{h}ambɔ-ana	→	t^{h}ambwana	→	t^{h}ambjana	→	[$t^{h}amb^{j}$ana]
Rope.DIM		*GF*		*LD*		*SA*

120. mulambɔ-ana	→	mulambwana	→	mulambjana	→	[mulamb^{j}ana]
River-DIM		*GF*		*LD*		*SA*

(Nemakhavhani, 2002, p. 28)

Figure 9 below, demonstrates the phonological processes that occur during the application of the secondary articulation rule in example (118c).

Figure 9: FG Representation of SA after LD (adapted from Nemakhavhani, 2002, p. 46)

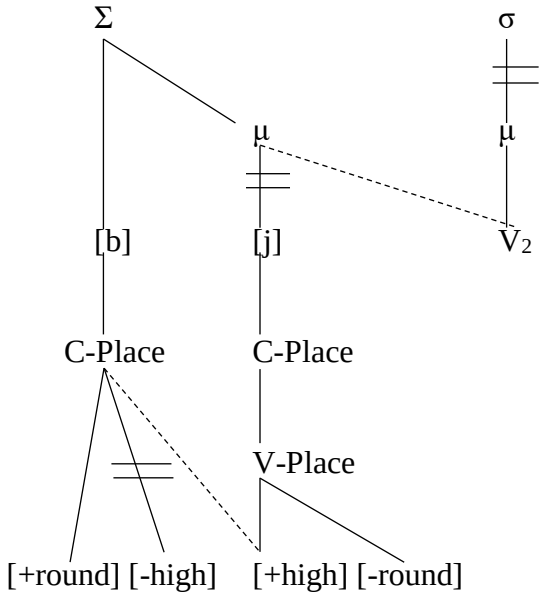


Figure 9 illustrates the process of secondary articulation which is triggered after labial dissimilation occurs. Like Figure 8, the mora associated to V_1 is elided and becomes associated to V_2. However, in Figure 9, the bilabial consonant /b/ disconnects from its [-high] feature allowing the [+high] feature to be spread. Thus, the bilabial consonant /b/ is realised as [b^j] (Nemakhavhani, 2002).

Tshivenda is not unique in its avoidance of sequences of sounds that share a feature such as labialised bilabial consonants; languages such as Xitsonga (Vratsanos and Kadenge, 2017) and the Nguni languages (Sibanda, 2009; Kotzé and Zerbian, 2008) also prohibit this construction.

The LD illustrated in examples (115) through (117) is a direct consequence of the Obligatory Contour Principle (OCP). OCP is a constraint that mitigates against a sequence of segments that are alike (McCarthy, 1988). This constraint (defined in example (121)) renders the combination of a labial consonant and a labial glide unacceptable and is ‘repaired’ through the

process of labial dissimilation (Kotzé and Zerbian, 2008). Example (122) contains the constraint ranking thus far. A formal analysis of the secondary articulation process in example (119) /tʰaᵐbɔ-ana/, which is realised as [tʰambʲana] ‘small rope’, is presented in Tableau 3. The constraint IDENT-IO(-HIGH)$_{ROOT}$, as defined in example (122), prohibits dissimilation in that it requires the [-high] feature of a segment in the input root to remain in the output. Finally, the constraint IDENT-IO(ROUND)V_1, as defined in example (123), prohibits the resultant glide from losing its [+round] feature.

121. OCP

A sequence of identical features is disallowed (McCarthy, 1988)

122. IDENT-IO(-HIGH)$_{ROOT}$

A [-high] segement in the root input must have a correspondent in the output

(Walker, 2005)

123. IDENT-IO(ROUND)V_1

The [+round] feature of V_1 in the input has a corresponding [+round] feature in the output (Lionnet, 2014)

124. NOHIATUS, *COMPLEX, OCP, ANCHOR-L ›› MAX(RT) ›› MAX(μ) ›› IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V_1

Tableau 3: Secondary Articulation after Labial Dissimilation in Diminutives

/ $t^ha^mbɔ$-ana /	NoHiatus	*Complex	OCP	Anchor-L	Max-IO(Rt)	Max-IO(μ)	Ident-IO(-High)$_{RT}$	Ident-IO(Round)V_1
a. [$t^ha.^mbɔ.a.na$]	*!							
b. [$t^ha.^mbwa.na$]		*!				*		
c. [$t^ha.^mb^wa.na$]			*!		*	*		
☞d. [$t^ha.^mb^ja.na$]					*	*	*	*
e. [$t^ha.^mbɔ.na$]				*!	*	*		

In Tableau 3, candidate (124a) is fully faithful and is, as a result, eliminated by fatally violating NoHiatus. Candidate (124b), on the other hand, undergoes glide formation which fatally violates *Complex and is, therefore, eliminated. Candidate (124c) is also eliminated because, in Tshivenda, the sequence [b^w] is illicit and the high-ranking OCP constraint is, therefore, fatally violated. Candidate (124e) fatally violates Anchor-L by deleting V_2 and is eliminated. The optimal candidate, candidate (124d), satisfies the high-ranking constraints by undergoing LD as well as secondary articulation. Candidate (124d) non-fatally violates Ident-IO(-High)$_{Root}$ by delinking from its [-high] feature. Moreover, it non-fatally violates Ident-IO(Round)V_1 during the labial dissimilation process where the resultant glide is realised as [j].

This subsection discussed secondary articulation, where V_1 is preceded by a compatible onset ($CV_1.V_2$). Glide formation is blocked in this context since Tshivenda, like other Southern Bantu

languages, does not permit complex onsets. Instead, the [+round] feature of V_1 is spread to the preceding consonant.

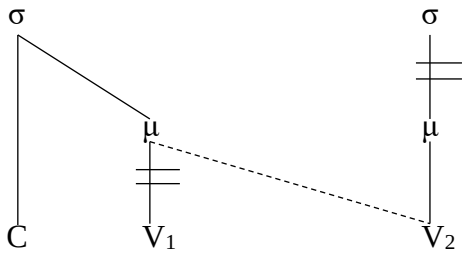
Furthermore, this subsection dealt with the fact that labial consonants are not labialised but are palatalized. This was shown to occur through the process of labial dissimilation where the glide that is formed loses its [+round] feature and becomes an acceptable alternative. The following subsection presents the strategy involved in the instances where the processes above are blocked.

5.2.3. Vowel Elision

The final repair strategy employed is that of vowel elision. Matthews (2014) describes vowel elision as the loss of a mora and root node loss at the end of a word. While this may be true in some languages, vowel elision in Tshivenda and many other Southern Bantu languages alike does not necessarily occur at the end of the word. Rather, vowel elision occurs at the boundary between a lexical and a functional morpheme, as well as the affix-stem boundary (Casali, 2011). This is an attested phenomenon in Bantu languages such as ciNsenga and chiShona (Kadenge and Simango, 2014), chiKaranga and Nambya (Mudzingwa and Kadenge, 2011), chiZezuru (Kadenge, 2010), and Fwe (Gunnink, 2018).

Compensatory lengthening does not occur in Tshivenda, which would render the inclusion of the constraint *V: or no long vowels (McCarthy and Prince, 1995) redundant since it would always be undominated.

Figure 10: FG Representation of Vowel Elision (Adapted from Mudzingwa and Kadenge, 2011)



Vowel elision is triggered in the contexts where both glide formation and secondary articulation are blocked. Specifically, where V_1 is the pharyngeal vowel /a/ or the coronal vowels /i ɛ/. The process of vowel elision is represented in Figure 10 above, which demonstrates the complete elision of V_1 and subsequent linking of V_2 to the mora of V_1. In what follows, a formal analysis of coronal and pharyngeal vowel elision is presented.

5.2.3.1. Coronal Vowel Elision

In Tshivenda, vowel elision is triggered in instances where the coronal vowels /i ɛ/ are preceded by a consonant. Due to the prohibition of complex onsets and palatalused nonlabial consonants, glide formation and secondary articulation are blocked in these contexts. Examples (125) through (133) illustrate V_1 elision where V_1 is /i/ or /ɛ/.

125. /pfʰɛn̪ɛ-ana/ → [pfʰɛn̪ana]

Baboon-DIM ‘small baboon’ (Westphal, 1946, p. 94)

126. /mbudʒi-ana/ → [mbudʒana]

Goat-DIM ‘small/young goat’

127. /kʰali-ana/ → [kʰalana]

Clay pot-DIM ‘small clay pot’

(Poulos, 1990, p. 83-84)

Examples (128) and (129) present the ‘descriptive possessive’ within a noun phrase (NP). The descriptive possessive serves a purely grammatical function. Specifically, it links the descriptive noun to the ‘main’ noun within an NP (Muṱheiwana, 2000). The curly brackets{ } indicate the so-called descriptive noun and the descriptive possessive within the NP.

128. /{l̰i-sɔlɛ **l̰i-a**} musadʑi/ → [{lisɔlɛ **l̰a**} musadʑi]

NC5-Solider NC5-POSS NC1-female ‘female soldier’

129. /{ʧʰi-βidʑɔ **ʧʰi-a**} βaswa/ → [{ʧʰiβidʑɔ **ʧʰa**} βaswa]

NC7-gathering NC7-POSS NC2b-youth ‘gathering of the youth’

(Muṱheiwana, 2000, p. 51 and 109)

Further examples are found in class 7 and 8 nouns:

130. /ʧʰi-aⁿd̰a/ → [ʧʰa.ⁿda]

NC7.hand ‘hand’

131. /ʧʰi-alɔ/ → [ʧʰa.lɔ]

NC7.graveyard ‘graveyard’ (Mulaudzi, 1996, p. 43)

132. /ɣʰi-ɛʤa/ → [ɣʰɛ.ʤa]

NC7.light ‘light’

(*English-Tshivenda: bilingual and explanatory dictionary*, 2006, p. 389)

133. /zʷi-aⁿḓa/ → [zʷaⁿḓa]

NC8.hand ‘hands’

(*English-Tshivenda: bilingual and explanatory dictionary*, 2006, p. 485)

If glide formation was not blocked in examples (125) through (133), above, it would form an illicit complex consonant cluster which would fatally violate the constraint *COMPLEX (113). On the other hand, forming a palatalized consonant through secondary articulation is also blocked in Tshivenda. Importantly, palatalization, as described above, is the consequence of satisfying the high-ranking OCP constraint that prevents labialisation of bilabial consonants. To account for this, the constraint *C^{j}, which mitigates against the palatalization of consonants, as defined in Sibanda (2009), is adapted to *$C_{[-round]}{}^{j}$, defined in (134), to ensure that only non-labial consonants are not palatalized. Tableau 4 provides a formal analysis of /i/ elision in the example (129) /{l̰i-solɛ **l̰i-a**} musaʤi/ which is realised as [{lisolɛ **l̰a**} musaʤi] ‘female soldier’.

134. *$C_{[-round]}{}^{j}$

No palatalized [-round] consonant (adapted from Sibanda, 2009)

135. NOHIATUS, *COMPLEX, *$C_{[-round]}{}^{j}$ ›› MAX-IO(RT) ›› MAX-IO(μ)

Tableau 4: /i/ Elision

/l̪isolɛ l̪i-a musadzi/	NOHIATUS	*COMPLEX	*$C_{[-round]}{}^{j}$	MAX-IO(RT)	MAX-IO(μ)
a. [lisolɛ li.a musadzi]	*!				
b. [lisolɛ l^{j}a musadzi]			*!	*	*
c. [lisolɛ lja musadzi]		*!		*	*
☞d. [lisolɛ la musadzi]				*	*

In Tableau 4, candidate (135a) shows that the $V_1.V_2$ sequence is illicit by fatally violating the high-ranking constraint against such sequences. Candidate (135b) elides V_1 and the preceding consonant is palatalized, fatally violating *$C_{[-round]}{}^{j}$ which disallows palatalized non-labial consonants. Candidate (135c) fatally violates *COMPLEX by undergoing glide formation. The optimal candidate is candidate (135d) as complete vowel elision is the most preferred vowel hiatus resolution strategy in this context.

The process /Ci+V_2/ → [CV_2], as well as the avoidance of palatalized consonants, is not unique to Tshivenda. Other Bantu languages that exhibit this are illustrated in Table 4 below, including but not limited to Xitsonga (Vratsanos and Kadenge, 2017), chiShona (Kadenge and Simango, 2014), the Nguni languages (Sibanda, 2009), chiKaranga (Mudzingwa and Kadenge, 2011), and chiZezuru (Kadenge, 2010).

5.2.3.2. Pharyngeal Vowel Elision

When V_1 in the (C)V_1.V_2 sequence is the pharyngeal vowel /a/, it is elided in many Bantu languages (as discussed in Table 4 below). Examples (136) through (139) illustrate the complete V_1 elision.

136. /tʰaβa-ana/ → [tʰaβana]
Mountain-DIM ‘small mountain’ (Poulos, 1990, p. 83)

137. /nowa-ana/ → [nowana]
Snake-DIM ‘small snake’ (Westphal, 1946, p. 94)

138. /{βa-ana **βa-a**} musalauno/ → [{βana **βa**} musalauno]
NC2b-child NC2b-POSS nowadays ‘children of these days’
(Muṱheiwana, 2000, p. 51)

139. /a-o-ne/ → [one]
NC6-PROROOT-SUFFIX NC6 3sg (Poulos, 1990, p. 95)

Resolving vowel hiatus using secondary articulation is blocked when V_1 is the pharyngeal /a/. This is because Tshivenda’s phonemic inventory does not contain pharyngeal consonants (Poulos, 1990). The high-ranking constraint *$C^{ʕ}$ as defined in (140) mitigates against the formation of pharyngealized consonants. Glide formation is also blocked as the consequence of the undominated *COMPLEX constraint (114).

140. *Cˤ

No pharyngealized consonants (Mudzingwa, 2010)

Tableau 5 presents a formal analysis of the vowel elision process in example (136) /tʰaβa-ana/ which is realised as [tʰaβana] ‘small mountain’. The constraint ranking is defined in (141), below.

