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Some Repair Strategies in Xitsonga

by

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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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ABSTRACT

Every language has its own unique set of preferred phonological structures, along with an array of strategies that it can employ to ensure that these structures are maintained. This study examines repair strategies used in Xitsonga in relation to syllable structure and Prosodic Word (PWord) minimality. Evidence gleaned from loanword adaptation supports claims by previous work (Vratsanos and Kadenge, 2017) that Xitsonga prefers a CV syllable structure. When words from English and Afrikaans are adapted to suit the Xitsonga phonological structures, several repair strategies may occur: segment substitution ensures that the phonemic inventory of Xitsonga is adhered to; vowel epenthesis is used to eliminate codas and break up consonant clusters; diphthongs are repaired using glide epenthesis and, in some cases, monophthongisation; and prenasalisation resolves NC consonant clusters. Secondly, Xitsonga requires words to be minimally disyllabic, and uses the epenthesis of a semantically null morpheme in order to achieve this.

The analysis is couched within Optimality Theory (OT: Prince and Smolensky, 2004), with additional insights gleaned from Feature Geometry (FG: Clements and Hume, 1995). OT allows for strategies to be accounted for by means of constraint interaction, and for variation to be accounted for by means of constraint rerankings. The aim of this study is to present what is thought to be the first comprehensive account of repair strategies used in Xitsonga syllable to maintain preferred phonological structures, highlighting the importance of the syllable as a level of phonological analysis in this language and others like it. Additionally, the results of this analysis are compared to

those of other Southern Bantu languages in an effort to situate Xitsonga within its language family, thereby contributing to linguistic typology.

Key words: repair strategies, loanwords, rephonologisation, prosodic word minimality, Optimality Theory, Feature Geometry, constraints, candidates, input, output, Bantu languages

DEFINITIONS OF KEY TERMS

Repair strategies	Strategies that conspire to ensure that the phonological rules of a language are maintained.
Loanwords	Words adopted from one language and adapted to suit another.
Rephonologisation	The process whereby words from the donor language are adapted to suit the phonotactics of the recipient language.
Prosodic word minimality	The minimum number of syllables required by a language to form an acceptable word.
Optimality Theory	A constraint-based theory of generative grammar developed by Prince and Smolensky in 1991 (Archangeli, 1997).
Feature Geometry	A feature-based theory of generative grammar that illustrates the distinctive phonetic features of sounds (Clements and Hume, 1995).
Constraints	The requirements governing grammatical structure, based on language universals. Markedness constraints prohibit marked surface structures and faithfulness constraints aim to preserve the input form as much as possible.
Candidates	The possible output forms based on the input.
Input	The original form of a word before it is repaired or rephonologised.

Output	The realisation of the input once the optimal form has been determined based on the constraints.

LISTS OF SYMBOLS, ABBREVIATIONS AND CONSTRAINTS

LIST OF SYMBOLS

/ /	Phonemic/broad transcription (Optimality Theory Input)
→	Is realised as/becomes
[ ]	Phonetic/narrow transcription (Optimality Theory Output)
.	Syllable boundary
-	Morpheme boundary

LIST OF ABBREVIATIONS

C	Consonant
FG	Feature Geometry
IMP	Imperative
N	Nasal consonant
OT	Optimality Theory
PWord	Prosodic Word
V	Vowel

LIST OF CONSTRAINTS

OK(SEG)	Segments that are not permitted in Xitsonga must not appear in the output (Rose and Demuth, 2006).
IDENT-IO	The features of an input segment must remain in the output; no segment substitution (Kadenge and Mudzingwa, 2012).
NOCODA	Syllable codas are prohibited; syllables must be open/end on a vowel (Kager, 1999).

DEP-IO All segments in the output must have correspondents in the input; no epenthesis (Kager, 1999).

MAX-IO Segments in the input must have output correspondents; no elision (Kager, 1999).

***COMPLEX** Complex onsets (consonant clusters CC) and syllable nuclei (diphthongs VV) are prohibited (Prince and Smolensky, 2004).

UNIQUE In $\forall x$, where x is a feature, x must have a unique segmental anchor y (Benua, 1997).

NOHIATUS A sequence of two heterosyllabic vowels (V.V) is prohibited (Kager, 1999).

CANONICAL STEM (CS) Prosodic Stems are minimally disyllabic (Downing, 2005).

WORD/ MORPH Words are always parsed into morphemes (Downing, 2005).

DEPMORPH All morphemes in the output must be present in the input; no epenthetic morphemes (Downing, 2005).

IMPERATIVE≈CS

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

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CHAPTER 1: INTRODUCTION AND BACKGROUND TO STUDY

1.1. Introduction

Languages employ repair strategies that conspire to satisfy specific phonological requirements. Repair strategies eliminate dispreferred or outlawed structures, and replace them with more harmonious ones. Xitsonga, like most other Southern Bantu languages, adheres to a set of strict rules governing its phonology: its preferred syllable structure is of the CV shape; and the minimal size of its Prosodic Words (PWords) is disyllabic.

This study aims to comprehensively identify and document a number of the repair strategies that Xitsonga employs to maintain these desirable structures. This research aims to add to the list of Xitsonga repair strategies that have been found in previous studies (Vratsanos and Kadenge, 2017; Lee and Burheni, 2014), in an attempt to add to Bantu language typology.

1.2. Background to Study: Preferred Phonological Structures in Xitsonga

Previous research has already illustrated that Xitsonga has strict CV syllable structure requirements (see Vratsanos and Kadenge, 2017; Lee and Burheni, 2014). Vratsanos and Kadenge (2017), for example, illustrate how the language employs several repair strategies to eliminate vowel hiatus – a heterosyllabic sequence of two vowels – in order to preserve preferred structures at the level of the syllable. It is this prior research that acts as the basis of the current study, which expands on this by

identifying additional strategies used to maintain preferred syllable structures, but within loanword rephonologisation, as well as strategies employed to maintain minimality requirements.

Xitsonga has had extensive contact with other languages, particularly with two Indo-European languages: English and Afrikaans. As a result of this language contact, many words from English and Afrikaans have found their way into the lexicon of Xitsonga. However, given the differences in language family structure, English and Afrikaans have very different phonological requirements to Xitsonga. As a result, several repair strategies must be employed in order to reconcile these very disparate phonological systems, thus making the original English or Afrikaans word phonologically legal in Xitsonga (Baumbach, 1987). In all examples, full stops indicate syllable boundaries. Take the following words, for example:

1. /kɒpi/ → [ko.pi] 'copy'
2. /bak/ 'bake' → [ba.k**a**] 'bake bread'
3. /stəʊv/ → [**ʃi**.to.f**u**] 'stove'

In example (1) above, the original English word *copy* is rephonologised so as to become [kò.pì]. The only change here is segment substitution, which allows the word to adhere to the phonemic inventory of Xitsonga. Example (2), however, illustrates how the Afrikaans word *bak* 'bake', which contains a coda, undergoes vowel epenthesis so as to adhere to the CV syllable structure of Xitsonga. A similar process is evident in example (3), which contains a coda as well as a consonant cluster /st/.

Both are outlawed structures and so vowel epenthesis is triggered again to resolve them. These processes are detailed more extensively in Chapter 5 of this thesis.

These words are commonly termed 'loanwords' or 'borrowings', but – since the words are incapable of being returned to the donor languages – many scholars prefer the term 'adoptives' (Cole, 1990). For ease of reference, the term 'loanwords' will be used throughout this study, as it has been in many others like it (see Tzanakakis, 2017; Adomako, 2008; Davis and Kang, 2006; Kadenge, 2012).

The second aim of this study is to use data from native phonology to determine the requirements that dictate what the minimum size of a legal word – a PWord – in Xitsonga is, and the strategies that ensure this. In other words, this study outlines the repair strategies employed to maintain PWord minimality requirements in Xitsonga. Like most other Bantu languages (Downing, 2005), Xitsonga prefers minimally disyllabic words. This is particularly evident when examining the imperative formation and Class 9 nouns. In cases where the verb stem is polysyllabic, the imperative form of the verb is equivalent to the stem alone:

4. /ti.ra/ 'work' → [ti.ra] 'work IMP'

5. /ba.ka/ 'bake' → [ba.ka] 'bake IMP'

Examples (4) and (5) above illustrate that no changes need to occur to the stem to form the imperative in cases where the stem is polysyllabic. However, if the stem is monosyllabic, an additional syllable [-na] is added:

6. /ba/ 'beat' → [ba.**na**] 'beat IMP'

7. /fa/ ‘die’ → [fa.**na**] ‘die IMP’

In each case presented in (6) and (7) above, the words are made minimally disyllabic in the imperative. A similar process occurs with Class 9 nouns, which ordinarily have a null prefix. When the stem is monosyllabic, however, [ji] is epenthesised word-initially, resulting in a disyllabic noun (9):

8. [homu] ‘cow’

9. [**ji**.^{n}ko] ‘vessel for beer’

Example (8) above is already disyllabic so it is realised as it stands. Augmentative epenthesis would be redundant and ungrammatical in this example. However, example (9) receieves the epenthetic [ji] so as to make it minimally disyllabic. These processes are expounded upon in Chapter 6.

CV syllable structure, which is explored here by means of a loanword analysis, and PWord minimality are both vital in illustrating the processes at work at syllable level. The two areas complement one another, with the former looking at the makeup of the syllable itself, and the other illustrating how these syllables come together to create acceptable words. Analysis at syllable level is particularly valuable in a phonological study of Xitsonga as it is rich in phonological processes that take the syllable as their domain of application. This dissertation illustrates the importance of the CV syllable structure, as well as the general importance of analyses at syllable level in studies of Xitsonga and Bantu languages more generally.

1.3. A Note on Terminology

It will not be unfamiliar to any linguists, but readers from other disciplines may find the use of the term 'Bantu', which is used liberally throughout this study and all others of its kind, rather contentious. The term was coined in the late 19th century by W. H. I. Bleek, a German linguist and author of *A Comparative Grammar of South African Languages* (Bailey, 1995). Despite having played a pivotal role in revealing that not all African languages are related, as literature of the time would have had people believe, Bleek paved the way for people with more nefarious intentions. The term was adopted by the early racist government of South Africa as a replacement for 'native', an ethnonym that essentially denoted 'all black people' (Bailey, 1995). It must, however, be noted that use of this word as terminology, referring to a widely-studied language family, pre-dates the word's pejorative use by the Apartheid regime and its perpetuators. It is nonetheless a problematic relic of a term that may require revision in future studies, but is unfortunately not the focus of this one. As such, the term is used throughout this dissertation to refer to the language family under scrutiny.

1.4. Problem Statement

As mentioned above, there are strategies in place in every language that ensure that the preferred phonological structures of a language are maintained and that dispreferred structures are eliminated. These are termed 'repair strategies' (Kager, 1999). There are many instances in which repair strategies are employed within a language. This study examines these strategies in Xitsonga with specific focus on

syllable structure and PWord minimality. Optimality Theory (henceforth OT) is used to analyse the data presented in this study.

It is noteworthy that Vratsanos and Kadenge (2017) demonstrated that Xitsonga prefers a CV syllable structure. Morphosyntactic concatenation often results in vowel hiatus which is a heterosyllabic sequences of vowels ($V_1.V_2$) (Casali, 2011). Vocalic hiatus is an undesirable phonological configuration which violates the markedness constraint NO-HIATUS (Mudzingwa, 2010; Casali, 2011; Vratsanos and Kadenge, 2017). This discovery was not unexpected, as previous studies indicate that vowel hiatus is generally dispreferred in Bantu languages (Casali, 2011; Mudzingwa and Kadenge, 2011; Mudzingwa, 2010).

Due to the agglutinating nature of Xitsonga, there are multiple instances in which an affix beginning or ending on a vowel is attached onto a stem or root in such a way as to create the undesirable sequence of vowels. Four main strategies to resolve this in Xitsonga were identified: glide formation, secondary articulation, vowel coalescence and vowel elision (Vratsanos and Kadenge, 2017).

Glide formation is the most preferred strategy in Xitsonga, and involves a vowel losing its moraicity to become a glide, thereby functioning as an onset for the following vowel. This can happen in Xitsonga if the first vowel is /i-/ or /u-/:

10. /i-e-na/ → [je.na] ‘him’

11. /u-o-na/ → [wo.na] ‘it’

If the first vowel is preceded by a consonant, glide formation is blocked as it would form a dispreferred sequence of consonants (that is, a complex onset) (Vratsanos and Kadenge, 2017). In many cases, secondary articulation in the form of either labialisation or palatalization may occur:

12. /ʃi-poto-ana/ → [ʃi.po.t^{w}a.na] ‘small pot’

13. /ʃi-tʃuri-ana/ → [ʃi.tʃu.d^{j}a.na] ‘small mortar’

When neither of the aforementioned strategies can take place, an alternative strategy is vowel coalescence, which involves a non-high V_1 and a high V_2 coalescing to form a non-high V_3 (Vratsanos and Kadenge, 2017). There are only two forms of coalescence in Xitsonga: /a – i/ → [e] and /a – u/ → [o]:

14. /ma-ino/ → [me.nu] ‘teeth’

15. /la-u-ku/ → [lo.ku] ‘this’

Finally, when the other strategies are blocked, vowel elision – that is, the loss of all features of one vowel –occurs (Vratsanos and Kadenge, 2017). As is to be expected, the elision of the first vowel is more common than that of the second (Casali, 2011).

16. /ʃi-anɮa/ → [ʃanɮa] ‘hand’

17. /ri-endʒo/ → [rendʒo] ‘journey’

This study builds on previous work on vowel hiatus resolution, in an effort to identify and describe further repair strategies in Xitsonga with regard to CV syllable structure

within the sphere of loanword rephonologisation. Vowel hiatus resolution and loanword rephonologisation have the same objective, namely, to maintain the language's preferred syllable structure.

Loanword rephonologisation is a particularly useful realm of study with regard to identifying how the syllable structure requirements of a particular language are maintained (see Chang, 2009; Adomako, 2008; Mwita, 2009; Khan, 2016; and Kadenge, 2012). Donor languages frequently have vastly disparate syllable structures to the recipient languages, thus paving the way for repair strategies to spring into action (see Chang, 2009; Adomako, 2008; Mwita, 2009; Khan, 2016; and Kadenge, 2012). This occurs when two or more languages come into contact, often in the context of colonisation, languages will 'borrow' words from the other languages and adapt them to suit their own phonetic and phonological (and often morphological) constraints (Haugen, 1950).

Due to extensive contact with English and Afrikaans, Xitsonga – like most Bantu languages – has borrowed extensively from these languages. Thus, several strategies need to be employed in order to reconcile the disparate phonotactic constraints between the Bantu borrower and its Indo-European lenders. The borrowed words, because they come from languages with different rules from Xitsonga, will naturally often violate the rules governing Xitsonga structural well-formedness.

As already mentioned, the repair strategies used to rephonologise loanwords are quite similar to those used to solve vowel hiatus, detailed above. In fact, many of the repair strategies listed here are applied broadly cross-linguistically, and are not particular to

Xitsonga, or even to the Bantu language family more broadly. Vowel epenthesis – or the insertion of an additional vowel – is a fairly common strategy employed by a variety of Bantu languages to eliminate syllable codas and consonant clusters (Khan, 2016; Kadenge, 2012; Mwita, 2009). The following examples from Xitsonga illustrate this process:

18. /bif/ → [bi.**fi**] 'beef' [CVC] → [CV.CV]

19. /pɑk/ → [-pa.k**a**] 'to park' [CVC] → [-CV.CV.]

20. /gris/ → [g**i**.ri.s**i**] 'grease' [CCVC] → [CV.CV.CV]

Example (18) and example (19) involve the epenthesis of a final vowel to eliminate the coda, while example (20) involves this as well as an additional epenthetic vowel to eliminate the consonant cluster /gr/. In each case, epenthesis serves to repair the undesirable syllable structures that are legal in English, so that they become CV syllable structure-compliant.

In addition, complex articulation in the form of pre-nasalisation is employed in instances where a sequence of two consonants, where the first C is a nasal (N), appears. Once again, this serves to ensure that a viable syllable structure in Xitsonga is achieved. This is illustrated by the following examples:

21. /ɪnk/ → [i.^{ŋ}ki] 'ink' [VCC] → [V.CV]

22. /mæŋgəʊ/ → [ma.^{ŋ}gu] 'mango' [CVCCV] → [CV.CV]

23. /paʊnd/ → [po.^{n}d**o**] 'pound sterling' [CVCC] → [CV.CV]

In each case, segment substitution has occurred to align the phonetic units of the borrowed words with the phonetic inventory of Xitsonga. It is also important to note that these strategies are not uncommon in languages all over the world, including many other Bantu languages. This study will compare the findings to those of other studies on other Bantu languages such as isiZulu, isiNdebele, and chiShona.

In addition to an examination of repair strategies that repair loanwords at syllable level, this study aims to also determine the requirements governing PWord minimality in Xitsonga, and identify the strategies employed to fulfil these requirements. PWord minimality is closely linked to the discussion of loanwords expounded upon above, as it also deals very closely with syllable structure. It refers to the number of syllables or morae required to constitute a structurally well-formed prosodic word (Prince and Smolensky, 2004).

Various languages impose different rules regarding how small a word can be. English, for example, requires words to merely be minimally monosyllabic – thus, a monosyllabic, monomoraic word is considered well-formed. In other words, English monosyllabic words like *dog* [dɒg], *hit* [hɪt] and *I* [aɪ] are all viable, well-formed words in this language.

ChiKaranga, unlike many other Bantu languages, allows the existence of monosyllabic words (Mudzingwa, 2010; Kadenge and Mathangwane, 2017). ChiZezuru, however, absolutely requires words to be minimally disyllabic (Mudzingwa, 2010; Downing and Kadenge, 2015; Kadenge and Mathangwane, 2017), while iKalanga imposes different minimality requirements depending on the

category of word in question (Kadenge and Mathangwane, 2017). Xitsonga is no different from many other Southern Bantu languages like chiZezuru and iKalanga, in that it also has minimality requirements, for which it employs a few strategies (du Plessis, 2014). This study identifies and describes these strategies, once again in an effort to create a fairly exhaustive list of the repair strategies used by this language.

OT is used to formalise both the loanword rephonologization and minimality effects data, and to account for the use of certain strategies over others by means of constraint rankings. It is believed that this study is the first to do this for Xitsonga, a language that is largely understudied.

1.5. Objectives of Study

The objectives of this study are threefold:

- To identify and describe the repair strategies employed in Xitsonga to maintain the language's preferred phonological structures, with specific reference to syllable structure and PWord minimality;
- To analyse these strategies using OT, thereby bringing Xitsonga into the arena of Universal Grammar;
- To situate the analysis of these phonological processes in Xitsonga within the broader body of work on Bantu Phonology, thus contributing, in a small but significant way, to linguistic typology.

1.6. Justification for the Study

A significant part of the value of this study lies in the fact that Xitsonga itself has been somewhat neglected as a field of academic inquiry in recent years, with the most recent seminal studies on the language having been conducted in the 1980s (see Baumbach, 1987; Bill, 1984; Cuenod, 1982). Since then, only a handful of follow-up studies have been conducted (cf. Janson, 2001; Zerbian, 2007; Lee and Burheni, 2014; Vratsanos and Kadenge, 2017). Much of the recent research into Xitsonga has been conducted on its tonomorphology (Lee, 2015), vowel hiatus resolution (Vratsanos and Kadenge, 2017), phonetics (van Wyk, Odendaal and Nkatini, 1989), orthography (Janson, 2001), and idioms and literature (Bill, 1984). There has until now been no updated, thorough analysis of the phonological processes present in contemporary Xitsonga, nor has there been a comprehensive analysis of loanwords or minimality requirements in this language. Thus, this study fills a gap in research on Xitsonga, and Southern Bantu languages more generally, by presenting a comprehensive, updated account of the phonological processes in this language.

The study is also theoretically significant, as the analysis will be couched in OT. The use of OT not only modernises the approach taken, but also allows for a unified description of data that has otherwise been dealt with fragmentally or peripherally in other studies. OT also allows one to deftly account for the use of certain strategies over others by means of constraint interaction and constraint rankings. This research therefore attempts to contribute to the linguistic typology of Bantu languages, by presenting an updated, comprehensive account of the repair strategies of Xitsonga.

1.7. Structure of Dissertation

The rest of this dissertation is structured as follows:

CHAPTER 2 provides a literature review, which surveys descriptive and theoretical studies and situates the current research within a larger body of work.

CHAPTER 3 provides background information on Xitsonga, English and Afrikaans in an attempt to highlight the disparity between the phonologies of the three languages. It also discusses PWord minimality requirements, paying particular attention to the general trends of Bantu languages.

CHAPTER 4 details the methodology of the present research, including the sources of data, the data verification protocol, and the theoretical framework.

CHAPTER 5 presents loanword data and an analysis thereof. It details the repair strategies used by Xitsonga to maintain preferred CV syllable structures. A discussion of these repair strategies as compared to other Bantu languages is also included, to situate Xitsonga within its language family and contribute to linguistic typology.

CHAPTER 6 presents data from native phonology and an analysis thereof. It details the repair strategies used by Xitsonga to maintain PWord minimality requirements. This is followed by a discussion on how these repair strategies compare to those used by other Bantu languages, in order to situate Xitsonga within its language family and thus contribute to linguistic typology.

CHAPTER 7, the final chapter of the dissertation, provides concluding remarks and some suggestions for further studies.

Thereafter is a comprehensive reference list as well as a section of Appendices, containing the various data lists used in the analysis sections of this dissertation.

1.8. Empirical and Theoretical Contributions

The empirical value of this study lies in the fact that it is the first study to offer a comprehensive account of the repair strategies used by Xitsonga to rephonologise loanwords and ensure that its PWord minimality requirements are met. Previous studies have illustrated certain of Xitsonga's phonological repair strategies (Lee and Burheni, 2014; Lee, 2015), but none has done so exhaustively. In other words, this study provides a cohesive analysis of previously fragmented data. It greatly contributes to the body of work on Xitsonga phonology, by examining all of the repair strategies that function at syllable level to rephonologise English and Afrikaans loanwords, which has not been done before. This study also presents the first comprehensive, focused analysis of the PWord minimality requirements in Xitsonga, and the repair strategies that conspire to maintain them.

As also pointed out by Mudzingwa (2010), the simultaneous analysis of multiple repair strategies within a language illustrates the close link between the phonology and morphosyntax of Bantu languages. The minimality effects that are explored in this study also demonstrate the inextricable link between morphogy and phonology. Moreover, by linking the main analysis to those of similar phenomena in other Bantu languages, this study paints a picture of the general tendencies of these languages, thus contributing to Southern Bantu linguistic typology.

In addition, this study is theoretically valuable given that the analysis is couched within OT, thus allowing data to be formalised. Most previous work on Xitsonga does not involve the use of a sound theoretical framework, and is superficial and largely descriptive (see Baumbach, 1987; Cuenod 1982; and van Wyk, Odendaal and Nkatini 1989).

1.9. Summary of Chapter

This chapter, the first of the present dissertation, has presented important background information relevant to understanding the origins, objectives and value of this study. The use and origins of the term 'Bantu' have also been explained. The structure of the remainder of this dissertation has also been detailed. The following chapter presents a review of existing literature relevant to the current research.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

Studies of Bantu languages are particularly numerous. Much work has been published on the morphology, syntax and phonology of these languages. Nevertheless, there still remains a wealth of untapped knowledge. Odden (2015, p. 5), notes the particular contributions made in particular by studies in Bantu phonology in "testing grammatical theories" as they "constitute a naturally occurring controlled experiment that varies the building blocks of phonological systems". This study aims to contribute to this great body of work. This chapter presents a survey of pre-existing literature on Xitsonga, as well as on loanword adaptation, prosodic word minimality, and Bantu linguistics more generally. The aim of this is to llustrate where the current study is situated amongst other work on the same, or similar, subject.

