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Vowel Phonological Processes Affecting Syllable Structure in Tshivenḓa

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Abstract

There are different phonological processes across Tshivenḓa linguistics, however, this paper only focuses on vowel processes involving syllable structure or syllabification in Tshivenḓa. When a syllable is affected by any phonological phenomena, it is either reduction, deletion or glide formation that takes place. This study explores three vowel phonological processes affecting syllable structure in Tshivenḓa, namely; vowel deletion, vowel epenthesis and glide formation. The in-depth of this study will add to the literature of Tshivenḓa linguistics and to the knowledge of the scientific study of language. Qualitative data was gathered through the use of phonological field work. The Optimality Theory is the framework underpinning this study.

Keywords: Deletion, epenthesis, glide formation, phonological processes, syllable structure, vowel hiatus.

1. INTRODUCTION

In Tshivenḓa, vowel phonological processes affecting syllable structure take place when some vowels occur sequentially in a word or phrase, i.e. vowel clusters. Sometimes they occur when breaking consonant clusters, while sometimes they occur during the application of borrowed words in Tshivenḓa. This paper proposes that observed phonological changes are due to restore methods to allow cluster simplification and to avoid a sequence of vowel sounds. This study offers new additional data that fills the gap in previous descriptions of vowel phonological processes affecting syllable structure in Tshivenḓa.

Tshivenḓa is a language spoken in the Limpopo province of South Africa and Matabeleland South province of Zimbabwe. Historically, Stayt (1968, p.13) asserts that, Vhavenḓa were originally from either the lower areas of Congo or the Great Rift Valley, crossing through the Limpopo River during the Bantu expansion or migrations. There are many phonological processes in Tshivenḓa, and these involve both vowels and consonants, but only consonantal phonological processes received more attention from a linguistic point of view than those involving vowels, (Nyoni, 2021).

Guthrie (1967, Vol.1) came up with 15 zones that he used to categorize the Bantu languages where Tshivenḓa was also classified. Among other Bantu languages, Tshivenḓa was classified as zone S.20. However, Mesthrie (1995:45), argued that Tshivenḓa language is falling under the category S.21. This could be the reason Bailey in Mesthrie (1995:32) placed Tshivenḓa language under the category of S.20, S.21. It is important to note that in line with the literature Tshivenḓa has five basic vowels which are [a], [ɛ], [i], [ɔ] and [u], (Milubi 1984, Van Warmelo 1989).

2. LITERATURE REVIEW

2.1. Vowel Elision/deletion

Taking it from the available literature, vowel elision/ deletion occurs in different forms which include, phonotactic vowel deletion, syntactic vowel deletion and morphophonemic vowel deletion, (Coler and Banegas-Flores, 2020). The phonotactic vowel deletion occurs, when a vowel cluster exist as a result of suffix addition, or when a noun phrase is formed, (Coler and Banegas-Flores, 2020). According to Coler (2014), syntactic vowel deletion occurs when a Noun Phrase modifier has a three vowel rule. Morphophonemic vowel deletion occurs when the final or the preceding vowel is deleted, (Briggs, 1976; Coler and Banegas-Flores, 2020). The phonotactic vowel deletion is common in Tshivenḓa language.

Vowel hiatus is a common phenomenon in many Bantu languages including Tshivenḓa. When vowel clusters appear in Tshivenḓa speech, vowel elision/deletion can be used as one of the ways to resolve hiatus, (Sabao, 2015). In other Bantu languages, like siSwati when high vowels occur inter-

consonantally during speech, vowel deletion may occur as a result, (Harford and Malambe, 2015). Mtenje-Mkochi (2018), states that, a vowel in hiatus challenges can also be elided when a consonant precede a high vowel /u/ that is followed by a rounded vowel /o/. One of the reasons vowel clusters are destroyed is to obtain a consonant-vowel (CV) syllable structure because in Tshivenḓa, the most common syllable sequence is CV or CCV or CCCV or V syllables, however, Tshivenḓa accommodates VV sequences in some cases while in other cases it does not accommodate VV sequences, (Nyoni & Ṋetshisaulu, 2021). According to Zimmermann (2013), vowel deletion in other languages such as, Yine is categorized both in line with morphology and phonology because it is believed that the vowel process can only be analysed when phonology has access to morphology. This is the case with Tshivenḓa vowel processes such as vowel deletion, both morphology and phonology are considered crucial.