141. NOHIATUS, *COMPLEX, * Cˤ ›› MAX-IO(RT) ›› MAX-IO(μ)

Tableau 5: /a/ Elision

/tʰaβa-ana/	NOHIATUS	*COMPLEX	* Cˤ	MAX-IO(RT)	MAX-IO(μ)
a. [tʰa.βa.a.na]	*!				
☞b. [tʰa.βa.na]				*	*
c.[tʰa.βˤa.na]			*!	*	*
d.[tʰa.βʕa.na]		*!			

Candidate (141a) in Tableau 5 is disqualified as it features unresolved vowel hiatus. Candidate (141c) is eliminated and is not the optimal candidate as it fatally violates *Cˤ by undergoing secondary articulation. Candidate (141d) fatally violates the undominated constraint *COMPLEX during glide formation and is, therefore, eliminated. This leaves candidate (141b) as the optimal choice as it elides the entire segment, non-fatally violating MAX-IO(RT) and MAX-IO(μ) in the process of satisfying higher-ranking constraints.

5.2.4. Discussion

In summary, the above subsection dealt with vowel hiatus resolution with a specific focus on nominals. The study demonstrated that in nominals, the phonological rules associated with the syllabic well-formedness are favoured. In other words, nominals undergo phonological changes to satisfy the well-formedness constraints which maintain the CV syllable structure. These changes include the elision of a root node and/or the mora as well as glide formation and secondary articulation. This, as discussed below, is not applied universally within the language. Hence, the inclusion of co-phonologies is required. The co-phonology that governs nominals is referred to as 'Co-Phonology N'.

As mentioned, this is one way of accounting for the intra-linguistic differences. However, unlike what Figures 4 and 5 in Chapter 4 suggest, the data does not account for a simple distinction between the different co-phonologies. As is further discussed, one explanation of this would be historical sound shifts or lack thereof. For example, according to Gibson, Guerois, and Marten (2017), Tshivenda has not widely adopted the diminutive suffix *-ana* with the use of NC7/8 *tshi-* and *zwi-* as well as NC20 *ku-* to denote not only diminutives but also characteristics of nouns derived from verbs.

142. /ʧʰi-kunwanɛ/ → [ʧʰi.ku.nʷa.nɛ]

NC7-toe 'small toe'

143. /ʧʰi-ambi/` → [ʧʰi.a.ᵐbi]

NC7-speaker 'good speaker' (Poulos, 1990, p. 36)

144. /mu-unḍiwa/ → [mu.u.^{n}ḍi.wa]

NC1-dependant ‘dependant’ (N.)

145. /mu-ɛni/ → [mu.ɛ.ni]

NC1-guest ‘guest’

146. /ku-a^{m}bɛlɛ/ → [ku.a.^{m}bɛ.lɛ]

NC20-saying ‘manner of speaking’

(*English-Tshivenda: bilingual and explanatory dictionary*, 2006, p. 251, 207, 115)

147. /lu-a^{m}b-o/ → [lu.a.^{m}bo]

NC5-speak-DEVERB ‘language’

148. /lu-anak^{h} a/ → [lu.a.na.k^{h}a]

(Caesalpinia sepiaria Roxb.) ‘specific kind of shrub’

(Mulaudzi, 1996, p. 41)

While this historical shift is not the focus of this dissertation, it may be worthwhile for future studies to explore the possibility that the influence of the origin of the root has blocked the expected processes as seen below. In other words, following Roberts-Kohno (1995), future studies should examine the possibility of an empty C node. Another factor that may explain these exceptions is the influence Northern Sotho has had on Tshivenda (Mulaudzi, 1996). Since the data does show that there may be exceptions, the Co-Phonology Theory (as described in the previous chapter) is used to account for this intra-linguistic variation. The constraint rankings for nominals in Co-Phonology N is presented in (149).

149. <u>Co-Phonology N</u>: NoHiatus, *Complex, OCP, Anchor-L, Dep, *$C^{ʕ}$, *$C_{[-round]}{}^{j}$ ›› Max(Rt) ›› Max(μ)

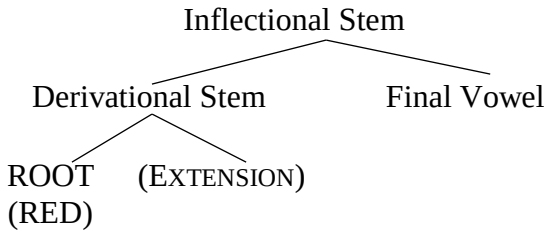
5.3. Hiatus Non-resolution in Verbs

As mentioned earlier, Tshivenda permits the occurrence of $V_1.V_2$ sequences within verbs. Tolerating vowel hiatus in certain constructions is not unique to Tshivenda (see Mutonga, 2017; Kadenge and Simango, 2014; Kula, 2002 and Hamann and Kula, 2015). The aim of this subsection is to provide a formal analysis which argues that in Tshivenda verbs, the morphological construction is favoured over the phonotactic constraints. Firstly, the tolerance of vowel hiatus across the inflectional stem is discussed, followed by the tolerance of hiatus across the macro-stem.

5.3.1. Tolerance of Vowel Hiatus in the Inflectional Verb Stem

The inflectional verb stem in Tshivenda is formed as follows: Root + (Reduplicated Root) + (Extension) + (Final Vowel) where parentheses indicate that the morpheme is optional (adapted from Poulos, 1975, 1990). That is, the inflectional stem is the derivational stem and the final vowel. Following Mudzingwa and Kadenge (2014), Figure 11 illustrates the relations between the inflectional verb stem and the prosodic constituents.

Figure 11: Inflectional Verb Stem (adapted from Mudzingwa and Kadenge, 2014b; Poulos, 1990; Westphal, 1946)



This agglutinative process – the affixation of material – creates many instances of vowel hiatus, just like in nominals. This is seen in the isolated lexical items presented by Poulos (1975) in examples (150) through (155) where vowel hiatus is tolerated between the verb stem and the final vowel. In what follows, I present one tableau for each expected vowel hiatus resolution strategy (vowel elision, secondary articulation, and glide formation) to demonstrate the need for a separate constraint ranking.

150. /sɛ-a/ → [sɛ.a]

Laugh-FV ‘laugh’ (Poulos, 1975, p. 2)

151. /βɛ-a/ → [βɛ.a]

Put-FV ‘put/place’

152. /si-a/ → [si.a]

Leave behind-FV ‘leave behind’

153. /kapɛ-a/ → [ka.pɛ.a]

Hang-FV ‘hang, sling something up’

154. /βalɛ-a/ → [βa.lɛ.a]

Legible-FV ‘be legible’

155. /ite-a/ → [i.tɛ.a]

Doable-FV ‘be doable’ (Poulos, 1975, p. 9-10)

As this data suggests, what is found in the input is identical to that in the output – there is no deletion. Tableau 6 below, provides a formal analysis for the above example (152) – /-si-a/ → [-sia] ‘leave behind’ using the constraint ranking for Co-Phonology N ((156) and simplified in (157)). The symbol (💣) represents the false optimal candidate.

156. <u>Co-Phonology N</u>: NoHiatus, *Complex, OCP, Anchor-L, Dep, * $C^{ʕ}$, *$C_{[-round]}{}^{j}$ ›› Max(Rt) ›› Max(μ)

157. NoHiatus, Dep ›› Max-IO(Rt) ›› Max-IO(μ)

Tableau 6: Vowel Elision in Verbs

/-si-a/	NoHiatus	Dep	Max-IO(Rt)	Max-IO(μ)
☞a. [-si.a]	*!			
.b. [-sw.a]		*!		*
💣c. [-sa]			*	*

The optimal candidate in Tableau 6, and what is realised in the output, is candidate (157a), despite it fatally violating the highest ranked constraint. This suggests that NoHiatus should

rather be the lowest ranking constraint. Since the optimal candidate is always faithful to the input, MAX-IO(RT) and MAX-IO(μ) are simplified to MAX-IO.

158. MAX-IO

Input segments must have output correspondents (no deletion)

(McCarthy and Prince, 1995)

Thus, the following is the constraint ranking for verbs as illustrated in example (159).

159. DEP, MAX-IO ›› NOHIATUS

Tableau 7: Vowel Hiatus in the Inflectional Stem

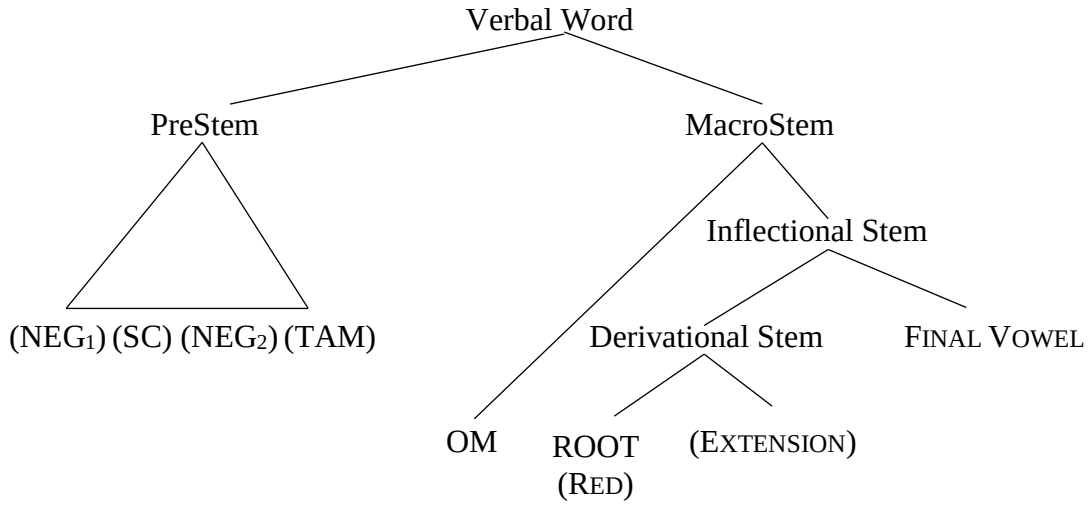
/-si-a/	DEP	MAX-IO	NOHIATUS
☞a. [-si.a]			*
b. [-si.ja]	*!		
c. [-sa]		*!	

Tableau 7 contains the modified constraint ranking that allows for the optimal candidate – candidate (159a) – to be chosen. Candidate (159b) utilises glide epenthesis, which fatally violates the constraint DEP. Neither is candidate (159c), which is eliminated because it deletes V_1 in fatal violation of MAX-IO. The above tableau and the examples illustrate that the expected repair strategy of vowel elision is blocked in verbal constructions, whereas in nominals, vowel elision would be triggered.

5.3.2. Tolerance of Vowel Hiatus in the Verbal Word

The above subsection presented the tolerance of vowel hiatus within the inflectional stem. However, vowel hiatus in verbs is not confined to the inflectional stem; it also occurs within the PreStem, across the PreStem and MacroStem, as well as within the MacroStem. The morphology of the Tshivenda verb structure is illustrated in Figure 12 below.

Figure 12: The Morphology of the Tshivenda Verbal Word (adapted from Poulos, 1990; Westphal, 1946; Mudzingwa and Kadenge, 2014b; Hyman, 1993)



For example, in Tshivenda, vowel hiatus is tolerated across the subject concord + tense marker/formative seen in the long form of the present tense SC-a-R-FV (Poulos, 1990). Vowel hiatus is further tolerated across word boundaries between main lexical categories (nominals and verbs). The bracket ({) indicates the boundary between the nominal and verbal phrase, with the concerned vowels in bold.

160. /mudɛdɛʤi {β**a-a**-lʷal-a/ → [mudɛdɛʤi-βa.a.lʷa.la]

Teacher-SC-TNS-ill-FV ‘the teacher is ill’

161. /ɱbʲa-iji {**i-a**-sɛ-a/ → [ɱ.bʲa.i.ji.i.a.sɛ.a]

Dog-DEM-SC-PRES-laugh-FV ‘this dog laughs’

162. /r**i-a**-mu-diβ-a/ → [ri.a.mu.di.βa]

SC-TNS-OC-know-FV ‘we know him’

163. /ɱe-aŋa {β**a-a**-ʃum.a/ → [ɱe.a.ŋa.βa.a.ʃu.ma]

Mother-PRN-SC-TNS-work-FV ‘my mother works’

(Poulos, 1990, p. 255)

Vowel hiatus also occurs between SC + tense marker (+ OC); Formative + OC; and tense marker or negative + root as illustrated in examples (164) through (174).

164. /**u-a-u**-zʷim-a/ → [u.a.u.zʷi.ma]

SC-TNS-OC-hunt-FV ‘he hunts it’ (e.g. an animal)

165. /β**a-a-i**-zʷim-a/ → [βa.a.i.zʷi.ma]

SC-TNS-OC-hunt-FV ‘they hunt them’ (e.g. animals)

166. /muɲa {**u-a**-mu-βon-a musaʤi/ → [mu.ɲ.a u.a.mu.βo.na mu.sa.ʤi]

Man.SC-TNS.OC-see-FV.woman ‘the man sees the woman’

167. /**u-a**-lʷal-a/ → [u.a.lʷa.la]

SC-TNS-sick-FV ‘he is sick’

(Ziervogel et al., 1972, p. 24, 34, 36)

168. /**u-i**-rʷ-a/ → [u.i.rʷa]

INF-OC-hit-FV ‘to hit it’ (Poulos, 1990, p. 240)

169. /u-kʰ**ou-i**-rʷ-a/ → [u.kʰou.i.rʷa]

SC- TNS-OC-hit-FV ‘he is hitting it’

170. /ⁿdi-ɖ̰**ɔ-a**ᵐb-a/ → [ⁿdi.ɖ̰ɔ.a.ᵐba]

SC-TNS-speak-FV ‘I will speak’

(Poulos, 1990, p. 248-249)

171. /ja-s**a-i**t-ɛ/ → [ja.sa.i.tɛ]

SC-NEG-do-FV ‘it did nothing’

172. /ɣʰa-s**a-a**ʤim-ɛ/ → [ɣʰa.sa.a.ʤi.mɛ]

SC-NEG-borrow-FV ‘it didn’t borrow’

(Makwarela, 1992, p. 20)

173. /murwa waŋa {**u-a**-ᵬvaɸ-a/ → [mu.rwa wa.ŋa u.a.ᵬva.ɸa]

son-PRN.SC-TNS-lazy-FV ‘my son is lazy’

174. /β**a-a**- ᵬvaɸ-a/ → [βa.a.ᵬva.ɸa]

SC- TNS-lazy-FV ‘they are lazy’

(Poulos, 1975, p. 73-74)

Since the infinitive marker in example (168) above is [+round] and is onsetless, glide formation is expected to occur. However, this is blocked by the high-ranking faithfulness constraints as in the constraint ranking shown in example (175). A formal analysis of the tolerance of vowel hiatus across the PreStem and MacroStem in example (168) – /u-i-r^{w}a/ which is realised as [u.i.r^{w}a] 'to hit it' – is presented in Tableau 8.