2.2.Bantu Phonology

There have been many studies into various aspects of Bantu grammar, particularly over the course of the last century. Research in Bantu phonology has been especially active, with many diachronic studies into Proto-Bantu reconstruction (Meinhof, 1932; Guthrie, 1967; Meeussen, 1967) having been done. More synchronic studies include those with a more phonetic focus, particularly looking at the peculiar nature of nasal-consonant (NC) clusters, in which researchers debate the realisation of these as a single, complex segment versus as a cluster of two segments (Schadeberg, 2003;

Kula, 1999; Downing, 2005). Moreover, phonological studies into vowel harmony – a phenomenon common amongst Bantu languages – are numerous.

To name a few, Beckman (1997) looks at this phenomenon in chiShona and Odden (1996) does the same with Matuumbi, while Malambe (2015) examines this process in Siswati. Various aspects of tone, including tonomorphology, have also come under some scrutiny (Stevick, 1969), as this remains a particularly rich area within Bantu grammars. Relevant to the present study, however, are studies that look particularly at the CV syllable structure requirements of Bantu languages (Hyman and Katamba, 1999), often through an analysis of vowel hiatus resolution (Sibanda, 2009; Vratsanos and Kadenge, 2017; Harford, 1997; Kadenge and Simngo, 2014; Sibanda, 2009).

Additionally, OT has frequently been the framework within which studies into Bantu phonology have been couched, thus providing subsequent intrepid Bantu phonologists with a wealth of formalised, contemporary information. To name but a few: Mudzingwa and Kadenge (2011) use OT to compare vowel hiatus resolution strategies in Karanga and Nambya, and Simango and Kadenge (2014) do the same but looking at vowel hiatus resolution in Nsenga. Khan (2016) uses OT to examine loanword rephonologisation in isiZulu and Mwita (2009) does the same with Arabic loanwords in Kiswahili. Tzanakakis (2017) accounts for the differences between the ways in which vowel epenthesis functions in Setswana and isiZulu using OT constraint rankings. The application of OT to Bantu phonology allows for one to account for variation within this language family by means of cross-linguistically different constraint rankings (Archangeli, 1997; Kager, 1999), thus creating a body of work that – as a whole – contributes to linguistic typology.

2.3. General Xitsonga Grammatical Work

Unlike isiZulu and chiShona, Xitsonga grammar has largely been neglected, particularly in recent literature. There is minimal mention of it in the periphery of a few publications that examine Bantu languages as a general family. Such is the case in Odden's (2015) survey of Bantu phonology, where Xitsonga is briefly mentioned only to exemplify tone tripling as a process sometimes found in languages of this family. A similar phenomenon occurs once again in van der Spuy's (1990) brief comparison of Bantu phonologies, in which Xitsonga is mentioned in passing and no explicit examples from this language are given.

Despite the dearth of literature that deals solely with the phonology of Xitsonga, there is a small body of work on other aspects of the language. Xitsonga-related studies include the lexicographical implications of compiling Xitsonga dictionaries (Prinsloo and Schryver, 2001), as well as pedagogical studies pertaining to the use of Xitsonga in various school settings (Manyike and Lemmer, 2010). Several other pieces of work with a more sociolinguistic focus also exist, including studies of the Xitsonga oral tradition (Malungana, 1999), analyses of various Xitsonga songs (Chauke, 2004), and analyses of the representation of women in Xitsonga literature and proverbs (Machaba, 2011).

Descriptive studies on the rich morphology of this agglutinating language, its complex syntax, and tonomorphological system are, although not bountiful, in existence. Cole-Beuchat (1961) details the formation of the qualificative and the pronoun in Xitsonga, while van Wyk (1957) provides a morphological analysis of the

augmentative in Xitsonga. Van Wyk, Odendaal and Nkatini (1989) provide a basic comparison of the phonemic inventories and syllable structures of Xistonga and Afrikaans. Janson (2001) provides a detailed overview of the phonetic inventory of the language. The latter two articles proved useful for compiling the section on the background information of Xitsonga in the present study. Mayevu (1979) provides a brief overview of subjectival concord in Xitsonga, and Nkondo (1987) briefly compares the formation of adjectives in Xitsonga compared to Northern Sotho. Mabaso (2009) examines the functioning of Xitsonga verbs that denote possession (e.g. "give"), paying particular attention to the interplay between syntax and semantic roles.

Seunghun Lee can be considered a foremost contemporary scholar of Xitsonga, and his studies into Xitsonga morphosyntax (Lee, 2009, 2015) and, to a lesser extent, phonology (Lee and Burheni, 2014) constitute the most recent, up-to-date body of formalised work. Lee's (2009) work analyses how various morphosyntactic processes impact the tone of various segments in various words and phrases. In a more phonology-oriented study, Lee and Burheni (2014) examine labial dissimilation as it occurs in the formation of the diminutive – formed by the suffixation of /-ana/ to a noun stem. This investigation details the CV syllable structure of Xitsonga by examining one aspect of vowel hiatus resolution – labial dissimilation – but it is hardly comprehensive. This process involves velarisation of the nasal, once secondary articulation to solve vowel hiatus has occurred: /ʃi-gomo-ana/ 'small forehead' is realised as [ʃigo^{ŋ}wana] and not *[ʃigo^{m}wana]. In this study, this process of labial dissimilation is the main focus, and is merely the result of a particular instance of vowel hiatus resolution, which is not dealt with in much detail. In Lee (2015),

tonomorphology becomes the object of scrutiny, with particular attention paid to high-tone spreading and depressor consonants. The latter is one of only a few recent articles which couches the analysis in OT.

Most recently, Vratsanos and Kadenge (2017) presented an OT analysis of vowel hiatus resolution in Xitsonga. This study unifies fragmented data and piecemeal analyses to create a comprehensive formal analysis of the repair strategies employed to resolve sequences of heterosyllabic vowels. The study determined that Xitsonga makes use of four repair strategies in this regard: glide formation, secondary articulation, vowel coalescence and vowel elision (Vratsanos and Kadenge, 2017). The current study builds on this to look at additional repair strategies, this time with regard to loanword adaptation and prosodic word minimality requirements.

E. J. M. Baumbach is perhaps the most prolific scholar of Xitsonga. His *Analytical Tsonga-English Dictionary* (n.d.) and *Analytical Tsonga Grammar* (1987) have formed the basis of most, if not all, of the contemporary studies done on this language, and are to date the most comprehensive descriptive accounts of Xitsonga grammar. The *Tsonga-English Dictionary* takes the form of a traditional dictionary, listing Xistonga words and their English translations. However, Baumbach also includes concise but comprehensive notes on various aspects of Xitsonga phonetics, phonology, morphology and syntax. His *Analytical Tsonga Grammar* provides a more detailed account of Xitsonga grammar, however the examples are few in number and the book is merely descriptive.

Baumbach's *Introduction to the Speech Sounds and Speech Sound Changes in Tsonga* (1974) is short book which briefly outlines the phonological processes of several dialects of Xitsonga. Here, Baumbach lists several processes, including elision, vowel and consonant epenthesis, and secondary articulation, as they occur in the various dialects of Xitsonga. Much like his other work, this book, although useful, is nowhere near exhaustive nor has it been formalised using any one theoretical framework. In each case, Baumbach provides one or two examples to illustrate the process, and provides no explanation of the processes and how they work, nor does he account for why the processes occur. Using OT, the current study aims to present a more modernised, formalised and cohesive analysis of phonological processes in Xitsonga as spoken in South Africa.

In summary, phonological analyses of Xitsonga are few in number, and many are not couched within a theoretical framework that adequately accounts for the occurrence of the various processes in the language. In addition, many of these descriptive studies are over thirty years old, and so run the risk of being out of date. A couple of more recent studies have attempted to examine and account for various phonological processes, including tonomorphology (Lee, 2015) and vowel hiatus resolution (Vratsanos and Kadenge, 2017), but there is, as yet, no comprehensive study of repair strategies in Xitsonga that is accounted for by means of a sound theoretical framework (in this case, OT). Other aspects of Xitsonga have been studied more thoroughly by comparison, such as its orthography, literature and oral tradition, and there remains many more unexplored facets of this language. This study aims to present an account that significantly adds to the contemporary body of work on

Xitsonga, and paves the way for future studies. See Chapter 7 for a full list of recommendations for further study.

2.4. Loanword Rephonologisation

The strategies used to adapt loanwords to suit the phonology of the receiver language are a particularly rich area of phonological research. Studies into this phenomenon in languages across the world have been carried out, many of which make use of OT as an analytical tool (Chang, 2009; Kenstowicz, 2007; Adomako, 2008; Khan, 2016). Davis and Kang (2006) examine English loanwords in Korean, focusing on how English words ending in /s/ are adapted to suit the phonology of Korean. They note a difference in adaptation of /s/ alone, compared to when it forms part of a consonant cluster (Davis and Kang, 2006). Chang (2009) uses OT to analyse the rephonologisation of English loanwords in Burmese. He accounts for segment substitution, as well as discusses how obstruents in the coda position become laryngealised in Burmese (Chang, 2009). Moreover, he notes that consonant clusters are resolved by means of vowel epenthesis (the insertion of a vowel) or consonant deletion (Chang, 2009). Kenstowicz (2007) studied a corpus of English loanwords in Fijian, and conducted an OT analysis of how stress is determined, how voiced stops are adapted, and how consonant clusters are resolved.

Loanword adaptation offers particularly valuable insight into the repair strategies employed by languages to maintain preferred structures at the level of the syllable. Adomako (2008) uses OT to account for the strategies employed by Akan to reconcile the syllable structures of English loanwords with its strict CV syllable structure.

Akan, a Niger-Congo language spoken in parts of Ghana, primarily uses vowel epenthesis to repair consonant clusters and syllable codas, as in the following examples (Adomako, 2008, p. 26):

24. /spiːd/ → [s**u**.pi.d**i**] ‘speed’

25. /klɒk/ → [k**ʊ**.lɔ.k**ʊ**] ‘clock’

Adomako (2008) also notes that Akan differs from chiShona and Sesotho – two Bantu languages – as a result of differences in the constraint rankings of the three languages. The notion that inter-linguistic differences arise as a result of differing constraint rankings is important in the current research, which will also discuss how Xitsonga differs from other Bantu languages as a result of how the languages rank constraints.

Even in the relatively small realm of Bantu phonology, loanword studies – and indeed those that make use of OT – are plentiful. For example, Mwita (2009) looks at Arabic loanwords in Kiswahili, also accounting for the use of various strategies by means of OT constraint rankings. Kiswahili predominantly employs vowel epenthesis to maintain its preference for open syllables, but also makes use of consonant deletion and certain feature changes (Mwita, 2009). In some cases, consonant clusters are tolerated – Mwita notes that Kiswahili has had extensive contact with non-Bantu languages (namely English and Arabic), thus the absolute outlawing of undesirable structures has become more lax. Similarly, Rose and Demuth (2006) examine English and Afrikaans loanwords in Sesotho, focusing on vowel epenthesis. They found that phonological and phonetic features are important when considering loanword adaptation in Sesotho specifically, as well as in other languages more broadly.

Khumalo's (1984) work looks specifically at words from English and Afrikaans that have entered into the lexicon of isiZulu after undergoing segment substitution and epenthesis. This paper is, however, far from all-encompassing. In addition to being preliminary and merely descriptive, Khumalo employs no specific analytical framework when examining his data. Moreover, Khumalo's data is only presented orthographically, which does not allow for very accurate or illustrative representations of phonological processes. This piece of work, however brief, is nonetheless considered ground-breaking and paved the way for further studies. Khan (2016) picks up on Khumalo's (1984, 1987) (amongst others) research on English and Afrikaans loanwords into isiZulu, modernising and formalising the data by conducting an OT analysis thereof. Khan focuses on changes relating to segment substitution and those at the level of the syllable, noting four main strategies used to rephonologise loanwords: segment substitution, vowel epenthesis, glide epenthesis, and segment deletion (Khan, 2016). Her data also illustrates that words may be partially or fully rephonologised, indicating intra-linguistic differences as a result of, Khan argues, the reranking of OT constraints (Khan, 2016). Similarly, Khan (2016) also notes that the differences between the repair strategies used to rephonologise loanwords in isiZulu compared to in other Bantu languages is also a result of differences in constraint rankings. Compare, for example, the constraint rankings of isiZulu and isiNdebele, as presented by Khan (2016, p. 106):

- IsiZulu: *COMPLEX, NOCODA, *r, *ʊ, *ɪ >> MAX-IO >> *NC̥, DEP-IO, UNIQUE, IDENT-IO
- IsiNdebele: *COMPLEX, NOCODA, *NC̥, MAX-IO, *ʊ, *ɪ >> *r, DEP-IO, UNIQUE, IDENT-IO

Here, Kahn (2016) accounts for the differences between how loanwords are rephonologised in isiZulu compared to isiNdebele by means of two different, language-specific constraint rankings. In other words, as evidenced by Khan (2016) above, inter-linguistic differences are due to variations in constraint ranking (Archangeli, 1997; Kager, 1999). This notion is important in the present study, which will also attempt to contribute to linguistic typology of Bantu languages by comparing Xitsonga to closesly related Bantu languages.

Kadenge (2012) conducts an OT analysis of English loanwords used by chiShona monolinguals. He focuses on two types of epenthesis (or, the insertion of additional segments): vowel epenthesis and glide epenthesis. Kadenge (2012) notes how these strategies of epenthesis conspire to maintain the syllable requirements of the receptor language when adopting words from English, which has a vastly disparate syllable structure to that of chiShona. ChiShona has a strict CV syllable structure, thus vowel epenthesis is used to repair complex onsets and the presence of syllable codas, which are legal in English. Glide epenthesis, on the other hand, is employed to repair syllables with complex nuclei – that is, to eliminate the presence of diphthongs, which are used in English but violate the phonotactics of chiShona (Kadenge, 2012). OT provides a useful tool to illustrate how the choice of one strategy over another is determined by constraints, and occurs in an effort to satisfy the highest-ranking constraints.

Kadenge and Mudzingwa (2012) also examine loanwords in chiShona using OT, but this time looking specifically at the differences between monolinguals and bilinguals. They noted intra-linguistic differences in the phonologies of the two groups of

speakers, with monolinguals faithfully preserving the phonological rules of chiShona, while bilinguals often retain some aspects of the phonology of the original English loanword (Kadenge and Mudzingwa, 2012). For example, monolinguals simplify complex onsets, while bilinguals often retain them (Kadenge and Mudzingwa, 2012):

26. English: /prəʊtiːn/

Monolingual: [p**ù**rótén**i**]

Bilingual: [próténì]

27. English: /ɑprə/

Monolingual: [òp**é**rà]

Bilingual: [òprà]

28. English: /drʌm/

Monolingual: [d**ì**rám**ù**]

Bilingual: [drám**ù**]

These intra-linguistic differences can also be accounted for by means of different constraint rankings, and are illustrative of the interesting effects language contact has on phonology.

The aforementioned OT studies of loanword adaptations in Bantu languages are particularly helpful in that they provide hints as to how to go about conducting successful studies in this area, as well as providing information regarding which strategies are to be expected of Bantu languages. This will allow me to determine how closely related Xitsonga is to its genetically related languages, thus contributing to Bantu language typology.

Most glaring, however, is the dearth of analyses of Xitsonga loanwords. To my knowledge, there is no comprehensive analysis of Xitsonga loanwords from English and Afrikaans, with only a few instances being noted peripherally in previous studies. At the present time, the closest piece of work on Xitsonga loanwords is a list of extracts from the Tsonga Language Committee, which appears as an appendix in Cuenod's 1982 *Tsonga-English Dictionary*. This study aims to fill this gap by presenting the first OT analysis of loanwords in Xitsonga, in an effort to identify some of the phonological processes employed to maintain preferred syllable structures in the language.

2.5. Prosodic Word Minimality

Many languages have requirements regarding the minimum size of a Prosodic Word (McCarthy and Prince, 1994). The present study also details the minimality requirements of Xitsonga – another area of research on this language that is somewhat lacking. This is done in an effort to determine further repair strategies used by Xitsonga to maintain preferred structures. Several studies on word minimality requirements, of Bantu languages included, have been conducted: Topintzi (2005), for example, looks at the peculiar word minimality requirements of Bella Coola (a Salishan language). Martínez-Gil (2010) looks at the diachronic emergence of word minimality requirements in Hispano-Romance languages, positing that the bimoraic foot is the minimum requirement in languages of this type.

Studies into the word minimality requirements of Bantu languages show that these languages tend to prefer minimally disyllabic words (Park, 1997; Downing and

Kadenge, 2015). Park (1997) looks at the disyllabic requirements of Swahili, a Bantu language, which employs reduplication in verbs and nouns, and cliticisation in verbs in order to augment words to have a minimum of two syllables. When verbs are reduplicated, monosyllabic stems are resuplicated along with an epenthetic *ku*, indicating that a disyllabic minimality requirement is at play:

29. inuka → inuka-inuka 'rise up'[1]

30. ku-ja → ku-ja-kuja 'come'

Cliticisation of the emphatic copula *ndi-* occurs to make words minimally disyllabic:

31. ndi-mi 'it is I'

32. ndi-ye 'it is he/she'

Park (1997) accounts for this by means of OT.

Downing and Kadenge (2015) illustrate how chiZezuru, a dialect of chiShona, requires words to be minimally disyllabic, achieving this by means of augmentation. This process of augmentation occurs in both nouns and verbs and involves the epenthesis of [i] to add an additional syllable to monosyllabic words. Monosyllabic verbs, for example when forming the imperative, must be augmented by means of this [i] so as to be minimally disyllabic (Downing and Kadenge, 2015):

33. –pá → **i**-pá 'give IMP'

[1] Words are presented orthographically, as in the original study.

34. –dyá → i-dyá ‘eat IMP’

The same occurs with monosyllabic nouns that have a null class prefix (Downing and Kadenge, 2015):

35. go → **i**-go ‘wasp’

36. mbwa → **i**-mbwa ‘dog’

This discussion serves to illustrate how the Prosodic Stem might fit into the Prosodic Hierarchy as a unit distinct from the Prosodic Word level. They argue that the Prosodic Stem level is dominated by the Prosodic Word (Downing and Kadenge, 2015). This claim is further explored by Downing (2016), but this time using evidence from Chichewa, a Bantu language spoken in Malawi. Similarly to chiZezuru, monosyllabic verbs are augmented by means of lengthened [i] in the imperative:

37. ii-ba ‘steal IMP’

38. ii-dya ‘eat IMP’

Downing (2016) argues that Chichewa presents two problems for the Prosodic Hierarchy: there is a distinction between word and stem level phonology, which cannot be accounted for without accounting for the “interface between the phonological and morphological components of the grammar” (p. 36); secondly, the phonological phrase does not feature in Chichewa grammar.

IKalanga, a dialect of chiShona spoken mainly in Zimbabwe and Botswana, differs greatly from chiZezuru in terms of minimality requirements, having different

requirements for different word categories (Kadenge and Mathangwane, 2017). It therefore presents a "paradoxical" case. Imperative verbs must be minimally disyllabic, and so monosyllabic words in these cases are augmented, much like in chiZezuru, by means of an epenthetic vowel [i] (Kadenge and Mathangwane, 2017):

39. ijá 'eat IMP'

40. idwa 'go out IMP'

41. idá 'love IMP' cf. chiZezuru: **i**dă

Pronouns in iKalanga are augmented using a stabilizing (STAB) vowel (Kadenge and Mathangwane, 2017):

42. i-mí 'I'

STAB-I

43. i-wé 'you'

STAB-you

On the other hand, unlike chiZezuru but similar to chiKaranga, iKalanga nouns and adjectives can be monosyllabic, and so no augmentation is required (Kadenge and Mathangwane, 2017):

44. iKalanga: go 'wasp' cf. chiZezuru: [**i**go] 'wasp' chiKaranga: [go] 'wasp'

45. iKalanga: psá 'new' cf. chiZezuru: [**i**tʂá] 'new' chiKaranga: [tʂá] 'new'

Kadenge and Mathangwane (2017) account for this inter-linguistic variation using the co-phonologies theory. That is, the differences between these three dialects arise out of differences in constraint ranking determined by the type of word or morpheme in question.

Mkochi (2017) argues, using Malawian Tonga, that analyses of prosodic stems in this language need to occur at the level of the syllable. Malawian Tonga illustrates generational discrepancies with regards to the use of the [i] augment before monomoraic verb stems (Mkochi, 2017). Elderly people tend not to use this augment, instead ensuring that the stem is bimoraic (but monosyllabic) (Mkochi, 2017):

46. –swa	**ii**-swa 'break IMP'	cf. elderly people's speech: swaa
47. –lja	**ii**-lja 'eat IMP'	cf. elderly people's speech: ljaa

Thus, the minimality requirement of Malawian Tonga is that words are minimally disyllabic, and that monosyllabic stems are sub-minimal, but attain bimoraicity through phonological phrasing (Mkochi, 2017). This analysis is empirical, couched in OT, and this interesting phenomenon is accounted for by means of constraint interaction.

Downing (2005) takes a more theoretical approach to prosodic minimality. She criticises the Prosodic Hierarchy-based approach to minimality requirements, claiming that it is inadequate to properly assess certain languages, particularly Bantu languages (Downing, 2005). Downing acknowledges that certain languages require lexical words to be minimally a particular size, but – she argues – this is not

phonologically bound, as previously thought. The Prosodic Word hierarchy assumes that each word contains at least one stress Foot, which is made up of either two syllables or two morae (Downing, 2005). However, this works on the assumption that stress is assigned to every PWord, when many Bantu languages that have minimality requirements do not have stress patterns. She points out that minimality is frequently fulfilled morphologically, as opposed to phonologically (Downing, 2005). Downing (2005) uses a wide variety of Bantu languages to demonstrate her point, showing that there are several strategies in place to fulfil the CANONICAL STEM constraint by augmenting stems to be minimally disyllabic. These strategies include:

- Phonological epenthesis, as in isiZulu, in which a segment that is phonologically and semantically void is epenthesised;
    - **a.** –dla → yi-dla 'eat IMP'
    - **b.** –pha → yi-pha 'give IMP'
- Morphological epenthesis, as in siSwati, in which a phonologically-viable morpheme is epenthesised. This morpheme is a type of 'dummy' morpheme (Downing, 2005);
    - **c.** pha → pha-ni 'give IMP'
- And the addition of a morphological alternative, which involves the use of an alternate morphological derivation that functions similarly to that used by polysyllabic stems. For example, English comparative and superlative forms can either be formed by means of suffixing on *–er*/*-est* respectively, or by means of *more/most*.

Downing (2005) goes on to show that these strategies can be accounted for by means of OT constraint rankings.

Xitsonga minimality requirements have not yet been explicitly examined. Du Plessis (2014) offers a descriptive account of the formation of various moods and tenses in Xitsonga, focusing predominantly on the dependent mood. Differences in the formation of the imperative mood between monosyllabic and disyllabic words are mentioned briefly, but the underlying rules are not expounded upon. This study is useful as it provides a starting point which states that there are some minimality requirements at play in Xitsonga. Thus, the present study examines how these parameters function in the language, in order to fill the aforementioned gap.

2.6.Summary of Chapter

This chapter presented a review of existing literature, examining theoretical and descriptive studies relevant to Bantu languages more generally, as well as to analyses of loanword rephonologisation and Pword minimality. The following chapter presents background information to the languages discussed in this study: Xitsonga, English and Afrikaans. It details the history and status, consonant and vowel inventories, morphosyntax (where relevant) and syllable structure of each of the three languages.