2.2. Epenthesis

Epenthesis is the insertion or addition of a segment into a word which can be a vowel or a consonant in a position in which no segment was formerly in place, (Trusk, 2004). According to Aloufi (2021), "The insertion of segments is not a rare phonological process, it is used to meet the constraints' requirements on phonotactics and syllable structure in a given language, which can be perhaps as a result of hiatus (separating two vowels) or consonant clusters (separating two consonants)." Vowel epenthesis in Tshivenḓa occurs with different forms that suit the phonotactics of the language. For example, if English words with consonant clusters and/or word-final consonants are borrowed into Tshivenḓa, vowel epenthesis takes place to break up consonant clusters and to avoid word-final consonants, (Kakeru. *et al*, 2015). In Tshivenḓa, like in Japanese, consonant clusters, such as /pl/, are phonotactically not allowed. In words such as /plan/ Tshivenḓa speakers would add the vowel /u/ to separate foreign consonant clusters /pl/ and the vowel /e/ at word final position giving rise to /puḽane/, (Dupoux, 2016; Rukoz, 2018).

The native grammar evaluates the phonotactic legal grounds of a language and if a phonotactic violation is detected, the grammar, repairs the violated form by adding a vowel to suit its phonological representation, (Rukoz, 2018). According to Monahan, *et al*, (2009), lack of epenthesis would present a different syllable structure of the input than when epenthesis has occurred. Vowel epenthesis is a well-qualified example to deal with foreign consonant clusters as past research has shown that sound sequences which are not permitted in native languages may be reconstructed by native languages' perceptual system, (Rukoz, *et al*, 2017). However, the literature asserts that different rates of epenthesis variation among languages is caused by differences in markedness (Zhao and Berent, 2018), differences in prosodic constraints, (Kahng, 2016), and cross-linguistic differences (Durvasula *et al*, 2018)

2.3. Gliding

Glide sounds are also known as semi-consonants and sometimes semi-vowels, as they have been largely documented in the literature, from different point of views, since they are known for causing a problem to phonological theory, (Lahrouchi and Ridouane, 2021). On the one hand, they are closely related to vowels, exchanging with them in suitable contextual forms, in different languages, (Levi, 2011). Then on the other hand, they function as consonants, aligning to the corresponding vowels, (Lahrouchi and Ridouane, 2021).

Mangoyar (2012) defines glide epenthesis/formation as a process by which both vowels (the one preceding and the one preceded) are preserved through the insertion of a semivowel (or a glide sound) between them between them to simplify vowel clusters. In Bantu languages such as Tshivenḓa and Shona, vowels clusters are separated by the insertion or epenthesis of glide sounds, [w] and [j], (Mudzingwa, 2013). The process is influenced by the phonological environment. This is true in the case of Tshivenḓa and Shona where the glide /j/ is normally inserted in the environment of the coronal vowels /e/ and /i/ and /w/ on the other hand is inserted in the environment of the round vowel /o/ and /u/, (Mvundura, 2015). Language differences determine which vowels glide when they are adjacent to each other in word or a phase, (Casali, 1995). Lahrouchi and Ridouane (2021) explain that from a syllabic point of view, glide sounds and high vowels are phonetic reflexes of two underlying high vocoids /i/ and /u/.

3. METHODOLOGY

This study applied the use of qualitative methods for gathering data where a phonological fieldwork was conducted. A purposive sampling technique was applied where 15 Tshivenḓa speaking informants were involved. The informants were not linguistically knowledgeable in order to avoid biasedness. Where necessary the International Phonetic Alphabet was applied during transcription procedures. The use of Tshivenḓa wordlist of basic words was organized from Van Warmelo (1989) Tshivenḓa dictionary. The study adopted Prince and Smolensky's Optimality Theory of 1993 for help with data interpretation and analysis. The Optimality Theory terminology used in this study in line with the assertion by McCarthy (2007), Prince & Smolensky (1993), and Pullum and Ladusaw (1996), include the following:

* stands for violations.

*! Stands for strong violation and cannot be successful candidate

☞ indicates the optimal candidate.

*VV: Vowel clusters are prohibited.
DEP (seg): Inserting a segment is prohibited.
*CODA: Coda is not allowed.
MAX: No segment should be deleted.
MAX-V: Vowel deletion is prohibited.
ONSET: Onset syllables are allowed.
*ONSET: Onset syllables are prohibited.
*COMPLEX-CC: Consonant clusters are prohibited.
NUC: Syllables should have nucleus.