175. DEP, MAX-IO ›› NOHIATUS

Tableau 8: Vowel Hiatus Non-Resolution Between INF and OC

/u-i-r^{w}-a/	DEP	MAX-IO	NOHIATUS
a. [u.wi.r^{w}a]	*!		
b. [i.r^{w}a]		*!	
☞c. [u.i.r^{w}a]			*
d. [wi.r^{w}a]		*!	

Tableau 8 presents the tolerance of the $V_1.V_2$ sequence between the infinitive marker + object concord in the phrase 'to hit it'. Candidate (175a) is not optimal because it fatally violates DEP by inserting a glide between V_1 and V_2. Similarly, candidate (175b) is also eliminated as it fatally violates the high-ranking constraint MAX-IO by deleting V_1 which gives meaning to the phrase. Candidate (175d) fatally violates MAX-IO by deleting the mora associated with V_1 despite maintaining the root node. Since MAX-IO mitigates against any form of deletion, candidate (175d) is eliminated. While candidate (175c) violates NOHIATUS, it is non-fatal, thereby satisfying the high-ranking faithfulness constraints and making it the optimal candidate. What can be gleaned from this tableau is that the process of glide formation is, like vowel elision, blocked, which allows for the $V_1.V_2$ sequences to remain unchanged.

Tableau 9, below, formally illustrates that the process of secondary articulation is blocked in verbs when the vowel sequence is -$CV_1.V_2$ using example (169) /u-k^{h}ou-i-r^{w}a/, which is realised as [u.k^{h}ou.i.r^{w}a] ‘he is hitting it’.

Tableau 9: Vowel Hiatus Non-Resolution Between TNS + OC

/ u-k^{h}ou-i-r^{w}-a /	DEP	MAX-IO	NOHIATUS
a. [u.k^{h}ou.wi.r^{w}a]	*!		
b. [u.k^{hw}i.r^{w}a]		*!	
c. [u.k^{h}i.r^{w}a]		*!	
☞d. [u.k^{h}ou.i.r^{w}a]			*

In Tableau 9, candidate (175b) is eliminated because fatally violates MAX-IO where the velar consonant becomes labialised after the elision of V_1. Like candidate (175b), candidate (175c) also elides V_1 in turn, fatally violating MAX-IO. While candidate (175a) does not elide any vowels, the epenthesis of the glide /w/ is prohibited, which causes the constraint DEP to be fatally violated. Following the same pattern presented in the two preceding tableaux, the optimal candidate is the one where the output remains fully faithful to the input – that is, there is no change to the output. This is seen in candidate (175d), which is the optimal candidate despite non-fatally violating the lowest-ranked constraint.

The above subsection was concerned with the vowel hiatus between the verbal word. Formal analyses were presented that demonstrated that vowel hiatus between SC + tense marker (+ OC); formative + OC; and tense marker or negative + root is tolerated.

5.3.3. Discussion

To summarise this subsection, the data presented demonstrated the lack of phonological processes in the most basic formation of the verb. In Tshivenda verbs, the integrity of the morphological requirements is favoured over the phonological requirements (unlike in nominals). Firstly, examples of the basic verb root and final vowel were presented. This was followed by examples that included the various other affixes associated with the verb. Each tableau included a situation where the expected repair strategies discussed in the preceding subsection were predicted to occur. However, what was presented is that the $V_1.V_2$ sequence in verbs remains unchanged regardless of the surrounding segments or its position. And, as mentioned, the consequence of which is the re-ranking of the so-called master constraints. Because the output is completely faithful to the input where all elision is prohibited, the constraints MAX-IO(RT) and MAX-IO(μ) were simplified to MAX-IO. Since the output is unchanged, including the remaining undominated markedness constraints, *COMPLEX, OCP, ANCHOR-L, *$C^{ç}$, *$C_{[-round]}{}^{j}$, was unnecessary. This is because to violate these constraints would mean the output is no longer faithful to the input. The complete constraint ranking for Co-Phonology V is presented in (176).

176. <u>Co-Phonology V:</u> *COMPLEX, OCP, DEP, *$C^{ç}$, *$C_{[-round]}{}^{j}$, MAX-IO, ANCHOR-L, IDENT-IO(-HIGH)$_{ROOT}$ ›› NOHIATUS

As Inkelas and Zoll (2007) state, the master ranking contains the partial ranking of the constraints available to the co-phonologies within the main phonology. The master ranking provides the most general information about the main phonology (Inkelas and Zoll, 2007). The

master ranking in (177) illustrates that in every possible co-phonology in Tshivenda, the constraints *COMPLEX, OCP, DEP, *C^{ʕ}, *C$_{[-round]}^{j}$, and ANCHOR-L are always high-ranking and undominated. What differentiates Co-Phonology V and Co-Phonology N is the ranking of the constraints within the parenthesis ({}).

177. <u>Master Ranking:</u> *COMPLEX, OCP, DEP, *C^{ʕ}, *C$_{[-round]}^{j}$, ANCHOR-L›› {NOHIATUS, MAX(RT), MAX(μ), MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V$_1$}

Figure 13: Representation of the Co-Phonologies

<u>Main Phonology – V$_1$.V$_2$ sequences</u>

*COMPLEX, OCP, DEP, *C^{ʕ}, *C$_{[-round]}^{j}$, ANCHOR-L ›› {NOHIATUS, MAX(RT), MAX(μ), MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V$_1$ }

<u>Co-Phonology N</u>	**<u>Co-Phonology V</u>**
NOHIATUS, *COMPLEX, OCP, DEP, *C^{ʕ}, *C$_{[-round]}^{j}$, ANCHOR-L, ›› MAX(RT) ›› MAX(μ) ›› IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V$_1$	*COMPLEX, OCP, DEP, *C^{ʕ}, *C$_{[-round]}^{j}$, ANCHOR-L, MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V$_1$ ›› NOHIATUS

Figure 13 presents the possible partial constraints that can be used when V$_1$.V$_2$ sequences are encountered. These co-phonologies then contain the ranked constraints relative to the (non)resolution of vowel hiatus. As mentioned, there are examples in which vowel hiatus is tolerated in some nominals. This poses a problem to the above figure in which there is a definite separation between Co-Phonology N and Co-Phonology V. To resolve this, Co-Phonology N

should have sub-co-phonologies – Na and Nb – each with separate constraint rankings drawn from the master constraints (as seen in Inkelas and Zoll, 2007). Included in Co-Phonology Nb would be the small group of nominals that tolerate vowel hiatus.

Figure 14: Representation of the Main Phonology of Tshivenda

Main Phonology – $V_1.V_2$ sequences

*COMPLEX, OCP, DEP, *Cˤ, *$C_{[-round]}{}^{j}$, ANCHOR-L ›› {NOHIATUS, MAX(RT), MAX(μ), MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V_1}

Co-Phonology Na

NOHIATUS, *COMPLEX, OCP, DEP, *Cˤ, *$C_{[-round]}{}^{j}$, ANCHOR-L, ›› MAX(RT) ›› MAX(μ) ›› IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V_1

Co-Phonology V

*COMPLEX, OCP, ANCHOR-L, DEP, *Cˤ, *$C_{[-round]}{}^{j}$, MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V_1 ›› NOHIATUS

Co-Phonology Nb

*COMPLEX, OCP, ANCHOR-L, DEP, *Cˤ, *$C_{[-round]}{}^{j}$, MAX-IO, IDENT-IO(-HIGH)$_{ROOT}$, IDENT-IO(ROUND)V_1›› NOHIATUS

Figure 14 illustrates the three co-phonologies that govern the formation of nominals and verbs in Tshivenda. Firstly, it contains the master ranking which stipulates that in every co-phonology, the constraints *COMPLEX, OCP, DEP, *Cˤ, *$C_{[-round]}{}^{j}$, and ANCHOR-L are undominated.

The constraints presented in parenthesis are then re-ranked in the individual co-phonologies. This re-ranking of the same set of constraints results in the intralinguistic differences within Tshivenda. The constraint NOHIATUS is undominated in Co-Phonology Na which triggers the various vowel hiatus resolution strategies. This constraint is low-ranking in Co-Phonology Nb and Co-Phonology V; both of which tolerate vowel hiatus.

The above sections were concerned with the asymmetrical behaviour of vowel hiatus resolution. Formal analyses using OT was put forward and the intralinguistic differences were accounted for using Co-Phonology Theory. In what follows, a comparison of Tshivenda and other Bantu languages is presented.

5.4. Tshivenda and other Bantu Languages: A Comparison

It is important to situate the above findings within the broader context of vowel hiatus resolution observed in other Southern Bantu languages. This will allow for a contribution, albeit small, to the linguistic typology of the overall Bantu language family. To do so, this section provides a comparison between Tshivenda and the surrounding languages such as chiShona (Kadenge and Simango, 2014) – along with the dialects: chiNdau (Mutonga, 2017), iKalanga (Mudzingwa and Kadenge, 2011), and chiZezuru (Kadenge, 2010), ciNsenga (Kadenge and Simango, 2014; Simango and Kadenge, 2014), isiNdebele (Sabao, 2015), and Xitsonga (Vratsanos and Kadenge, 2017).

The above languages and dialects employ some, if not all, the typical repair strategies used to avoid an illicit $V_1.V_2$ sequence. The repair strategy that is not found in Tshivenda is that of vowel coalescence. Matthews (2014) states that coalescence is the process whereby two

segments coalesce, or merge, to form a new segment. Specifically, in vowel coalescence, a non-high V_1 coalesces with a high V_2 to become a non-high vowel (V_3) that retains the features of V_2 sans height (Casali, 2011). This general process is seen in chapter 2, repeated below in example (178). In the languages where coalescence occurs, compensatory lengthening is not observed as vowel length is non-contrastive (Vratsanos and Kadenge, 2017; Sabao, 2015; Mudzingwa and Kadenge, 2011).

178. <u>Coalescence</u>: Ca.i → Ce Ca.u → Co

(Casali, 1995, p. 1)

This indicates that in Xitsonga, chiZezuru, chiNdau, and isiNdebele the NOHIATUS and DEP constraints dominate the constraint MAX-IO. This is because deletion (and the resulting coalescence) is preferred over epenthesis, glide formation, or secondary articulation (Vratsanos and Kadenge, 2017). Table 4 provides examples of vowel coalescence in Xitsonga (Vratsanos and Kadenge, 2017, p. 188), chiZezuru (Kadenge, 2010, p. 8-9), chiNdau (Mutonga, 2017, p. 9), and isiNdebele (Sabao, 2015, p. 128):

Table 4: Vowel Coalescence in Xitsonga, chiZezuru, chiNdau, and isiNdebele

	/Ca + i/ → [Ce]	**/Ca + u/ → [Co]**
Xitsonga (Vratsanos and Kadenge, 2017, p. 8-9)	/va-iru/ → [veru] 'our children'	/la-u-ku/ → [loku] 'this'
ChiZezuru (Kadenge, 2010, p. 8-9)	/sa-iwe/ → [sewe] 'like you' (2sg)	/ɦa-ujo/ → [ɦojo] 'that one'
ChiNdau (Mutonga, 2018, p. 9)	/ná-ì-ní / → [néní] 'with me'	/ná-ù-j-ú/ → [nójú] 'with this one'
IsiNdebele (Sabao, 2015, p. 128)	/la-i-nja/ → [lenja] 'with/by/and a dog(s)'	/la-um-fana/ → [lomfana] 'with/by/and a young person'

Table 5, below, presents examples in Tshivenda where vowel coalescence does not occur where it would in the above languages. There are very few, if any, examples found in Tshivenda nominals where V_1 is /a/ and V_2 is /u, i/, thus the following are verb phrases which follow the above sequence.

Table 5: Vowel Non-Coalescence in Tshivenda

	/-a + i/ → [-a.i]	**/-a + u/ → [-a.u]**
Tshivenda (Ziervogel et al., 1972, p. 24)	/u-a-u-z^{w}im-a/ → [u.a.u.z^{w}i.ma] 'he hunts it' (e.g. an animal)	/βa-a-i-z^{w}im-a/ → [βa.a.i.z^{w}i.ma] 'they hunt them' (e.g. animals)

The following tableaux present a formal analysis of vowel coalescence in Xitsonga in comparison to Tshivenda.

179. NOHIATUS, DEP ›› MAX-IO

Tableau 10: Vowel Coalescence in Xitsonga

/la-u-ku/	NOHIATUS	DEP	MAX-IO
a. [la.u.ku]	*!		
b. [la.ju.ku]		*!	
☞c. [lo.ku]			*

Tableau 10 presents an analysis of the Xitsonga word *loku* ‘this’. Candidate (179a) and (179b) demonstrate that neither maintaining the input form nor inserting a glide, respectively, produces the optimal candidate since both candidates fatally violate the high-ranking constraints. Candidate (179c), which undergoes vowel coalescence, is the optimal candidate as it satisfies the high-ranking constraints.