CHAPTER 3: BACKGROUND TO LANGUAGES

3.1. Introduction

A main aim of this research is to illustrate the repair strategies used to reconcile the disparate phonologies of two languages when borrowing occurs between them. Thus, an overview of the various aspects of the three languages in question – Xitsonga, English and Afrikaans – is imperative for understanding why these repair strategies are necessary in the first place. This chapter provides relevant background information about Xitsonga and the two languages from which it has borrowed extensively: English and Afrikaans. It details the history and status, phonemic inventories, and syllable structure requirements of the languages in question. Moreover, this chapter provides more detail on PWord Minimality, paying particular attention to the typical PWord requirements in Bantu languages.

3.2. Xitsonga

3.2.1. History and Status

Xitsonga[2] is a Southern Bantu language spoken in parts of South Africa, Swaziland, Mozambique and Zimbabwe (Lee and Burheni, 2014). Xitsonga, or Shangani as it is also called, is one of sixteen official languages in Zimbabwe and one of eleven official languages in South Africa, mainly spoken in the north-eastern parts of the Limpopo province (Lee and Burheni, 2014). Despite its official status, Xitsonga is spoken as a first language by a relatively small portion of the population – only about

[2] The language has also been called Thonga/Tonga, Shangaan, Shangani and Gwamba, among others (Baumbach, 1987).

4.5%– compared to isiZulu (22.7%) and Afrikaans (13.5%) (Statistics South Africa, 2012), for example.

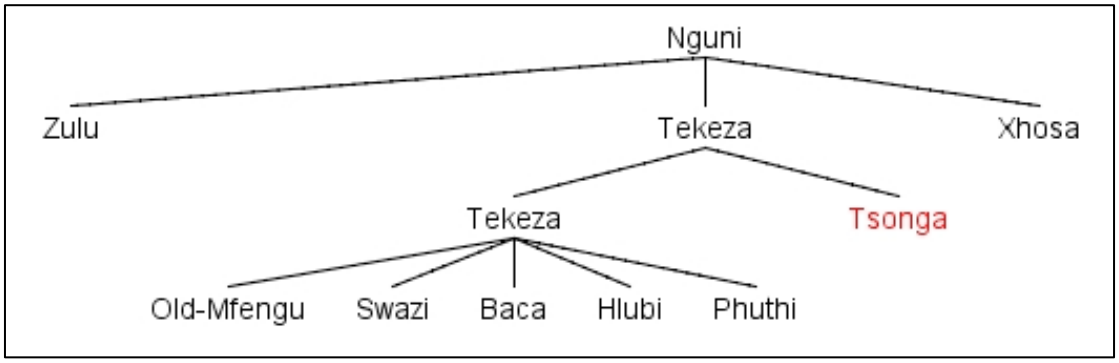

Figure 1: Proposed Nguni Classification of Xitsonga (Baumbach, 1987)

Because of the various synchronic similarities between Xitsonga and the Nguni family of Bantu languages, E.J.M. Baumbach (1987) claims that it should be classified under this family. However, Xitsonga's classification is widely disputed in this regard, and remains officially classified under its own branch, Tswa-Ronga (Nurse and Philippson, 2003). This is illustrated in Figure 2 below:

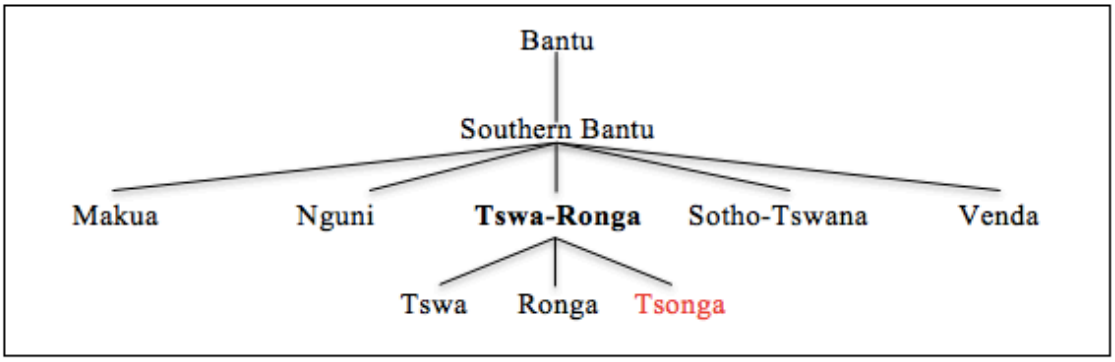

Figure 2: Tsonga Classification (adapted from Nurse and Philippson, 2003)

According to Guthrie's classification system, Xitsonga is classified S50 (Zerbian, 2007). Thus, Xitsonga is less closely related to other Bantu languages such as Sesotho and isiZulu, S30 and S40 respectively, despite geographical proximity (Zerbian, 2007). The vowels of Xitsonga are presented in the following section.

3.2.2. Vowels

As with many other Bantu languages (Baumbach, 1974; Janson, 2001; Kadenge, 2015; Mudzingwa and Kadenge, 2014; van Wyk, Odendaal, and Nkatini, 1989), Xitsonga adheres to a simple vowel system containing five monophthongs: /a e i o u/. This vowel system is common in Southern Bantu languages: Nguni languages (Khumalo, 1984; Sibanda, 2009), chiShona (Kadenge, 2009), and iKalanga (Kadenge & Mathangwane, 2017).

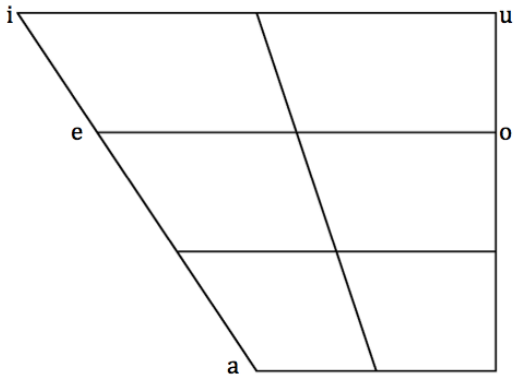

Figure 3: Xitsonga Vowels

The following table presents the vowels of Xitsonga in more detail, and provides examples of words in which the various vowels[3] appear.

Table 1: Xitsonga Vowels (Cuenod, 1982)

Vowel	Example	Gloss
a	/áka/	'to build'
e	/dèda/	'to give way'
i	/ínà/	'yes'
o	/òlèlà/	'to collect'
u	/úma/	'to threaten'

The following section presents the consonants of Xitsonga.

[3] Tone is marked in all examples where it appears in the original source of data. This holds for the entirety of this thesis.

3.2.3. Consonants

Xitsonga has a very large consonant inventory and, to complicate already complex matters, there is much debate surrounding the classification of sounds as phonemes versus allophones. Janson (2001) identifies over 125 consonants, both simple and complex[4], present in Xitsonga and classifies these all as phonemes. He provides no minimal pairs to support his classification of phonemes, rather stating that the richness and complexity of Xitsonga's consonantal system are alone enough to warrant treating each consonant and consonant variation (i.e. labialised, prenasalised or palatalised variations) as individual segments. Nevertheless, in the interests of simplicity and in keeping with linguistic norms, Table 1 below presents only the simple phonemes of Xitsonga**:**

Table 2: Consonants of Xitsonga

	Bilabial	**Labiodental**	**Alveolar**	**Postalveolar**	**Retroflex**	**Palatal**	**Velar**	**Glottal**
Plosive	p b		t d				k g	
Nasal	m		n			ɲ	ŋ	
Trill			r					
Fricative	ß	f v	s z	ʃ ʒ	ʂ ʐ			h
Lateral Fricative			ɬ ɮ					
Approximant			ɹ			j		
Lateral Approx.			l					

(Adapted from Baumbach, 1987; Cuenod, 1982; Janson, 2001; van Wyk, Odendaal, and Nkatini, 1989)

[4] Prenasalised consonants, for example.

Xitsonga also contains six affricates /tʃ dʒ ts dz pʂ bʐ/ and makes use of the labial-velar approximant /w/.

As stated above, the complexity of Xitsonga lies in the intricacies associated with the large number of possible sound variations that can occur. All voiceless stops and fricatives have aspirated counterparts, and prenasalisation can occur with most stops, affricates and fricatives. The aspiration of fricatives in Xitsonga is marked, such that an acoustic analysis of this feature could provide useful insights into the nature and character of aspiration in general. Moreover, all sounds that are [-labial] can be labialised, and all non-palatal sounds can be palatalised. Each phoneme presented in Table 1 can be altered according to any viable combination of the aforementioned variations. Thus, the sheer range of consonants available to a Xitsonga speaker, regardless of whether they function as phonemes or allophonic variations, is certainly very wide. Moreover, the status of the various consonants in Xitsonga as phonemic or not is irrelevant to the present study, and remains available for future research.

It is interesting to note that Xitsonga only contains one click sound. This is the alveolar click /!/, which may be realised as either voiced [ᵍ!] or nasalized [ᵑ!]. This sound made its way into Xitsonga from isiZulu, and is only found in loanwords: for example, *qìvì* /!ivi/ ‘swamp’.

Moreover, tone is contrastive in Xitsonga (van Wyk, Odendaal, and Nkatini, 1989), which can be illustrated by means of a minimal pair: *mbílá* ‘dough’ and *mbílà* ‘dassie’ (Cuenod, 1982). Xitsonga has a rich and interesting tonomorphological system that

has formed the basis of previous studies (see Lee, 2009). The following section presents important information regarding the syllable structure of Xitsonga.

3.2.4. Syllable Structure

Like many other Bantu languages, Xitsonga adheres to a strict CV syllable structure (van Wyk, Odendaal, and Nkatini, 1989; Vratsanos and Kadenge, 2017). The prerequisites for this type of syllable structure are as follows: first, the onset of a syllable can be a complex consonant, but cannot be a consonant cluster (i.e. no complex onsets are allowed). For example [ɲa.^{ŋ}g^{w}a] (‘entrance’) is viable, because [^{ŋ}g^{w}] is a complex consonant and not a complex onset. However, an English word such as ‘store’ /stɔ(r)/ is not viable in Xitsonga because the consonant cluster /st/ constitutes a complex onset. Secondly, it is vital to note that all syllables must be open, that is that there is no allowance made for codas in languages of the CV type. An illustrative example of this is [ri.va.^{m}bu] ‘rib’, the syllabification of which could not be *[ri.vam.bu] or *[riv.am.bu] as the presence of closed syllables is strictly prohibited in Xitsonga.

However, a sequence of a consonant and a vowel (CV) is not the only viable syllable structure in Xitsonga. Onsetless syllables (V) are allowed and are predominantly found word-initially (van Wyk, Odendaal, and Nkatini, 1989), for example, in the English loanword [í.^{ŋ}kí] ‘ink’. Only syllables of the form CV (a sequence of a single consonant segment followed by a vowel and no coda) and V (only a vowel, with neither onset nor coda) are allowed in the language, indicating that Xitsonga is a Type 2 language according to Clements and Keyser’s (1983) classification of syllable typology.

Finally, Xitsonga disprefers NC clusters (van Wyk, Odendaal, and Nkatini, 1989). To return to a previous example, an input form /rivambu/ ‘rib’ would have to be [ri.va.^{m}bu] in the output, as opposed to a form that keeps the nasal as a standalone segment: *[ri.va.mbu].

The syllable structure parameters of Xitsonga are unremarkable for languages of its kind. This holds true for many Bantu languages, including isiZulu (Khan, 2016), ciNsenga and chiShona (Kadenge and Simango, 2014), Kiswahili (Mwita, 2009), isiNdebele (Mahlangu, 2007) and other languages classified in Guthrie’s S group (Gowlett, 2003).

3.2.5. Some Aspects of Xitsonga Morphosyntax

Information regarding morphosyntax is a vital inclusion in any study on Bantu languages as it is inextricably linked with their phonology (Myers, 1987; Mudzingwa, 2001). As a Bantu language, Xitsonga is unremarkably an agglutinative language and so has an incredibly rich morphological system. The language makes use of an intricate system of affixation to structure words. Firstly, class prefixes need to be affixed to nouns, verbs and other stems in contexts where the class of a particular argument must be made evident. The noun class prefixes of Xitsonga, along with their various allomorphs, are detailed orthographically in the table below:

Table 3: Noun Class Prefixes of Xitsonga

Class		**Allomorphs**	**Class**		**Allomorphs**
1	*mu-*	*m-, n-, n'w-, n'-, zero*	**2**	*va-*	*v-, van-*
1a	*mu-*	*ma-, nya-, na-, n'wa-, zero*	**2a**	*vá-*	*vá- plus all 1a allomorphs*
3	*mu-*	*m-, n-, n'w-, n'-, zero*	**4**	*mi-*	*mim-, min-, min'w-, min'*
5	*ri-*	*t-, dy-, dz-, zero*	**6**	*ma-*	*ma- plus all 5 allomorphs*
5a	*dyi-*		**6a**	*madyi-*	
7	*xi-*	*x-, c-*	**8**	*swi-*	*sw-*
9	*ny-*	*n-, m-, n'-, yin-, zero*	**10**	*tiny-*	*tin-, tim-, tin'-, tiyin-*
11	*ri-*		**10**	*tim-*	*tin-*
14	*vu-*	*by-, v-*	**6**	*ma-*	*maby-, mav-*
15	*ku-*	*kw-, k-*			
16	*ha-*	*h-*			
17	*ku-*				
18	*mu-*	*n-*			

(Vratsanos and Kadenge, 2017; adapted from Baumbach, 1987; and Cuenod, 1982)

It is also interesting to note that, unlike in Nguni languages, Xitsonga does not make use of augments (pre-prefixes) (Vratsanos and Kadenge, 2017). In addition, concord markers in the form of prefixes and infixes are used in Xitsonga. The following table illustrates these markers in their orthographic forms:

Table 4: Concord Markers of Xitsonga

	Subject	**Object**	**Possessive**	**Adjective**
1 pers sg	*ndzi-/ndza*	*-ndzi-*		
1 pers pl	*hi-/ha-*	*-hi-*		
2 pers sg	*u-/wa-*	*-ku-*		
2 pers pl	*mi-/ma-*	*-mi-*		
Cl 1 and 1a	*u-/wa-*	*-n'wi-*	*wa-*	*lon-/n-*
Cl 2 and 2a	*va-*	*-va-*	*va-*	*Lava-/va*
Cl 3	*wu-/wa-*	*-wu-*	*wa-*	*lowu-/wu-*
Cl 4	*yi-/ya-*	*-yi-*	*ya-*	*leyi-/yi-*
Cl 5	*ri-/ra-*	*-ri-*	*ra-*	*leri-/ri-*
Cl 5a	*dyi-/dya-*	*-dyi-*	*dya-*	*ledyi-/dyi*
Cl 6 and 6a	*ya-*	*-ya-*	*ya-*	*lama-/ma-*
Cl 7	*xi-/xa-*	*-xi-*	*xa-*	*lexi-/xi-*
Cl 8	*swi-/swa-*	*-swi-*	*swa-*	*leswi-/swi-*
Cl 9	*yi-/ya-*	*-yi-*	*ya-*	*leyi-/yi-*
Cl 10	*ti-/ta-*	*-ti-*	*ta-*	*leti-/ti-*
Cl 11	*ri-/ra-*	*-ri-*	*ra-*	*leri-/ri-*
Cl 14	*byi-/bya-*	*-byi-*	*bya-*	*lebyi-/byi-*
Cl 15	*swi-/swa-*	*-swi-*	*kwa-*	*loku-/ku-*

(Vratsanos and Kadenge, 2017; adapted from Baumbach, 1987)

Many morphosyntactic processes, most notably affixation, create contexts in which phonological processes occur. For example, affixation may result in a vowel hiatus context, which is dispreferred in Xitsonga:

48. /ma-ino/ CL6-'tooth' → [meno] 'teeth'

49. /ʃi-mbuti-ana/ CL7-'goat'-Dim → [ʃi^{m}butana] 'small goat'

In (48) the Class 6 prefix, when added to the beginning of a noun stem that begins with a vowel /i/, results in a VV sequence that is resolved by vowel hiatus in the output as it results in a CVCV structure (Vratsanos and Kadenge, 2017). In (49), the addition of the diminutive suffix /–ana/ following an open syllable, results in the same problem, but is resolved via elision of the first vowel (V_1), once again creating a word that adheres to the CV syllable structure requirements (Vratsanos and Kadenge, 2017). Thus, a discussion of morphosyntax is vital in studies of Bantu phonology. The following section provides background information on Bantu languages more generally.

3.3. Background to Bantu Languages

This section presents the necessary background information on Bantu languages more broadly, paying specific attention to syllable structure and PWord minimality.

3.3.1. Bantu Syllable Structure

As already mentioned above, most Bantu languages adhere to a CV syllable structure (Khumalo, 1987). This is clearly illustrated when considering loanwords from isiZulu, a relatively widely-studied Bantu language, which forms the basis of Khumalo's descriptive study (1987). Take the following loanwords, for instance:

50. /dɪnə/ → [idina] 'dinner'

51. /kɒfi/ → [ikofi] ‘coffee’

Here, there is no change to the English word, besides sound substitution and the addition of the noun class prefix *i-*, as the English words already adhere to the phonological rules of isiZulu. Much like Xitsonga, isiZulu syllables must be in the form CV.

52. /kæt/ ‘cat’ → [ikat**i**] ‘cat’

53. /væn/ → [iven**i**] ‘van’

54. /vɔl/ ‘wool’ → [uvol**o**] ‘wool’

In (52), however, the English word *cat* contains a syllable coda, which is outlawed in isiZulu again because of the strict CV syllable regulations. Thus, in order to eliminate this coda, a vowel [i] has been epenthesised word-finally. This is the same process occurring in (53) and (54).

55. /flæg/ ‘flag’ → [if**u**leg**i**] ‘flag’

56. /stul/ ‘chair’ → [is**i**tul**o**] ‘chair’

Example (55) contains a complex onset /fl/ in the English input, which is dispreferred in isiZulu. Once again, vowel epenthesis occurs in order to repair this. The word-final coda of the English word *flag* is also repaired using the same strategy. In (56), vowel epenthesis occurs once again to resolve the cluster /st/ and the coda.

The syllable structure of Xitsonga is fairly expected of a Southern Bantu language. Although isiZulu has been used here to exemplify this, there are many other Bantu languages that adhere to the same rules: chiShona (Kadenge, 2012), isiNdebele (Mahlangu, 2007) and most Nguni languages (Sibanda, 2009), including isiZulu (Khan, 2016; Khumalo, 1987), to name a few. The following section looks at PWord minimality in Bantu languages.

3.3.2. Bantu Word Minimality

Prosodic word (PWord) minimality refers to the minimum number of syllables required by a language to form an acceptable word. It is common for Bantu languages to prefer minimally disyllabic words (Downing and Kadenge, 2015). Take for example the case of chiZezuru, a dialect of chiShona, in which monosyllabic roots are augmented by means of an epenthetic vowel:

57. In the imperative, monosyllabic verb roots are augmented with [i]:

/ɓ-á/ 'steal' → [i.ɓá]

/p-á/ 'give' → [i.pá]

58. Monosyllabic nouns are also augmented with [i]:

/go/ 'Cl5-wasp' → [i.go]

^{m}ba 'Cl 9-house' → [imba]

Language, however, is rarely so one-dimensional. In contrast to chiZezuru, iKalanga – another dialect of chiShona – has a slightly more complex system of word minimality requirements, in which the type of word determines the minimum number

of syllables required (Kadenge and Mathangwane, 2017). Imperative verbs and pronouns need to be minimally disyllabic:

59. Imperative: já → i.já ‘eat’

In (59), an epenthetic vowel [i] is used to augment the monosyllabic verb root to become disyllabic (Kadenge and Mathangwane, 2017).

60. Pronoun: i-mí ‘I’ STAB-I

Here, the pronoun is made minimally disyllabic by means of a stabilising vowel (Kadenge and Mathangwane, 2017).

IKalanga does, however, allow for monosyllabic nouns and adjectives (Kadenge and Mathangwane, 2017):

61. [go] ‘wasp’ (compare to the chiZezuru equivalent in (19) above)

62. [bí] ‘ugly’

Thus, despite the existence of minimality requirements in iKalanga, the language does not enforce these rules in all domains. Rather the type of word determines which minimality requirements, if any, apply. No work, as yet, has been done on Xitsonga word minimality requirements – thus this is one gap that this study seeks to fill.

3.4. English

A brief discussion of the background of English – from which Xitsonga has borrowed extensively – is relevant to the discussion of how words from this language are rephonologised to suit the CV syllable structure requirements of Xitsonga. This section provides background information on English, highlighting the disparity between it and Xitsonga.

3.4.1. History and Status

First used in England in the early medieval era, English is an Indo-European language in the Western Germanic sub-family (Crystal, 2003a). Due to an exhaustive history of invasion and colonisation by the British, the English language itself consists of a vast number of loanwords from Latin, Greek and French, with various other additions from the indigenous languages of places such as Australasia, South America, and Polynesia. English is spoken as a mother tongue by approximately 400 million people, and is an official language in over 60 countries (Crystal 2003b), including South Africa, where it is – along with Xitsonga – one of eleven. Despite the relatively small number of native speakers of English, it is the most common lingua franca in the world.

English initially came to South Africa in 1795 with the first British occupation, dethroning Dutch as the only Germanic language present at the time (Lass, 2002). English was declared the official language of the Cape in 1822, after the arrival of the first batch of permanent British settlers in 1820 (Lass, 2002). Following several more influxes of British settlers into the Cape and other parts of South Africa (notably

Natal from 1848 onwards), English became increasingly more prominent. Today, it is spoken as a first language by approximately 9.6% of the population of South Africa (Statistics South Africa, 2012), and is the *de facto* lingua franca as well. South African English (often shortened to SAfE) is what is termed an extraterritorial English, as it is spoken outside of England. More specifically, it falls under the category Southern Hemisphere Extraterritorial Englishes (Lass, 2002). As is the case with all dialects, the South African dialect of English has many features that differentiate it from other English dialects, including a slightly raised /æ/ vowel, and what is termed the KIT-PIN split[5] (Lass, 2002). A full account of the nuances of South African English is beyond the scope of this study, and all Englih words are transcribed broadly. The following section presents English vowels.

3.4.2. Vowels

The inventory of South African English vowels is significantly larger than that of Xitsonga. English makes use of 20 vowels: twelve phonemic monophthongs /i u ɪ ʊ e ə ɜ ʌ ɔ æ ɑ ɒ/ and eight phonemic diphthongs /eɪ aɪ ɔɪ aʊ əʊ ɪə ea ʊə/ (Niesler et al., 2005).

[5] This involves an allophonic variation with regards to the pronunciation of the /ɪ/ vowel, which is realised higher and fronter word-initially, in the context of a velar, and before /ʃ/ (Lass, 2002). It has a more centralised realisation elsewhere (Lass, 2002).

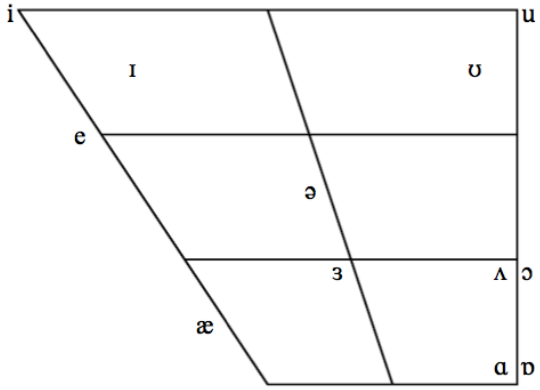

Figure 4: English Monophthongs

The following table provides word examples to illustrate the English monophthongs listed above.