4. RESULTS AND DISCUSSION

4.1. Vowel elision/deletion

In most cases when vowel elision occur in Tshivenḓa, the part of the syllable which is affected at most is the nucleus or the whole syllable because sometimes a single vowel make up a syllable or a one syllable word. The study found out that vowel elision/deletion occurs in different forms in Tshivenḓa language.

4.1.1. Vowel elision which occur with proper and common nouns of Tshivenḓa

One of the forms in which vowel elision/deletion occurs in Tshivenḓa is with proper and common nouns.

I. Vowel deletion on common nouns

A.

Input	Meaning	Output	IPA
/muphakho/	/distribution/	/mphakho/	[mphakhɔ]
/mupengo/	/mad man/	/mpengo/	[mpɛŋgɔ]
/muphogoli/	/skeleton/	/mphogoli/	[mphɔgɔʃi]
/muvhalo/	/census or mathematics/	/mbalo/	[mbaʃɔ]

The data above illustrate the occurrence of vowel elision/deletion in Tshivenḓa language. Vowel /u/ of the first syllable /mu/ is deleted. This form of vowel elision/deletion is influenced by the occurrence of nasalisation (in this case) of p[p'], ph[ph] and vh[β] among the above common nouns where p[p'] becomes mp[mp], ph[ph] becomes mph[mph] and vh[β] correspond to mb[mb]. In Tshivenḓa it is discovered that there are phonological processes that occur as a result of other phonological processes in the language, (Nyoni, 2021). When vowel /u/ is deleted the prefix /mu-/ of class (1) is affected.

B.

Prefix	Input	Meaning	Output	IPA
/ḽi-/	/ino/	/tooth/	/ḽino/	[ɺinɔ]
/ḽi-/	/iṱo/	/eye/	/ḽiṱo/	[ɺiṱɔ]
/ḽi-/	/ifa/	/inheritance/	/ḽifa/	[ɺifa]

This kind of vowel elision/deletion occurs with common nouns of class (5) prefix /ḽi-/ in Tshivenḓa. In this case, vowel /i/ is deleted to break the /ii/ vowel cluster in between the class (5) prefix and the input as illustrated above.

Table 1: A tableau on vowel deletion occurring with common nouns in Tshivenḓa

ḽiino (Input)	***VV**	**ONSET**	***COMPLEX-CC**	**MAX-(seg)**	**NUC**
A. ḽiino	*!				
B. ☞ḽino				*	
C. ḽno			*!	*!	*!
D. iino	*!	*!		*!	

The above tableau indicates the OT approach to vowel deletion in Tshivenḓa. B is the optimal candidate, however, it violates constraint MAX (seg) where at least one segment was deleted, that is vowel /i/. Other candidates have at one strong violation of the generated constraints.

II. Vowel deletion on proper nouns

Input	Meaning	Output	IPA
/a thi livhali/	/I do not forget/	/thilivhali/	[thiliβaʃi]
/a thi zwi hangwi/	/I do not forget/	/thizwihangwi/	[thizwiɦaŋgwi]
/a thi zwi londi/	/I do not follow/	/thizwilondi/	[thizwiʃɔndi]
/a thi na vhuyo/	/I have nowhere to go/	/thinavhuyo/	[thinaβujɔ]

The data in section C shows vowel elision/deletion which occur with some forms of proper nouns in Tshivenḓa. This phenomenon occurs with child naming among the Tshivenḓa speaking people. In some of the Bantu languages, such as Tshivenḓa, names can be formed from a sentence through sentence reduction process. According to Nguyen, *et al*, (2004), "Sentence reduction is the elimination of words or phrases that are no longer useful from an input sentence by creating a new sentence in which the original meaning of the sentence remains unchanged." In line with the above illustrated data, vowel /a/ is deleted from the word initial position as both the vowel and the syllable.

Table 2: A tableau on vowel deletion occurring with proper nouns in Tshivenḓa

Athilivhali (Input)	*CODA	ONSET	*VV	MAX-V
A. athilivhali		*!		
B. ☞thilivhali				*
C. aathilivhali		*!	*!	
D. thilivhali	*!			*!