Tableau 11: Vowel non-Coalescence in Tshivenda

/ u-a-u-z^{w}im-a /	NOHIATUS	DEP	MAX-IO
☞a. [u.a.u.z^{w}i.ma]	*!		
💣b. [u.o.z^{w}i.ma]			*
c. [u.a.ju.z^{w}i.ma]		*!	

Tableau 11 demonstrates that vowel coalescence in Tshivenda would result in the non-optimal output [u.o.z^{w}i.ma] being selected since it non-fatally violates the lowest-ranking constraints. The true optimal candidate is (179a). This demonstrates that Tshivenda is not like the above languages in this respect. However, Tshivenda is similar to ciNsenga, since it also does not employ vowel coalescence (Simango and Kadenge, 2014; Kadenge and Simango, 2014).

As illustrated in Table 6, the use of glide formation in nominals, specifically, appears to be a shared feature cross-linguistically.

Table 6: Glide Formation Comparison

	/u+V/ → [wV]	**/i+V/ → [jV]**
Tshivenda (Poulos, 1975, p. 73; Gershkoff, 2012, p. 13)	/u-aŋga/ → [waŋga] 'mine'	/i-aʃu/ → [jaʃu] 'ours'
Xitsonga (Vratsanos and Kadenge, 2017, p. 182)	/u-o-na/ → [wona] 'it'	/i-o-na/ → [jona] 'them'
ChiZezuru (Kadenge, 2010, p. 4)	/u-aŋgu/ → [waŋgu] 'mine (NC1)'	/i-aŋgu/ → [jaŋgu] 'mine (NC9)'
ChiNdau (Mutonga, 2018, p. 4)	/u-ake/ → [wake] 'his/hers'	/ i-ose/ → [jose] 'all'
CiNsenga and chiShona (Kadenge and Simango, 2014, p. 110; Simango and Kadenge, 2014, p. 81)	/u-aŋgu/ → [waŋgu] 'mine'	/i-ake/ → [jake] 'his'
iKalanga (Mudzingwa and Kadenge, 2011, p. 213)	/mu-ti u-ose/ → [muti wose] 'the whole tree'	/mu-ti i-ose/ → [muti jose] 'all the trees'

A third process observed shared by the above languages is vowel elision. In all the languages, V_1 is targeted – which, as mentioned, is an attested phenomenon in Bantu languages (Casali, 2011). In ciNsenga and chiShona (Kadenge and Simango, 2014) as well as iKalanga (Simango and Kadenge, 2014), V_1 will be elided if both V_1 and V_2 are [+round] due to OCP constraints. In Tshivenda, however, this vowel hiatus would be rectified through secondary articulation. Vratsanos and Kadenge (2017) claim that in Xitsonga, V_1 would be elided if secondary articulation would result in the disallowed C^j or $C^ʔ$ segments; chiNdau also prohibits these

segments (Mutonga, 2017). This is also true for Tshivenda; hence the three languages are alike in that respect. It must be noted that in isiNdebele, Sibanda (2009) argues that when V_1 is /i/, the glide that is formed is elided (because of the lack of Cj sequences) and not the vowel itself – hence, it is labelled ‘not applicable’ below.

Table 7: Vowel Elision Comparison

	Ca + V_2 → CV_2	**$CV_{1[+rnd]}$ + $V_{2[+rnd]}$ → C $V_{2[+rnd]}$**	**Ci + V_2 → CV_2**
Tshivenda (Poulos, 1990, p. 83; Mulaudzi, 1996, p. 43)	/tʰaβa-ana/→ [tʰaβana] ‘small mountain’	*Not applicable*	/ʧʰi-alɔ/→[ʧʰa.lɔ] ‘graveyard’
Xitsonga (Vratsanos and Kadenge, 2017, p. 189)	/va-aki/ → [vaki] ‘builders’	/mu-usi/ → [musi] ‘smoke’	/ʃi-a nɮa/ → [ʃa nɮa] ‘hand’
ChiZezuru (Kadenge, 2010, p. 7)	/va-ose/ → [vose] ‘all of you’	/mu-oto/ → [moto] ‘fire’	/ri-adʒga/ → [radʒga] ‘it ate’
ChiNdau (Mutonga, 2017, p. 6)	/và-é ʃé/ → [ʊéʃé] ‘All of you’	*Not applicable*	/ʧì-éʃé/ → [ʧéʃé] ‘All of them’
CiNsenga (Kadenge and Simango, 2014, p. 117)	/ka-awo/ → [kawo] ‘theirs’	/ku-oⁿse/ → [ko ⁿse] ‘all’	/ʧì-aᵑgu/ → [ʧaŋgu] ‘mine’
ChiShona (Kadenge and Simango, 2014, p. 117)	/pa-ake/ → [pake] ‘his’	/mu-oᵑgo/ → [moᵑgo] ‘bone marrow’	/ʧì-ake/ → [ʧake] ‘mine’
iKalanga (Mudzingwa and Kadenge, 2011, p. 129)	/kà-ánà/ → [kánà] ‘small child’	/mù-òtò/ → [mòtò] ‘fire’	/ʧì-ùrù/ → [ʧùrù] ‘ant-heap’
IsiNdebele (Sabao, 2015, p. 125)	*Not applicable*	/uku-oma/ → [ukoma] ‘to dry/get thirsty’	*Not applicable*

A final strategy observed in all the above languages is secondary articulation. What Table 8 makes observable is that Tshivenda is like the mentioned languages whereby a [+round] V_1 that is preceded by a consonant motivates secondary articulation or labialisation of said consonant. IsiNdebele (Saboa, 2015) and chiZezuru (Kadenge, 2010) do not undergo labialisation; rather, glide formation occurs. This is unlike the above languages as the constraint mitigating against complex onsets is highly ranked, unlike in isiNdebele or chiZezuru.

Table 8: Secondary Articulation Comparison

	Cu + V_2 → C^wV_2 or **Co + V_2 → C^wV_2**	**Ci + V_2 → C^jV_2**
Tshivenda (Poulos, 1990, p. 83)	/nd̰u-ana/ → [nd̰^{w}ana] 'small hut'	*Not applicable*
Xitsonga (Vratsanos and Kadenge, 2017, p. 184)	/ʃì-pótó-áná/ → [ʃìpótwáná] 'small pot'	*Not applicable*
ChiNdau (Mutonga, 2017, p. 7)	/mù-ó-tór-á/ → [m^{w}ótórá] 'take'	*Not applicable*
CiNsenga (Kadenge and Simango, 2014, p. 115)	/tu-eka/ → [t^{w}eka] 'only'	*Not applicable*
ChiShona (Kadenge and Simango, 2014, p. 115)	/mu-eni/ → [m^{w}eni] 'visitor'	*Not applicable*
iKalanga (Mudzingwa and Kadenge, 2011, p. 216)	/mù-àná/ → [m^{w}àná] 'child'	*Not applicable*

Along with sharing the process of labialisation, Xitsonga and Tshivenda share another feature – neither language allows for the labialisation of labial consonants. Examples of this can be seen in the table below. The changes seen are driven by the OCP constraint which prohibits a sequence of identical features. In other words, a labial consonant cannot be labialised. The difference, however, is that the consonant in Xitsonga undergoes labial dissimilation while in Tshivenda, as presented in Section (5.2.2.1.) the glide that is formed before labialisation occurs is palatalized. Thus, in Tshivenda the consonant remains the same but is palatalized. This is the only instance where the segment C^{j} is formed through secondary articulation. While both languages have a high-ranking OCP constraint, the way it is solved is different in each language.

Table 9: Labial Dissimilation Comparison in Xitsonga and Tshivenda

	/C[+round]o + V2/ or /C[+round]o + V2/
Tshivenda (Nemakhavhani, 2002, p. 28)	/rambɔ-ana/ → [rambʲana] 'small bone'
Xitsonga (Vratsanos and Kadenge, 2017, p. 185)	/ʃi-gomo-ana/ → [ʃigoŋʷana] 'small forehead' /ʃi-namu-ana/ → [ʃinaŋʷana] 'small neck'

To summarise the above subsection, while Tshivenda verbs seem to not mimic those of other Bantu languages, nominals do. Firstly, glide formation and the rules associated with it were presented and it was shown that the process is the same across the languages. Secondly, where V_1 is /a/ or /i/, it is elided completely, showing another similarity between Tshivenda and the languages presented. However, both Tshivenda and chiNdau (Mutonga, 2017) do not elide a [+] V_1 if V_2 is also [+round] – making Tshivenda more like chiNdau in that respect. The final

process discussed was that of secondary articulation. All the languages presented, including Tshivenda, prevented the palatalization of the preceding consonant when V_1 is /i/. The one difference between Tshivenda and Xitsonga was the prohibition of labialised [+round] consonants. To resolve this issue, both languages undergo labial dissimilation where, in Xitsonga, the consonant retains the manner of articulation but not the place feature (Vratsanos and Kadenge, 2017); on the other hand, in Tshivenda, the glide that is formed undergoes this process before secondary articulation occurs. This means that while Xitsonga and Tshivenda rank the OCP constraint highly, the outcome is different.

5.5. Summary of Chapter

In this chapter, the methodology presented in Chapter 4 was applied and a theoretical analysis was put forward. Along with the analysis, an interpretation and discussion on the possible reasons for the asymmetrical behaviour observed in the Tshivenda data were provided. FG diagrams were used to motivate the relevancy of the constraints as well as to provide a visual representation of the repair strategies discussed.

The first subsection was dedicated to the resolution of $V_1.V_2$ sequences through the use of glide formation, secondary articulation, and vowel elision. What became observable was that each process was motivated by the surrounding environments as well as the features of V_1 itself. Glide formation occurs when V_1 does not have an onset, secondary articulation occurs when V_1 is [+round] and is preceded by a consonant, and vowel elision occurs elsewhere. Following

this, exceptions were briefly discussed, along with the summary of the constraint ranking of Co-Phonology N.

The second subsection presented the tolerance of vowel hiatus in verbal domains. It was argued that in this context, the integrity of the morphology of the verbal construction was preferred over the phonotactic constraints (as seen in nominals). Like the previous subsection, a discussion was presented. In this discussion, the constraint ranking for Co-Phonology V was presented. Furthermore, a visual representation of the phonological system was presented where each co-phonology and its respective constraint rankings were included. To address the issue raised previously about the exceptions seen in nominals, the co-phonologies were modified. This modification argued that Co-Phonology N must be separated into Co-Phonology Na and Co-Phonology Nb. These sub-co-phonologies are still part of Co-Phonology N as the lexical items associated with it are all nominals.

The final subsection put forward a comparison between Tshivenda and other Southern Bantu languages. These include chiShona (and the dialects chiZezuru, chiNdau, and iKalanga), Xitsonga, ciNsenga, and isiNdebele. What can be gleaned from this comparison is that Tshivenda is least like isiNdebele since the latter undergoes vowel coalescence and glide formation (as opposed to secondary articulation). In all the languages, secondary articulation, glide formation, and vowel elision are all productive in some way. However, vowel coalescence is not productive in Tshivenda and ciNsenga. From this, it can be argued that Tshivenda nominals are not unlike those of other Bantu languages. The following chapter is dedicated to the discussion of PWord minimality in Tshivenda.

CHAPTER 6: PROSODIC WORD MINIMALITY

6.1. Introduction

The degree to which vowel hiatus is tolerated in a language is one of the many phonotactic requirements of that language. Another requirement, according to Prince and Simolensky (2004), is that which governs the minimal size of a prosodic word (PWord). In other words, there are restrictions about the minimum number of syllables that can constitute a well-formed PWord. In Bantu languages, for example, the common minimal size of a well-formed PWord is disyllabic or bimoraic (Downing, 2005).

Minimality requirements in Tshivenda are like other Bantu languages in that a well-formed PWord contains at least two syllables (Poulos, 1990). In this chapter, information gleaned from the imperative passive verbal extension, as well as the process of reduplication, is presented to examine how minimality requirements in Tshivenda are maintained.

In the formation of the imperative, the stabiliser /i-/ is affixed to C-only monosyllabic verb roots. Occasionally, according to Poulos (1990), if the C-only root stem does not contain a subject marker, /-i/ is suffixed. The passive verb extension /-iw/, according to Poulos (1990), can be used with all roots and is interchangeable with its allomorph /-w-/ in certain situations, discussed below. When undergoing reduplication, on the other hand, the root must take the form CV+ to be eligible for reduplication with the affix /-a-/ between the roots. Poulos (1975) states that this affix is not the final vowel but rather is a conjunctional affix. However, when

the root is C-only, it cannot be reduplicated and, thus, the process is blocked; instead, an auxiliary verb is included (Poulos, 1975, 1990). This can be attributed to the fact that the final vowel /-a/ is not part of the reduplicated stem and, therefore, does not work to satisfy Prosodic Stem (PStem) minimality in reduplication.

Figure 15: The Bantu Verb PStem and Canonical PStem (Downing, 2005)

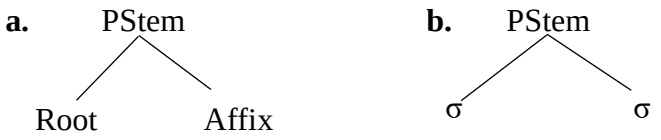


Figure 15 represents what Downing (2005) calls a canonical stem – a minimally disyllabic PStem. This structure holds true in Tshivenda; consequently, the markedness constraint that militates against a monosyllabic PStem is undominated. For clarity, in Tshivenda, the affix is not always on the right of the root (as seen in the prefixation of the stabiliser in C-only imperative stems). The constraint CANONICALSTEM which is defined in example (180) governs this.

180. CANONCIALSTEM (CS)

PStems must have at least two syllables (Downing, 2005)

6.2. PWord minimality

The following subsections detail the effects of minimality requirements in the imperative, the passive, and the reduplication process. This is followed by a comparison with other Bantu languages.