Table 5: English Monophthongs

Vowel	Example
i	*see* /si/
u	too /tu/
ɪ	*sit* /sɪt/
ʊ	*look* /lʊk/
e	*let* /let/
ə	*a* /ə/
ɜ	*learn* /lɜ(r)n/
ʌ	*up* /ʌp/
ɔ	*or* /ɔ(r)/
æ	*at* /æt/
ɑ	*calm* /kɑm/
ɒ	*on* /ɒn/

The table below presents English diphthongs, along with illustrative word examples.

Table 6: English Diphthongs

Diphthong	Example
eɪ	*way* /weɪ/
aɪ	*why* /waɪ/
ɔɪ	*boy* /bɔɪ/
aʊ	*how* /haʊ/
əʊ	*show* /ʃəʊ/
ɪə	*ear* /ɪə(r)/
ea	*hair* /hea/
ʊə	*poor* /pʊə(r)/

The following section presents information on English consonants.

3.4.3. Consonants

The phonemic consonants of English are presented in the following table:

Table 7: Phonemic Consonants of English

	Bilabial	**Labio-dental**	**Dental**	**Alveolar**	**Post-alveolar**	**Palatal**	**Velar**	**Glottal**
Plosive	p b			t d			k g	
Nasal	m			n			ŋ	
Fricative		f v	θ ð	s z	ʃ ʒ			h
Approximant				ɹ		j		
Lateral Approximant				l				

In addition to the consonants in the above table, English also uses the voiced labial-velar approximant /w/, and the voiceless and voiced postalveolar affricates /tʃ dʒ/. The following section describes the syllable structure of English.

3.4.4. Syllable Structure

Following Clements and Keyser's (1983) classification of the core syllable types of languages, English is Type 4, allowing syllables in the following forms:

- CV, as in the word *to* /tu/
- V, as in the word *a* /ə/
- CVC, as in the word *but* /bʌt/
- VC, as in the word *in* /ɪn/

Moreover, English – unlike Xitsonga – permits complex onsets and codas, allowing a maximum of three consonant segments in an onset and four in a coda, as in the monosyllabic word /strɛŋgθs/ 'strengths'. English also contains diphthongs, thus by extension allowing syllables with a VV nucleus. The following section presents background information on Afrikaans.

3.5. Afrikaans

Xitsonga has also borrowed extensively from Afrikaans. Like English, Afrikaans has a very different phonology to Xitsonga. This section expounds upon this in order to highlight the disparity.

3.5.1. History and Status

Afrikaans is an Indo-European Germanic language, which originated in the Cape in the seventeenth century. Hesseling (1923) argued that Afrikaans came about as a result of pidginisation and creolisation: settlers who spoke a colloquial form of Dutch came into contact with not only the Bantu languages of the region, but also speakers of Khoisan languages, English, French, Malay, Portuguese, and the Malayo-Portuguese creole (den Besten, 1986). Although classified as Indo-European, and very closely related to Dutch, Afrikaans and Dutch differ somewhat, presumably as a result of the influence of other languages on Afrikaans.

Originally termed Cape Dutch, Afrikaans developed a reputation after it was declared the official language of the Union of South Africa in 1925. Its imposition by the Apartheid government and the establishment of "Afrikaner identity" promoted its use. Today, Afrikaans is widely spoken as both a first and second language in Southern Africa, and is one of the eleven official languages of South Africa. It is spoken as a first language by 13.5% of the population, mainly in the Western and Northern Capes (Statistics South Africa, 2012). Despite having its roots in European languages and identity, Afrikaans is also the first language of many coloured South Africans, particularly from the Western Cape (Statistics South Africa, 2012). The following section deals with the vowels of Afrikaans.

3.5.2. Vowels

Like English, Afrikaans has a larger vowel inventory than Xitsonga. It makes use of 18 monophthongs /a aː œː ɛ ɛː eː ə ɪ i iː oː øː ɔ ɔː u uː y yː/ and five diphthongs /əi əu œy aːi oːi/ (Mahlangu, 2007; van Wyk, Odendaal and Nkatini, 2007).

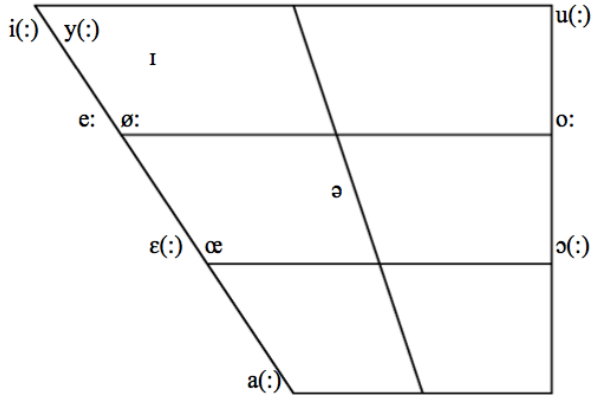

Figure 5: Afrikaans Monophthongs

The following table illustrates the monophthongs of Afrikaans by means of examples.

Table 8: Afrikaans Monophthongs (adapted from Khan, 2016; Mahlangu, 2007)

Monophthong	Example	Gloss
a	*pad* [pat]	'road'
aː	*plaas* [plaːs]	'farm'
œː	*stoep* [stœːp]	'veranda'
ɛ	*met* [mɛt]	'with'
ɛː	*sé* [sɛː]	'say'
eː	*spreek* [spreːk]	'speak'
ə	*niks* [nəks]	'nothing'
ɪ	*dit* [dɪt]	'this'
i	*besiel* [bəsil]	'inspire'
iː	*vier* [fiːr]	'four'
oː	*oom* [oːm]	'uncle'
øː	*neus* [nøːs]	'nose'
ɔ	*om* [ɔm]	'around'
ɔː	*bordesel* [bɔːrdɛsɛl]	'easel'
u	*oertipe* [urtɪpə]	'original'
uː	*meur* [muːr]	'nut'
y	*nuus* [nys]	'news'
yː	*muur* [myːr]	'wall'

The following table illustrates the Afrikaans diphthongs by means of examples.

Table 9: Afrikaans Diphthongs (adapted from Mahlangu, 2007)

Diphthong	Example	Gloss
əi	*vlei* /fləi/	'valley'
əu	*goud* /xəut/	'gold'
œy	*druiwe* /drœyvə/	'grapes'
aː**i**	*kwaai* /kwaːi/	'vicious'
oː**i**	*mooi* /moːi/	'pretty'

The following sections details the consonant inventory of Afrikaans.

3.5.3. Consonants

The phonemic consonants of Afrikaans are presented in the table below:

Table 10: Phonemic Consonants of Afrikaans

	Bilabial	**Labio-dental**	**Alveolar**	**Post-alveolar**	**Palatal**	**Velar**	**Glottal**
Plosive	p b		t d		c	k g	
Nasal	m		n		ɲ	ŋ	
Trill			r				
Fricative		f v	s z	ʃ ʒ	ç	x	ɦ
Approximant					j		
Lateral Approximant			l				

(Adapted from Mahlangu, 2007; van Wyk, Odendaal and Nkatini, 2007; Khan, 2016)

The following section expounds upon the syllable structure of Afrikaans words.

3.5.4. Syllable Structure

Much like English, Afrikaans has a large number of viable syllable structures (van Wyk, Odendaal and Nkatini, 2007), indicative of its being a Type 4 language according to Clements and Keyser's (1983) classification:

- CV, as in the word *haai* /ɦaːi/ 'shark'
- V, as in the word *'n* /ə/ 'a'

- CVC, as in the word *vier* /fiːr/ ‘four’
- VC, as in the word *op* /op/ ‘on’

Much like English, Afrikaans also allows complex onsets (e.g. *praat* /prɑːt/ ‘speak’) and complex codas (e.g. *kort* /kɔrt/ ‘short’), unlike Xitsonga.

3.6. Summary of Chapter

This chapter has provided vital background information useful to the discussion on loanword rephonologisation that will be presented later in this dissertation. Xitsonga has borrowed words from English and Afrikaans, despite having vastly disparate phonologies and phonetic inventories. The aim of this chapter was to highlight these differences. The following chapter presents the methodology applied in the data collection, verification and analysis of this study.

CHAPTER 4: METHODOLOGY

4.1. Introduction

This chapter details the vital methodological aspects of this study, including the sources of data and the method of data verification. It also discusses the origins and tenets of the two theories that are used in the analysis presented in a later chapter.

4.2. Sources of Data

The data that forms the basis of the analysis in this study comes from a combination of previous studies and dictionaries, most notable of which is E. J. M. Baumbach's *Analytical Tsonga-English Dictionary* (n.d.). This dictionary, compiled some time in the 1980s, provides not only an exhaustive list of Xitsonga words and their English translations, but fairly detailed notes on its grammar as well. Baumbach's clear indications as to the donor language of loanwords in Xitsonga also proved invaluable for this research. Data gleaned from this dictionary has been supplemented and crosschecked with another dictionary: Rene Cuenod's *Tsonga-English Dictionary* (1982), a compilation similar in form, although somewhat less extensive, to that of Baumbach's dictionary. These two authors, both of whom were linguists by training, also provide keys which match phonetic realisations onto the various orthographical features used in their respective compilations. This proved invaluable to the present study.

In addition to the aforementioned dictionaries by Baumbach and Cuenod, more concrete information on the phonology of Xitsonga can be found in another of

Baumbach's publications: *Introduction to the Speech Sounds and Speech Sound Changes in Tsonga* (1974). This short book offers a brief outline of the various phoneme inventories and phonological processes occurring in the numerous dialects of Xitsonga. Despite covering a large number of phonological aspects of a large number of dialects, this book is by no means exhaustive. The descriptions of phonological process are brief and each process is illustrated by a mere one or two examples, without context. Furthermore, the book is separated into dialect categories, so all information therein had to be checked against the dictionaries to ensure it matched the South African form of Xitsonga.

Additional information and examples were gleaned from Baumbach's *Analytical Tsonga Grammar* (1987), which can perhaps be considered the definitive guide to the language and is – to my knowledge – the only comprehensive descriptive Xitsonga grammar in existence. The grammar details every aspect of Xitsonga grammar by means of brief explanations and a couple of illustrative examples. The book, although it offers a fairly extensive list of grammatical constructions in Xitsonga, is rather superficial and, like its predecessor *Introduction to the Speech Sounds and Speech Sound Changes in Tsonga* (1974), only provides minimal examples to illustrate the various phonological, morphological, and syntactic processes. The analyses are presented seemingly haphazardly, and the limited amount of data makes it difficult to establish an all-encompassing, coherent analysis using examples mined solely from this book. Nevertheless, an initial close reading of *Analytical Tsonga Grammar* proved useful in the development stages of this study, as it would to any scholar of the Xitsonga language.

One possible limitation to the use of these books lies in their age, all of which are at least thirty years old, and so run the risk of being at least thirty years out of date. Therefore, two L1 speakers of Xitsonga verified the dictionary data. In addition to data verification, informants have also played a major role in data collection for this study. Loanwords can easily be mined from dictionaries and previous studies, but evidence for strategies relating to word minimality are found in native phonology. These words and phrases have been determined based on previous studies, with the approval and added input of the informants. Xitsonga transcriptions were done using Baumbach's *Analytical Tsonga-English Dictionary*, Afrikaans transcriptions were done with the help of a previous loanword study (Mahlangu, 2007), and English transcriptions using an open access online programme called *PhoTransEdit*[6]. The following section details how the data was verified.

4.3. Data Verification

In order to ensure accurate data, two informants, both L1 speakers of Xitsonga, verified the data collected from the aforementioned sources. Both informants were men who were born and grew up in South Africa and had Xitsonga-speaking parents. The informants fell into different age categories, with the first being in his late twenties and the second in his forties. Each informant was asked to pronounce the words, to ensure accurate transcription. In addition, informants were asked to verify whether each word in the data set is in use as it appears. Data for the analysis of word minimality was gleaned through a discussion of various constructions in Xitsonga – most notably the formation of the imperative and Class 9 nouns.

[6] Accessible at http://www.photransedit.com.

Due to certain similarities between English and Afrikaans, the correct origin of a loanword in Xitsonga is often unclear. E. J. M. Baumbach's *Analytical Tsonga-English Dictionary* and Cuenod's *Tsonga-English Dictionary* give indications as to the origins of various words. The two publications were crosschecked to ensure accuracy and consistency. The following section details the theoretical framework applied in the analysis of data.

4.4. Theoretical Framework

The main analysis of the repair strategies of Xitsonga in this dissertation is couched within Optimality Theory. Additional insights were, where relevant, gleaned from an additional theory: Feature Geometry. This sub-section introduces the tenets and functioning of the two theories in question.

4.4.1. Optimality Theory

Introduced in April of 1991 by Alan Prince and Paul Smolensky at the University of Arizona Phonology Conference, Optimality Theory (OT) has rapidly become the preferred theoretical framework in the linguistic sub-discipline of phonology (Archangeli, 1997). The constraint-based theory revolutionised previous theories of Generative Grammar, and allows linguists to account for both intra- and inter-linguistic nuances by means of a constraint hierarchy. The set of possible constraints is vast and stems from language universals, an integral part of a human's genetic inheritance (Archangeli, 1997). These constraints dictate what is considered well-formed within a language: markedness constraints prohibit marked surface structures,

while faithfulness constraints aim to preserve the input form as much as possible in the output.

Constraints present Universal Grammar (UG) as being flexible, as each constraint can be legally violated within any given language. OT is a particularly appealing framework as it allows one to account for inter-linguistic variation. Constraints and their legal violations are not the same for every language. In other words, each language has a unique ranking of constraints, which determines which constraints are allowed to be violated and which violations are fatal. It is this difference in constraint ranking that gives rise to cross-linguistic differences (Prince and Smolensky, 2004). Thus, constraints do not function as binaries, but rather the notion of dominance is an important one: languages rank the relevant constraints, with those that are more highly ranked dominating (taking precedence over) those that are less highly ranked. Dominance is indicated by means of '>>', with the constraints to the left of the arrows dominating those to the right. Violations of high-ranking constraints are said to be fatal, or absolutely disallowed. Low-ranking constraints, on the other hand, can be legally violated.

The functioning of an OT analysis can be summed up by three processes or stages: Lexicon, Generator, and Evaluator (Kager, 1999). The Lexicon refers to the input form that is ungoverned by constraints. This presents the input as a collection of morphemes, before any phonological processes have occurred. The Generator acts to produce a number of possible output candidates by satisfying and/or violating a number of different combinations of constraints. Finally, the Evaluator acts to

determine the candidate that incurs the least fatal violation(s). This is the so-called Optimal Candidate.

An OT analysis is conventionally illustrated by means of a tableau, with the relevant constraints in the columns, and the possible output candidates indicated in the rows, often between square brackets. The input form is indicated between slash brackets in the top left cell of the tableau, with the relevant morphemes separated by means of a hyphen. Constraint violations are indicated by an asterisk (*), and those that are fatal violations are accompanied by an exclamation mark (!). The optimal candidate is the output candidate that incurs the least fatal violation(s) and is indicated with a pointer icon (☞). Solid vertical lines are indicative of dominance, while dotted lines indicate that neighbouring constraints have the same ranking. In this study, each candidate is numbered for ease of reference. Tableau 1 provides an exemplar for the layout of a conventional OT tableau.

Tableau 1: Optimality Theory Exemplar

/ɪn-pʊt/	CONSTRAINT 1	CONSTRAINT 2	CONSTRAINT 3
a. [candidate a]	*!		
b. [candidate b]		*!	
c. ☞ [candidate c]			*

In the above tableau exemplar, each candidate (a) through (c) violates a constraint. It is important to note here that constraints are naturally conflicting, thus there is no such thing as the "perfect" candidate (Kager, 1999). However, (c) is the *optimal* candidate as it only incurs a violation of the low-ranking CONSTRAINT 3, whereas candidates (a) and (b) fatally violate CONSTRAINTS 1 and 2, respectively.

OT is indispensible in the analysis of repair strategies as it allows one to account for the use of one strategy over another as a means to satisfy high-ranking constraints. It provides the tools necessary to formalise data, taking the analysis beyond mere description. Thus, it aids the researcher in fulfilling the ultimate goal of the linguist – to account for linguistic patterns that can be generalised beyond the data presented. Constraints relevant to the discussion presented in this study will be introduced and defined as they become relevant. The secondary framework, Feature Geometry, is detailed in the following section.

4.4.2. Feature Geometry

In order to supplement the main OT analysis of the data, Feature Geometry (FG) is employed to account for epenthetic processes that result from feature spreading.

FG is a theory of generative grammar developed in the mid 1980s by George N. Clements and Elizabeth Hume (Clements and Hume, 1995). FG is used to illustrate the distinctive phonetic features of sounds by means of hierarchically structured tree diagrams. These diagrams allow one to schematically indicate all the universal features involved in the articulation of any sound used in any language (Clements and Hume, 1995). The trees indicate laryngeal, supralaryngeal, and manner features on different "nodes" of the tree, clearly illustrating the composition of each sound. FG replaced previous illustrations of distinctive features as matrices or checklists, making the representations more logical. FG is also a useful way of demonstrating the changes that happen to features during phonological processes, such as the spreading of features in assimilation. In this study, FG plays a role in demonstrating how glide epenthesis in loanword rephonologisation is actually as a result of spreading (see

Chapter 5). More specifically, the place feature of the second vowel in a diphthong spreads regressively, resulting in the insertion of either a coronal or labial glide.

4.5. Summary of Chapter

This chapter has presented the methodology behind data collection and analysis that has been employed in this study. The sources of data and methods of data verification have been expounded upon, and the history and tenets of the two theories that act as tools of analysis have been discussed. The following chapter presents the analysis of loanwords, illustrating and accounting for the repair strategies used at syllable level to reconcile the grammars of the donor languages with that of Xitsonga.

CHAPTER 5: SYLLABLE STRUCTURE

5.1. Introduction

The previous chapter presented the methodology employed in this study, including the data collection, verification and analysis using two important phonological theories: OT and FG. The present chapter presents the first part of the analysis, and the first part of the list of repair strategies employed by Xitsonga, based on the aforementioned methodology. This is in order to identify mainly how Xitsonga manages to reconcile its strict CV syllable structure with the Type 4 syllable structures of English and Afrikaans, that allow for syllable codas and complex consonant clusters (Clements and Keyser, 1983). This discussion illustrates the importance of the syllable as a level of phonological analysis, and links the findings of this study to the groundwork laid by the previous study of Xitsonga hiatus resolution (Vratsanos and Kadenge, 2017).

After the analysis part of this chapter will come a discussion of the strategies employed by Xitsonga as compared to languages of a similar type, in order to situate Xitsonga within its language family and contribute to Bantu language typology.

5.2. Repair Strategies in Xitsonga Loanword Phonology

Xitsonga employs a number of strategies to rephonologise Afrikaans and English words so that they harmonise with the phonology of the receiver language. Along with segment substitution, which reconciles the disparate phonemic inventories of the languages, there are several additional strategies that operate at syllable level and alter English and Afrikaans words so that they adhere to Xitsonga's strict CV syllable

structure. These are vowel epenthesis, glide epenthesis or spreading, and elision. Vowel epenthesis serves the dual purpose of resolving both syllable codas and consonant clusters, while glide epenthesis (a spreading process) resolves diphthongs. Elision is very rare and operates in only a handful of words to resolve all three of the aforementioned issues. This section presents data to illustrate each of these processes, as well as a formal analysis and discussion thereof.

5.2.1. Segment Substitution

As mentioned previously, Xitsonga and the languages from which it borrows have different phonologies. Thus, they have different requirements regarding syllable structure, and they also have vastly different phonemic inventories. This chapter deals specifically with an analysis of repair strategies that function at syllable level, however segment substitution is pervasive and evident in almost every word in the dataset, thus it is briefly described in this study. This section deals briefly with segment substitution between English and Afrikaans, and Xitsonga. The greater implications of the following account of segment substitution are not dealt with in this study, and remain available for future research.

Xitsonga makes use of a mere five monophthongs and no diphthongs, compared to twelve monophthongs and eight diphthongs in English, and twelve monophthongs and seven diphthongs in Afrikaans. Thus, the vowels in the original English and Afrikaans words need to be replaced by their closest Xitsonga approximations. Diphthongs are repaired by means of glide epenthesis (see Chapter 6). The following tables provide the typical vowel segment substitutions between English, Afrikaans and Xitsonga monophthongs:

Table 11: Examples illustrating substitution of English vowels with Xitsonga vowels

English Example	**Xitsonga Form**	**English Vowel**	**Xitsonga Vowel**	**Gloss**
/ʧ**i**ki/	[ʧ**i**k**i**]	/i/	[i]	cheeky
/bal**u**n/	[bal**u**n**i**]	/u/	[u]	balloon
/**ɪ**ŋk/	[**i**^{ŋ}k**i**]	/ɪ/	[i]	ink
/wʊl/	[wul**u**]	/ʊ/	[u]	wool
/b**e**d/	[^{m}b**e**d^{w}**a**]	/e/	[e]	bed
/fʌnə**l**/	[fan**e**l**e**]	/ə/	[e]	funnel
/d**ɜ**t/ and /dʒ**ɜ**zi/	[dot**i**] and [dʒ**e**z**i**]	/ɜ/	[o]/ [e]	dirt/ jersey
/fʌnə**l**/	[f**a**nel**e**]	/ʌ/	[a]	funnel
/st**ɔ**/	[ʃ**i**t**o**l**o**]	/ɔ/	[o]	store
/k**æ**ʃ/	[k**e**ʃ**e**]	/æ/	[e]	cash
/h**ɑ**f/	[h**a**f**u**]	/ɑ/	[a]	half
/b**ɒ**tə**l**/	[b**o**ɮel**a**]	/ɒ/	[o]	bottle

Table 12: Examples illustrating substitution of Afrikaans vowels with Xitsonga vowels

Afrikaans Example	**Xitsonga Form**	**Afrikaans Vowel**	**Xitsonga Vowel**	**Gloss**
/bak/	[-bak**a**]	/a/	[a]	bake
/bət**a**ːl/	[badal**a**]	/aː/	[a]	pay
/pœts/	[pits**i**]	/œː/	[i]	well
/d**ɛ**k/	[-d**e**k**a**]	/ɛ/	[e]	lay table
/pɛːrt/	[^{m}per**e**]	/ɛː/	[e]	horse
/b**e**ːkər/	[bikir**i**]	/eː/	[i]	mug
/bətaːl/	[b**a**dala]	**/ə/**	[a]	pay
/x**ɪ**f/	[ʃ**e**f**u**]	/ɪ/	[e]	poison
/erk**i**s/	[erek**i**s**i**]	/i/	[i]	pea
/liːr/	[ler**a**]	/iː/	[e]	ladder
/boːr/	[-bor**a**]	/oː/	[o]	drill
/vərnøːk/	[-fur**u**^{n}juk**a**]	/øː/	[u]	cheat
/bɔrd/	[bor**o**t**a**]	/ɔ/	[o]	board
/buk/	[buk**u**]	/u/	[u]	book
/buːr/	[bun**u**]	/uː/	[u]	Boer
/dyːr/	/-dur**a**/	/yː/	[u]	be expensive

The above table illustrates that there are only three vowels that occur in English, Afrikaans and Xitsonga /i u e/, and Afrikaans and Xitsonga also have /a/ in common. However, the remaining English and Afrikaans monophthongs are replaced by the closest Xitsonga vowel.

At this point, our first OT constraint becomes relevant: OK(SEG) is a segmental markedness constraint that, in essence, prohibits the occurrence of segments not found in the target language (in this case, Xitsonga) in the output. This constraint is high-ranking in Xitsonga. This constraint is used for ease, so as to avoid having to define a new constraint for each prohibited segment (such as *æ, *ɪ, *ɜ and so on). It is defined in (63) below:

63. OK(SEG)

Segments that are not permitted in Xitsonga must not appear in the output (adapted from Rose and Demuth, 2006).