Table 2 shows the OT analysis of vowel deletion occurring with proper nouns in Tshivenḓa. Candidate A strongly violates the ONSET constraint candidate B violates MAX-V constraint at minimal levels, candidate C strongly violate the ONSET and *VV constraints while candidate D strongly violates the *CODA and MAX-V constraints. Therefore, B is the optimal candidate.

4.1.2. Vowel elision which occur with verb forms (base forms)

The study also discovered that, in Tshivenḓa, there is vowel elision/deletion which occurs with some of the verb forms (root) that allow the addition of a suffix /-iwa/. This at often times occurs in continuous speech as Tshivenḓa speaking people interact with each other.

Input	Meaning	Output	IPA
/feliwa/	*/deceased for/*	*/felwa/*	*[fɛfʷa]*
/buliwa/	*/articulated/*	*/bulwa/*	*[buʃʷa]*
/kuliwa/	*/pulled out/*	*/kulwa/*	*[k'uʃʷa]*
/humbeliwa/	*/requested/*	*/humbelwa/*	*[humbɛʃʷa]*
/ḓodziwa/	*/anointed/*	*/ḓodzwa/*	*[ɖɔdzʷa]*

The Tshivenḓa speaking people delete the vowel /i/ of the verb forms or roots when it is articulated in fast speech. The added suffix /-iwa/ is affected since the vowel deleted is its word initial V syllable.

4.1.3. Vowel elision which occur with demonstratives (adverb)

The study also found out that in Tshivenḓa there is vowel elision/deletion which occurs with demonstratives. The following data is an illustration of how this phonological process (vowel deletion) occur with some demonstratives.

Demonstratives	Speech	Meaning	Output	IPA
/iyi/	*/a si + iyi/*	*/here it is/*	*/asiyi/*	*[asiji]*
/izwi/	*/a si + izwi/*	*/here they are/*	*/asizwi/*	*[asizʷi]*
/itshi/	*/a si + itshi/*	*/here it is/*	*/asitshi/*	*[asiʧhi]*
/uku/	*/a si + uku/*	*/here it is/*	*/asuku/*	*[asuku]*

The study shows that there are instances where the final vowel (usual vowel /i/) of the preceding syllable is followed by a vowel of the same qualities (usual vowel /i/ or /u//) which is a syllable at word initial position. When sentence or phrase reduction is applied, vowel /i/ is deleted and that sentence or phrase loses its properties since as a result it becomes one demonstrative word in the output.

Table 3: A tableau on vowel deletion occurring with demonstratives in Tshivenḓa

Asiiyi (Input)	*VV	MAX-V	*ONSET	*CODA
A. asiyi	*!			
B. ☞asiyi		*		
C. siyi		*!	*!	
D. asiyi	*!	*!		*!

Inn table 3 above, B is the optimal candidate because it has less violations of the constraints than other candidates. Candidate A strongly violates the *VV (no adjacent vowels) constraint, candidate C strongly violates the MAX-V, and the *ONSET constraints and candidate D strongly violates the *VV, MAX-V and *CODA constraints.

4.1.4. Vowel elision which with adjectives

Tshivenḓa allows vowel elision/deletion to occur with certain forms of adjectives. The following data shows possibilities of vowel deletion in Tshivenḓa.

Prefix	Adjective	Meaning	Output	IPA
/vha-/ (vha-+-aṋe)	*vhaaṋe*	*/his own/*	*/vhaṋe/*	*[βaɲɛ]*
/vha-/ (vha-+-oṱhe)	*vhaoṱhe*	*/alone or his own/*	*/vhoṱhe/*	*[βɔʈhɛ]*
/ma-/ (ma-+-aṋe)	*maaṋe*	*/its own/*	*/maṋe/*	*[maɲɛ]*

This kind of vowel deletion affects the adjectives which are responsible for identifying ownership in Tshivenḓa. The selected adjectives are categorized under class (2) and (6) prefixes /vha-/ for both plurality and a form of respectful address and /ma-/ for plurality. When these prefixes are added to the identifying adjectives, vowel /a/ is deleted. The following examples are showing the usage of these adjectives in speech in line with Van Warmelo, (1986).

*a. /Baba vha khou ḽa nga vhone **vhaṋe**/ (the father is eating on his own).*
*b. /Vhamusanda vha khou tshimbila vhe **vhoṱhe**/ (the Chief is walking alone (on his own).*
*c. /Maḓi o tevhuwa nga one **maṋe**/ (the water is spilt out on its own).*

Table 4: A tableau on vowel deletion occurring with adjectives in Tshivenḓa

Vhaaṋe (Input)	*VV	MAX-(seg)	ONSET
A. ☞vhaṋe		*	
B. vhaaṋe	*!		
C. aṋe		*!	*!