6.2.1. The Imperative

According to Downing and Kadenge (2015), the imperative in Bantu languages appears as the unchanged verb root. The lack of inflectional morphemes or other affixes makes this formation popular amongst Bantuists since it demonstrates the effects of minimality requirements. Typically, when the stem is monosyllabic, a stabiliser is affixed to satisfy these constraints in Bantu languages that are related to Tshivenda, such as chiShona and iKalanga (see Mudzingwa, 2008; Kadenge and Mathangwane, 2017). Poulos (1990) states that the C-only radicals will obtain the stabiliser /i-/; the suffix /-i/ is optional here and elsewhere.

Examples (181) through (185) show that the verb stem does not change when forming the imperative. This is because they are multisyllabic and, therefore, satisfy minimality requirements. The research participants confirmed that the two forms in examples (181) and (182) are acceptable; the form without the suffix was indicated when questioned about which form they prefer to use. The singular imperative takes the form **R-a(-i)**, **OC-R-e** or **Relative Prefix-R-e** and the plural imperative takes the form **OC-R-e-ni** or **RP-R-e-ni** (Poulos, 1990, p. 242-243). The suffixes are indicators of grammatical number and are not stabilisers.

Downing and Kadenge (2015) and Kadenge and Mathangwane (2017) argue that the infinitive form of the Bantu verb provides suitable contextualization when investigating minimality requirements because it consists of the verb stem only.

	Imperative		***c.f.***	***Infinitive***
181.	/ʃum-a(-i)/ →	[ʃuma]or [ʃumai]		u shuma
	Work-FV(-IMP)	‘work!’		‘to work’
182.	/a^{m}b-a(-i)/ →	[a^{m}ba] or [a^{m}bai]		u amba
	Speak-FV(-IMP)	‘speak!’		‘to speak’
			(Ziervogel et al., 1972, p. 11)	
183.	/i- ɸaṯ-ɛ/ →	[i ɸaṯɛ]		u fhaṯa
	OC-build-IMP	‘build that! (e.g. a village)’		‘to build’
184.	/βa-βiʤ-ɛ-ni/ →	[βa βiʤɛni]		u vhidza
	OC-call-IMP-PL	‘call them!’		‘to call’
			(Ziervogel et al., 1972, p. 29)	
185.	/βa-t^{h}us-ɛ/ →	[βa t^{h}usɛ]		u thusa
	OC-help-IMP	‘help them!’		‘to help’
			(Mulaudzi, 1996, p. 154)	

Examples (186)-(190) are examples of monosyllabic verb stems that take the form **i-R-a(-i)** or **OC-R-e** when singular when forming the imperative. The latter form makes observable that the object marker works to satisfy minimality constraints and the addition of the stabilizer is unnecessary. Similar to examples (181) and (182), above, the research participants indicated that the suffix /-i/ is optional and that they typically use the form without the suffix.

Imperative			***c.f.***	***Infinitive***
186. /i-d̰-a/	→	[id̰a]		u d̰a
STAB-come-FV		‘come!’		‘to come’
187. /i-l̰-a/	→	[il̰a] or [il̰ai]		u l̰a
STAB-eat-FV		‘eat!’		‘to eat’
188. /i-f-a/	→	[ifa] or [ifai]		u fa
STAB-die-FV		‘die!’		‘to die’
			(Ziervogel et al., 1972, p. 11)	
189. /mu-r^{w}-ɛ/	→	[mu r^{w}ɛ] or [mu r^{w}ɛi]		u rwa
OC-hit- IMP		‘hit him!’		‘to hit’
190. /u-l̰-ɛ/	→	[u l̰ɛ]		u l̰a
OC-eat- IMP		‘eat it!’		‘to eat’
			(Ziervogel et al., 1972, p. 29)	

As seen in Chapter 5, epenthesis of a segment in both nominals and verbs is prohibited. This means that the dependency DEP-IO constraint as presented above cannot be undominated in imperatives – both mono- and polysyllabic. However, to be more specific and to distinguish the two constraints, the constraint DEPMORPH is introduced, as defined in example (191). The final constraint that aids in this discussion is IMPERATIVE≈CS (example (192)), which prohibits the separation of the imperative from the canonical stem.

191. DEPMORPH

All input morphemes must have output correspondents (no epenthesis)

(Downing, 2005)

192. IMPERATIVE≈CANONICALSTEM(CS)

The imperative form coincides with the canonical stem (Downing, 2005)

Example (193) illustrates the constraint ranking which ensures the prosodic stem is minimally disyllabic, and the imperative form is required to be part of the PStem. These constraints dominate the dependency constraint as epenthesis is the preferred strategy to resolve minimality violations.

193. CS, IMPERATIVE≈CS ›› DEPMORPH

Tableau 12: Formation of a Monosyllabic Imperative

/-ḍ̲-a/	CS	IMPERATIVE≈CS	DEPMORPH
a. [-ḍ̲a]	*!		
b. [ḍ̲a-a]		*!	
☞c. [i-ḍ̲a]			*
☞d. [i-ḍ̲a-i]			**

Candidates (193a) and (193b) in Tableau 12 above are eliminated and are not optimal candidates. Candidate (193a) is eliminated because the minimal size of a canonical stem is at least two syllables whereas this candidate is only one syllable. Candidate (193b), on the other hand, is eliminated because the epenthetic phonological vowel suffixed is not a morpheme associated with the formation of the imperative. Both candidates (193c) and (193d) are the optimal candidates because they non-fatally violate the lowest-ranking constraint. Unlike candidate (193b), the segment suffixed onto the root is an optional morpheme associated with the construction of the imperative, which does not fatally violate high-ranking constraints.

6.2.2. The Passive

In many Bantu languages (for example, chiNdau, Fwe, isiNdebele, isiXhosa, chiZezuru), the verbal extension /-(i)w-/ creates the passive form. Poulos (1975, p. 31) argues that /-w-/ occur with any root except when it is: with a C-only root, an adopted root, a root ending with /w/ or

a vowel, or a -VC root where C is /ɸ/ or /β/. However, /-iw-/ is possible in all situations, indicating that while /-iw-/ is used to satisfy minimality, it is the main form of the passive extension as it appears in the most diverse environments and /-w-/ is its allomorph.

The passive takes the following form when it is the only extension applied: **-R-(i)w-FV** (Poulos, 1975). The following examples (194) through (207) illustrate this assertion. In examples (197) and (202) through (204), the passive /-w-/ causes palatalization when preceded by /n/ or a labial consonant (an OCP process seen in Chapter 5).

194. [-ɸfiwa] *'be heard'*

195. [ɸiwa] *'be given'* (Poulos, 1975, p. 30)

196. [kiwa] *'be plucked/drawn'*

(Ziervogel et al., 1972, p. 52)

197. [-laiwa] *'be advised'* (Poulos, 1975, p. 12)

198. [funiwa] or [fuɲa] *'be loved'*

199. [nɛtisiwa] or [nɛtisʷa] *'be tired'*

200. [ʤulʷa] *'be sat'*

201. [diβiwa] *'be known'* (Ziervogel et al., 1972, p. 11)

202. [βulaiwa] '*be killed'* (Poulos, 1975, p. 13)

203. [bɔbʲa] *'be planted'*

204. [tapʲa] *'be flicked away'* (Nemakhavhani, 2002, p. 26)

205. [limiwa] or [limʲa] *'be ploughed'*

206. [ɸatiwa] *'be built'*

207. [tʰaipʰiwa] *'be typed'* (Poulos, 1975, p. 30-31)

The passive morpheme is always /-w-/ when it is preceded by other extensions. Consider examples (208) through (211):

208. [d̯isɛʤʷa] *'have brought to someone'* ***c.f.*** /d̯-/ 'come'

209. [laisululɛlʷa] *'be unloaded for'* /-lais-/ 'load'

210. [laṯɛʧɛlʷa] *'lose'* /-laṯ-/ 'throw away'

211. [reŋululʷa] *'be bought back'* /-reŋ-/ 'buy'

(Poulos, 1975, p. 64)

The constraint PASSIVE≈CS, as defined in example (212), ensures the whole passive form is connected to the canonical stem. Example (213) provides the ranking of the constraints. MAX-IO is low-ranking since the vowel can be deleted when the allomorph /-w-/ is realised. The labialisation and palatalization seen above are the consequence of the OCP and *COMPLEX constraints already discussed in examples (121) and (113), respectively. Tableau 13 presents a formal analysis of the passive form of 'be plucked/drawn' in example (196), /k-iw-a/, which is realised as [kiwa].

212. PASSIVE≈CS

The passive form coincides with the canonical stem

(Adapted from Downing, 2001, 2005)

213. CS, PASSIVE≈CS ›› MAX-IO

Tableau 13: Formation of the Monosyllabic Passive Form

/-k-iw-a/	CS	PASSIVE≈CS	MAX-IO
a. [ka]	*!		**
☞b. [kiwa]			
c. [i-ka]		*!	
d. [k^{w}a]	*!		*

Tableau 13 represents the formation of the passive form of ‘pluck/draw’. Candidate (213a) deletes the extension which does not allow for the formation of the passive. It is also monosyllabic, which fatally violates the high-ranking constraint CS. Candidate (213d) also fatally violates CS. Even though it contains the passive extension, there is only one syllable eliminating it from being the optimal candidate. Candidate (213c) has the inclusion of a vowel not associated with the verbal extension and is eliminated since it fatally violates PASSIVE≈CS. Candidate (213b) is the optimal candidate because it satisfies the constraints given above.

Tableau 14 exemplifies the formation of the passive on a multi-syllabic stem ‘netisa’ in example (199). Thus, the minimality constraint is not required as minimality is already satisfied. Instead, the constraint *COMPLEX is included because both /-iw-/ and its allomorph /-w-/ can be realised freely. The ranking is shown in example (214).

214. PASSIVE≈CS, *COMPLEX ›› MAX-IO

Tableau 14: The Formation of a Disyllabic Passive Form

/-nɛtis-iw-a/	PASSIVE≈CS	*COMPLEX	MAX-IO
☞a. [nɛtisʷa]			*
☞b. [nɛtisiwa]			
c. [nɛtisa]	*!		**
d. [nɛtiswa]		*!	*

Tableau 14 above, accounts for the possibility of two optimal candidates – candidates (214a) and (214b). These are both optimal since they non-fatally violate low-ranking constraints when forming the passive form. Candidate (214c) is eliminated because it fatally violates PASSIVE≈CS, which is undominated, by eliding the passive extension. Candidate (214d) is not the optimal choice because it fatally violates the well-formedness constraint mitigating against complex onsets – *COMPLEX.

6.2.3. The Reduplicated Root

Reduplication is another phenomenon Bantuists use to investigate minimality requirements (see Downing, 1998, 2005;; Mutonga, 2017; and others referenced below). Reduplication is applied to verbs to indicate continuous or repetitive actions; it can also be used with ideophones and nouns for emphasis. Typically, reduplication illustrates the attested disyllabic nature of a

well-formed PStem (Downing, 2005; Mutonga, 2017). This holds true in Tshivenda, as discussed in this subsection.

Poulos (1990) states that, in verbal constructions, when the root is C-only, it cannot be reduplicated. Instead, an auxiliary verb is used for emphasis, as seen in examples (222) and (223) (auxiliary verb is in bold). When the verb root is CV(+), the root alone is reduplicated (that is, the prefixes are omitted) with the conjunctional suffix /-a-/ affixed between the two roots (Poulos, 1990). Poulos (1990) offers no further explanation for this assertion since $V_1.V_2$ (or /-a.a.-/) sequences are tolerated in verbal constructions and would result in the satisfaction of minimality requirements. The claim that it is, in fact, a conjunctional suffix and not the final vowel can possibly be explained by vowel hiatus being resolved in reduplicated PStems. However, this is a fallacious argument since CV stems can be reduplicated, as seen below in examples (215) and (216).

215. [sɛ.a.sɛ] ‘keep on laughing’

216. [βɛ.a.βɛ] ‘put here and there’ (Poulos, 1975, p. 67)

217. [a^{m}b.a.a^{m}ba] ‘keep on talking/babble’

218. [ʤul.a.ʤula] ‘sit here and there’

219. [gidim.a.gidima] ‘run about’

220. [alamul.a.alamula] ‘keep on yawning’

221. [balaŋaŋ.a.balaŋaŋa] ‘scatter indiscriminantly’ (Poulos, 1990, p. 196)

222. [u.**t̪ˠɛla**.u.l̪a] ‘he keeps on eating’

223. [βa.khou.**sokou**.u.rʷa] ‘they are just hitting it’ (e.g. a tree)

(adapted from Poulos, 1990, p. 65[3])

In examples (222) and (223), the auxiliary verb is bolded. Thus, the simple answer is that the input *root* is minimally one syllable. The constraints [σ], R≤ROOT, and MAX-IO(FV) as defined in examples (224) through (226).

224. [σ]

The reduplicant is minimally monosyllabic

(adapted from Hyman, Inkelas, and Sibanda, 2009)

225. R≤ROOT

The reduplicant contains only the root

(McCarthy and Prince, 1993, p. 80)

[3] Examples that are overtly offensive (such as those that include violence towards animals or humans) are adapted

226. MAX-IO(FV)

The final vowel in the input root must have a correspondent final vowel on the reduplicated root (no deletion)

(Hyman, Inkelas, and Sibanda, 2009)

The constraints must be ranked in a way that ensures the final vowel is elided from the reduplicated root, the reduplicant is only the root, the root has minimally one syllable, and no segment of the root may be deleted. Thus, the constraints are ranked as illustrated in example (227). Tableau 15 presents a formal analysis of the reduplicated monosyllabic verb stem in example (215) /sɛ.a/ which is realised as [sɛasɛa] 'keep on laughing'.