Furthermore, a faithfulness constraint is also relevant, as defined below:

63. IDENT-IO

The features of an input segment must remain in the output (adapted from Kadenge and Mudzingwa, 2012).

Take for example the case of the English vowel /æ/, which does not occur in Xitsonga and is replaced by [a] in the case of the word *stack* /stæk/, which becomes [ʃitaka] in the output. Here, OK(SEG) is ranked above IDENT-IO, which is non-fatally violated by all cases of segment substitution in Xitsonga. The following tableau presents a formalised OT analysis of the word *stack* /stæk/, and the relevant Xitsonga output[7]:

[7] Note that the word /stæk/ also undergoes additional repair processes so as to repair the consonant cluster and coda – these are disregarded for now, as they are discussed in more detail in a subsequent section.

Tableau 2: The Xitsonga Realisation of the English Word /stæk/

/stæk/	OK(SEG)	IDENT-IO
a. [stæk]	*!	
b. ☞ [ʃi.ta.ka]		*

In the above tableau, candidate (a) which is fully faithful and contains a prohibited vowel [æ], incurs a fatal violation of the high-ranking segmental markedness constraint OK(SEG). This contraints bans vowels that are not present in native Xitsonga phonology. Candidate (b) incurs only a non-fatal violation of the lower-ranking faithfulness constraint IDENT-IO, and is therefore the optimal candidate for the Xitsonga realisation of the English word /stæk/.

Naturally, the same process is applicable to the Afrikaans loanwords as well. Take for example the Afrikaans word *betaal* /bəta:l/ 'pay', which is realised as [badala] in Xitsonga, which involves the substitution of the schwa and the long vowel /a:/. The additional [a] at the end of the Xitsonga realisation acts to prevent the occurrence of a coda, and will be dealt with in the following sub-section. Again, OK(SEG) is high-ranking while IDENT-IO remains low-ranking, and is non-fatally violated by segment substitution. The following tableau presents this formally:

Tableau 3: The Xitsonga Realisation of the Afrikaans Word /bəta:l/

/bəta:l/	OK(SEG)	IDENT-IO
a. [bə.ta:.la]	*!*	
b. ☞ [ba.da.la]		*

In the above tableau, disregarding for now the epenthesis of a word-final vowel, the optimal candidate for the realisation of the Afrikaans word /bəta:l/ is candidate (b), as

it only incurs a non-fatal violation of IDENT-IO. Candidate (a), on the other hand, incurs two fatal violations of OK(SEG) for containing the outlawed vowels /ə/ and /a:/.

The segment substitution process can be analysed *mutatis mutandis* across the remaining instances of substitution, including that of consonants. OK(SEG) outranks the IDENT-IO constraint. Therefore, if we take into account only those that have been dealt with so far, the constraint ranking of Xitsonga is thus: OK(SEG) >> IDENT-IO. The focus of this study, however, is not segment substitution and the above discussion is far from exhaustive. Thus, to include IDENT-IO in all analyses henceforth would be redundant. In every word in which segment substitution has occurred, the reader can assume a non-fatal violation of this constraint, despite it not being explicitly present in the tableaux.

5.2.2. Vowel Epenthesis

Vowel epenthesis is the most commonly used strategy by Xitsonga to reconcile its strict CV syllable structure with the more varied structures allowed by English and Afrikaans. This process involves the insertion of an additional vowel somewhere within a word (Uffman, 2004), and has two functions in Xitsonga: to eliminate word-final syllable codas, and to break up consonant clusters. This strategy and its dual purpose are not uncommon in Bantu languages. The way that these two functions operate in Xitsonga is expounded upon in the following two sub-sections.

5.2.2.1. Vowel Epenthesis to Eliminate Codas

Xitsonga follows a CV syllable structure pattern, thus syllable codas – syllable-final consonants – are prohibited. In every instance, syllable codas must be eliminated and this is most commonly done by means of vowel epenthesis. Codas are a common occurrence in both English and Afrikaans, thus making this a particular issue in Xitsonga loanword rephonologisation.

The following table presents a list of English words that pose coda-related issues, and their Xitsonga realisations once vowel epenthesis has occurred. This is just a handful of examples that have been chosen because they explicitly illustrate the use of epenthesis to eliminate codas. Other examples that contain this strategy (and others) will be presented in due course. Epenthetic vowels are bolded in these examples, and all those presented subsequently. Tone markers are included in tables so as to match the transcription to its orthographic form, but are not included in tableaux as a discussion of tone is not included in this discussion.

Table 13: Vowel Epenthesis to Eliminate Codas in English Loanwords

Xitsonga		**English**	
khéxè	[ké.ʃ**è**]	cash	/kæʃ/
phínì	[pí.n**ì**]	pin	/pɪn/
wúlù	[wú.l**ù**]	wool	/wʊl/
bázì	[bá.z**ì**]	bus	/bʌs/
bífì	[bí.f**ì**]	beef	/bif/
bódò	[bó.d**ò**]	board	/bɔd/
chízì	[tʃí.z**ì**]	cheese	/tʃiz/
chókòlétì	[tʃó.kò.lé.t**ì**]	chocolate	/tʃɒk(ə)lət/
dàzènì	[dà.zè.n**ì**]	dozen	/dʌzən/
sálàdí	[sá.là.d**í**]	salad	/sæləd/
thìkìthì	[tì.kì.t**ì**]	ticket	/tɪkət/

The following table presents examples of Afrikaans loanwords that contain a coda repaired by vowel epenthesis in the output.

Table 14: Vowel Epenthesis to Eliminate Codas in Afrikaans Loanwords

Xitsonga		**Gloss**	**Afrikaans**	
pátó	[pá.t**ó**]	road	pad	/pat/
pótó	[pó.t**ó**]	potjie pot	pot	/pot/
tásì	[tá.s**ì**]	pouch for bullets	tas	/tas/

As already mentioned, vowel epenthesis to eliminate codas acts at the syllable level. It is a process whereby the coda of the word-final syllable in the input becomes the onset of a new syllable, whose nucleus is the epenthetic vowel. For example, in the Afrikaans word /pat/, which is realised as [pa.to] in Xitsonga, the coda /t/ becomes the onset of the epenthetic vowel [o]. In other words, a monosyllabic Afrikaans word /pat/ of the CVC types becomes a viable disyllabic Xitsonga word of the type CVCV [pa.to]. An analysis of the factors that determine the choice of the epenthetic vowel is beyond the scope of this study.

Vowel epenthesis to eliminate codas involves additional two OT constraints. The markedness constraint in (65) below militates against syllable codas.

64. NoCoda

Syllable codas are prohibited (Kager, 1999).

Two additional faithfulness constraints, one prohibiting epenthesis and one elision, are given in (66) and (67):

65. DEP-IO

All segments in the output must have correspondents in the input (no epenthesis) (Kager, 1999).

66. MAX-IO

Segments in the input must have output correspondents (Kager, 1999).

The codas of all English and Afrikaans loanwords are repaired, indicating that NOCODA is a very high-ranking constraint. The occurrence of vowel epenthesis as a repair strategy to resolve codas indicates that DEP-IO is a low-ranking constraint. The following tableau presents a formalised OT analysis of the above example of /pat/:

Tableau 4: The Xitsonga Realisation of the Afrikaans Word /pat/

/pat/	NOCODA	MAX-IO	DEP-IO
a. [pat]	*!		
b. [pat.o]	*!		*
c. [pa]		*!	
d. ☞ [pa.to]			*

In the above tableau, candidate (a) is not altered from the original Afrikaans form at all, remaining a word that consists of a single closed syllable. This incurs a fatal violation of the high-ranking NOCODA constraint and so is disqualified as being the optimal candidate. Candidate (b) is disqualified for the same reason as (a). Candidate (c) incurs a fatal violation of MAX-IO as it involves the deletion of the coda [t]. This would also result in the word being monosyllabic, which may pose additional problems that will be discussed in the following chapter. Candidate (d), which contains the all-important epenthetic vowel [o], is the optimal candidate as it incurs

only a non-fatal violation of DEP-IO, while satisfying the dominant NOCODA constraint.

This process is equally prevalent in the English loanword data. The following tableau illustrates the rephonologisation of the English word /pɪn/.

Tableau 5: The Xitsonga Realisation of the English Word /pɪn/

/pɪn/	NOCODA	MAX-IO	DEP-IO
a. [pin]	*!		
b. ☞ [pi.ni]			*
c. [pin.i]	*!		*
d. [pi]		*!	

In the above tableau, candidate (a) exhibits only segment substitution given that the vowel /ɪ/ is not allowed in Xitsonga. It therefore incurs a fatal violation of the high-ranking NOCODA constraint, as the word-final [n] is still present. Candidate (c) incurs the same fatal violation, despite also having an epenthetic [i]. These two candidates are therefore disqualified. Candidate (d) incurs a fatal violation of MAX-IO due to the deletion of the coda [n]. Candidate (b) contains an epenthetic [i], and the [n] acts as the onset to this newly formed syllable. Thus, it incurs an additional non-fatal violation of DEP-IO, making it the optimal realisation of the English word /pɪn/ in Xitsonga.

Thus far, the constraint ranking governing the syllable structure of Xitsonga loanwords is: NOCODA, MAX-IO >> DEP-IO, IDENT-IO. NOCODA must be satisfied and candidates that fail to do so are immediately eliminated. DEP-IO can be, and is, violated legally by the optimal candidate.

The following sub-section discusses vowel epenthesis to eliminate consonant clusters.

5.2.2.2. Vowel Epenthesis to Eliminate Consonant Clusters

Both English and Afrikaans permit consonant clusters and complex onsets. A structure of the form [CC] is dispreferred in Xitsonga, and is commonly re-syllabified so as to become a [CV.CV] structure. In other words, vowel epenthesis occurs to separate adjacent consonants, thereby creating an additional syllable. The following table presents examples of words from English in which vowel epenthesis to eliminate consonant clusters is evident, and the table thereafter does the same but for Afrikaans. It is important to note that many of the words listed below also contain vowel epenthesis to eliminate codas, as detailed in the previous sub-section.

Table 15: Vowel Epenthesis to Eliminate Consonant Clusters in English Loanwords

Xitsonga		**Original**	
fòròkò	[fò.r**ò**.kò]	fork	/fɔk/
sòkìsì	[sò.k**ì**.sì]	sock	/sɒks/
bùláchì	[b**ù**.lá.tʃì]	brush	/brʌʃ/
bùràndì	[b**ù**.rà.^{n}dì]	brandy	/brændi/
désìkí	[dé.s**ì**.kì]	desk	/desk/
dìrámù	[d**ì**.rá.mù]	drum	/drʌm/
fùlórò	[f**ù**.ló.rò]	floor	/flɔ/
gìrísì	[g**ì**.rí.sì]	grease	/gris/
kàpìténì	[kà.p**ì**.té.nì]	captain	/kæptɪn/
khásítàdì	[ká.s**í**.tà.dì]	custard	/kʌstəd/
píkìníkì	[pí.k**ì**.ní.kì]	picnic	/pɪknɪk/

The following table illustrates examples of consonant clusters in Afrikaans loanwords being resolved via vowel epenthesis.

Table 16: Vowel Epenthesis to Eliminate Consonant Clusters in Afrikaans Loanwords

Xitsonga		**Gloss**	**Original**	
bùrúkù	[b**ù**.rú.kù]	trousers	broek	/brœːk/
gàlàkúnì	[gà.l**à**.kú.ni]	turkey	kalkoen	/kalkœːn/
hàrhàfò/ù	[h**à**.rà.fò]	spade	graaf	/xraːf/
kàlákà	[kà.l**á**.kà]	lime	kalk	/kalk/
kèpìsì	[kè.p**ì**.sì]	cap	keps	/keps/
kèrékè	[kè.r**é**.kè]	church	kerk	/kɛrk/
kùnúpù	[k**ù**.nú.pù]	button	knoop	/knoːp/
nélètá	[né.l**è**.tá]	needle	naald	/naːlt/

For example, in the English word *desk* /desk/, the consonant cluster /sk/ is broken up by the epenthetic vowel [i], with the [s] becoming the onset of the newly-formed syllable. The coda [k] becomes the onset of another new syllable, formed once again by adding a word-final [i], thus forming the Xitsonga realisation [de.s**i**.ki].

A markedness constraint that prohibits sequences of consonants (or consonant clusters) is *COMPLEX as defined in (68) below:

67. *COMPLEX

Complex onsets (consonant clusters) and syllable nuclei (diphthongs) are prohibited (Prince and Smolensky, 2004).

DEP-IO is still relevant to this continued discussion of vowel epenthesis, as is NOCODA. The following tableau provides an OT analysis of the Xitsonga realisation of the English word *desk* /desk/:

Tableau 6: The Xitsonga Realisation of the English Word /desk/

/desk/	NoCoda	*Complex	Dep-IO
a. [desk]	*!	*	
b. [deski]		*!	*
c. [de.sik]	*!		*
d. ☞[de.si.ki]			**

In Tableau 6, candidate (a) is most faithful candidate to the input and so incurs a fatal violation of both NoCoda and *Complex. Candidate (b) repairs the problem of the word-final coda, thereby non-fatally violating Dep-IO. However, the presence of the [s] fatally violates *Complex. Candidate (c) incurs a fatal violation of NoCoda, due to the [k] acting as coda. Candidate (d) is the optimal candidate as it satisfies the two high-ranking constraints: NoCoda and *Complex. It only incurs minor violations of the low-ranking constraint, Dep-IO.

The same process occurs in Afrikaans loanwords, as evidenced by Tableau 7 below, which illustrates the rephonologisation of the Afrikaans word /brœk/ ‘trousers’.

Tableau 7: The Xitsonga Realisation of the Afrikaans Word /brœk/

/brœk/	NoCoda	*Complex	Dep-IO
a. [bruk]	*!	*	
b. [bru.ku]		*!	*
c. [bu.ruk]	*!		*
d. ☞[bu.ru.ku]			**

In the tableau above, candidate (a) is the most faithful to the input, and incurs fatal violations of both high-ranking constraints, NoCoda and *Complex. It is therefore disqualified. Candidate (b) remedies the coda through vowel epenthesis, thereby

satisfying NoCoda, but still fatally violating *Complex. It also incurs a non-fatal violation of Dep-IO. Candidate (c) addresses the issue of the complex onset, thereby satisfying *Complex and non-fatally violating Dep-IO, but its fatal violation of NoCoda disqualifies it. Finally, candidate (d) involves the epenthesis of two vowels, which repair the complex onset and the coda, thereby satisfying the highest-ranking constraints and only incurring minor violations of Dep-IO. Thus, this last candidate is the optimal one.

It is interesting to note the interplay between phonology and morphology in the rephonologisation of the following words from English:

Table 17: Sounds Substituted by Xitsonga Prefixes

Xitsonga		**Original**	
xìtófù	[**ʃi**.tó.fù]	stove	/stəʊv/
xìtóló	[**ʃi**.tó.ló]	store	/stɔː/

At first glance, the above examples appear to show a fairly standard process of segment substitution, vowel epenthesis to eliminate the coda /v/ and vowel epenthesis to repair the consonant cluster /st/. However, upon closer inspection, it becomes evident that the consonant cluster has been replaced by a phonetically similar class prefix [ʃi-]. This has the dual result of (a) providing the word with its rightful noun class prefix, and (b) resolving the issue of the complex onset without eliding and replacing it entirely. This happens in several Bantu languages, including chiShona, as in the examples below (see Kadenge, 2012):

68. *stove*: /stəʊv/ → [ʧitofu]

69. *store*: /stɔː/ → [ʧitoro]

The OT analysis conducted above can still be applied to these examples, in addition to this prefix substitution.

The constraint ranking of Xitsonga now stands as: NoCoda, *Complex >> Dep-IO, Ident-IO. The following section deals with a case of sub-phonologies, whereby differing constraint rankings appear to occur within Xitsonga, resulting in intra-linguistic differences.

5.2.2.3. Intra-Linguistic Variation

The examples given above all indicate that consonant clusters are always repaired, however discussions with the informants indicate that there may be other factors at work. The following table presents contradictory data from each informant, indicating that the apparently rigid *Complex rule detailed above might not always be so:

Table 18: Comparison of Consonant Clusters between Informants

Informant 1	Informant 2	Gloss	Donor	Original
[bru.ku]	[bu.ru.ku]	trousers	Afrikaans	/brœ:k/
[fa.sko.ti]	[fa.si.ko.ti]	apron	Afrikaans	/fo:rsko:t/
[fa.ste.re]	[fa.si.te.re]	window	Afrikaans	/fɛnstər/
[pe.tro.lo]	[pe.ti.ro.lo]	petrol	English	/petrəl/
[pla.sti.ki]	[pu.la.si.ti.ki]	plastic	English	/plæstɪk/
[bra.^{n}di]	[bu.ra.^{n}di]	brandy	English	/brændi/
[fla.ti]	[fu.la.ti]	flat	English	/flæt/

In each of the examples in the table above, Informant 1 maintains the consonant clusters, while Informant 2 uses vowel epenthesis to break them up. Given the analysis conducted earlier in this section, all of these words should technically incur a fatal violation of *Complex, and therefore should not have been selected as the optimal candidate by Informant 1. However, this is not an uncommon occurrence in

Bantu languages, many of which have allowed the occasional 'foreign' structure to sneak into the language – this is particularly evident when considering a generational gap, and an increase in the number of bilinguals. Kadenge and Mudzingwa (2012) illustrate a clear distinction between the chiShona loanwords as said by monolinguals and bilinguals: monolinguals, who have not been influenced by the donor language, have a tendency to remain absolutely faithful to chiShona phonology, while bilinguals, to whom the dispreferred structures are familiar, often retain certain phonological aspects of the original word.

A particular phenomenon picked up by Kadenge and Mudzingwa (2012) was the retention of certain consonant clusters by bilingual speakers, in much the same way as can be seen from the Xitsonga data above. ChiShona bilinguals retained the consonant cluster in the English loanword [proteni] 'protein', from English /prəʊtiːn/ (Kadenge and Mudzingwa, 2012). Monolinguals, on the other hand, realised the same word as [puroteni], with an epenthetic [u] separating the consonants in the initial cluster /pr/. Intra-linguistic nuances such as this can also be accounted for using OT. This indicates that constraints are ranked differently by different groups of speakers of the same language.

An in-depth analysis of the type by Kadenge and Mudzingwa (2012) is beyond the scope of this research, but a few preliminary remarks can be made, albeit tentatively. Younger Xitsonga speakers, like those of all other Southern Bantu languages, are commonly bilingual, speaking their mother tongue along with English or Afrikaans (or both) and a host of other South African Bantu languages. As such, these speakers are accustomed to phonological structures that are not typically allowed by the phonology of native Xitsonga. Thus, these structures find their way into Xitsonga, by

speakers for whom *COMPLEX is not so highly ranked. This is also referred to as a case of sub-phonologies, or co-phonologies, in which different constraint rankings give rise to intra-linguistic differences, and not solely inter-linguistic ones (Kadenge and Mudzingwa, 2012).

Discussions with informants about this phenomenon gleaned additional insights into the reasons behind this reranking. Although both informants are bilingual, the difference in the pronunciations is glaring. The younger of the two informants (Informant 1, a man in his late twenties) claimed that the forms devoid of consonant clusters were more akin to the way his older relatives would speak, or how one would speak were they in a more formal setting. The elder of the informants (Informant 2, a man in his forties) was very quick to indicate that the "correct" way of pronouncing [petrolo] was [petirolo], hinting that the form containing the consonant cluster was some sort of debased, undesirable form. This split is potentially the result of three factors, which may be functioning simultaneously:

- First, the expected monolingual versus bilingual split, in which the previously illegal structures are familiar to bilingual speakers of the donor language, and so have crept into the language;
- Secondly, a generational gap between older speakers of the language who seek to speak a 'pure', prescriptivist form of the language;
- And finally, the role of register, whereby the retention of undesirable structures from English or Afrikaans is found in colloquial, everyday Xitsonga, and not in more formal settings.

Whether these supposedly undesirable structures will slowly become part of the main phonology of the language remains to be seen, and would perhaps make an interesting subject for a diachronic study in the future.

The tableau below illustrates how the constraints are ranked differently by speakers who have different purposes or backgrounds, essentially resulting in two possible realisations of the word *petrol*, depending on the constraint ranking in question:

Tableau 8: The Realisation of the English Word /petrəl/ by Informants 1 and 2

	/petrəl/	NoCoda	*Complex	Dep-IO
Informant 1	[pe.tro.lo]		*	*
Informant 2	[pe.ti.ro.lo]			**

The above tableau illustrates something interesting: both forms eliminate the codas, but consonant clusters can be optionally retained. NoCoda, therefore, is one constraint that is never violated, by both sets of speakers alike. Informant 2 adheres to the rules stipulated by the earlier constraint ranking: NoCoda, *Complex >> Dep-IO, Ident-IO. This is an optimal candidate for speakers whose speech ranks *Complex highly. Younger, potentially bilingual, speakers in informal settings might, however, select [pe.tro.lo] as the optimal candidate – as in the case of Informant 1. It satisfies the still high-ranking NoCoda but violates the now low-ranking *Complex. Both forms are acceptable by the standards of Xitsonga-speaking people, therefore indicating that there is an intra-linguistic variation, due to a reranking of constraints within the language itself.

To summarise, the two constraint rankings within Xitsonga are:

- NoCoda, Max-IO, *Complex >> Dep-IO, Ident-IO
- NoCoda, Max-IO >> *Complex >> Dep-IO, Ident-IO

The following sections looks at how certain diphthongs are eliminated by means of glide epenthesis.

5.2.3. Glide Epenthesis to Eliminate Diphthongs

In much the same way that Xitsonga outlaws complex consonant clusters, it also does not allow for the presence of diphthongs. English and Afrikaans, on the other hand, make use of eight and five diphthongs respectively. The table below summarises the diphthongs of English and Afrikaans:

Table 19: The Diphthongs of English and Afrikaans

English	**Afrikaans**
eɪ	əi
aɪ	əu
ɔɪ	œy
aʊ	a:i
əʊ	o:i
ɪə	
ea	
ʊə	

Diphthongs are strictly forbidden in Xitsonga, once again indicating that *Complex is undominated in this language. Thus, certain repair strategies need to be employed to

ensure that Xitsonga remains diphthong-free. The main one used is glide epenthesis, which involves inserting a glide – either [j] or [w] – between the two vowel elements in the offending diphthong. This acts at the level of the syllable as it turns illegal /CVV/ sequences into viable [CV**C**V] ones, thereby maintaining the strict CV syllable requirements of the language. The two possible glides that can be inserted are in complementary distribution – that is, they occur in different environments. [j] is inserted when the right adjacent vowel is coronal and [w] when it is labial. As such, given the importance of features in the description of glide epenthesis, it can also be described as a process of spreading (Clements and Hume, 1995; Kadenge and Mudzingwa, 2011). In this case, the features of one of the input vowels inform the features of the glide to be inserted.

The following table provides a list of examples of English words in which glide epenthesis has occurred to repair the diphthongs. Afrikaans words, which provide evidence of the same process, are presented in the table thereafter. Note that all verbs in Xitsonga end on [-a].