In table 4 the MAX (seg) prohibits segments from being deleted, however, a minimal violation of this constraint allowed candidate A to become the optimal candidate since other candidates have strong violations than candidate A.

4.1.5. Vowel elision which occur with pronoun related verbs

Vowel elision/deletion in Tshivenḓa also occurs within pronoun related verbs which correspond to /is/, /am/, /are/, where a difference in structure occurs between how speech is written and how it is articulated. However, according to this study, this form of vowel deletion is violating the standard and allowed way of written language. The following are examples showing this form of vowel deletion in Tshivenḓa.

Standardized form	Meaning	Speech form	Output
/tou/ (kha tou ḓa)	*/let him come/*	*/kha to ḓa/*	*/to/*
/khou/ (u khou ḓa)	*/he is coming/*	*/u kho ḓa/*	*/kho/*
/sokou/ (kha sokou ḓa)	*/let him just come/*	*/kha soko ḓa/*	*/soko/*

This form of phonological processes occurs when Tshivenḓa speaking people are unconsciously deleting some segments of the word, especially during fast speech.

Table 5: A tableau on vowel deletion occurring with oral articulation in Tshivenḓa

Tou (input)	*VV	MAX-V	DEP(seg)
A. tou	*!		
B. ☞To		*	
C. toou	*!	*	*!

The table above show the lesser the violations the higher the chance towards optimality, hence, B is the optimal candidate.

4.2. Vowel epenthesis

Vowel epenthesis is the insertion of a vowel in a word. Trask defines epenthesis as, the insertion or addition of a segment or speech sound into a word in a position in which no other segment was previously inserted. We understand that there is prosthesis and

anaptyxis, however in Tshivenḓa only anaptyxis occur. Vowel epenthesis in Tshivenḓa occur with borrowed words, and in this study only borrowed words from English language were involved. This adds a sociolinguistic effect in that the lexical code of the source language is enforced into that of the borrowing language. The phonology of one language is not the same with another hence the occurrence of vowel epenthesis in Tshivenḓa.

4.2.1. Vowel epenthesis which occur with more emphasis on vowels [a]

Tshivenḓa allows the epenthetic vowel /a/ to simplify foreign consonant clusters or foreign word final syllables.

Input (Borrowed words)	Output
/lecturer/	*/ḽekhitshara/*
/tender/	*/thendara/*
/style/	*/tshitaila/*
/ice/	*/aisi/*

In the above illustration, vowel /a/ is inserted (mostly at the end of the words) because in Tshivenḓa language, there are no words that have two or more syllables that end with the consonant /r/ at word final position. It is also noted that there is no place in the language where vowel /i/ is a diphthong or represents two vowels.

4.2.2. Vowel epenthesis which occur with more emphasis on vowel e[ɛ]

The illustration below show the cases where vowel epenthesis occurs with vowel /e/ being the epenthetic vowel in Tshivenḓa.

Input (Borrowed words)	Output
/strike/	*/tshiṱereke/*
/tank/	*/thannge/*
/tent/	*/dennde/*
/slab/	*/tshilebe/*

The vowel /e/ is inserted to accommodate complex consonant clusters to suit the phonotactics of Tshivenḓa language. Tshivenḓa language does not have consonant clusters such as, /str/, /sl/, /nk/ and /nt/. The consonant /b/ and other mentioned consonant clusters are violating the CVCV, CCVCCV syllable structure in Tshivenḓa.

4.2.3. Vowel epenthesis which occurs with more emphasis on vowel i[i]

Literature shows that the epenthetic vowel /i/ is common in many languages. In the case of Tshivenḓa language, vowel /i/ can also be inserted when borrowed words are put to work in the language. The data below show instance where vowel /i/ is inserted in Tshivenḓa.

Input (Borrowed words)	Output
/matric/	*/maṱiriki/*
/school/	*/tshikolo/*
/plate/	*/puleithi/*
/taxi/	*/thekhisi/*
/yoghurt/	*/yogathi/*
/club/	*/kiḽabu/*

When vowel /i/ is inserted with borrowed words in Tshivenḓa, like any other possible epenthetic vowel in Tshivenḓa, it is used to break consonant clusters which cannot be articulated in the language. Borrowing from the provided data above, such consonant clusters include, /pl/, /tr/, /sch/, /rt/ and /cl/.

4.2.4. Vowel epenthesis which occurs with more emphasis on vowel u[u]

In the same manner with vowels /a/, /e/, and /i/ vowel /u/ is inserted where borrowed words from English language are used in Tshivenḓa language.

Input (Borrowed words)	Output
/plan/	/pulane/
/lift/	/lifuthi/
/zone/	/zouni/
/phone/	/founu/

NB: according to this study, vowel /o/ can be inserted in rare cases in Tshivenḓa. Its use as an epenthetic vowel is minimal in that it can only appear in few borrowed word cases such as /tshidulo/ for /stool/, /fosholo/ for /shovel/ and /tshikolo/ for /school/.

Table 6: A tableau on vowel epenthesis in Tshivenḓa

Strike (Input)	*COMPLEX-CC	*VV	*CODA	DEP(seg)
A. strike	*!			
B. straiki	*!	*!		*
C. ☞tshiṱereke				*
D. tshiṱerek			*!	*

Vowel epenthesis occurs in different environments of the word in Tshivenḓa, and for this reason one OT tableau is used to represent all instances where vowels /a/, /e/, /i/, /o/ and /u/ are inserted when loanwords are borrowed from English language. The borrowing process in Tshivenḓa allows all 5 basic vowels to be epenthetic. In table 6, output C is the optimal candidate, regarding its level of constraint violation in comparison with other candidates' level of constraint violations.

4.3. Glide formation

When two vowels are adjacent to each other in a word, the vowels may remain unchanged or a semi-vowel may be inserted between them where glide sound /y/ correspond to vowel /i/ while /w/ correspond to /u/, (Kadenge, 2010; Meinhof, 1984). The data presented in this section show the forms where glide formation occur with, in Tshivenḓa language.

4.3.1. Glide formation which occurs with vowel e[ɛ] and i[i]

In Tshivenḓa there is glide formation which occurs with vowels /e/ and /i/. This form of phonological processes takes place with demonstratives as indicated through the data presented below.

Input	Meaning	Output	IPA
/khei/	/here it is/	/kheyi/	[kheji]
/yenei/	/this one/	/yeneyi/	[jɛnɛji]
/hei/	/this one/	/heyi/	[heji]
/ngei/	/here it is/	/ngeyi/	[ŋgɛji]

The above demonstratives contain a vowel cluster which is constructed by bringing together vowel /e/ and vowel /i/. The glide sound /y/ is inserted between the two vowels because it is the corresponding glide for vowel /i/. When this form of glide formation has occurred, the word meaning remain unchanged.

Table 7: A tableau on glide formation occurring with vowels /e/ and /i/in Tshivenḓa

Khei (Input)	*VV	*COMPLEX-CC	*CODA	DEP(seg)
A. khei	*!			
B. ei	*!			
C. ☞kheyi				*
D. Khy		*!	*!	*

The above representation shows the constraints and their violations. Candidate A and B strongly violate the *VV constraint, candidate C and D violates the DEP constraint and yet candidate D strongly violates the *COMPLEX-CC and *CODA constraint. Output C is the optimal candidate.

4.3.2. Glide formation which occurs with vowel i[i] and a[a]

According to the findings in this study, glide formation may occur between vowels that are in positions at a distant in Tshivenḓa language. Instead of it to occur with lone words only, it also occurs with Tshivenḓa short phrases as illustrated below.

Input	Meaning	Output
/i a ḍa/	/it comes/	/i ya ḍa/
/i a vhona/	/it sees/	/i ya vhona/
/i a rwa/	/it beats/	/i ya rwa/
/i a lila/	/it cries/	/i ya lila/
/i a mangadza/	/it surprises/	/i ya mangadza/

This kind of glide formation is mostly perceived when Tshivenḍa speaking people are involved in a conversation. The vowel /i/ at the word initial position influences the glide /y/ in the next syllable. As a result glide /y/ is formed and is inserted before vowel /a/.

Table 8: A tableau on glide formation occurring with vowels /i/ and /a/in Tshivenḍa

Iaḍa (Input)	***VV**	***ONSET**	**MAX-V**	**DEP (seg)**
A. iaḍa	*!			
B. aḍa			*!	
C. yaḍa		*!	*!	*
D. ☞iyaḍa				*

Output D becomes the optimal candidate with one lesser violation of the generated constraints. Candidates A, B, and C have strong levels of violations.

4.3.3. Glide formation which occur with vowel a[a] and i[i]

This form of glide formation occurs with directive variants in Tshivenḍa where vowel /a/ and /i/ are located at a distant in one variant and are adjacent to each other in another variant. This is demonstrated below.

Input (Variant 1 and 2)	Meaning	Output
/ṭuwani/, /ṭuwai/	/go/	/ṭuwayi/
/iḍani/, /iḍai/	/come/	/iḍayi/
/ibvani/, /ibvai/	/get out/	/ibvayi/
/ambani/, /ambai/	/talk/	/ambayi/

Variant 1 gives rise to variant 2 and from a linguist point of view, variant 2 is as a result of nasal deletion where a nasala-alveolar sound n[ñ] is deleted. In articulating the variant 2 where vowels /a/ and /i/ are adjacent, glide sound /y/ is formed and replaces variant 1's deleted nasal sound.

Table 9: A tableau on glide formation occurring with vowels /a/ and /i/in Tshivenḍa

Ṭuwai (Input)	***VV**	**DEP**	***CODA**	**MAX-V**
A. ṭuwai	*!			
B. ☞ṭuwayi		*		
C. ṭuwan			*!	*!

Table 9 above shows that candidate A strongly violate the *VV constraint, candidate B violates the DEP constraint and candidate C strongly violate both the *CODA and MAX-V constraints. As a result, candidate B is the rightful candidate.

4.3.4. Glide formation which occurs with vowel o[ɔ] and u[u]

The study revealed that there are very few instances where glide formation in Tshivenḍa is influenced by vowels /o/ and /u/. The few instances include very few demonstratives of Tshivenḍa, such as, /khouḽa/ (there he is) and /honouḽa/ (that one). The study noted that when vowel /o/ and /u/ are adjacent to each other, the corresponding glide sound which is formed as a result is /w/. The demonstrative /khouḽa/ correspond to /khowuḽa/ and /honouḽa/ correspond to /honowuḽa.

Table 10: A tableau on glide formation occurring with vowels /o/ and /u/in Tshivenḓa

Khouḽa (Input)	*VV	DEP	*CODA	MAX-V
A. khouḽa	*!			
B. ☞khowuḽa		*		
C. khoḽa				*!
D. khouḽ	*!		*!	*!

The constraints in the table above are as follows, (1) vowel clusters are prohibited in the output, (2) no segment should be inserted, (3) Coda is not allowed in the output and (4) no vowel should be deleted. Having output A, C and D strongly violating the generated constraints, output B becomes the optimal candidate.

5. CONCLUSION

The study illustrated vowel phonological processes involving syllable structure in Tshivenḓa language. The vowel processes covered in this study are vowel elision/deletion, vowel epenthesis and glide formation. The following is a list of words where generalization of data is illustrated indicating phonological change in vowel processes.

	Words	IPA	Meaning	Sound change
(1)	*Asiyi*	*[asiji]*	*'isn't it here' / 'here it is'*	*vowel deletion*
(2)	*Asiavha*	*[asiβa]*	*'aren't they here'/ 'here they are'*	*vowel deletion*
(3)	*School*	*[tʃikɔʃɔ]*	*'a school'*	*vowel epenthesis*
(5)	*Khei*	*[khɛji]*	*'here it is'*	*glide formation*
(6)	*Yenei*	*[jɛnɛji]*	*'this one'*	*glide formation*
(7)	*Stove*	*[tʃˋìt̪ofu]*	*'stove'*	*vowel epenthesis*

According to this study, vowel elision//deletion occurs with common noun, proper nouns, verb forms, demonstratives, adjectives and pronoun related verbs in Tshivenḓa. During this phonological process, only vowel /a/, /i/ and /u/ are involved, hence, no data was recorded where vowels /e/ and /o/ are deleted. Vowel epenthesis occurs with borrowed words and in this case, borrowed words from English language were involved. The study showed that all 5 basic vowels of Tshivenḓa can be inserted when borrowed words from English are applied. Glide formation occurs when some vowels are at adjacent. This study recorded that glide formation in Tshivenḓa occurs with vowels clusters such as, /ei/, /ia/, /ai/ and /ou/ where the corresponding glide sounds are /y/ and /w/.

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