227. [σ], R≤ROOT, MAX-IO(RT) ›› MAX-IO(FV)

Tableau 15: Reduplication of Monosyllabic Stem

/ RED-sɛ-a/	[σ]	R≤ROOT	MAX-IO(RT)	MAX-IO(FV)
a. [sɛ.a.a.sɛ.a]		*!		
b. [ɛ.a.sɛ.a]			*!	*
c. [s.a.sɛ.a]	*!		*	*
☞d. [sɛ.a.sɛ.a]				*

Tableau 15 presents the process of reduplication with a verb root that is monosyllabic. Candidate (227a) is disqualified because it violates R≤ROOT fatally by reduplicating the entire

PStem rather than just the root. Candidate (227b) is also eliminated because it, too, fatally violates the high-ranking constraint MAX-IO(RT) when the consonant is elided. Candidate (227c) fatally violates [σ], proving it to not be the optimal candidate as there is no vowel to form a well-formed syllable. This leaves candidate (227d) as the optimal outcome since it non-fatally violates the lowest-ranking constraint to satisfy higher ranking ones.

As mentioned above, Tshivenda nominals are also subject to reduplication, and in the case of ideophones, triplicated (Poulos, 1990). For example, when a noun is monosyllabic, the root will be reduplicated with the prefix to remain minimally disyllabic. This shows that the prefix, unlike the final vowel in verbs, is productive for minimality in nominal reduplication, as presented in examples (228) through (230).

228. [mut^{h}a.mut^{h}a] ‘kind person’

229. [muri.muri] ‘real, solid tree’

230. [lufɔ.lufɔ] ‘strong, good wooden spoon’ (Poulos, 1990, p. 73)

c.f. **di- or poly-syllabic nouns**

231. [musadʑi.sadʑi] ‘kind woman’

232. [muka^{m}ba.ka^{m}ba] ‘genuine leather’

233. [ʧi-ɛ^{n}da.ɛ^{n}da] ‘a real shoe’ (Poulos, 1990, p. 73)

To understand this, the constraints presented above need to be modified and re-ranked. Thus, the constraint that is altered is [σ], in this case, the reduplicate needs to be at least two syllables long. Thus, the constraint [σσ], as defined in example (234), is included.

234. [σσ]

The reduplicant is minimally bisyllabic

(Hyman, Inkelas, and Sibanda, 2009)

Furthermore, the more general MAX-IO replaces MAX-IO(FV) since nouns do not have final vowels.

235. [σσ], MAX-IO(RT) ›› R≤ROOT, MAX-IO

Tableau 16: Reduplication of Monosyllabic Noun

/mu-t^{h}a-RED/	[σσ]	MAX-IO(RT)	R≤ROOT	MAX(IO)
a. [t^{h}a.mu.t^{h}a]	*!			*
b. [mu.a.mu.t^{h}a]		*!	*	*
☞c. [mu.t^{h}a-mu.t^{h}a]			*	

Tableau 16 presents a formal analysis of the reduplication process in a monosyllabic noun. Candidate (235a) is eliminated because it does not satisfy minimality requirements, thereby fatally violating the high-ranking constraint [σσ]. Candidate (235b) is also eliminated based on its fatal violation of a high-ranking constraint when deleting a segment in the root. That leaves

candidate (235c) as the optimal outcome despite it non-fatally violating the low-ranking constraint that mitigates against affixes forming part of the reduplicative. Tableau 17, below, provides a formal analysis of the reduplication process in a disyllabic noun.

Tableau 17: Reduplication of a Disyllabic Noun Stem

/ mu-sadʒi-RED/	[σσ]	MAX-IO(RT)	R≤ROOT	MAX-IO
☞a. mu.sa.dʒi.sa.dʒi				**
b. mu.sa.dʒi.mu.dʒi		*!	*	**
c. mu.sa.dʒi.mu.sa.dʒi			*!	

The input in Tableau 17 meets minimality requirements; therefore, the inclusion of the prefix /mu-/ in the output (as in candidate (235c)) fatally violates R≤ROOT. Candidate (235b) is eliminated because it violates the high-ranking constraint MAX-IO(RT) resulting in a non-optimal candidate. By non-fatally violating MAX-IO, candidate (235a) proves to be the optimal output.

Interestingly, ideophones have a different minimality requirement. Poulos (1990) states that when the stem is monosyllabic, it is triplicated. This shows that an ideophone is minimally trisyllabic (the analysis of which is beyond the scope of this paper). Some examples include those in examples (236) through (239).

236. [ⁿdɛ.ⁿdɛ.ⁿdɛ] ‘the idea of intensive biting’

237. [kʷa.kʷa.kʷa] ‘the idea of being exactly the same’

238. [di.di.di] ‘the idea of the heart throbbing’

239. [du.du.du] ‘absolutely silent (also absolutely silent because everything is fine)’ (Poulos, 1990, p. 431)

***c.f.* di- or poly-syllabic stems**

240. [ʃɛŋi.ʃɛŋi] ‘idea of chewing intensively’

241. [t̪aᵐbi.t̪aᵐbi] ‘idea of bathing hastily’

242. [tɛtɛmɛli.tɛtɛmɛli] ‘idea of trembling’

243. [ʧiᵐbili.ʧiᵐbili] ‘idea of strolling a bit’

(Poulos, 1990, p. 431-432)

6.2.4. Summary of Tshivenda

The above subsection provided an explanation as well as an analysis of how minimality constraints are satisfied in Tshivenda. First, the imperative forms were provided where the stabiliser /i-/ was prefixed onto the root to satisfy the minimality constraints. Secondly, the passive verbal extension /-iw-/ and its allomorph /-w-/ were examined. It was argued that the

form /-iw-/ can occur anywhere but /-w-/ can only occur when the stem is not C-only, adopted roots, roots ending with /w/ or a vowel, or -VC roots where C is /ɸ/ or /β/.

Finally, the process of reduplication of both nominals and verbs was examined. Verb roots are required to have at least one syllable to qualify for reduplication, otherwise, an auxiliary verb is used. Nominals also have strict minimality requirements where monosyllabic roots are reduplicated with the prefix to ensure the reduplicative is minimally disyllabic – unlike di- or polysyllabic stems which omit the prefix. The differences seen in the reduplication processes add support to the Co-Phonology Theory presented in Chapter 5. The constraint ranking governing minimality requirements in monosyllabic nouns is [σσ], MAX-IO(RT) ›› R≤ROOT, MAX-IO while the ranking for monosyllabic verbs is [σ], R≤ROOT, MAX-IO(RT) ›› MAX-IO(FV).

6.2.5. Comparison to Other Bantu Languages

As mentioned, these processes are not unique to Tshivenda. In this subsection, I provide examples of the same processes observed in other Bantu languages. While the processes observed in Bantu languages may not mirror each other, the strategies all conspire to achieve the same goal. That goal is to satisfy minimality requirements. The following table presents the imperative for the word ‘eat’ in chiZezuru (Mudzingwa, 2008, p. 40; Vratsanos, 2018, p. 128), kiSwahili (Park, 1995, p. 297; Vratsanos, 2018, p. 128), Malawian chiTonga (Kadenge and Mathangwane, 2017, p. 128), and chiNdau (Mutonga et al., 2018, p. 8).

What is noticeable is that, as Vratsanos (2018) remarks, the languages below (including Tshivenda) insert some form of morpheme or phonological segment that allows for the maintenance of a well-formed syllable. This shows that faithfulness constraints – those that mitigate against epenthesis – are lower-ranking constraints in these languages, specifically regarding imperatives.

Table 10: Comparison of Imperative 'eat!'

Language	**Imperative 'eat!'**
Tshivenda	[i-**l̰a**]
ChiZezuru	[i-**ʤga**]
KiSwahili	[ku-**la**]
ChiTonga	[i-**lya**]
ChiNdau	[i-**rʲa**]

Table 11 presents the use of the passive verbal extension /-iw-/ and /-w-/ in the environments where they occur. Firstly, as Poulos (1975) suggests, the passive /-iw-/ in Tshivenda can occur in mono- and polysyllabic stems. This is true for Namibian Few, where the passive forms are in free variation (Gunnink, 2018, p. 205). However, /-w-/ cannot occur in monosyllabic stems. This is also true for In Ndau (Mutonga et al., 2018, p. 10) and isiXhosa (Potgieter, 2017, p. 45) where /-iw-/ is used with monosyllabic stems and /-w-/ with disyllabic stems. These are fixed environments, unlike Tshivenda. In isiNdebele, Downing (2001, p. 48) states that the form /-iw-/ only occurs in C-only roots and vowel-initial stems and /-w-/ occurs elsewhere.

Table 11: Comparison of Passive Forms

Language	**/-iw-/**	**Gloss**	**/-w-/**	**Gloss**
Tshivenda	[**ɸ**iwa]	*Be given*	[**ʣul**^{w}a]	*Be sat*
Namibian Fwe	[**ʃum**iwa]	*To be bitten*	[**kondor**wa]	*Be brewed (beer)*
ChiZezuru	[**p**iwa]	*Given by*	[**bat**wa]	*Held by*
ChiNdau	[**p**iwa]	*Given by*	[**ɓek**wa]	*Put by*
IsiXhosa	[**tj**iwa]	*Be eaten*	[**bon**wa]	*Be seen*
IsiNdebele	[**ph**i:wa]	*To give*	[**linganis**wa]	*To measure*

Finally, Table 12 presents reduplication in siSwati, Kinande, Kikuyu (Downing, 1999, p. 63-64), isiNdebele (Downing, 2001, p. 46), and chiNdau (Mutonga et al., 2018, p. 9) monosyllabic verbs. siSwati (Downing, 1999) and isiNdebele unsurprisingly share the process of inserting /-yi-/ to fill the second syllable required for minimality reasons. Kinande, Downing (1999) observes, doubles the root, while in Kikuyu, V_1 in both the root and the reduplicated root gain a mora, making them long vowels. Finally, in Ndau, a vowel is inserted for the purposes of minimality. And as mentioned, Tshivenda inserts the conjunctional suffix /-a-/ with monosyllabic verb roots, which makes it more like Ndau. What must be noted is that in the examples below (except Kikuyu and Tshivenda), the *stem* is monosyllabic. In Tshivenda, the minimal size of a *root* must be monosyllabic for reduplication to occur. This differentiates Tshivenda from the languages presented below.

Table 12: Comparison of Reduplication

Language	**Stem**	**Reduplicated**	**gloss**
Tshivenda	/-sɛa/	[**sɛa**sɛa]	*Laugh*
SiSwati	/-pha/	[**phayi**pha]	*Give*
IsiNdebele	/-lwa/	[**lwayi**ːlwa]	*Fight*
Kinande	/-swa/	[**swaswa**swa]	*Grind*
Kikuyu	/-goa/	[**go**ːagoːa]	*Fall*
ChiNdau	/-rʲa/	[**rʲaa**rʲa]	*Eat*

6.4. Summary of Chapter

In this chapter, a discussion and analysis of word minimality in Tshivenda was presented. In Tshivenda, minimality requirements affecting the imperative, passive, and the reduplicated roots were examined. Following this, a comparison between Tshivenda and other Bantu languages was presented.

The imperative formation in Tshivenda requires the stabiliser /i-/ when the root is monosyllabic. The passive verbal extension /-iw-/ was also shown to be productive for minimality requirements. And input roots without at least one syllable (C-only roots) cannot undergo reduplication. Instead of reduplication, an auxiliary verb is used with C-only verb roots (Poulos, 1990). In nominals, to satisfy minimality, the noun class prefix is included in the reduplication. When compared to languages such as isiNdebele, chiZezuru, Kiswahili,

chiNdau, Namibian Fwe, and chiTonga, which have similar minimality requirements, it is unsurprising that Tshivenda's behaviour mirrors the behaviour seen in those languages.

CHAPTER 7: CONCLUSION

7.1. Conclusion

This study examined the asymmetrical behaviour of vowel hiatus resolution strategies in Tshivenda nominals and verbs. To do so, instances of vowel hiatus were identified in both nominals and verbs. These were then analysed using OT and Co-Phonology Theory, and the results compared to other Bantu languages. Following this, the effects of minimality requirements were discussed. The main aim of the study was to demonstrate that the asymmetrical behaviour, and therefore the intra-linguistic variation, seen in Tshivenda is the consequence of the separate rankings of the same set of constraints. Specifically, it was argued that there are multiple co-phonologies within the main phonology. This allows for the different morphological constructions to be governed by separate rankings of the same constraints.

This study gathered and analysed data from multiple academic as well as online sources. These include previous studies (Poulos, 1975, 1990; Westphal, 1946), a dictionary (Van Warmelo, 1989), YouTube videos (Nevhutalu, 2015a, 2015b, 2016a, 2016b, 2016c), and grammar guides (Ziervogel et al., 1972; Gershkoff, 2012). From the data, an elicitation list in English was created and some examples were modified. The data was elicited from four L1 speakers of Tshivenda who confirmed the accuracy of the transcription (see Appendix 3 and 4). To give a formal account of why certain processes occur in specific contexts, OT and Co-Phonology Theory were employed as the main theoretical framework. FG was employed to provide visual representations of the processes because OT is strictly computational.

Nominals were shown to be augmented through the processes of glide formation, secondary articulation, and vowel elision. However, exceptions were presented, indicating that vowel

hiatus is tolerated in a limited number of nominal forms, for example, [mueni] ‘guest’ and [lua^{m}bo] ‘language’. To account for this, the co-phonologies that govern vowel hiatus resolution in nominals were presented as Co-Phonology Na and Nb. The constraint rankings for the nominals governed by Co-Phonology Na and Nb are presented in examples (244) and (245), below.

244. <u>Co-Phonology Na</u>: NoHiatus, *Complex, OCP, Anchor-L, Dep, *C^{ʕ}, *C$_{[-round]}^{j}$ ›› Max(Rt) ›› Max(μ) ›› Ident-IO(-High)$_{Root}$, Ident-IO(Round)V$_1$

245. <u>Co-Phonology Nb</u>: *Complex, OCP, Anchor-L, Dep, *C^{ʕ}, *C$_{[-round]}^{j}$, Max-IO, Ident-IO(-High)$_{Root}$, Ident-IO(Round)V$_1$ ›› NoHiatus

Verbs, on the other hand, are not augmented, thereby tolerating vowel hiatus. The constraint ranking for the verbs governed by Co-Phonology V is presented in example (246), below.