Table 20: Examples of English Words that Illustrate Spreading to Repair Diphthongs

Xitsonga		**Gloss**	**Original**
bàyìsíkìrì	[bà.**j**ì.sí.kì.rì]	bicycle	/baɪsɪkl̩/
-béyila	[bé.**j**i.la]	pay bail	/beɪl/
dáyimanì	[dá.**j**i.ma.nì]	diamond	/daɪmənd/
khwáyà	[k^{w}á.**j**à]	choir	/kwaɪə/
-sáyina	[sá.**j**i.na]	sign	/saɪn/
wàyènì	[wà.**j**è.nì]	wine	/waɪn/
wàyèlà	[wà.**j**è.là]	wire	/waɪə/
áwàrá	[á.**w**à.rá]	hour	/aʊə/
áyínì	[á.**j**í.nì]	iron (household implement)	/aɪən/
áyísìkrímì	[á.**j**í.sì.krì.mì]	ice cream	/aɪs kriːm/
Chàyínà	[ʧà.**j**í.nà]	China	/ʧaɪnə/
fáyìlì	[fá.**j**ì.lì]	file (for documents)	/faɪl/
khóyínì	[kó.**j**í.nì]	coin	/kɔɪn/
láyíbùràrì	[lá.**j**í.bù.rà.rì]	library	/laɪbrəri/
rhèyìsì	[rè.**j**ì.sì]	rice	/raɪs/
tháwùlá	[tá.**w**ù.lá]	towel	/taʊəl/

Table 21: Examples of Afrikaans Words that Illustrate Spreading to Repair Diphthongs

Xitsonga		**Gloss**	**Original**	
búraya	[bú.ra.**j**a]	roast	braai	/braːi/
-fíriya	[fí.ri.**j**a]	make love to	vry	/frəi/
hàyísà	[hà.**j**í.sà]	rectangular dwelling	huis	/ɦœys/
rìbàyì	[rì.bà.**j**ì]	thin white cotton blanket	baai	/baːi/

The FG diagram below illustrates how the features of the V-Place spread, resulting in the insertion of the coronal glide [j].

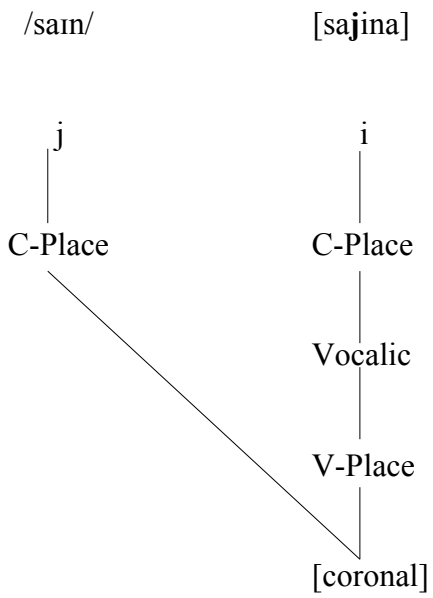

Figure 6: The Spreading of Features from Coronal Vowel

In the above diagram, the features of the vowel V-Place [coronal] spread regressively and result in the epenthesis of a coronal glide [j]. Note also the epenthetic vowel at the end of the Xitsonga realisation that serves to eliminate the coda. The same process occurs for labial vowels, as in the example illustrated in the figure below:

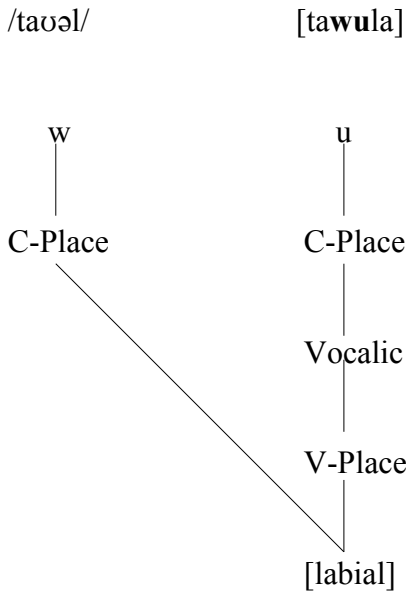

Figure 7: The Spreading of Features from Labial Vowel

Once again, the V-Place features spread, which ultimately results in the insertion of the labial glide [w].

Each of the words in the two tables above involves either a coronal glide [j] or a labial glide [w] being inserted between the two units of the diphthongs, in order to create a sequence in which both vowels have an onset. This is so the CV structure of the language is maintained and, more specifically, so that the dominant markedness constraint *COMPLEX[8] is satisfied. An additional faithfulness constraint is also at play here:

70. UNIQUE

In $\forall x$, where x is a feature, x must have a unique segmental anchor y (Benua, 1997).

UNIQUE prevents the spreading of features, and so is violable in Xitsonga. Additionally, some languages use a process of heterosyllabification to resolve diphthongs. This involves separating the two elements of the diphthong into two separate monophthongs. This is, however, untenable in Xitsonga as it ranks the constraint NOHIATUS – defined in (72) below – very highly. This is a particularly valid constraint to any discussion of phonological processes at syllable level, and links directly back to the work on Xitsonga vowel hiatus resolution that laid the foundations for this study (see Vratsanos and Kadenge, 2017).

[8] In some studies, the prohibition of diphthongs is indicated by a different constraint: NODIPH (cf. Vratsanos and Kadenge, 2017). However, *COMPLEX is used here to encompass both consonant clusters and diphthongs for ease of reference.

71. NOHIATUS

A sequence of two heterosyllabic vowels is prohibited (Kager, 1999).

The following tableaux provide formalised OT analyses of the examples used in the FG diagrams above, using the new constraints as well as the ones that have already been introduced.

Tableau 9: The Xitsonga Realisation of the English Word /raɪs/

/raɪs/	*COMPLEX	NOHIATUS	NOCODA	UNIQUE	DEP-IO
a.[reis]	*!		*		
b. [rei.si]	*!				*
c. ☞[re.**j**i.si]				*	**
d. [re.i.si]		*!			*

In Tableau 9, candidate (a) remains the most unchanged from the input. The presence of the diphthong and the coda incur two fatal violations of *COMPLEX and NOCODA. Candidate (a) is therefore eliminated. Candidate (b) solves the problem of the coda, by epenthesising a vowel (therefore non-fatally violating DEP-IO), but the diphthong and the subsequent fatal violation of *COMPLEX remain. The second candidate is therefore also eliminated. Candidate (d) re-syllabifies the vowels so that they occur across a syllable boundary to avoid the violation of *COMPLEX, thereby incurring a fatal violation of NOHIATUS. It is therefore eliminated. The penultimate candidate (c) contains an epenthetic glide as a result of spreading, thus incurring a non-fatal violation of UNIQUE and DEP-IO and satisfying the *COMPLEX constraint. The epenthetic vowel satisfies NOCODA and incurs an additional non-fatal violation of DEP-IO. Thus, this is the optimal candidate for the realisation of this word in Xitsonga.

Tableau 10: The Xitsonga Realisation of the English Word /taʊəl/

/taʊəl/	*COMPLEX	NOHIATUS	NOCODA	UNIQUE	DEP-IO
a. [taul]	*!		*		
b. [tau.la]	*!				*
c. [ta.u.la]		*!			*
d. ☞[ta.**w**u.la]				*	**

Tableau 10 is very similar to Tableau 9, except in this instance the epenthetic glide is the labial glide [w] as opposed to the coronal glide [j]. Candidate (a) is eliminated as it fatally violates *COMPLEX and NOCODA. The only alteration that has been made to candidate (a) is, in essence, segment substitution. Candidate (b) contains an epenthetic vowel so as to satisfy NOCODA, but the diphthong is still present, and so it is eliminated due to a fatal violation of *COMPLEX. There is also a legal violation of DEP-IO due to the epenthesis. Candidate (c) contains an illegal sequence of heterosyllabic vowels, therefore fatally violating NOHIATUS, and is thus disqualified. Finally, candidate (d) contains two epenthetic segments – a vowel to satisfy NoCoda, and a labial glide [w] to satisfy *COMPLEX (thus, incurring two non-fatal violations of DEP-IO). The spreading of the features of the labial vowel [u] resulting in glide epenthesis mean that UNIQUE has also been violated, albeit legally. Thus, having incurred no fatal violations, candidate (c) is the optimal candidate.

This analysis can be applied *mutatis mutandis* to the Afrikaans data as well, but for the sake of detail, the following tableau looks at how the Afrikaans word /braːi/ is rephonologised so as to not contain complex consonant clusters or diphthongs.

Tableau 11: The Xitsonga Realisation of the Afrikaans Word /braːi/ 'barbecue'

/braːi/	*COMPLEX	NOHIATUS	UNIQUE	DEP-IO
a. [brai]	*!*			
b. [bu.rai]	*!			*
c. [bu.ra.i]		*!		*
d. ☞[bu.ra.**j**i]			*	**

In the above tableau, the first candidate (a) contains a consonant cluster and a diphthong and so incurs two fatal violations of *COMPLEX. It is therefore disqualified. Candidate (b) solves the issue of the consonant cluster, but is eliminated given that it still incurs a fatal violation of *COMPLEX due to the presence of the diphthong. The penultimate candidate (c) contains an undesirable sequence of vowels across a syllable boundary, thereby incurring a fatal violation of NOHIATUS. It is therefore eliminated as the optimal candidate. Candidate (d) is the optimal candidate as it satisfies both facets of *COMPLEX (that is, no consonant clusters or diphthongs). It incurs only minor violations of UNIQUE and DEP-IO.

To summarise thus far: *COMPLEX is high-ranking, while UNIQUE is low-ranking. This is due to the fact that spreading is used to determine which glide will be inserted between two vowel elements so as to eliminate the diphthong. As such, the constraint ranking as it stands is: NOHIATUS, NOCODA, *COMPLEX >> UNIQUE, DEP-IO, IDENT-IO. The following section examines how secondary articulation in the form of prenasalisation functions to eliminate certain consonant clusters.

5.2.4. Monophthongisation to Eliminate Diphthongs

An additional way in which diphthongs are eliminated in Xitsonga is to replace them with a legal monophthong. This, however, does not occur consistently throughout the language, with some words containing the diphthong /eɪ/ being resolved using glide epenthesis, and other instances with substitution for the vowel [e]. This process could be influenced by external factors, like orthography for example. This is a widely-attested occurrence: for example, Vendelin and Peperkamp (2005) illustrated the effect that orthography has on the realisation of English loanwords in French, indicating that there is a difference between taught pronunciation, and pronunciation when reading. French speakers tend to change their realisation of vowels based on the absence or presence of a written input, thus indicating that orthography has a great impact on how loanwords are adapted (Vendelin and Peperkamp, 2005).

The table below presents some examples of this process of monophthongisation:

Table 22: Monophthongisation to Resolve Diphthongs

Diphthong	**Xitsonga**		**Monophthong**	**Gloss**	**Original**
/əʊ/	xìtófù	[ʃì.t**ó**.fù]	[o]	stove	/stəʊv/
	báyísíkópò	[bá.jí.sí.k**ó**.pó]		bioscope	/baɪəskəʊp/
	brochi	[br**o**.tʃi]		brooch	/brəʊtʃ/
	zírô	[zí.r**o**]		zero	/zɪərəʊ/
/eɪ/	phèphà	[p**è**.pà]	[e]	paper	/peɪpə/
	khékhè	[k**é**.kè]		cake	/keɪk/
/aʊ/	póndò	[p**ó**.^{n}dò]	[o]	pound	/paʊnd/
/əi/	-férefa	[fé.r**e**.fa]	[e]	polish	/frəif/

The sound replacements are consistent, each time involving the replacement with a phonetically similar monophthong. However, this is not the main strategy used to repair diphthongs, as glide epenthesis is more common.

5.2.5. Prenasalisation to Eliminate Consonant Clusters

In addition to vowel epenthesis, there is another strategy that is employed by Xitsonga to repair a very select few instances of consonant clusters. In cases where an obstruent is preceded by a nasal in the original donor language it counts as a consonant cluster. Such structures violate *COMPLEX and so are not viable in Xitsonga as they appear. However, Xitsonga contains monosegmental prenasalised consonants. It is a fairly frequent occurrence for consonant clusters in loanwords that lend themselves to this sort of treatment to surface as a single, prenasalised consonant, thereby eliminating the occurrence of the consonant cluster. This is illustrated by the following two diagrams, which show the difference between the English word *camp* and its Xitsonga realisation [ᵑkaᵐbu].

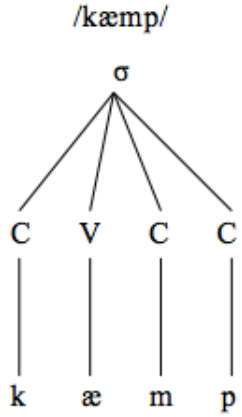

Figure 8: CV Diagram of /kæmp/

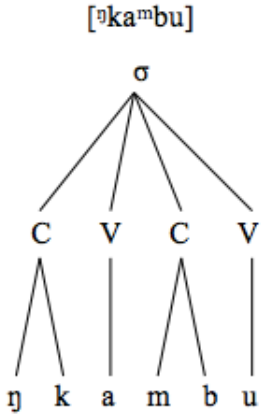

Figure 9: CV Diagram of [ᵑkaᵐbu]

The English word in the first diagram contains a coda that consists of two independent consonants – a consonant cluster. The second diagram, of the Xitsonga realisation of the same English word, illustrates that the word maintains its CV syllable structure, but that each C is a complex one involving prenasalisation. There is much evidence to support the fact that this type of co-articulation, common in Bantu languages, results in a single segment as opposed to a consonant cluster (see Khan,

2016; Kadenge, 2015). In cases such as this, epenthesis does not need to occur to break up the consonant cluster.

The following table provides a list of examples that illustrate this prenasalisation process:

Table 23: Examples of Words that Illustrate Prenasalisation as a Strategy to Repair Consonant Clusters

Xitsonga		**Gloss**	**Original**	
hémbè	[hé.^{m}bè]	shirt	Afrikaans	/ɦɛmp/
ínkì	[í.^{ŋ}kì]	ink	English	/ɪŋk/
-jámba	[-dʒá.^{m}ba]	jump	English	/dʒʌmp/
khándélàrì	[ká.^{n}dé.là.rì]	candlestick	Afrikaans	/kandəlaːr/
khàndlèlà	[kà.^{n}ɮè.là]	candle	English	/kændl̩/
mángú	[má.^{ŋ}gú]	mango	English	/mæŋgəʊ/
njhìní	[^{n}dʒì.ní]	engine	English	/endʒɪn/
nkámbù	[^{ŋ}ká.^{m}bù]	camp	English	/kæmp/
póndò	[pó.^{n}dó]	pound sterling	English	/paʊnd/
sàmbhókò	[sà.^{m}bó.kò]	sjambok	Afrikaans	/ʃambɔk/
sàndhàlà/àsì	[sà.^{n}dà.là]	sandal	English	/sændl̩/
vhènkele	[vè.^{ŋ}ke.le]	shop	Afrikaans	/vəŋkəl/
xìpáncì	[ʃì.pá.^{n}tʃì]	sponge	English	/spʌndʒ/
bàndèjì	[bà.^{n}dè.jì]	bandage	English	/bændɪdʒ /
bùràndì	[bù.rà.^{n}dì]	brandy	English	/brændi/

The following tableau illustrates this process of prenasalisation using the realisation of the English word *ink* /ɪŋk/, which is realised in Xitsonga as [i.^{ŋ}ki].

Tableau 12: The Xitsonga Realisation of the English Word /ɪŋk/

/ɪŋk/	*COMPLEX	NOCODA	DEP-IO
a. [iŋk]	*!	*	
b. [i^{ŋ}k]		*!	
c. ☞[i.^{ŋ}ki]			*

In the above tableau, candidate (a) is the least changed from the original English. Therefore, there remains a consonant cluster, which also acts as a coda for the monosyllabic word. Thus, candidate (a) fatally violates the two high-ranking constraints and is therefore eliminated as a possible optimal candidate. Candidate (b) invokes prenasalisation, which satisfies *COMPLEX, but there is still a fatal violation of NOCODA, and so it, too, is eliminated. Finally, candidate (c) uses prenasalisation and vowel epenthesis to satisfy *COMPLEX and NOCODA respectively. It incurs only minor, non-fatal violations of the low-ranking constraint DEP-IO. Candidate (c) is, therefore, the optimal candidate for the Xitsonga realisation of the English word /ɪŋk/.

A very similar process can be applied to the Afrikaans word *kandelaar* /kandəla:r/ 'candlestick', which is realised as [ka.^{n}de.la.ri] in Xitsonga. For the sake of completeness, the following tableau illustrates this:

Tableau 13: The Xitsonga Realisation of the Afrikaans Word /kandəla:r/

/kandəla:r/	*COMPLEX	NOCODA	DEP-IO
a. [ka.nde.lar]	*!	*	
b. [ka.^{n}de.lar]		*!	
c. ☞[ka.^{n}de.la.ri]			*

In Tableau 13 above, candidate (a) fatally violates *COMPLEX and NOCODA, and so is eliminated as a potential optimal candidate. Candidate (b) repairs the complex consonant cluster by means of prenasalisation, but the coda remains, thus incurring a fatal violation of the high-ranking NOCODA constraint. Candidate (c) uses prenasalisation to satisfy *COMPLEX and vowel epenthesis to satisfy NOCODA, and only incurs a non-fatal violation of DEP-IO. Therefore, candidate (c) is the optimal candidate for the Xitsonga realisation of the Afrikaans word /kandəla:r/.

5.2.6. Structure Retention

Occasionally, when examining loanword rephonologisation, one encounters words which require minimal repairs. These words generally coincidentally already comply with the syllable requirements of the receiver language, and need only undergo segment substitution. The following table provides such examples:

Table 24: Examples of Words That Undergo No Change at Syllable Level

Xitsonga		**Gloss**	**Donor**	**Original**
kòfí	[kò.fí]	coffee	Afrikaans	/kofi/
kópì	[kó.pì]	copy	English	/kɒpi/
lápí	[lá.pí]	cloth	Afrikaans	/lapi/
lòrí	[lò.rí]	lorry	English	/lɒri/
ólì	[ó.lì]	oil/paraffin	Afrikaans	/oːli/
sòpè	[sò.pè]	intoxicating distilled drink	Afrikaans	/soːpi/
dìnà	[dì.nà]	dinner	English	/dɪnə/
jèsí	[dʒè.zí]	jersey	English	/dʒɜzi /
kótà	[kó.tà]	quarter	English	/kɔːtə/
pìjámà	[pì.dʒá.mà]	pyjamas	English	/pədʒɑːmə/
yúnívhésìtí	[jú.ní.vé.sì.tí]	university	English	/juːnɪvɜːsɪti/

The words in the above table already adhere to a CV syllable structure, and so no changes need to occur at syllable level. The following tableau illustrates these words' cooperation with Xitsonga, using the English word *copy* /kɒpi/, which is realised as [ko.pi] in Xitsonga. First, it is relevant to note that the vowel /ɒ/, which occurs in English, is prohibited in Xitsonga. This prohibition is covered by the constraint introduced at the beginning of this chapter in (64): OK(SEG).

Tableau 14: The Xitsonga Realisation of the English Word /kɒpi/

/kɒpi/	OK(SEG)	*COMPLEX	NOCODA	IDENT-IO
a. [kɒ.pi]	*!			
b. ☞ [ko.pi]				*

In the above tableau, candidate (a) is the English form of the word. It contains no diphthongs, no complex consonant clusters and no syllable codas, thus satisfying all three of the most commonly violated highly ranked constraints. It is only eliminated because of the presence of the illegal vowel [ɒ], which fatally violates OK(SEG). The optimal candidate (b) replaces the offending vowel /ɒ/ with the Xitsonga vowel [o], thereby violating IDENT-IO, which we already know is a violable low-ranking constraint. This is the only change that need have taken place. The remaining words in this section undergo the same process of segment substitution, but the essential syllable structure of the words is retained as it already adheres to the phonological rules of Xitsonga.

5.2.7. Summary of Strategies

In summary, Xitsonga employs several repair strategies to rephonologise loanwords. Segment substitution does not occur at syllable level, but is nevertheless included as a strategy so as to make this study more all encompassing. IDENT-IO prohibits changing the features of a segment, but is low-ranking in Xitsonga as segment substitution always occurs in cases where a particular sound is outlawed in Xitsonga. The illegality of particular sounds can be indicated by means of constraints which take the form *x, where x is the offending sound. For example, *ɒ indicates that the vowel ɒ is not allowed. These specific constraints are all high-ranking in Xitsonga. However, these can all be accounted for by means of the high-ranking constraint OK(SEG). Some words in English and Afrikaans already adhere to the syllable structure requirements of Xitsonga, and so only need to undergo segment substitution.

Secondly, vowel epenthesis is the most common strategy that is applied to repair loanwords at syllable level. It involves inserting a vowel into a word to either eliminate a coda (to satisfy the high-ranking NOCODA constraint), or break up a consonant cluster (to satisfy the usually high-ranking *COMPLEX constraint). Epenthesis of any kind in Xitsonga non-fatally violates DEP-IO. However, there is evidence to suggest the presence of sub-phonologies. That is, some speakers may retain certain consonant clusters that would otherwise be outlawed in Xitsonga. This is indicative of differing intra-linguistic constraint rankings – particularly of the constraint *COMPLEX – and is a common feature of Bantu languages, many speakers of which are bilingual.

Diphthongs are predominantly repaired by means of glide epenthesis, which involves the spreading of certain features of one of the vowels. This is to satisfy the high-ranking constraint *COMPLEX. Spreading incurs a non-fatal violation of the constraints UNIQUE and DEP-IO.

English and Afrikaans words that contain a sequence of a nasal and an obstruent /NC/ are repaired by means of prenasalisation, which results in a segment of the form [^{N}C]. This is to prevent a consonant cluster from occurring, thereby satisfying *COMPLEX.

Finally, certain words that are adopted into Xitsonga already coincidentally abide by the rules of the language adopting them. These words only undergo segment substitution, so as to comply with the phonemic inventory of Xitsonga. They are, however, already in the form /CVCV/, therefore requiring no repairs at syllable level.

As such, the constraint ranking of Xitsonga may be stated thusly: NOCODA, PEAK, *COMPLEX, MAX-IO >> IDENT-IO, DEP-IO, UNIQUE. From this, it is interesting to note that most of the high-ranking constraints are markedness constraints, while the low-ranking constraints are all faithfulness constraints. The ranking of *COMPLEX, as it applies to consonant clusters, may change in the speech of some bilingual speakers, therefore altering the constraint ranking to: NOCODA, PEAK, MAX-IO >> *COMPLEX, IDENT-IO, DEP-IO, UNIQUE. The tableau below summarises the constraint ranking and the strategies that have so far been identified and described.

Tableau 15: Summary of Syllable Structure Repair Strategies and Constraint Ranking

Repair Strategy	**Constraints →** / **Optimal Candidates ↓**	**OK(SEG)**	**NOCODA**	***COMPLEX**	**MAX-IO**	**NOHIATUS**	**IDENT-IO**	**DEP-IO**	**UNIQUE**
Segment substitution	[k**o**.pi]						*		
Vowel epenthesis to eliminate codas	[pa.t**o**]							*	
Vowel epenthesis to eliminate consonant clusters	[fo.r**o**.ko]						*	**	
Glide epenthesis	[re.**j**i.si]						*	**	*
Prenasalisation	[i.$^{\eta}$ki]						*	*	

The analysis that has been conducted in this chapter has identified, described and analysed the repair strategies that conspire in Xitsonga to preserve the CV syllable structure of the language. These findings complement the previous work that was done on vowel hiatus resolution in Xitsonga by Vratsanos and Kadenge (2017) by expanding on the list of repair strategies that function at the level of the syllable. This illustrates that there is a myriad strategies operating at this level, indicating that the syllable level is one that is important in phonological studies of Xitsonga, as well as of Bantu languages more extensively.

The following section attempts to position Xitsonga in relation to other Bantu languages, by comparing the repair strategies used by four Bantu languages to rephonologise loanwords, thereby reconciling the disparate syllable structures of the donor language(s) and receiver language.

5.3. Xitsonga and other Bantu languages: A comparison

This section examines some of the similarities and differences between Xitsonga loanword rephonologisation and that of some of its Bantu relatives, namely isiZulu, chiShona and isiNdebele. This is in an effort to contribute to linguistic typology, and situate Xitsonga within its language family.

First, all four of the languages in question here have certain features in common. All four languages have a five vowel system, only making use of the vowels /a e i o u/ (Khan, 2016; Kadenge, 2012; Mahlangu, 2007). Thus, naturally, segment substitution must occur in all of these languages indicating, like Xitsonga, that IDENT-IO is low-ranking in all three of the languages to which it is being compared. Moreover, like Xitsonga, isiZulu, chiShona and isiNdebele have CV syllable structures, and so need to employ strategies to repair codas, consonant clusters and diphthongs when rephonologising words from languages with disparate syllable structures to their own.

As in Xitsonga, vowel epenthesis is common, and serves a dual function in all of the languages in question: to eliminate codas and consonant clusters. Thus, its use in Xitsonga is unsurprising and unremarkable. The first word that will be taken into

consideration that, luckily, works across three of the four languages under scrutiny is the English word *drum* /drʌm/.

Table 25: The Realisation of /drʌm/ in Xitsonga, isiZulu and chiShona

English	**Xitsonga**	**isiZulu**	**chiShona**
/drʌm/	[di.ra.mu]	[i.di.la.mu]	[ḍi.ra.mu]

In all three languages, vowel epenthesis has been applied to (a) eliminate the consonant cluster /dr/, and (b) eliminate the presence of the coda /m/. Additionally, the vowel /ʌ/ is illegal in Xitsonga, isiZulu and chiShona, and has been replaced by [a] across the board. This indicates that OK(SEG) is high-ranking in all three languages. In contrast to Xitsonga and chiShona, isiZulu does not allow /r/ to occur and so replaces it with the legal [l]. The [r] is retained in Xitsonga and chiShona as it forms part of the phonemic inventories of those languages. Moreover, unlike isiZulu, Xitsonga and chiShona do not have a morphosyntactic requirement involving the addition of a word-initial vowel [i]. The choice of epenthetic vowel, however, is more complex but no less predictable: isiZulu and chiShona both insert a coronal vowel in the context of a coronal consonant and a labial vowel in the context of a labial vowel – both are evidenced in the example of *drum* above. A future study might compare this to the epenthetic vowel choice of Xitsonga, which – as stated previously – is beyond the scope of this study.

Similarly, isiNdebele also makes use of vowel epenthesis to serve the same two functions as above: to eliminate consonant clusters and codas. This is evident in the table below, which illustrates the realisations of the English word *stool* /stu:l/ in Xitsonga, isiZulu and isiNdebele:

Table 26: The Realisation of /stu:l/ in Xitsonga, isiZulu and isiNdebele

English	**Xitsonga**	**isiZulu**	**isiNdebele**
/stu:l/	/ʃi.tu.lu/	[i.si.tu.lo]	[i.si.tu.lo]

Both isiZulu and isiNdebele involve the morphosyntactic insertion of a word-initial [i], while Xitsonga does not. The main difference between Xitsonga and isiZulu and isiNdebele here is the choice of epenthetic vowel to eliminate the coda. Xitsonga epenthesises [u] while isiZulu and isiNdebele both use [o]. Once again, [i] has been epenthesised to eliminate the consonant cluster [st], which, by extension results in the presence of the noun class prefix [ʃi]. This process is also evident in chiShona, as evident in the following comparison table:

Table 27: The Realisation of the Afrikaans Word /spo:k/ in Xitsonga and chiShona

Afrikaans	**Xitsonga**	**chiShona**
/spo:k/	[ʃi.po.ku]	[tʃi.po.ku]

In each case, the /sp/ consonant cluster is broken up by means of an epenthetic vowel, which also serves to create the noun Class 7 prefix [ʃi] in Xitsonga, and [tʃi] in chiShona.

IsiZulu, unlike the other three languages in question, occasionally makes use of consonant deletion to eliminate codas. For example, the English word /kɪtʃən/ is realised as [i.ki.ʃi] in isiZulu (cf. chiShona [kiʧeni] and Xitsonga [kiʧini]). This is not a process found across all four languages and, of those being scrutinised here, isiZulu seems to be the only one to employ this strategy in this context. Therefore, Xitsonga is more similar to chiShona and isiNdebele than to isiZulu in this regard.

However, a similarity between all four languages is the use of glide epenthesis to eliminate diphthongs. What is more, every instance in all four languages is a spreading process, in which the features of the second vowel determine the glide that is epenthesised. The following table provides some examples of this in the three newly introduced languages:

Table 28: Diphthong Elimination by Glide Epenthesis in isiZulu, chiShona and isiNdebele

	isiZulu	**chiShona**	**isiNdebele**
Coronal Vowel	/taɪgə/ → [i.ta.**j**i.ga] ‘tiger’	/peɪnt/ → [pa.**j**i.^{n}di] ‘paint’	/taɪ/ → [i.ta.**j**i] ‘tie’
Labial Vowel	/ʃaʊə/ → [i.ʃa.**w**a] ‘shower’	/θaʊznd/ → [ta.**w**u.ze.^{n}di] ‘thousand’	/fəʊn/ → [i.fo.**w**u.nu] ‘phone’

In each case above, as in Xitsonga, the spreading of the V-Place of a coronal vowel results in the insertion of the coronal glide [j], while the spreading of the V-Place of a labial vowel results in the insertion of the labial vowel [u]. This is evidently not an uncommon phenomenon in Bantu languages. Glide epenthesis is a common repair strategy for dipthong elimination, as above, as well as for vowel hiatus resolution – as in the chiZezuru (Downing and Kadenge, 2015) and Chichewa (Downing, 2016) examples below:

Table 29: Glide Epenthesis as a Vowel Hiatus Resolution Strategy

	ChiZezuru	**Chichewa**
Coronal Vowel	/tí-énde/ → [tí**j**énde] ‘we should go’	/ku-imba/ → [ku**j**imba] ‘to sing’
Labial Vowel	/tí-úye/ → [tí**w**úye] ‘we should come’	/mu-uluk-e/ → [mu**w**uluúké] ‘you (pl.) should fly’

In summary, Xitsonga, chiShona, isiZulu and isiNdebele use similar repair strategies to rephonologise loanwords. Segment substitution occurs across the board, with differences occurring with regards to which segments are allowed and which are not (for example, the case of /r/ being realised as [l] in isiZulu and not the others). Vowel epenthesis serves a dual purpose in isiZulu, chiShona and isiNdebele in much the same way as it does in Xitsonga: it serves to eliminate both codas and consonant clusters. Finally, all languages use glide epenthesis in similar ways to eliminate diphthongs. Like in Xitsonga, the choice of glide is dependent on the V-Place of the vowel, which spreads to form either an epenthetic coronal glide [j] or labial glide [w].

5.4. Summary of Chapter

This chapter provided an OT analysis of repair strategies in Xitsonga that act at syllable level to repair English and Afrikaans loanwords so that they adhere to the rules of Xitsonga. Xitsonga makes use of vowel epenthesis, glide epenthesis, monophthongisation, prenasalisation and segment substitution to rephonologise loanwords. Vowel epenthesis serves two purposes: to eliminate consonant clusters and, to a greater extent, codas. Vowel epenthesis, prenasalisation, and glide epenthesis all serve to maintain the CV syllable structure of Xitsonga, while segment substitution ensures that only the five vowel permitted in Xitsonga occur in the output:

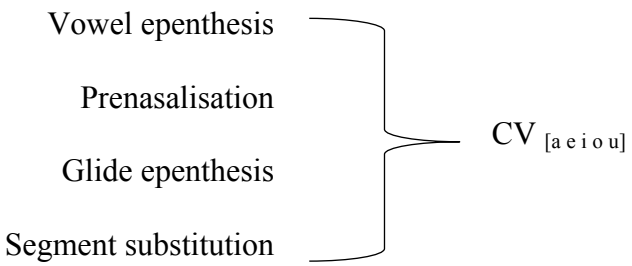

Figure 10: Repair strategies conspire to maintain CV syllable structure

There is some evidence of intra-linguistic differences – possibly a difference between monolinguals and bilinguals, or in formal versus informal Xitsonga. The use of the various strategies, as well as this intra-linguistic disparity, was accounted for by means of OT constraint rankings.

This chapter also compared the strategies used by Xitsonga to those used by three of its relatives: isiZulu, chiShona and isiNdebele. This illustrated that Xitsonga follows a fairly expected route, as the strategies used by all four languages are very similar.

Deviating from this chapter's discussion of loanwords, the following chapter looks at Prosodic Word minimality requirements in Xitsonga based on native phonology. In a similar way to Chapter 5, Chapter 6 will present examples and OT analyses in order to account for this second batch of repair strategies.

CHAPTER 6: PROSODIC WORD MINIMALITY

6.1. Introduction

Languages generally impose restrictions on acceptable minimal sizes on their PWords (Prince and Simolensky, 2004). Many languages trigger repair strategies to eliminate the occurrence of monosyllabic words, preferring instead words that are minimally disyllabic. Bantu languages are known for having this preference (Downing, 2005).

Like many Bantu languages, Xitsonga prefers words to contain a minimum of two syllables. This chapter examines how Xitsonga ensures this, by looking at Class 9 nouns and the formation of imperative verbs. An epenthetic *yi-* is used to augment class 9 nouns (with a null prefix) to be minimally disyllabic. In the formation of the imperative, monosyllabic verb stems are consistently augmented by means of the addition of *–na* to the end of the stem. As mentioned earlier, these strategies are accounted for using OT.

An important, high-ranking constraint, is constantly relevant to a discussion of minimality, namely:

72. CANONICALSTEM (CS)

Prosodic stems are minimally disyllabic (Downing, 2005).

Stems consist of a root and an affix, and must branch at syllable level according to Downing's (2005, p. 12) illustration below.

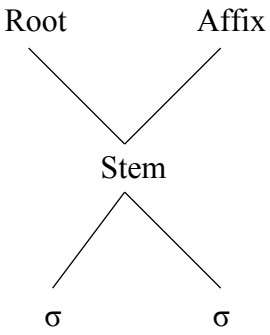

Figure 11: Canonical Stem (Downing, 2005)

This indicates that a stem that is monosyllabic creates a "mismatch" (Downing, 2005, p. 12) between the branching of the morphological and phonological elements, in which the second syllable (indicated by the sigma branch on the right) is left empty. Thus, in languages with minimality requirements, the CS constraint is high ranking.

6.2. Class 9 Nouns in Xitsonga

In Xistonga, Class 9 nouns often have a null prefix. The table below presents some examples of this. Note that all of the nouns in the following table consist of at least two syllables.

Table 30: Class 9 Nouns with Null Prefix

Noun		**Gloss**
mbyana	[$^{m}b^{j}$a.na]	dog
homu	[ho.mu]	cow
mbyani	[$^{m}b^{j}$a.ni]	stone for forging iron
phungubya	[pu.^{ŋ}gu.b^{j}a]	jackal
phanga	[pa.^{ŋ}ga]	a type of seed

Contrary to this, when a noun stem consists only of one syllable, the stem is augmented by means of a prefix *yi-*. The table below presents some examples of this:

Table 31: Monosyllabic Class 9 Nouns

Noun		**Gloss**
yi-ndlu	[ji-^{n}ɮu]	house
yi-nhla	[ji-^{n}ɬa]	point
yi-nkho	[ji-^{n}ko]	vessel for beer
yi-ntshwa	[ji-^{n}ʧ^{w}a]	termites for eating

In addition to CS, detailed above, the following markedness constraint is also high-ranking in Xitsonga:

73. WORD/MORPH

Words are always parsed into morphemes (Downing, 2005).

This necessitates the epenthesis of a morpheme, as opposed to that of a phonological element, such as a sound. Epenthesis of any kind, as evidenced already in Chapter 5 previously, incurs a violation of DEPENDENCY constraints. In this case, DEPMORPH is violated, albeit non-fatally:

74. DEPMORPH

All morphemes in the output must be present in the input (no epenthetic morphemes) (Downing, 2005).

The following tableau illustrates how these constraints interact in order to result in the epenthesis evidence in the above table:

Tableau 16: The Realisation of the Class 9 Noun /ⁿʒu/

/ⁿʒu /	CS	WORD/MORPH	DEPMORPH
a. ☞ [ji-ⁿʒu]			*
b. [ⁿʒu]	*!		
c. [i-ⁿʒu]		*!	

In Tableau 16 above, the optimal candidate (a) involves the addition of an expletive morpheme (Downing, 2006) [ji-], thereby incurring a non-fatal violation of DEPMORPH. It satisfies CS as the epenthesis results in a disyllabic noun stem, and it also does not violate WORD/MORPH. Candidate (b), however, is eliminated as it incurs a fatal violation of CS as it is not minimally disyllabic as dictated by this constraint. Finally, candidate (c) is eliminated as it involves phonological epenthesis of [i], which fatally violates WORD/MORPH.

Thus, the constraint ranking with regard to the augmentation of nouns so that they are minimally disyllabic is: CS, WORD/MORPH >> DEPMORPH. This is one instance in which a strategy is employed to ensure that words in Xitsonga are minimally disyllabic. The following section looks at a similar process that occurs in the creation of imperative verbs.

6.3. The Imperative in Xitsonga

Scholars of word minimality often study imperatives, as the creation of imperative verb forms in Bantu languages frequently involves merely the use of the stem itself, with no affixes or inflections (Downing and Kadenge, 2015). Xitsonga is no exception, as evident in the table below:

Table 32: Xitsonga Imperatives – Polysyllabic Verb Stems

Verb	Gloss	Imperative
tirha	work	[ti.ra]
nwana	drink	[ᵑwa.na]
baka	bake	[ba.ka]
hima	hit	[hi.ma]
khirhakhirha	work hard	[ki.ra.ki.ra]
langa	choose	[la.ᵑga]
letela	teach	[le.te.la]
nghena	enter	[ᵑge.na]

The above table illustrates that the imperative form of the verb is identical to the original stem. Note that all of the verbs in the above table are polysyllabic already at the level of the stem, and are therefore polysyllabic in the imperative, and so augmentation is redundant. The case is slightly different when the verbs in question are monosyllabic, as evidenced by the following table:

Table 33: Xitsonga Imperatives – Monosyllabic Verb Stems

Verb	Gloss	Imperative
-dya	eat	[dʲa-na]
-ba	beat	[ba-na]
-fa	die	[fa-na]
-ha	give	[ha-na]
-ka	draw water	[ka-na]
-kha	pick fruit	[kʰa-na]
-lwa	fight	[lʷa-na]
-ta	come	[ta-na]
-na	fall	[na-na]
-nya	defecate	[nʲa-na]
-pfa	come from	[pfa-na]
-phya	evaporate	[pʲa-na]
-tha	break (egg)	[tʰa-na]
-twa	hear	[tʷa-na]
-va	be	[va-na]
-wa	fall, drop	[wa-na]
-xa	rise	[ʃa-na]
-xwa	remain	[ʃʷa-na]
-ya	go	[ja-na]

In the above table, the verb stems are all monosyllabic. In the imperative form, each verb receives an epenthetic [–na] onto the end of it, thus forming a disyllabic imperative form. This can be accounted for in much the same way as the epenthesis that occurs with the class 9 nouns, detailed above. CS and WORD/MORPH remain high-ranking, while epenthesis violates DEPMORPH non-fatally. The CanonicalStem (CS) constraint can, however, be narrowed here slightly as the imperative form of the verbs is minimally equivalent to the canonical stem itself:

75. IMPERATIVE≈CS

The imperative form is minimally coincident with the canonical stem itself (Downing, 2005).

This constraint is high ranking in Xitsonga. The following tableau accounts for the realisation of the imperative form of the verb /dʲa/ ‘eat’ as [dja-na].

Tableau 17: The Imperative Form of the Xitsonga Verb /dʲa/

/dʲa/	IMPERATIVE≈CS	WORD/MORPH	DEPMORPH
a. ☞ [dʲa-na]			*
b. [i-dʲa]		*!	
c. [dʲa]	*!		

In the tableau above, the optimal candidate is (a), as the epenthetic morpheme merely incurs a non-fatal violation of DEPMORPH, and satisfies the high-ranking IMPERATIVE≈CS and WORD/MORPH constraints. Candidate (b) involves an epenthetic vowel [i] word-initially, which subsequently results in a fatal violation of WORD/MORPH as it is not parsed as a morpheme. It is therefore eliminated. Finally,

candidate (c) is also eliminated as it violates the CS requirement by consisting solely of the monosyllabic verb stem.

Thus, the constraint ranking remains the same for verbs as it was for nouns in the previous section: IMPERATIVE≈CS, WORD/MORPH >> DEPMORPH.

6.4. Summary of Strategies

It is evident that Xitsonga has minimality requirements governing its words, which are required to consist of at least two syllables. Class 9 nouns and imperative forms employ a similar strategy that acts to epenthesise an additional morpheme of the shape [CV], so as to augment the monosyllabic stem by means of an extra syllable. Class 9 nouns receive a word-initial [ji-], while verb stems receive a word-final syllable [-na] in the imperative. This is all to satisfy the CANONICALSTEM (CS) constraints, which dictate that stems must be minimally disyllabic. Moreover, WORD/MORPH is high-ranking, and dictates that a morpheme must be added, as the individual parts of a word must be parsed as morphemes. Finally, epenthesis of these morphemes incurs a non-fatal violation of DEPMORPH, which dictates that each ouput morpheme must have a correspondent in the input. The following tableau summarises how the optimal candidates presented in this chapter adhere to the constraint ranking.

Tableau 18: Summary of Minimality Constraints

Optimal Candidates ↓	**Constraints** →	CANONICALSTEM	WORD/MORPH	DEPMORPH
[dʲa-na]				*
[ji-ⁿɮu]				*

Once again, the importance of analysis at syllable level must be emphasised. As with loanwords, these strategies act at this level in order to maintain the syllable-related structural well-formedness requirements of Xitsonga. With loanwords, the strategies act to reconcile the disparate syllable structures of the donor languages with the CV structure of Xitsonga. With word minimality, the requirements once again relate directly to the syllable, dictating how many syllables must constitute a well-formed word.

6.5. Comparison to Other Bantu Languages

Most Bantu languages have minimality requirements, which have formed the basis of many different studies (see Park, 1997; Downing and Kadenge, 2015). The strategies differ from language to language but the goal is ultimately the same cross-linguistically: to ensure that stems (words) are minimally disyllabic.

Epenthesis of some element (be it a morpheme or other phonological string) is seemingly inevitable, meaning that a faithfulness DEPENDENCY constraint of some sort is almost always violated in order to satisfy higher-ranking markedness constraints that dictate word size. The following table summarises the creation of the imperative form of the verb ‘eat’ in seven Bantu languages (Downing, 2015;

Downing and Kadenge, 2015), including Xitsonga for comparison purposes. The verb root is in bold.

Table 34: The Imperative of 'eat' in Bantu Languages

Language	Imperative Form of 'eat'
Xitsonga	[**dʲa**-na]
IsiZulu	[ji-**dla**]
Tshivenda	[i-**ɻa**]
Southern Sotho	[i-**ʤa**]
SiSwati	[**ɮa**-ni]
Swahili	[ku-**la**]
ChiZezuru	[i-**ʤga**]

The above table illustrates how languages with the same (or similar) requirements deal with the problem differently. For example, Xitsonga and chiZezuru have the same verb stem [dʲa], but different strategies to solve it. Xitsonga adds a morpheme to the end of the word, while chiZezuru epenthesises a vowel [i] to the beginning of the word. SiSwati, on the other hand, is very reminiscent of Xitsonga, but for the morpheme itself: SiSwati uses [-ni] as opposed to Xitsonga's [-na].

Nevertheless, the requirements evident from the table above are the same cross-linguistically, indicating that there is nothing surprising about Xitsonga. The structural requirements regarding word minimality are common for languages of its type, as is the strategy employed by this language in order to ensure the satsifaction of these requirements.

6.6. Summary of Chapter

Chapter 6, the penultimate chapter in this dissertation, has presented evidence illustrating that Xitsonga prefers words which are minimally disyllabic. This was shown using nouns in Class 9, which receive no prefix when the stem is polysyllabic, but are augmented by an initial [ji-] when monosyllabic. Additional evidence from the imperative formation was also presented. In this case, monosyllabic verb stems are augmented by means of a word-final [-na].

This chapter also presented a brief discussion of the minimality requiremtnes of other Bantu languages in relation to Xitsonga. The following chapter, the final one in this dissertation, provides some concluding remarks, and recommendations for further study.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS FOR FURTHER STUDY

7.1. Conclusion

This research set out to identify some of the repair strategies employed by Xitsonga to maintain its preferred phonological structures. It aimed to do so by looking at two different aspects of the language: rephonologisation of loanwords from English and Afrikaans and how they are repaired at syllable level so as to conform to the CV syllable structure of Xitsonga; and evidence from native phonology, illustrating how Xitsonga maintains its minimality requirements. The study aimed to identify these repair strategies and analyse them using OT, then compare them to the strategies used by other Bantu languages.

The data analysed in this study consisted of a list of words and constructions collected from several dictionaries and previous studies, which were then verified by two L1 speakers of Xitsonga. OT served as the main theoretical framework, and allowed the identified strategies to be accounted for by means of constraint rankings. Additional insights were provided, where relevant, by means of FG. Both frameworks are used to great effect by many other researchers, and are considered topical and relevant by today's phonologists. OT especially is useful in illustrating how and why certain repair strategies are selected.

Across loanword rephonologisation and prosodic word minimality, Xitsonga was found to prefer epenthesis as the main strategy. Vowels are epenthesised in loanwords in order to eliminate the presence of codas and break up consonant clusters, thereby ensuring that the adopted words adhere to the CV syllable structure of Xitsonga. For

example, /desk/ contains a consonant cluster /sk/ which acts as the coda of the monosyllabic word. Vowel epenthesis occurs twice to form the Xitsonga realisation [de.si.ki], in which the two consonants from the cluster now act as onsets for two newly-formed syllables.

Additionally, morpheme epenthesis occurs in cases of monosyllabic Class 9 nouns and verbs in the imperative so as to ensure that the resultant words are minimally disyllabic. Moreover, glide epenthesis and monophthongisation were employed in loanwords in order to eliminate diphthongs, resulting in words that adhere to a CV syllable structure. In instances of NC clusters in English or Afrikaans words, Xitsonga employed a strategy of prenasalisation, which resulted in a legal monosegmental prenasalised consonant of the form of ^{N}C. Finally, some English and Afrikaans words already adhered to a CV syllable form, which was retained in the Xitsonga realisation. In this and all other cases, segment substitution occurred in order to make the original words conform to the phonemic inventories of Xitsonga.

This study also briefly compared repair strategies that are employed inXitsonga to those that occur in other Bantu languages including isiZulu, isiNdebele, chiShona, Swahili, SiSwati, and others. This comparison illustrated that Xitsonga fits within its language family comfortably. The structure of the language itself, as well as the strategies employed to maintain this structure are not uncommon or unexpected. Nevertheless, it is hoped that this analysis and comparison contributes to Bantu language typology.

Finally, this study illustrated the value of analysis at syllable level. The importance of the syllable as a level of phonological analysis of Bantu languages is unquestionable. Loanwords illustrate that the language places great importance on the CV structure. This complements and reinforces Vratsanos and Kadenge's (2017) findings about vowel hiatus resolution in Xitsonga. In both cases, loanword rephonologisation and vowel hiatus resolution, repair strategies serve to ensure that the syllable structure requirements of Xitsonga are met. Moreover, the minimality requirements of the language are also dependent on syllables, but in this case on the number of CV-shaped syllables within a word. Therefore, the syllable is a vital element in phonological analysis of Xitsonga and, by extension, of Bantu languages more generally.

It is hoped that this study has contributed somewhat to the relatively small body of work on Xitsonga phonology, and by extension to linguistic typology more broadly. This is the first detailed investigation of Xitsonga repair strategies as they function in loanwords and PWord minimality restrictions, and has presented a comprehensive analysis of previously fragmented or superficial data. The following section presents some suggestions for further study, based on areas of research closely linked to the research presented here.

7.2. Recommendations for Further Study

Although it is hoped that the research and analyses presented here are thorough and present a comprehensive account of Xitsonga repair strategies with regard to loanword rephonologisation and PWord minimality, there are still unanswered questions and areas of the language that are yet to be delved into. First, future

research may pay closer attention to the way segment substitution in loanword adaptation functions in Xitsonga. Moreover, Xitsonga shows evidence of containing words adopted from several other languages, including Portuguese, isiZulu, and Tshivenda. Future research may include these words, after having checked their validity, in a more complete analysis of loanword adaptation in Xitsonga.

Another area of Xitsonga that was not included in this research, but is worth more investigation, is the determining factors behind the choice of epenthetic vowels. IsiZulu and isiNdebele rely on phonological context to determine which vowel is epenthesised, while Setswana makes use of vowel harmony (Tzanakakis, 2017). Xitsonga's strategy remains undetermined and would make for interesting research.

Additionally, further research into the intra-linguistic variation within Xitsonga would be an interesting area of study. This study speculates that it could be the result of several factors, including monolingualism versus bilingualism, register, generational gap, and regional variation. However, a more thorough investigation into how these factors come into play would provide valuable insight into the inner workings of Xitsonga. The language is notoriously variable depending on region (Baumbach, 1987), so a detailed analysis of this distribution would contribute immensely to descriptions of Xitsonga, and by extension to Bantu language typology more broadly.

Finally, this study did not examine the way tone interacts with all of the processes detailed. Xitsonga has a rich tonal system that has already been the topic of much study. A thorough analysis of tone as it functions in conjunction with the repair strategies detailed here would contribute greatly to this body of work.

Xitsonga is a rich, complex language that has been largely neglected in recent years. Thus, there remains a massive sphere of unchartered territory in this minority Bantu language, which is no less insightful than that of more prolific languages of its kind.

7.3. Summary of Chapter

The final chapter of this dissertation presented a conclusion, summarising the major findings of the research. It also presented some suggestions for further study.

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APPENDICES

Appendix 1: Xitsonga Loanwords from Afrikaans

Xitsonga		Gloss	Original	
bábàlázà	[bá.bà.lá.zà]	hangover	babalaas	/babalaːs/
bàdala	[bà.da.la]	pay	betaal	/bətaːl/
bájì	[bá.ʤì]	jacket	baadjie	/baːiki/
-báka	[bá.ka]	bake bread	bak	/bak/
-bàkela	[bà.ke.la]	pummel	baklei	/bakləi/
bíkìrí	[bí.kì.rí]	mug	beker	/beːkər/
-bórha	[bó.ra]	drill	boor	/boːr/
bórhó	[bó.ró]	drill, bit, auger	boor	/boːr/
bóròtá	[bó.rò.tá]	plate	bord	/bɔrt/
búkù	[bú.kù]	book	boek	/bœk/
búlóhò	[bú.ló.hò]	bridge	brug	/brəx/
búnú	[bú.nú]	Boer	boer	/bœːr/
búraya	[bú.ra.ja]	roast	braai	/braːi/
bùrúkù	[bù.rú.kù]	trousers	broek	/brœk/
chéfù	[ʧé.fù]	poison	gif	/xɪf/
-déka	[dé.ka]	lay table	dek	/dɛk/
dúkù	[dú.kù]	headcloth	doek	/dœk/
-dúrha	[dú.ra]	be expensive	duur	/dyːr/
èrékìsì	[è.ré.kì.sì]	pea	ertjies	/ɛrkis/
fásìkòtì	[fá.sì.kò.tì]	apron	voorskoot	/voːrskoːt/
fàsítèré	[fà.sí.tè.ré]	window	venster	/fenstər/
-férefa	[fé.re.fa]	polish	vryf	/frəif/
-féyila	[fé.ji.la]	rasp, abrade	vyl	/fəil/
-fíriya	[fí.ri.ja]	make love to	vry	/frəi/
-fòroma	[fò.ro.ma]	mould bricks	vorm	/fɔrm/
fòròmò	[fò.rò.mò]	brick mould	vorm	/fɔrm /
fúláhà	[fú.lá.hà]	wagonload	vrag	/frax/
-fùrunyuka	[fù.ru.nʲu.ka]	cheat	verneuk	/vərnøːk/
gàlàkúnì	[gà.là.kú.nì]	turkey	kalkoen	/kalkœːn/

gàmbókò	[gà.^{m}bó.kó]	snow/white blanket	kapok	/kapɔk/
gérha	[gé.ra]	make irrigation furrow	keer	/keːr/
-háka	[há.ka]	fasten	haak	/ɦaːk/
hákà	[há.kà]	hook	haak	/ɦaːk/
hákìsì	[há.kì.sì]	small clothing hook	hakies	/ɦaːkis/
hàrhàfò	[hà.rà.fò]	spade	graaf	/xraːf/
hárhanà	[há.ra.nà]	sewing cotton	garing	/xaːriŋ/
hàyísà	[hà.jí.sà]	rectangular dwelling	huis	/ɦœys/
hémbè	[hé.^{m}bè]	shirt	hemp	/ɦemp/
hókò	[hó.kò]	pigsty	(vark)hok	/hɔk/
hòncí	[hò.^{n}ʄĩ]	pig	otjie	/oːki/
hóntò	[hó.^{n}tò]	oven'/'brick kiln	oond	/oːnt/
húkù	[hú.kù]	coner	hoek	/ɦœk/
-jàha	[ʤà.ha]	gallop	jaag	/jaːx/
jóngò	[ʤó.^{n}gò]	young person	jong	/jɔŋ/
kàlákà	[kà.lá.kà]	lime	kalk	/kalk/
-kárapa	[ká.ra.pa]	scrape hair off hide	krap	/krap/
kèpìsì	[kè.pì.sì]	cap	keps	/keps/
kèrékè	[kè.ré.kè]	church	kerk	/kɛrk/
kétáná	[ké.tá.ná]	chain	ketting	/ketiŋ/
khándélàrì	[ká.^{n}dé.là.rì]	candlestick	kandelaar	/kandəlaːr/
kòfí	[kò.fí]	coffee	koffie	/kɔfi/
-kòlota	[kò.lo.ta]	owe	skuld	/skəlt/
-kóropa	[kó.ro.pa]	scrub	skrop	/skrɔp/
-kórota	[kó.ro.ta]	shorten	kort	/kɔrt/
-kúnupelà	[kú.nu.pe.là]	button up	knoop	/knoːp/
kùnúpù	[kù.nú.pù]	button	knoop	/knoːp/
-kwáta	[k^{w}á.ta]	to be angry	kwaad	/kwaːt/
làmúlá	[là.mú.lá]	orange	lemoen	/ləmœn/
lápí	[lá.pí]	cloth	lappie	/lapi/
-lása	[lá.sa]	splice together	las	/las/
-lérha	[lé.ra]	tame	leer	/leːr/

lérhà	[lé.rà]	ladder	leer	/leːr/
létèré	[lé.tè.ré]	letter/character	letter	/letər/
màmbárhà	[mà.^{m}bá.rà]	unskilled person	baar	/baːr/
-mòxà	[mò.ʃà]	be careless with food or utensils	mors	/mɔrs/
mpérè	[^{m}pé.rè]	horse	perd	/pert/
nélètá	[né.lè.tá]	needle	naald	/naːlt/
nkàntárà	[^{ŋ}kà.^{n}tá.rà]	guitar	kitaar	/kɪtaːr/
ólì	[ó.li]	oil/paraffin	olie	/oːli/
pákánì	[pá.ká.nì]	beacon/target/boundary stone	baken	/baːkən/
pání	[pá.ní]	powder pan of flintlock musket	pan	/pan/
pátó	[pá.tó]	road	pad	/pat/
-péreka	[pé.re.ka]	preach	preek	/preːk/
pìrómpò	[pì.ró.^{m}pò]	cork of bottle	prop	/prɔp/
pítsì	[pí.tsì]	well	puts	/pəts/
pósò	[pó.sò]	post/mail	pos	/pɔs/
pótó	[pó.tó]	potjie pot	pot	/pɔt/
-púka	[pú.ka]	haunt	spook	/spoːk/
rìbàyì	[rì.bà.jì]	thin white cotton blanket	baai	/baːi/
-sáhá	[sá.há]	saw	saag	/saːx/
sáhà	[sá.hà]	saw	saag	/saːx/
sáká	[sá.ká]	grain bag	sak	/sak/
sàmbhókò	[sà.^{m}bó.kò]	sjambok	sjambok	/ʃambɔk/
-sèfà	[sè.fà]	sift	sif	/sɪf/
sèfò	[sè.fò]	sieve	sif	/sɪf/
-silaha	[si.la.ha]	slaughter	slag	/slax/
síláhà	[sí.lá.hà]	butchery	slag	/slax/
-sókola	[só.ko.la]	work or live under difficulties	sukkel	/səkəl/
sòpè	[sò.pè]	intoxicating distilled	sopie	/soːpi/

		drink		
swírì	[s^{w}í.rì]	lemon	suurlemoen	/syːrləmœn/
tásì	[tá.sì]	pouch for bullets	tas	/tas/
-téreka	[té.re.ka]	draw (tea/coffee)	trek	/trɛk/
tìhélè	[tì.hé.lè]	hell	die hel	/di ɦɛl/
-tòloka	[tò.lo.ka]	interpret	(ver)tolk	/tɔlk/
-vérenga	[vé.re.^{n}ga]	work for wages	werk	/verk/
vhènkele	[vè.^{n}ke.le]	shop	winkel	/wɪŋkəl/
vhíkì	[ví.kì]	week	week	/veːk/
vhìlwà	[vì.l^{w}à]	wheel/tyre	wiel	/viːl/
vùlékè	[vù.lé.kè]	tin with lid and handle	blik	/blɪk/
xìdìgìzèlà	[ʃì.dì.gì.zè.là]	cover/lid of cast iron pot	deksel	/dɛksəl/
xìkátsì	[ʃì.ká.tsì]	cat	kat	/kat/
xìkèlèmà	[ʃì.kè.lè.mà]	scoundrel	skelm	/skɛlm/
xìkéró	[ʃì.ké.ró]	scissors	skêr	/skɛr/
xìkìnérè	[ʃì.kì.né.rè]	hinge	skarnier	/skarnir/
xìkólò	[ʃì.kó.lò]	school	skool	/skoːl/
xìkwèlètì	[ʃì.k^{w}è.lè.tì]	debt	skuld	/skəlt/
xìpànì	[ʃì.pà.nì]	team of oxen/donkeys	span	/span/
xìpékè	[ʃì.pé.kè]	bacon	spek	/spek/
xìpélè	[ʃì.pé.lè]	spelling book	spell	/spel/
xìpérètá	[ʃì.pé.rè.tá]	pin	speld	/spelt/
xìpúkú	[ʃì.pú.kú]	ghost	spook	/spoːk/
xìsípí	[ʃì.sí.pí]	soap	seep	/seːp/
xìtálá	[ʃì.tá.lá]	stable	stal	/stal/
xìtàràtà	[ʃì.tà.rà.tà]	street in town	straat	/straːt/
xìtèrèkà	[ʃì.tè.rè.kà]	strength	sterk	/stɛrk/
xìtínà	[ʃì.tí.nà]	brick	(bak)steen	/steːn/
xìtókò	[ʃì.tó.kò]	part	stuk	/stək/
xìtúlú	[ʃì.tú.lú]	chair/stool	stool/stoel	/stuːl/

xìvépù	[ʃì.vé.pù]	whip	sweep	/sveːp/
yèfró	[jè.fró]	wife of mission pastor	juffrou	/jəfrəu/

Appendix 2: Xitsonga Loanwords from English

Xitsonga		Gloss	Original
bárà	[bá.rà]	wheelbarrow	/bærəʊ/
bàyìsíkìrì	[bà.jì.sí.kì.rì]	bicycle	/baɪsɪkl̩/
-bèdza	[bè.ʤa]	bet	/bet/
-béyila	[bé.ji.la]	pay bail for someone	/beɪl/
bòdlhèlà	[bò.ɮè.là]	bottle	/bɒtl̩/
búchàrá	[bú.tʃà.rá]	butcher	/bʊtʃə/
chèlènì	[tʃè.lè.nì]	shilling	/ʃɪlɪŋ/
chíkì	[tʃí.kì]	cheek, insolence	/tʃiːk/
chìmèlà	[tʃì.mè.là]	chimney	/tʃɪmni/
chùkèlà	[tʃù.kè.là]	sugar	/ʃʊgə/
dámù	[dá.mù]	dam	/dæm/
dáyimanì	[dá.ji.ma.nì]	diamond	/daɪəmənd/
dótì	[dó.tì]	dirt	/dɜːt/
fánèlé	[fá.nè.lé]	funnel	/fʌnl̩/
-fòla	[fò.la]	stand in ranks	/fɔːl ɪn/
fòròkò	[fò.rò.kò]	fork	/fɔːrk/
fòxòlè	[fò.ʃò.lè]	shovel	/ʃʌvl̩/
háfù	[há.fù]	half	/hɑːf/
-hàfùlà	[hà.fù.là]	divide	/hɑːf/
ínkì	[í.^{n}kì]	ink	/ɪŋk/
-jámpa	[ʤá.^{m}pa]	jump	/ʤʌmp/
jómbólè	[ʤó.^{m}bó.lè]	jumper drill	/ʤʌmpə/
khàndlèlà	[kà.^{n}ɮè.là]	candle	/kændl̩/
-khérefa	[ké.re.fa]	write address on letter	/keər ɒv/
khéréfò	[ké.ré.fò]	address on letter	/keər ɒv/
khéxè (5)	[ké.ʃè]	cage/hoist of mine shaft	/keɪdʒ/
khéxè (9)	[ké.ʃè]	cash	/kæʃ/
Khìsìmùsì	[kì.sì.mù.sì]	Christmas	/krɪsməs/
-khònà	[kò.nà]	go around a corner	/kɔːnə/
khwáyà	[k^{w}á.jà]	choir	/kwaɪə/

kòmpònì	[kò.^{m}pò.nì]	compound	/kəmˈpaʊnd/
-kópa	[kó.pa]	copy	/kɒpi/
kópì	[kó.pì]	copy	/kɒpi/
-kòrèkètà	[kò.rè.kè.tà]	correct	/kərekt/
lòrí	[lò.rí]	lorry	/lɒri/
màbívì	[mà.bí.vì]	bully beef	/biːf/
màkàrìtì	[mà.kà.rì.tì]	playing cards	/kɑːrd/
màkhádì	[mà.ká.dì]	playing cards	/kɑːd/
màkháníkhè	[mà.ká.ní.kè]	mechanic	/mɪkænɪk/
mángú	[má^{n}gú]	mango	/mæŋgəʊ/
mbédwà	[^{m}bé.d^{w}à]	bed	/bed/
mófùlánì	[mó.fù.lá.nì]	shawl	/mʌfl̩/
mùbédò	[mù.bé.dò]	bed	/bed/
mùchíní	[mù.tʃî.ní]	implement/piece of equipment	/məˈʃiːn/
nchàlí	[^{n}tʃà.lí]	rug	/ʃɔːl/
ndícì	[^{n}dí.tʃì]	dish	/dɪʃ/
némbhà	[né.^{m}bà]	identification disc	/nʌmbə/
njhìní	[^{n}dʒì.ní]	engine	/endʒɪn/
nkámbù	[^{n}ká.^{m}bù]	camp	/kæmp/
-páka	[pá.ka]	pack	/pæk/
-pákula	[pá.ku.la]	unpack/offload	/pæk/
phèphà	[pè.pà]	sheet of paper	/peɪpə/
phínì	[pí.nì]	pin	/pɪn/
phórìsá	[pó.rì.sá]	policeman	/pəliːs/
póndò	[pó.^{n}dò]	pound sterling	/paʊnd/
-póta	[pó.ta]	report	/rɪpɔːt/
-póyila	[pó.ji.la]	spoil/give someone a bad name	/spɔɪl/
-rhósa	[ró.sa]	become rusty	/rest/
-sàmànìsà	[sà.mà.nì.sà]	issue summons	/sʌmənz/
sàmànìsì	[sà.mà.nì.sì]	summons	/sʌmənz/
sàndhàlà	[sà.^{n}ɮà.là]	sandal	/sændl̩/
-sáyina	[sá.ji.na]	sign	/saɪn/
sèchènì	[sè.tʃè.nì]	sergeant	/sɑːdʒənt/

sóchà	[só.tʃà]	soldier	/səʊldʒə/
sòkìsì	[sò.kì.sì]	sock	/sɒks/
-táka	[tá.ka]	stack bags	/stæk/
-tòkisa	[tò.ki.sa]	interrogate	/tɔːk/
-vháka	[vá.ka]	vacation	/vəkeɪʃn̩/
wàyènì	[wà.jè.nì]	wine	/waɪn/
wàyèlà	[wà.jè.là]	wire	/waɪə/
wúlù	[wú.lù]	wool	/wʊl/
xìbèdlhélè	[ʃì.bè.ɮé.lè]	hospital	/hɒspɪtl̩/
xìkhwérè	[ʃì.k^{w}é.rè]	square	/skweə/
xìmólò	[ʃì.mó.lò]	small bottle	/smɔːl/
xìpáncì	[ʃì.pá.^{n}tʃì]	sponge	/spʌndʒ/
xìpànèlè	[ʃì.pà.nè.lè]	spanner	/spænə/
xìpélè	[ʃì.pé.lè]	spelling book	/spel/
xìtákà	[ʃì.tá.kà]	stack of objects	/stæk/
xìtèvèlè	[ʃì.tè.vè.lè]	stable	/steɪbl̩/
xìtìmèlà	[ʃì.tì.mè.là]	train	/stiːm/
xìtímù	[ʃì.tí.mù]	steam	/stiːm/
xìtófù	[ʃì.tó.fù]	stove	/stəʊv/
xìtókò	[ʃì.tó.kò]	stock in shop	/stɒk/
xìtóló	[ʃì.tó.kó]	store	/stɔː/
xìtúlú	[ʃì.tú.lú]	chair/stool	/stuːl/
álfábètè	[álfábètè]	alphabet	/ælfəbet/
àsìdì	[à.sì.dì]	acid	/æsɪd/
átòmò	[á.tò.mò]	atom	/ætəm/
áwàrá	[á.wà.rá]	hour	/aʊə/
áyínì	[á.jí.nì]	iron (household implement)	/aɪən/
áyísìkrímì	[á.jí.sì.krí.mì]	ice cream	/aɪs kriːm
bàkìtì	[bà.kì.tì]	bucket	/bʌkɪt/
bàlúnì	[bà.lú.nì]	balloon	/bəluːn/
bàndèjì	[bà.^{n}dè.dʒì]	bandage	/bændɪdʒ/
báyísíkópò	[bá.jí.sí.kó.pò]	bioscope	/baɪəskəʊp/
bázì	[bá.zì]	bus	/bʌs/

bèkònì	[bè.kò.nì]	bacon	/beɪkən/
bífì	[bí.fì]	tinned beef	/biːf/
bódò	[bó.dò]	board	/bɔːd/
brochi	[bro.tʃì]	brooch	/brəʊtʃ/
bùláchì	[bù.lá.tʃì]	brush	/brʌʃ/
bùràndì	[bù.rà.^{n}dì]	brandy	/brændi/
bùlákùbódò	[bù.lá.kù.bó.dò]	blackboard	/blækbɔːd/
Chàyínà	[tʃà.jí.nà]	China	/tʃaɪnə/
chékè	[tʃé.kè]	cheque	/tʃek/
chízì	[tʃí.zì]	cheese	/tʃiːz /
chókòlétì	[tʃó.kò.lé.tì]	chocolate	/tʃɒklət/
dàzènì	[dà.zè.nì]	dozen	/dʌzn̩/
désìkí	[dé.sì.kí]	desk	/desk/
dìnà	[dì.nà]	dinner	/dɪnə/
dìrámù	[dì.rá.mù]	drum	/drʌm/
fánèlé	[fá.né.lè]	funnel	/fʌnl̩/
fáyìlì	[fá.jì.lì]	file (docs)	/faɪl/
fùlátì	[fù.lá.tì]	flat in house	/flæt/
fùlórò	[fù.ló.rò]	floor	/flɔː/
gàrájì	[gà.rá.dʒì]	garage	/gærɑːʒ/
gìrísì	[gì.rí.sì]	grease	/griːs/
jèsí	[dʒè.zí]	jersey	/dʒɜːzi /
kàpìténì	[kà.pì.té.nì]	captain	/kæptɪn/
káròtá	[ká.rò.tá]	carrot	/kærət/
kháàbòdó	[ká.bò.dó]	cupboard	/kʌbəd/
khásítàdì	[ká.sí.tà.dì]	custard	/kʌstəd/
khékhè	[ké.kè]	cake	/keɪk/
khóyínì	[kó.jí.nì]	coin	/kɔɪn/
kópì	[kó.pì]	copy/duplicate	/kɒpi/
kótà	[kó.tà]	quarter	/kɔːtə/
láyíbùràrì	[lá.jí.bù.rà.rí]	library	/laɪbrəri/
lókò	[ló.kò]	lock	/lɒk/
màgàzínì	[mà.gà.zí.nì]	magazine	/mægəziːn/

màtèmátìkì	[mà.tè.mà.tì.kì]	mathematics	/mæθəmætɪks/
pétìròlò	[pé.ti.rò.lò]	petrol	/petrəl/
phèxènì	[pè.ʃè.nì]	pension	/penʃn̩/
píkìníkì	[pí.kì.ní.kì]	picnic	/pɪknɪk/
pìjámà	[pì.dʒá.mà]	pyjamas	/pədʒɑːməz/
pulásitíkì	[pu.lá.si.tí.kì]	plastic	/plæstɪk/
rhèyìsì	[rè.jì.sì]	rice	/raɪs/
sálàdí	[sá.là.dí]	salad	/sæləd/
tháwùlá	[tá.wù.lá]	towel	/taʊəl/
théléfónì	[té.lé.fó.nì]	telephone	/telɪfəʊn/
thìkìthì	[tì.kì.tì]	ticket	/tɪkɪt/
wáyèrè	[wá.jè.rè]	wire	/waɪə/
yúnívhésìtí	[jú.ní.vé.sì.tí]	university	/juːnɪvɜːsɪti/
zíro	[zí.ro]	zero	/zɪərəʊ/
zònì	[zò.nì]	zone	/zəʊn/

Appendix 3: Ethics Clearance Waiver Letter

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
Registration number: REC-101114-044

28 November 2017

Re: Ms. A Vratsanos (711405)

To whom it may concern,

Ms. A Vratsanos (711405) is currently registered as a Masters student at the School of Linguistics, University of the Witwatersrand, Johannesburg. This letter is to confirm that, at the time of writing, Ms Vratsanos does not need ethical clearance for her Masters study entitled '*Some Repair Strategies in Xitsonga*'. This decision has been reached based upon a description of the project supplied by Ms Vratsanos to the University Human Research Ethics Committee (Non-Medical), which has been evaluated by the Committee Chair. If, however, Ms Vratsanos changes the methods of data collection and analysis for this study, this decision may no longer be valid. If such changes take place, this should be communicated to the University Human Research Ethics Committee (Non-Medical) as soon as possible.

Please feel free to contact me should you require any further information.

Thank you.

Yours sincerely,
S Schoeman

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