246. <u>Co-Phonology V:</u> *Complex, OCP, Anchor-L, Dep, *C^{ʕ}, *C$_{[-round]}^{j}$, Max-IO, Ident-IO(-High)$_{Root}$, Ident-IO(Round)V$_1$ ›› NoHiatus

Following this, it was shown that, like other Bantu languages, Tshivenda has strict minimality requirements. Tshivenda, as suggested by Poulos (1990), maintains a strictly disyllabic PWord. To illustrate this, examples from the infinitive, passive, and reduplication were examined. Like vowel hiatus, reduplication in nouns and verbs is asymmetrical. In verb stems, the reduplicate must be at least monosyllabic. Where the stem does not have a vowel or is a C-only stem, reduplication is blocked and an auxilary verb is used instead. On the other hand, nominals require at least two syllables to be reduplicated. Where the noun stem did not adhere to this

minimality requirement, the appropriate noun class prefix was included in the reduplicated stem. Examples (247) and (248) contain the constraint rankings that govern minimality requirements in reduplication.

247. <u>Monosyllabic Nouns:</u> [σσ], MAX-IO(RT) ›› R≤ROOT, MAX-IO

248. <u>Monosyllabic Verb Stems:</u> [σ], R≤ROOT, MAX-IO(RT) ›› MAX-IO(FV)

The dissertation further provided comparisons between the repair strategies employed in Tshivenda and other Bantu languages, including the Nguni languages, chiShona, chiNdau, and Xitsonga. In doing so, a small contribution to the broader phonological typology of Bantu languages was made. The asymmetry in Tshivenda, while not unique, is not common amongst the neighbouring Southern Bantu languages.

7.2. Recommendations for Further Studies

As mentioned, Tshivenda has largely been ignored in comparison to the other Southern Bantu languages. While every effort was made to ensure the data and analysis presented in this dissertation was comprehensive, there remain aspects of the language that require further investigation. One aspect being the rich and complex tonal system of Tshivenda verbs. Questions that require further investigation include: Is there a historical or sociolinguistic reason for the tolerance of vowel hiatus in verbs but not in nominals? Does Tshivenda provide evidence for distinct PWord/PStems?

7.3. Summary of Chapter

In this chapter, a conclusion was presented which gave an overview of the dissertation by summarising the findings. Firstly, the purpose and arguments of the dissertation were clearly stated. Following this, an outline of the sources of data as well as how the data were verified was put forward. The theoretical framework used to analyse the data and a summary of the results were presented thereafter. Finally, two questions that fell out of the scope of the dissertation which require further investigation were recommended for further investigation.

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APPENDICES

Appendix 1: Participant Information Sheet

FACULTY OF HUMANITIES
SCHOOL OF LITERATURE, LANGUAGE AND MEDIA
UNIVERSITY OF THE WITWATERSRAND
1 JAN SMUTS AVENUE
BRAAMFONTEIN, JOHANNESBURG, 2000
TEL: 011717100

Dear sir/madam,

My name is Angelique Tzanakakis and I am working towards a Master of Arts degree in Linguistics at the University of the Witwatersrand in Johannesburg. As part of my studies, I must produce a dissertation and I am investigating *Noun-verb asymmetry in Tshivenda Vowel Hiatus Resolution*. The aim of this dissertation is to examine the differences seen in how a sequence of vowels is tolerated in Tshivenda nouns and verbs.

I would like to invite you (a fist language Tshivenda speaker) to take part in a research task which will involve you translating English words and phrases into Tshivenda. This research task may take up to 90 minutes to complete and the audio will be recorded. The audio will be kept on my password-protected PC as well as a USB stick. The recordings will be deleted after four (4) years. Only myself and my supervisor, Professor Kadenge, will have access to the recordings. The data may possibly be used in future academic studies (on topics such as accent variation) within this period.

You will not receive any direct benefits from participating in this voluntary study, and you may withdraw at any time with no repercussions. The reporting of the research task will be anonymous as I will not refer to you by name in my notes and dissertation.

Feel free to contact me or my supervisor, Professor Maxwell Kadenge, using the details below if you have any further questions. The dissertation will be available online through the university library website once completed. For any queries, concerns, or complaints regarding

the ethical procedures of this study, you can contact the University Human Research Ethics Committee (non-medical): + 27117171408 or Shaun.Schoeman@wits.ac.za.

Kind regards,

Angelique Tzanakakis 712078@students.wits.ac.za, +27829204403	Supervisor: Prof Maxwell Kadenge, Maxwell.Kadenge@wits.ac.za, +27117174167

Appendix 2: Written Consent Form

FACULTY OF HUMANITIES
SCHOOL OF LITERATURE, LANGUAGE AND MEDIA
UNIVERSITY OF THE WITWATERSRAND
1 JAN SMUTS AVENUE
BRAAMFONTEIN, JOHANNESBURG, 2000
TEL: 011717100

Master of Arts by Research: Noun-verb asymmetry in Tshivenda vowel hiatus resolution

Angelique Tzanakakis

I _____ agree to voluntarily participate in this research project. I agree that the research and its purpose have been explained to me and I fully understand what my participation will involve.

_____ (signature)

_____(date)

I _____ agree to voluntarily participate in this research project. I agree that this research task will be audio recorded. I understand that my personal details will not be included in the final dissertation. I understand that I can withdraw from the project at any time. I understand that the recordings will be securely stored, may be used for future studies, and destroyed after four years.

_____ (signature)

_____(date)

Appendix 3: Data Elicitation Sheet

1. **Isolated Lexical Items**

A. Diminutives and adjectives
1. Small mountain
2. Small river
3. Small hut
4. Small clay pot
5. Small ox
6. Young goat
7. Young sheep [lamb]
8. Small toe
9. Small child
10. Small children
11. Small girl/daughter
12. Small woman
13. Small baboon
14. Small rope
15. Small bone
16. Small snake
17. Small bride
18. Small kudu
19. Small pan
20. Female soldier
21. good singer
22. good speaker
23. a dependant (noun)
24. Kind person
25. Kind woman
26. Real, solid tree
27. Strong, good wooden spoon
28. Genuine leather
29. A real shoe

30. Black goat Slightly black goat
31. Grey chicken Slightly grey chicken
32. Green dress Slightly green dress

B. <u>Nominals Singular & Plural (if possible)</u>
1. Speaker
2. Guest
3. Patient, person under medical treatment
4. Unclean/dirty person
5. Specialist/doctor
6. Children of these days (nowadays)
7. A male person [lit. a person of man]
8. Bed
9. Alliance, a joining up with, partnership
10. Violent response to, on behalf of
11. Greedy or selfish eating of food for oneself
12. Wind/air
13. Dew
14. Banana tree
15. Fire
16. Ashes
17. Graveyard
18. A complete going away [e.g. he was gone for good]
19. Pigeon
20. Ugly, bad creature [e.g. a baboon is a good-for-nothing animal]
21. Sleeping mats of chief [plural]
22. Eye
23. Minute
24. Word

25. Strength, power or force
26. Status, rank, as in family through birth
27. Manner of doing, style, method, process
28. Manner of speaking
29. Wrinkle
30. Hand
31. Gathering of the youth
32. Light
33. Storm with some hail; place where landslide was caused by much rain
34. Garment; blanket if worn
35. Hands
36. Talk, gossip, discussion
37. Trickiness; ability to do tricky, smart, neat, clever, technical, questionable things; deceitfulness; witchcraft
38. A kind of shrub
39. Language
40. Huge protruding belly of a fat man or a pregnant woman
41. Song
42. Sea
43. Razor
44. Non-human live foetus in womb/egg
45. Stench
46. Journey
47. Thin bundles of grass, tobacco
48. Inaccessible place, difficult to return from
49. A loaf of bread
50. Place where one stands/stature
51. Something done for fun, camouflage
52. Method of doing
53. Alone
54. You there (come here)
55. They, themselves

56. He, himself
57. All of them [referring to people]
58. The whole of it [referring to country]

C. Verbs
1. Laugh
2. Put, place
3. Leave behind
4. Hang [clothing]
5. Be fearful
6. To speak
7. To hit
8. Not to hit
9. Advise
10. Be advised
11. Grind
12. Grind for
13. Kill
14. Kill for
15. Be killed
16. Be heard
17. Be doable
18. Be legible
19. Be given
20. Be plucked/draw
21. Be advised
22. Be loved
23. Be tired
24. Be sat
25. Be known
26. Be killed
27. Be ploughed
28. Be built
29. Be typed
30. Be planted
31. Be flicked away

32. Have brought to someone
33. Be unloaded for
34. Lose (throw away)
35. Be brought back
36. Cause to kill
37. Cause to leave behind
38. Cause to laugh
39. Keep on laughing
40. Put here and there
41. Keep on talking/babble
42. Cause to hang out to dry
43. Put here and there
44. Sit here and there
45. Scatter indiscriminately

2. Non-isolated Lexical Items

A. My…
1. My mother works
2. My mother
3. My tooth
4. My son is lazy
5. My wife
6. My wives
7. My chickens
B. Mine…
1. Mine barks
2. If the dress is white it is mine
3. A real wife is mine
4. Mine
C. I…
1. I see
2. I see him the man and the horse
3. I like them, your children
4. I have not yet finished
D. I will…
1. I will keep on calling him, this student
2. I will tell him the news that will open his head
3. I will speak
E. I have…
1. I have seen them [a singer and a dancer]
2. I have found them, the cow and the he-goat, at the river
3. I have left her being young

F. <u>Our…</u>
1. Our tooth
2. Our mother cooks for the people
3. Our gifts
4. Our chicken
5. Ours
G. <u>We…</u>
1. We know them
2. We know him
3. We keep on laughing
4. We wrote the letter but did not post it
5. We may go now
6. We are calling them
7. We will see each other tomorrow
H. <u>Your…</u>
1. Your tooth
2. Your blanket
3. Your gift
I. <u>You…</u>
1. You can see now
2. You saw those people where?
3. You will trouble my heart by telling me of the good news
4. If you study hard you will pass
J. <u>His…</u>
1. His tooth
2. His snake bites

3. His leg
K. He…
1. He travels
2. He likes them
3. He is sick
4. He is hitting it
5. He hunts it
6. He keeps on eating
7. He has loved
8. He will be reluctant to lay a hand on you
L. They are…
1. They are talking about this one [referring to this dog]
2. They are lazy
3. They are gossiping about you and the man
4. They are just hitting it
5. They hunt them
M. They…
1. They [the men] hunt them [the lions]
2. They [the young men] keep on eating it [the meat]
3. They have caught them, the women and the thieves
N. Their…
1. Their tooth
2. Their singing a song is very nice
3. Their cow
4. Their legs
5. Their noise disturbed my class
6. Theirs

O. <u>This…</u>
1. This snake bites
2. This dog laughs
3. This person is glad
4. This person adores me
P. <u>The…</u>
1. The boys have left
2. The dog did not bite the child
3. The dog that hunts eagerly has a master who urges him on
4. The dog laughs
5. The women have cooked
6. The woman cooks it
7. The woman calls the child
8. The woman sees the child
9. The woman puts the book on the table
10. The teacher stood up and asked me questions
11. The teacher is ill
12. The thoughts started to be clear
13. The cook cooks for the people
14. The fire burns
15. The children want food
16. The pastor came to give us good news
17. The work troubles the workers
18. The fire is extinguished
19. The house is being entered
20. The lion jumped up, it fell down, it arose, it jumped up again
21. The lady who is a nurse
22. The chief’s cattle
23. The boy’s axe
24. The teacher of this village

25. **The man sees the woman**
Q. <u>These….</u>
1. These people are called
2. These women are no longer angry
3. These men are my friends
R. <u>Miscellaneous</u>
1. It did nothing
2. It didn’t borrow
3. Work!
4. Speak!
5. Build that!
6. Call them!
7. Help them!
8. Come!
9. Eat!
10. Die!
11. Beat it!
12. Eat it!
13. The idea of intensive biting
14. The idea of being exactly the same
15. The idea of the heart beating/throbbing
16. Absolutely silent (because everything is fine)
17. The idea of chewing intensively
18. The idea of bathing hastily
19. The idea of trembling
20. The idea of strolling a bit

Appendix 4: Sample Transcript

1. **Isolated Lexical Items**

A. Diminutives and adjectives	
1. Small mountain	Tshikwara
2. Small river	Mulambwana
3. Small hut	Mutumba
4. Small clay pot	Tshidudu
5. Small ox	Phulwana
6. Young goat	Mbudzana / Tshibudzana
7. Young sheep [lamb]	Nngwana
8. Small toe	Tshikunwane
9. Small child	Ṅwana muṭuku
10. Small children	Vhana vhaṭuku
11. Small girl/daughter	Musidzanyana/ṅwana wa musidzana
12. Small woman	Mufumakadzi muṭuku
13. Small baboon	Pfenana
14. Small rope	Thambwana
15. Small bone	Rambwana
16. Small snake	Nowana
17. Small bride	Muselwa muṭuku
18. Small kudu	Tolwana
19. Small pan	Pani ṭhukhu
20. Female soldier	Lisole ḽa musadzi
21. good singer	Nambi
22. good speaker	Tshiambi
23. a dependant (noun)	Muunḓiwa
24. Kind person	Muthamutha
25. Kind woman	Musadzisadzi
26. Real, solid tree	Murimuri
27. Strong, good wooden spoon	Lufolufo
28. Genuine leather	Mukambakamba
29. A real shoe	Tshiendaenda

30. Black goat Slightly black goat	Mbudzi ntswu Mbudzi ntswunyana
31. Grey chicken Slightly grey chicken	Khuhu tseṱa Khuhu tseṱanyana
32. Green dress Slightly green dress	Rokho dala Rokho dalanyana

b. <u>Nominals</u>	
1. Speaker	Muambi
2. Guest	Mueni
3. Patient, person under medical treatment	Mulwadze, muthu ane a khou shumisa dzilafho
4. Unclean/dirty person	Tshikafhala/muthu a re na tshika
5. Specialist/doctor	Makone/dokotela
6. Children of these days (nowadays)	Vhana vha musalauno
7. A male person [lit. a person of man]	Muthu wa tshinnani [muthu wa munna]
8. Bed	Mmbete
9. Alliance, a joining up with, partnership	Vhushumisani, ṱhanganelano, vhuanḓani
10. Violent response to, on behalf of	Phindulo i si yavhuḓi kha, ho imelwa
11. Greedy or selfish eating of food for oneself	Vhutshivha kana tseḓa ya u ḽa zwiḽiwa iwe muṋe
12. Wind/air	Muya
13. Dew	Nwando
14. Banana tree	Muri wa muomva
15. Fire	Mulilo
16. Ashes	Miora
17. Graveyard	Thalo/mavhiḓani
18. A complete going away [e.g. he was gone for good]	U ṱuwa tshoṯhe [tsumbo. o vha o ṱuwa tshoṯhe]
19. Pigeon	Ḽiivha

20. Ugly, bad creature [e.g. a baboon is a good-for-nothing animal]	Tshivhumbwa tsha u vhifha, tshivhi [tsumbo. pfeṇe a si phukha kwayo]
21. Sleeping mats of chief [plural]	Thovho ya u eḓela khosi [vhunzhi]
22. Eye	Ḽiṱo
23. Minute	Munithi/muthethe
24. Word	Ipfi
25. Strength, power or force	Nungo, maanḓa
26. Status, rank, as in family through birth	Tshiimo/vhuimo zwi tshiya ngau bebwa mutani
27. Manner of doing, style, method, process	Nḓila ya u ita, tshitaela, ngona, maitele
28. Manner of speaking	Kuambele
29. Wrinkle	U sinyalala
30. Hand	Thsanḓa
31. Gathering of the youth	Tshivhidzo tsha vhaswa
32. Light	Tshedza
33. Storm with some hail; place where landslide was caused by much rain	Ḓumbu ḽa tshifhango; fhethu he u pilimuwa ha mavu ha vhangiwa nga mvula
34. Garment; blanket if worn	Tshiambaro; nguvho arali yo fukiwa
35. Hands	Zwanḓa
36. Talk, gossip, discussion	U amba, zwitshele, therisano
37. Trickiness; witchcraft	Vhuleme; vhuloyi/vhundiyandiya
38. A kind of shrub	Luanakha
39. Language	Luambo
40. Huge protruding belly of a fat man or a pregnant woman	Thumbu khulwane yo bvelaho nnḓa ya munna o khwaṱhaho/mufumakadzi wa muimana
41. Song	Luimbo
42. Sea	Lwanzhe
43. Razor	Luare
44. Non-human live foetus in womb/egg	Tshitumbuki tshi si tsha muthu tshine tsha khou tshila mbumbeloni/gumba
45. Stench	Munukho

46. Journey	Lwendo
47. Thin bundles of grass, tobacco	Ṅanda tsekene ya mahatsi, fola
48. Inaccessible place, difficult to return from	Fhethu hu sa swikelelei, hune ha konḓa u humela murahu
49. A loaf of bread	Mukonde wa vhurotho
50. Place where one stands/stature	Fhethu hune muthu a ima hone/tshiimo
51. Something done for fun, camouflage	Zwithu zwi no itelwa vhuḓimvumvusi, u kanganyisa
52. Method of doing	Maitele
53. Alone	U woṱhe
54. You there (come here)	Inwi hafhaḽa (i ḓani ngeno)
55. They, themselves	Vhone, vhone vhaṋe
56. He, himself	Ene, ene muṋe
57. All of them [referring to people]	Vhoṱhe
58. The whole of it [referring to country]	Ḽoṱhe ḽo fhelela

c. Verbs	
1. Laugh	U sea
2. Put, place	U vhea
3. Leave behind	U sia
4. Hang [clothing]	U kapea
5. Be fearful	U vha na nyofho
6. To speak	U amba
7. To hit	U rwa
8. Not to hit	U sa rwa
9. Advise	U eletshedza
10. Be advised	Kha vha dzhiele nzhele
11. Grind	U kuya
12. Grind for	U kuyela
13. Kill	Vhulaha
14. Kill for	U vhulahela
15. Be killed	U vhulahwa
16. Be heard	U phfiwa
17. Be doable	U itea
18. Be legible	U vhalea
19. Be given	U phiwa
20. Be plucked/draw	U kiwa
21. Be advised	U laiwa
22. Be loved	U funiwa/funwa
23. Be tired	U netisiwa/netiswa
24. Be sat	U dzulwa
25. Be known	U divhiwa
26. Be killed	U vhulaiwa
27. Be ploughed	U limiwa/limwa
28. Be built	U phatiwa
29. Be typed	U thaipiwa
30. Be planted	U bobyo
31. Be flicked away	U tapwa

32. Have brought to someone	Disedzwa
33. Be unloaded for	Laisululelwa
34. Lose (throw away)	Laṱetshelwa
35. Be brought back	Rengululwa
36. Cause to kill	U vhulaha
37. Cause to leave behind	U sia murahu
38. Cause to laugh	U sea
39. Keep on laughing	Seasea
40. Put here and there	Vheavhae
41. Keep on talking/babble	Ambaamba
42. Sit here and there	Dzuladzula
43. Scatter indiscriminately	Gidimagidi

3. <u>Non-isolated Lexical Items</u>

A. <u>My…</u>	
1. My mother works	Mme anga vha a shuma
2. My mother	Mme anga
3. My tooth	ḽiṋo ḽanga
4. My son is lazy	Murwa wanga u a ḅvafha
5. My wife	Mufumakadzi wanga
6. My wives	Vhafumakadzi vhanga
7. My chickens	Khuhu dzanga
B. <u>Mine…</u>	
1. Mine barks	Yanga i a huvha
2. If the dress is white it is mine	Arali rokho i tshena ndi yanga
3. A real wife is mine	Mufumakadzi vhukuma ndi wanga
4. Mine	Yanga
C. <u>I…</u>	
1. I see	Ndi a vhona
2. I see him the man and the horse	Ndi vhona munna na bere

3. I like them, your children	Ndi a vha funa, vhana vhaṋu
4. I have not yet finished	Ndi a thi athu fhedza
D. I will…	
1. I will keep on calling him, this student	Ndi ḓo dzula ndi tshi mu vhidza, hoyu mutshudeni
2. I will tell him the news that will open his head	Ndi ḓo mu vhudza mafhungo ane a ḓo mu vula ṱhoho yawe
3. I will speak	Ndi do amba
E. I have…	
1. I have seen them [a singer and a dancer]	Ndo vha vhona [muimbi na tshilombe]
2. I have found them, the cow and the he-goat, at the river	Ndo dzi wana mulamboni, kholomo na tshibokoṱo
3. I have left her being young	Ndo mu sia a tshi kha ḓi vha muṱuku
F. Our…	
1. Our tooth	ḽiṋo ḽashu
2. Our mother cooks for the people	Mme ashu vha bikela vhathu
3. Our gifts	Zwifhiwa zwashu
4. Our chicken	Khuhu yashu
5. Ours	Yashu
G. We…	
1. We know them	Ri a vha ḓivha
2. We know him	Ri a mu divha
3. We keep on laughing	Ri dzulela u sea
4. We wrote the letter but did not post it	Ro ṅwala vhurifhi fhedzi ra si vhu pose
5. We may go now	Ri nga bvela phanḓa/r inga tuwa zwino
6. We are calling them	Ri khou vha vhidza

7. We will see each other tomorrow	Ri ḓo vhonana matshelo
H. Your…	
1. Your tooth	ḽiṋo ḽaṋu
2. Your blanket	Nguvho yaṋu
3. Your gift	Tshifhiwa tshaṋu
I. You…	
1. You can see now	Ni khou kona u vhona zwino
2. You saw those people where?	No vhona avho vhathu ngafhi?
3. You will trouble my heart by telling me of the good news	Ni ḓo vhaisa mbilu yanga nga u mmbudza mafhungo avhuḓi
4. If you study hard you will pass	Arali na vhalesa ni ḓo phasa
J. His…	
1. His tooth	ḽiṋo ḽawe
2. His snake bites	ṋowa yawe i a luma
3. His leg	Mulenzhe wawe
K. He…	
1. He travels	U a tshimbila
2. He likes them	U a vha/zwi/dzi takalela
3. He is sick	U a lwala
4. He is hitting it	U khou i rwa
5. He hunts it	U a i zwima
6. He keeps on eating	U twela u ḽa
7. He has loved	U a funa
8. He will be reluctant to lay a hand on you	U ḓo teledza u vhea tshanḓa kha inwi/u ḓo timatima uni vhea tshanḓa

L. They are…	
1. They are talking about this one [referring to this dog]	Vha khou amba nga ha heyi [hu khou ambiwa nga ha heyi mmbwa]
2. They are lazy	Vha a ḅvafha
3. They are gossiping about you and the man	Vha khou sola inwi na munna
4. They are just hitting it	Vha khou sokou u rwa
5. They hunt them	Vha a zwi zwima
M. They…	
1. They [the men] hunt them [the lions]	[Vhanna] vha a dzi zwima [ndau]
2. They [the young men] keep on eating it [the meat]	[Vhanna vhaṱuku] vha dzulela u i l̓a [n̓ama]
3. They have caught them, the women and the thieves	Vho vha fara, vhafumakadzi na mbava
N. Their…	
1. Their tooth	Maṋo avho
2. Their singing a song is very nice	Kuimbele kwavho kwa luimbo ndi kwavhuḓi nga maanḓa
3. Their cow	Kholomo yavho
4. Their legs	Milenzhe
5. Their noise disturbed my class	Phosho yavho yo thithisa kiḽasi yanga
6. Theirs	Yavho
O. This…	
1. This snake bites	n̓owa iyi i a luma
2. This dog laughs	Mmbwa iyi i a sea
3. This person is glad	Muthu uyu o takala
4. This person adores me	Muthu uyu u a mpfuna
P. The…	
1. The boys have left	Vhatukana vho ṱuwa

2. The dog did not bite the child	Mmbwa a yo ngo luma ṅwana
3. The dog that hunts eagerly has a master who urges him on	Mmbwa ine ya zwima nga u ḓidina i na muṋe ane a i ṱuṱuwedza
4. The dog laughs	Mmbwa i a sea
5. The women have cooked	Vhafumakadzi vho bika
6. The woman cooks it	Mufumakadzi u a i bika
7. The woman calls the child	Mufumakadzi u vhidza ṅwana
8. The woman sees the child	Mufumakadzi u vhona ṅwana
9. The woman puts the book on the table	Mufumakadzi u vhea bugu kha ṱafula
10. The teacher stood up and asked me questions	Mugudisi o takuwa a ima a mmbudzisa dzimbudziso
11. The teacher is ill	Mudededzi vha a lwala
12. The thoughts started to be clear	Mihumbulo yo thoma u vha khagala
13. The cook cooks for the people	Mubiki u bikela vhathu
14. The fire burns	Mulilo u khou duga
15. The children want food	Vhana vha khou ṱoḓa zwiḽiwa
16. The pastor came to give us good news	Mufunzi o ḓa u ri ṋea mafhungo maḓifha
17. The work troubles the workers	Mushumo u khou dina vhashumi
18. The fire is extinguished	Mulilo wo dzimiwa
19. The house is being entered	Hu khou dzheniwa nḓuni
20. The lion jumped up, it fell down, it arose, it jumped up again	Ndau yo fhufhela nṱha, ya wela fhasi, ya takuwa, ya dovha ya fhufhela nṱha
21. The lady who is a nurse	Mufumakadzi ane a vha muongi
22. The chief's cattle	Kholomo dza khosi
23. The boy's axe	Mbaḓo ya mutukana
24. The teacher of this village	Mugudisi wa muḓi hoyu/mudededzi wa hoku kusi
25. The man sees the woman	Munna u a mu vhona musadzo
Q. <u>These….</u>	
1. These people are called	Havha vhathu vho vhidzwa

2. These women are no longer angry	Havha vhafumakadzi a vho ngo tsha sinyuwa
3. These men are my friends	Havha vhanna ndi khonani dzanga
R. <u>Miscellaneous</u>	
1. It did nothing	Ya sa ite
2. It didn't borrow	Tsha sa adzime
3. Work!	Shuma! Or shumai!
4. Speak!	Amba! Or ambai!
5. Build that!	I fhaṱe!
6. Call them!	Vha vhidzeni!
7. Help them!	Vha thuse!
8. Come!	Iḓa!
9. Eat!	Iḽa! or iḽai!
10. Die!	Ifa! Or ifai!
11. Beat it!	U rwe/rwei!
12. Eat it!	U ḽe!
13. The idea of intensive biting	Nde nde nde
14. The idea of being exactly the same	Kwa kwa kwa
15. The idea of the heart beating/throbbing	Di di di
16. Absolutely silent (because everything is fine)	Du du du
17. The idea of chewing intensively	Shengi shengi
18. The idea of bathing hastily	Ṱambi ṱambi
19. The idea of trembling	Tetemeli Tetemeli
20. The idea of strolling a bit	Tshimbili Tshimbili

Appendix 5: Ethics clearance certificate

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Tzanakakis

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H18/09/31**
PROJECT TITLE	Noun-verb asymmetry in Tshivenda vowel hiatus resolution
INVESTIGATOR(S)	Miss A Tzanakakis
SCHOOL/DEPARTMENT	SLLM/
DATE CONSIDERED	14 September 2018
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	01 November 2021

DATE 02 November 2018 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Professor M Kadenge

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES