SEGMENTAL ASPECTS OF KƗBWANɈI PHONOLOGY: A NON-LINEAR REPRESENTATION

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Abstract

This paper attempts a preliminary analysis of the phonological processes that affect vowels and consonants in Kɨβwanɟi language. Specifically, the paper examines the role played by these phonological processes in preserving the configuration of the phonologically possible word or morpheme in Kɨβwanɟi by using a Non-linear Approach (Autosegmental Phonology Theory). The findings reveal that the distribution of consonants is restricted in Kɨβwanɟi and the canonical syllable structure of Kɨβwanɟi is CV but not limited to V, C, CV and CGV. Syllables are conditioned by phonological sequential constraints (PSCs) that govern the sequence of segments in the language. These constraints serve as the mechanism through which the native speakers are able to recognize words by applying phonological rules that are in conspiracy. It is also revealed that the rules are ordered with respect to the satisfaction of the structural descriptions that allow more than one rule to apply.

Keywords: phonological sequential constraints, Kɨβwanɟi, Bantu, phonological processes

Introduction

This paper analyses the role assumed by phonological processes that affect vowels and consonants in preserving the configuration of the phonologically possible word or morpheme in Kɨβwanɟi by using a non-linear approach (autosegmental phonology theory). The study also posits that there is a symmetrical relationship among these aspects of phonology that helps in determining the phonologically possible words in Kɨβwanɟi. The rationale behind this undertaking is principally concerned with the description of language, while taking into consideration some theoretical concerns. It happens that Bantu languages in general and the Eastern group (to which Kɨβwanɟi belong) in particular have played a significant role in the recent improvements of theories and the description of various aspects

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of phonology such as tone, vowel harmony, nasals and nasalization, slots and moras, labial and palatal prosodies (Cammenga 1994, Hyman 2003). The discovery of fresh data has often led to the extension and adaptation of some of received theories. This phenomenon highlights the importance and necessity of the ongoing collection and accurate recording of new linguistic data from individual languages, preparing the ground for theoretical breakthroughs. In addition, the fact that languages do not all behave in exactly the same way, and that each language manifests unique features, helps to justify the pursuit of as much data as possible in different linguistic communities.

Since human languages develop organically, they share certain properties despite their many differences, such as utilising sounds from a finite set. Despite these similarities, sound patterns of human languages differ in three fundamental ways. Firstly, each natural language chooses only a limited number of sounds from its central pool; hence, the phonetic inventory of all languages cannot be the same. Secondly, each language may have an idiosyncratic ordering in the occurrence of its sounds. Thirdly, processes that affect sound changes in one language may not necessarily be the same as those prevailing in other languages. In this respect, every language has its own ways in which the speakers manipulate sound segments for their communication (Sloat 1978).

With respect to Bantu languages, studies show that this language group exhibits significant phonetic resemblances as a language phylum (Guthrie 1967, 1971; Welmers 1973; Hyman 1975, 2003; Mutaka and Tamanji 2000). Despite the large number of languages and great geographic expanses that they cover, the most noteworthy properties concerning Bantu syllable structure, consonant/vowel inventories, and phonological processes are robustly represented throughout the Bantu zone. However, although these shared features are striking, they mask a wide range of differences which are equally important in understanding Bantu phonology in general (Welmers 1973). It should be borne in mind that quite a number of studies on proto-Bantu (including Welmers' work) have been written with the aim of making generalizations about how all Bantu languages behave as a language phylum, together with the aim of providing a comparative analysis that features the relatedness of these languages in linguistic classification. As such, until these issues are explored, analysed, and resolved within individual languages, any significant work on the language cannot satisfactorily be carried out.

In most Bantu languages, vowels are numerically fewer than consonants, yet any consonant with the exception of syllabic C, cannot be used alone without forming syllabicity with a vowel (Mekacha 1985, Phil 2009). This shows that vowels exhibit the highest frequency of use compared to consonants, resulting in most of the Bantu vocabulary ending with a vowel. In combination, both consonants and vowels do undergo changes in their phonetic features when they are juxtaposed at the morpheme, word, or across word boundaries with respect to certain phonetic environments or contexts, that is, phonological processes. However, what is yet to be known is the role played by these phonological processes that affect consonants and vowels in preserving the phonetic configuration of the phonologically possible word or morpheme.

Theoretical framework

Unlike the studies by Mekacha (1985) in Nata (G40), Chaula (1985) in Kibena, Ismail (2000) in Meto (P30), and Samweli (2008) in Ki-Mwamba which used the Generative Phonology (GP) linear representation model, this descriptive study employs a non-linear phonological representation framework of the autosegmental phonology theory (henceforth AP). This approach was developed out of research in generative phonology at Massachusetts Institute of Technology (MIT) in the middle and late 1970s as a response to certain problems in the phonological theory of that time (Clements and Goldsmith 1984).

According to John Goldsmith whose ground-breaking dissertation in 1976 is often cited as the source for augosegmental theory:

> the principal innovation of autosegmental phonology is the idea that tone mapping rules do not merge tonal and segmental representations, but associate their elements by means of formal entities known as association lines In this framework, phonological representations consist of parallel tiers of phonological segments, both tonal and segmental.
>
> (G.N. Clements and J. Goldsmith 1984: 2)

Furthermore, according to this theory each autosegmental tier contains a linearly ordered sequence of autosegments. Different features may be placed on separate tiers; various tiers are organised by association lines.

> A further innovation of autosegmental theory is the set of universal principles termed well-formedness conditions, which govern the multi-tiered structure of the representation. These principles not only define the set of theoretically possible inter-tier configurations; they also

> trigger the operation of a set of universal repair mechanisms, often termed association conventions, whenever configurations that violate them arise.
>
> (Clements 2003: 187)

In subsequent work, autosegmental phonology underwent further development; by the mid-1980s it could be considered a fully general theory of phonological representation, radically different from the linear representational systems of more traditional approaches.

> The primary innovation of the generalized model has been the view that not just tone and other so-called 'prosodic' features, but all phonological features are arrayed in separate autosegmental tiers. In this conception which draws upon earlier research in metrical phonology and prosodic phonology [this theory proposes that the primitive elements of phonology (features) are not grouped together in unordered bundles (segments)].
>
> (G.N. Clements 2003: 188)

Rather, they lead their own independent lives. Thus phonological structure can be seen as a 'score' of individual instruments corresponding to articulatory organs which play together along the same beat. Given this theoretical foundation, this study embraces the point of AP that, firstly, various articulatory constriction parameters (such as aspiration, nasalization, and voicing) are autonomous; and articulations that result from them are, in principle, independent – that is, they stand at different levels or tiers. This is contrary to the GP which holds that any lexical item is a sequence of speech sounds, each sound characterized in turn as a feature matrix. Secondly, phonological representations are regarded as complex arrays of elements arranged at different levels or tiers. This stems from the AP concern with the ways in which phonological rules can change the organizations of phonological representations. This runs contrary to the linear model of representation, which is concerned with rules that modify feature specifications, with the ways in which rules mapping underlying onto surface representations interact, and with the degree to which underlying representation may differ from surface representations. Thirdly, phonological features are not just an unorganised bundle of features. Rather, these features have their own internal organisation. According to this argument, the phonological representation is more than just a linear arrangement of feature bundles; further, rules can be stated very generally without detailed conditions added to each and every rule (Goldsmith 1976, Kahn 1976). However, it should be noted here in that not all aspects of the data can be covered by AP. That is to say, other possible models such as GP and the Mora Model should be employed in presentation of aspects such as vowel inventory, allophonic variations and syllable structure.

The language under study

Kɨβwanɟi is a Bantu language spoken in the Southern Highlands part of Tanzania. The language is spoken in three villages, namely, Matamba, Ikuwo and Magoye found in the Market District in the Kipengere Mountain Range, west of the Bena, north of the Kinga and south of the Sangu (Paul 2009). The name of the language is pronounced with an augment (pre-prefix) *'ikɨβwanɟi'*(*i*-augment, *ki*-noun prefix and *-βwanɟi* the root)[3].

(1)	(a)	ɨ	-	kɨ	-	βwanɟi		*'the βwanji language'*
		AUG	-	Cl 7	-	Root		
	(b)	a	-	va	-	βwanɟi		*'the βwanji people'*
		AUG	-	Cl 7	-	Root		

This study will make use of the name Kɨβwanɟi, leaving out an augment for the sake of consistency. Kɨβwanɟi language is classified in zone G60 in the Bena-Kinga group where it is assigned as G66; forming a linguistic cluster with Bena (G63), Sangu (G61), Hehe (G62), Kinga (G65), and Kisi (G67) (Guthrie 1967-1971). Nurse (1988, 1999) classifies Kɨβwanɟi alongside with Bena (G63), Sangu (G61), Kinga (G65), Kisi (G67), Pangwa (G64), and Hehe (G62), in this Southern Highlands subgroup. Kɨβwanɟi is a homogeneous language and it is used extensively by βwanji speakers of all ages and there is no danger of it being lost in favour of another language (Fischer, 2011).

Methods

Using the Autosegmental Phonology Theory, the following questions are addressed:

i. What is the phonological manifestation of Kɨβwanɟi sound inventory?

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[3] Glosses are as follows: AUG (augment), Cl (class), ATR (advanced tongue root), C (consonant), V (vowel), syl (syllabic), nas (nasal), cons (consonantal), cor (coronal), dor (dorsal), bk (back), UR (underlying representation), SR (surface representation.

ii. What is the structure of the phonological possible word in the language and the constraints governing the sequence of sound segments?

iii. What are the phonological processes that affect the sounds and their roles in preserving the structures of the word or morpheme?

A vast majority of the information gathered for this study comprises primary data collected from Matamba and Magoye villages in Makete District (Tanzania) where Kɨβwanɟi language is spoken. Ten participants were involved in the primary data collection. This group of informants included both male and female participants aged thirty years and above. The primary data was gathered through elicitation and analysis of secondary source texts such as story books and religious manuscripts. Focus group discussions were used to confirm the data collected. During elicitation, a long list of one hundred basic vocabulary items (such as body parts, household items, local foodstuffs, geographical and objects, tools, clothing, kinship) and fifty sentences were presented to the participants, for them to provide the Kɨβwanɟi equivalent and pronunciation. The raw data were audio recorded and later on were transcribed accordingly.

Results and Discussion

Kiβwanji consonant inventory

From the data analysed in this study, Kɨβwanɟi attested twenty three consonant sounds, pre-nasalized consonants.

Table 1: Kɨβwanɟi Consonant Chart

		PLACE OF ARTICULATION												
		Bilabial		Labial Dental		Alveolar		Palatal Alveolar		Palatal		Velar		Glottal
		VL	VD	VL	VD	VL	VD	VL	VD	VL	VD	VL	VD	VL
MANNER OF ARTICULATION	Plosives	p	B		t		d		ɟ			k	g	
	Pre-nasalized		^{m}b			^{n}d			^{n}ɟ			^{ŋ}g	^{ŋ}g	
	Fricatives		B	f		s							ɣ	h
	Lateral						l							
	Nasals		m				n				ɲ		ŋ	
	Glides		w							j				

Legend: VL = Voiceless, VD = Voiced

With regard to glides /w/ and /j/, there are two scenarios: the first is that the glide consonants /w/ and /j/ are products of derivation process. This means that they exist by virtue of being derived consonants hence they were not present in the underlying structure of the language. The second scenario is concerned with the palatal glide /j/. This consonant alternates with the voiced alveolar palatal stop /Ɉ/. Therefore, it can be stated explicitly that the palatal glide consonant /j/ becomes the voiced alveolar palatal stop /Ɉ/ in the word initial; whereas it remains the same elsewhere. The only noticeable pre-nasalized consonants in Kɨβwanɟi are voiced bilabial stop /^{m}b/, voiced alveolar stop /^{n}d/, voiced palatal stop /^{n}Ɉ/ and voiced velar stop /^{ŋ}g/. The series of pre-nasalized stops present in Kɨβwanɟi differ from the majority of Bantu languages in three important ways. Firstly, pre-nasalized stops in Kɨβwanɟi do not lengthen the preceding nasal sounds. Consider example (2):

(2)	(a)	fidu^{n}da	*'mountains'*
	(b)	ŋ^{h}wembe	*'skin'*
	(c)	^{n}dooβo	*'bucket'*
	(d)	^{n}ga^{n}gala	*'sardines'*

Secondly, there is no requirement in the language that all nasal-stop sequences within a word must be homorganic. This means that the Kɨβwanɟi pre-nasalized consonants exist independently of the homorganic assimilation process, although nasal assimilation and post-nasal voicing is widespread in Bantu languages (Hyman, 2003). Thirdly, the pre-nasalized consonant can be triggered by the syllable onsets constraints. Nasals preceding a voiceless stop in a word-initial or root-inital position (i.e. unambiguous onsets) tend to be homorganic, and the stop does not change its voicing feature because the sound (nasal) in question forms a mora of its own; hence it exists as an independent syllable.

(3)	(a)	/n+tamu/	→	**[n'tamu]**	*'a sick person'*
	(b)	/m+buluɣutu/	→	**[mbuluɣutu]**	*'ears'*
	(c)	/n+kota/	→	**[ŋ'kota]**	*'medicine'*
	(d)	/n+dimi/	→	**[n'dimi]**	*'brother'*
	(e)	/^{n}dooβo/	→	**[^{n}dooβo]**	*'bucket'*
	(f)	/^{n}ɟala/	→	**[^{n}ɟala]**	*'hunger'*

In Example 3(a) and (c) the nasal consonant /n/ and /ŋ/ are syllabic. This means that there is no homorganic open transition between /n/ and /t/ or /k/

such that the transition is marked by a momentary relaxation of the articulatory stricture, followed by a renewed tensing into the former position. Moreover, the voiceless features of the consonants /t/ and /k/ remain stable with no clue of being voiced.

Kɨβwanɟi vowel inventory

Evidence from the field data indicates that Kɨβwanɟi has seven distinct vowels in its underlying structure, comparable to many other Bantu languages. This is similar to the seven vowels presented by Mahali (2007). However, due to vowel length contrast, the language attests more seven long vowels making a total of fourteen vowels. The following vowel chart presents fourteen vowels both long and short vowels.

Table 2: Kɨβwanɟi Vowels

		Front		Central		Back	
High	*+ATR*	i	iː			u	uː
		ɨ	ɨː			ʉ	ʉː
Mid		e	eː			o	oː
Low	*-ATR*			a	aː		

The Kɨβwanɟi vowels as presented in the table above are divided into two groups, depending on whether the tongue root is moved forward enlarging the throat cavity, or is in a neutral position, or is moved backwards reducing the throat cavity.

Vowel length was noted in the language and it was tested by means of pairs and sets of words. Moreover it was discovered that vowel lengthening in Kɨβwanɟi is lexical. The following presents a set of words that will serve as a justification of the presence of long versus short vowels in Kɨβwanɟi.

(4) Vowel Length Minimal Pairs

Kɨβwanɟi	Gloss	Kɨβwanɟi	Gloss
kupala	*'to scratch'*	kupaala	*'to praise'*
kupela	*'to create'*	kupeela	*'to diminish in size or amount'*
ɨᵐbile	*'s/he has sung'*	ɨᵐbiile	*''s/he has studied'*
kuvɨka	*'to crow'*	kuvɨɨka	*'to place/ put'*
kutola	*'to win'*	kutoola	*'to save'*
suka	*'wash'*	kusuuka	*'to evoke smoke'*
kiɟʉva	*'dry season'*	kiɟʉʉva	*'a woman'*

Allophonic variations in Kɨβwanɟi language

A phoneme may encompass several recognisable different speech sounds called 'phones'. In phonetics, the smallest perceptible segment is a phone (Odden 2005). For example, the /t/ in English word 'tummy' is aspirated [tʰ], while the /t/ in 'stick' is unaspirated [t]. Thus, phones that belong to the same phonemes are called allophones, as it can be seen in the sounds [tʰ] and [t], which are allophones of the phoneme /t/ given that the two sounds do not show word contrast. The task of any phonologist is to state the environments that determine these variations of the same phoneme (Jackson 1982, Odden 2005). Thus with regard to this aspect, Kɨβwanɟi language exhibits various allophonic variations as explained below.

The voiced bilabial fricative /β/ is realised as a voiced bilabial stop [b] when it is preceded by a nasal consonant and followed by a vowel. This means that where such consonant sequence is anticipated the sound /β/ is replaced by [b]. Thus, /β/→ [b]/N_____+V.

(5)	(a)	/ɨpundaɨm + βaha/ donkey big	→	[ɨpundaɨmbaha] donkey big	*'a big donkey'*
	(b)	/ɨm+βunda/	→	[ɨmbunda]	*'club'*

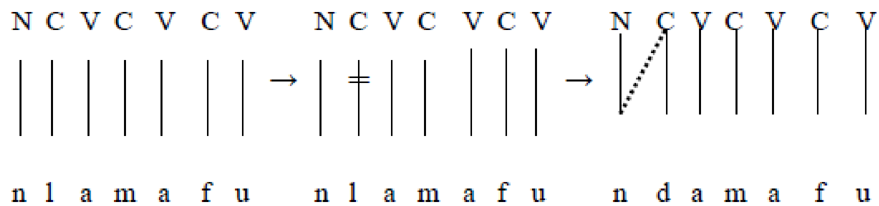
The voiced velar fricative /ɣ/surfaces as voiced velar stop [g]. The two allophones [ɣ] and [g] exist in free variation with each other, in that the two sounds occur in overlapping environments but cause no distinction in the meaning of their respective words. The speakers themselves perceive the phoneme as /ɣ/.

(6)	(a)	/ɣala/	→	[ɣala]	~	[gala]	*'get drunk'*
	(b)	/ɣula/	→	[ɣula]	~	[gula]	*'buy'*
	(c)	/ʉlʉɣulu/	→	[ʉlʉɣulu]	~	[ʉlʉgulu]	*'a leg'*
	(d)	/ɣomoka/	→	[ɣomoka]	~	[gomoka]	*'turn'*
	(e)	/kʉkɨɣaβo]	→	[kʉkɨɣaβo]	~	[kʉkɨgaβo]	*'other side of a river'*

This alternation may be described by the following phonetic rule: /ɣ / → [g] ~ [ɣ] / all environments. This rule states that the voiced velar fricative /ɣ/ may surface as the voiced velar stop [g] or as a voiced velar fricative [ɣ] in all environments.

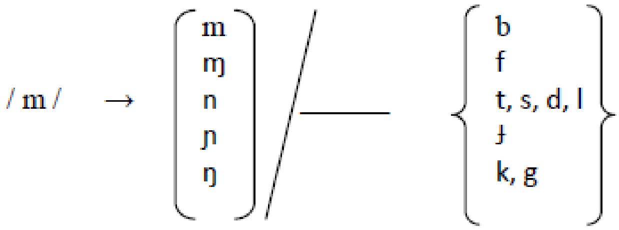
In Kɨβwanɟi, the lateral (liquid) sound /l/ surfaces as the voiced alveolar stop [d] over the morpheme boundary after a nasal sound. This is an assimilatory process which is triggered by an antecedent nasal sound especially /n/ as postulated in the following example:

(7)



'unclean'

Bilabial nasal consonant /m/, that belongs to class one (Cl 1) and three (Cl 3) in Kɨβwanɟi noun class system, surfaces as [n], [m], [ŋ], [ɱ], [ɲ] over the morpheme boundary. This is the assimilatory process, which is triggered by the fact that when noun class (NC) combinations occur in the morpheme boundary, there is a general tendency for the nasal to assimilate the place of articulation of the following consonant. The rule for these allophonic variations can be stated as follows:

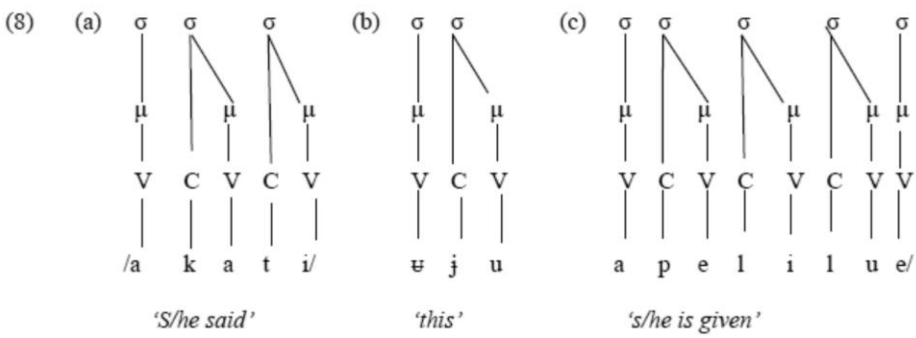


Kɨβwanɟi syllable structure and syllabification

Following the shortcomings of the traditional analysis, the moraic model was invented. The fundamental claim of moraic theory is that the only element intervening between the syllable node and the segmental root node is the mora. The moraic model of the syllable was first formalized in Hyman (1985) and further developed in Hayes (1989). Under this approach, the syllable contains neither an onset nor a rhyme. Instead, every syllable contains one or more moras (μ). This study uses the moraic model to present the possible sound combinations in forming a syllable and ultimately an acceptable phonological word in Kɨβwanɟi.

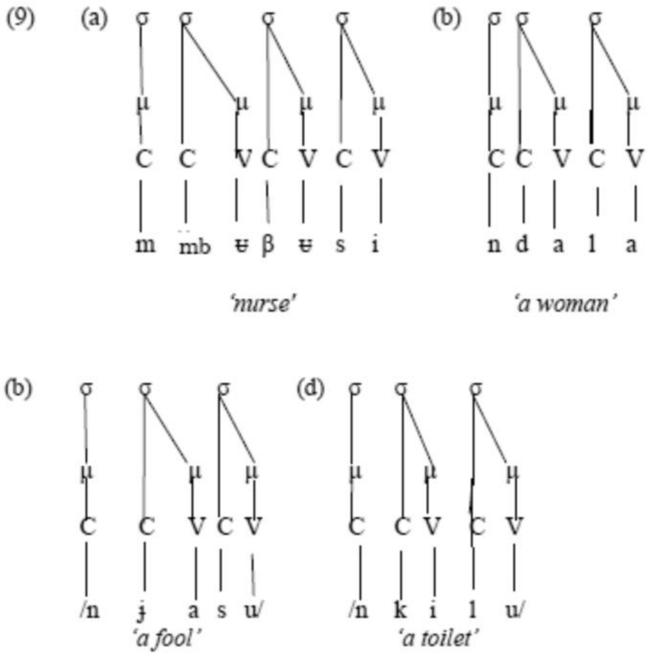
The V structure

In Kɨβwanɟi, a vowel can be an independent syllable. In this structure, the syllables have no onset, only a vowel which forms the peak of the syllable. However, the **V** structure is restricted to initial and word final position; this means that it cannot occur in the word medial position as in other Bantu languages like Kiswahili, as illustrated in the following example.



The C structure

Kɨβwanɟi language tolerates the existence of a single consonant as an independent syllable. However, it is not just a consonant; rather it must be a syllabic consonant which is a nasal /m/ and/or /n/. The phonological manifestation of these syllabic nasals emerges in their special and restricted way as they befall particular words initially. Moreover, this nasal is always followed by the consonant in the next syllable, and it shares a place feature with that consonant. It also forms a mora of its own.

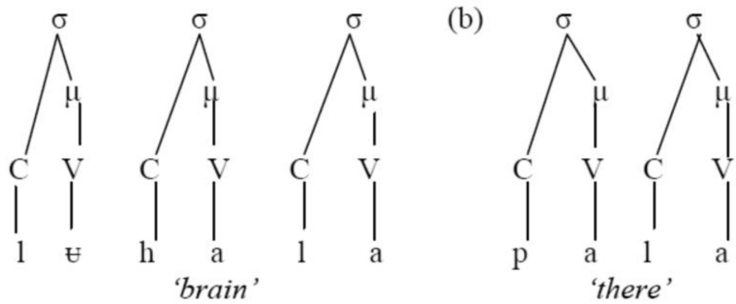


The examples in (9) indicate that there are two types of syllabic nasals. The first one is an alveolar nasal /n/ that assimilates in place of articulation to the following consonant, deletes before fricatives, and causes nasalization of voiceless stops. The second type is a bilabial nasal /m/, this kind of syllabic nasal is usually found at the beginning of a word. It is also derived from the reduced form of the /mu/ syllable structure through the common Bantu language deletion process, which requires that the vowel gets deleted when it is followed by a consonant in some contexts.

The CV structure

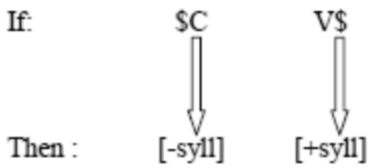
This is the default syllable structure in the language; it also covers a wide range of syllables in Bantu languages and other world languages.

(10) (a)



In this CV syllable sequence, there are no restrictions in the onset position and nucleus with regard to the type of consonant or vowel. This means any consonant can be followed by any vowel to form this syllable shape. This case in point can be demonstrated by using the following, if-then condition rule that read vertically.

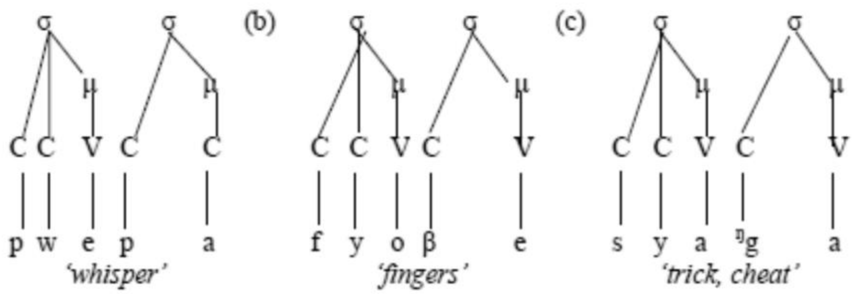
(11)



The CCV structure

The CCV structure in Kɨβwanɟi requires that the first consonant be any true consonant and the second consonant be a glide /w/ or /j/ respectively. The following examples help to support this.

(12)



In the structure presented above, the second consonant is always a product of the gliding process; whereas the first is a pure consonant of its own. In this respect the structure can be stated in the following conditions.

		C	C	V
(13)	If:	C	C	V
		⇩	⇩	⇩
	Then :	[-syll]	[-syll, -nas, +high, +son]	[+syll]

The Kiβwanji possible morpheme or phonological word

Kɨβwanɟi seems to hold a relatively strict CV syllable structure, tolerating very few V, C, and CCV clusters in which the second C is typically a glide. Therefore, from the structures presented above, the following syllable template can be derived.

(14)	(a)	V	/a	$	p	a/						*'here'*
			/βʉ	$	si	$	a/					*'ask'*
			/i	$	ge	$	ɣa					
	(b)	C	/n	$	da	$	la/					*'a woman'*
			/a	$	n	$	ta	$	^{ŋ}gi		le/	*'s/he helped'*
			/ɱ	$	fi		ɲi/					*'a greedy'*
	(c)	CV	/na	$	te	$	le	$	ka/			*'s/he didn't cook'*
			/pa	$	lu	$	ba	$	le/			*'aside'*
			/mʉ	$	sɨ	$	la/					*'in the path'*
	(d)	CGV	/m	$	bwa	$	fu/					*'an adulterer'*
			/ku	$	gwe	$	ba/					*'to scratch'*
			/ku	$	twi	$	βu	$	ki	$	la/	'to hazard'

As the templates above indicate, the language does not allow codas at the end of the syllable. This means that no vowel deletes at the word final to allow codas. Thus the morpheme or word is conceived on the basis of following constraints governing the sequence of segments in the language.

i. A word or morpheme allows a consonant (syllabic consonant) or a vowel to stand as an independent syllable and form a mora of its own.

ii. Although a vowel can optionally exist in the initial position of a word or morpheme, it is obligatory at the word final position allowing the syllable to have no coda.

iii. The consonants of the same quality are never allowed to occur next to each other. This constraint requires that if two consonants are to occur adjacently, the first one must be a true consonant then the second one a glide.

iv. Where the CV structure is assumed, the consonant is not restricted to certain phonological feature, meaning that any consonant qualifies for co-occurrence with any vowel.

As such, we can posit that Kɨβwanɟi language takes the following canonical syllable structure: # (V) (N) C (G) V#. This entails that a complete word in Kɨβwanɟi language may optionally begin with a vowel, but obligatorily must end in a vowel.

Phonological processes affecting vowels and consonants

In the course of segment juxtaposition, some segments may impose their features on others; others may be deleted; some may be inserted; and others may be permitted. Many of these processes change one phoneme to another and thus were often called morphophonemic in earlier phonological theories (Chaula 1985, Gardner 2012). These phonological processes occur under certain conditions, and are language specific. When such conditions as stipulated take place, we get phonological rules (Massamba 1996). In phonological rules, we construct paradigms of words to look for regular alternations and / or derivations in the phonetic shape of the stem as different affixes are added, as well as systematic differences in the realizations of the affixes as a function of the stem.

These rules also depict the variations in the pronunciations of the words in various contexts. If the derivation is regular, we assume that the morpheme has a unique underlying representation, such that the various phonetic shapes arise from sound changes introduced by context sensitive phonological rules. According to Kenstowicz:

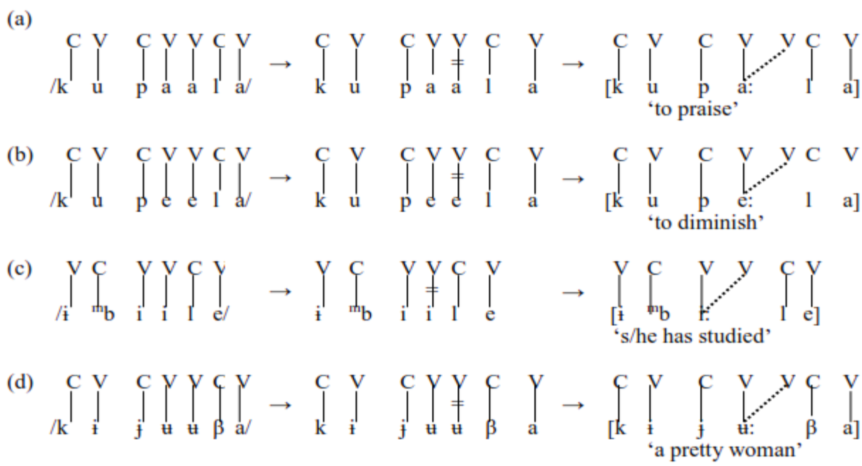
> Through analysis and description of the paradigms, we can, for example, isolate alternations and or derivations in which sounds, let us say, [x], alternates with [y] in a given context ([x] or [y] may be zero). There are always at least two possible analyses for the [x]~ [y] derivation that must be considered. Either [x] is underlying or a given rule apply to change [x] to [y] in some context; or [y] is underlying, and a given rule applies to change [y] to [x] in the complementary set of contexts such as [z].
>
> (Kenstowicz 1994).

However, what is so common in many languages is that phonological processes may apply from syllables to phrases and affect vowels or consonants (Kahigi 1977, Byarushengo 1975, Chaula 1985, Ismail 2000).

Phonological processes affecting vowels

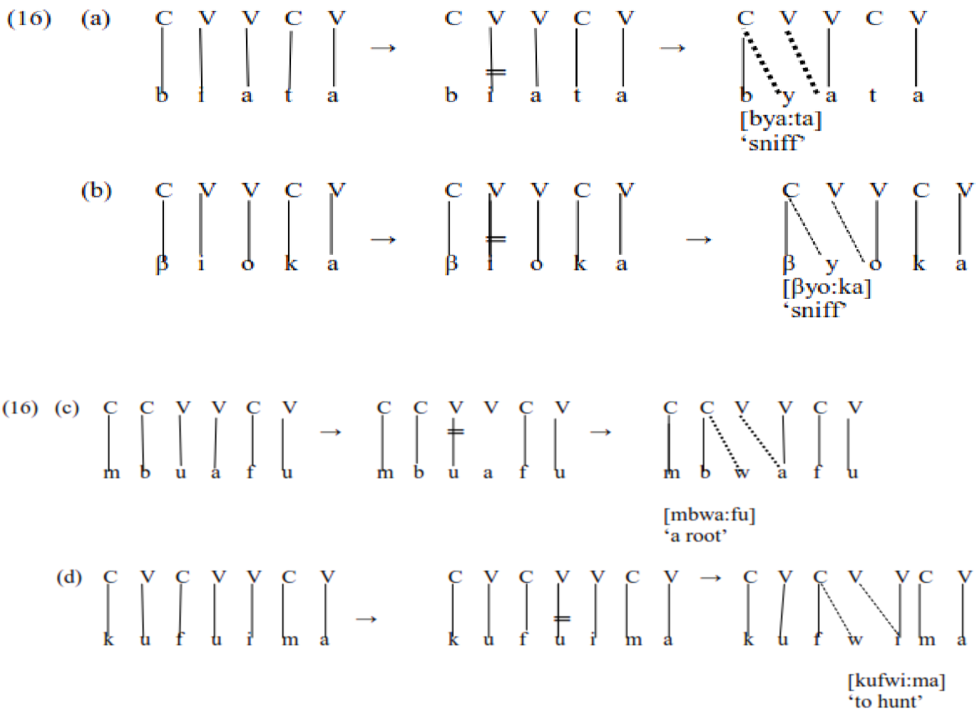
Vowel lengthening. Hyman (2003) lists five sources of vowel length across Bantu languages. These are: underlying representation i.e. phonemic length, vowel concatenation (either across morpheme boundaries or through consonant elision), gliding plus compensatory lengthening, compensatory lengthening preceding a moraic nasal plus consonant, and penultimate vowel lengthening. Kɨβwaɲɟi short vowels are unrestricted in their dispersal, whereas long vowels are only found stem-medially and characterize the penultimate syllable. Vowel lengthening in Kɨβwaɲɟi takes place under the following phonological conditions: first, after pre-nasalized consonants, and second, before labialized and palatalized consonants which are purely the product of compensatory lengthening.

(15)



The vowel lengthening presented in (15) above is not phonemic but derived. Although vowel lengthening as a result of a pre-nasalized consonant does not evoke any semantic explanation, it only serves as a means to preserve the configuration of the possible word in the language which requires that the vowel be lengthened when followed by a consonant. The second case that lengthens the vowel is when the vowel appears before labialized consonants and palatalized consonants. However, this environment is highly fused with the process known as compensatory lengthening. The language itself does not have these labialized or palatalized consonants as independent phonemes. They arise as the result of gliding of the high vowels /i/ and /u/ or which triggers vowel length to recover the lost vowel as the result of gliding as indicated in example 15 (d).

Glide Formation. Glide formation in many Bantu languages typically takes place as the high front vowel /i/- is followed by a vowel initial stem, producing the glide /j/ (written /y/), and the back high rounded vowel /u/ followed by a vowel initial stem, results in the glide /w/ (Hyman 2003). This process is relevant in Kɨβwanɟi language where the vowel /i/ becomes palatal approximant /j/ and /u/ becomes bilabial approximant /w/ when followed by a non-identical vowel. This case in point is illustrated in 16 below.

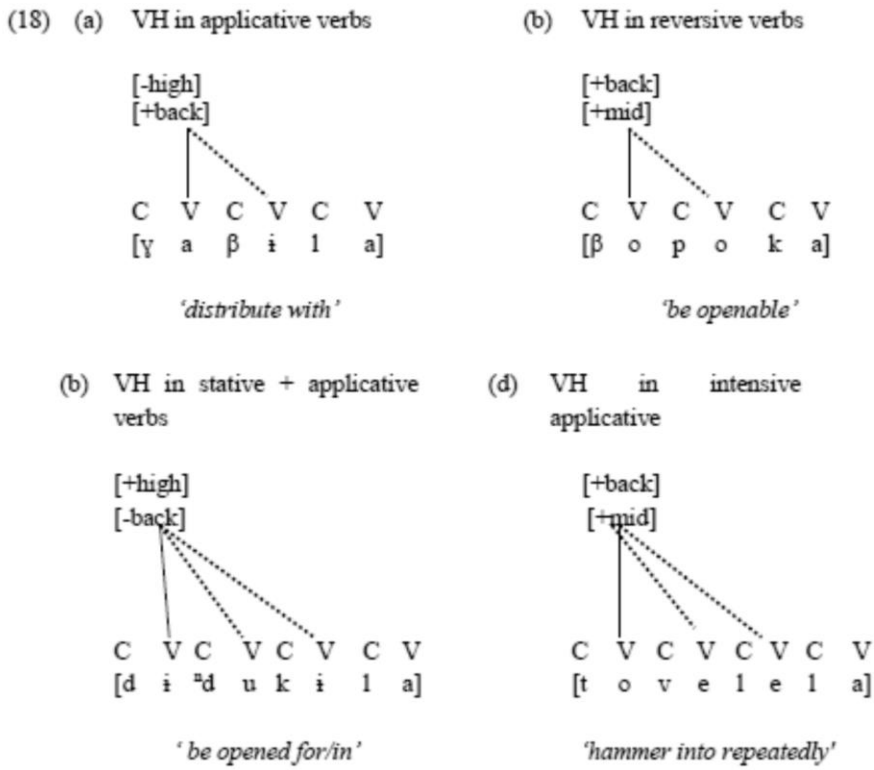


Although glide formation seems to be pervasive in this language, the available data reveals that its appearance is highly restricted as to where it should appear when forming Kɨβwanɟi words. From data presented in (17), it can be argued that the glide formation process only applies at the word initial and medial position. In the word final position this process does not apply hence there is no any gliding whatsoever, and that any attempt to have this process apply word-finally will definitely lead to an ill-formed word.

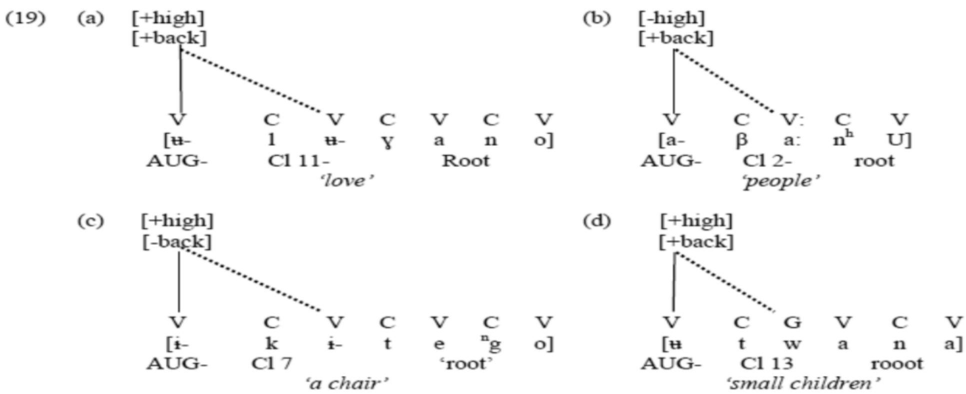
(17)	(a)	/ɟalembil**ue**/	[*ɟalembil**we**]	*'was written'*
	(b)	/ifipel**ua**/	[*ifipel**wa**]	*'s/he is given'*
	(c)	/kul**ia**/	[*kul**ya**]	*'to eat'*
	(d)	/ɨkyakʉl**ia**/	[*ɨkyakʉl**ya**]	*'food'*
	(e)	/βasyemil**ue**/	[*βasyemil**we**]	*'they have forgotten'*
	(f)	/ʉtʉpumwis**ie**/	[*ʉtʉpumwis**ye**]	*'you have persecuted us*
	(g)	/akahodes**ia**/	[*akahodes**ya**]	*'s/he knocked'*
	(h)	/aβaβʉlanɨsiβ**ua**/	[*aβaβʉlanɨsiβ**wa**]	*'the disciples'*
	(i)	/βakampelepes**ia**/	[*βakampelepes**ya**]	*'they whispered to him'*

Vowel height harmony. Vowel height harmony is common in Kɨβwanɟi, and usually affects the vowels of derivational suffixes of verb extension such as the causative, applicative, reversive/separative, neuter, and combinations of these, and in augmentation. Consider the following examples in (18).

(18)



Furthermore, vowel harmony in Kɨβwanɟi language occurs in the process of pre-prefixation (augmentation) in which the augment vowel reduplicates the prefix vowel across an intercepting consonant, as presented in (19).

(19)


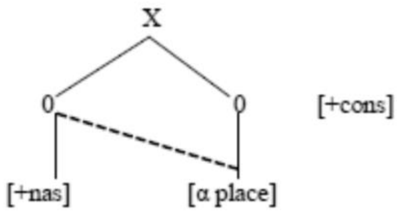
Phonological processes affecting consonants
The most noticeable phonological processes affecting consonant sounds in Kɨβwanɟi include homorganic nasal assimilation, nasal palatalization, and consonant hardening.

Homorganic nasal assimilation. In Kɨβwanɟi, the first person singular is underlying marked by /m/ in the subject slot. However, when the prefix /m/ precedes a lexeme beginning with a consonant, it assimilates to the place of articulation of the following obstruent. Thus, the nasal become homorganically assimilated to the following stop. The following examples will help to demonstrate this.

(20)	(a)	/ʉ-mʉ-diim-a-ŋombe/ AUG-Cl.1-herd-FV-Cl.9.cow	→	[ʉndimaŋombe]	"cow herder"
	(b)	/ʉ-mʉ-nʰumʉ-taali/ AUG-Cl.1-person Cl.1-tall	→	[ʉmʉnʰuntaali]	'a tall person'
	(c)	/ʉ-mʉ-kotaɣwangu/ AUG-Cl.2-medicine myne	→	[ʉ-ŋkotaɣwaŋgu]	'my medicine'
	(d)	/ʉ-vemʉ-nofu/ AUG-be Cl.1-good	→	[ʉ-ven-nofu]	'be good'
	(e)	/ʉ-mu-ɟaasu/ AUG-cl.9-fool	→	[ʉ-ɲɟaasu]	'a fool'

These data indicate that in all instances the nasal consonant /m/ assimilates in place of articulation of the succeeding obstruent. The rule spreads the place feature of a consonant to the preceding [+nas] element unspecified for place. However, this rule suggests that homorganic assimilation is a natural process that is highly compelled by physiological properties of the vocal organs, thereby insuring that the native speaker does not face difficulty in pronouncing the words and preserving the configuration of phonological word as well.

(21)

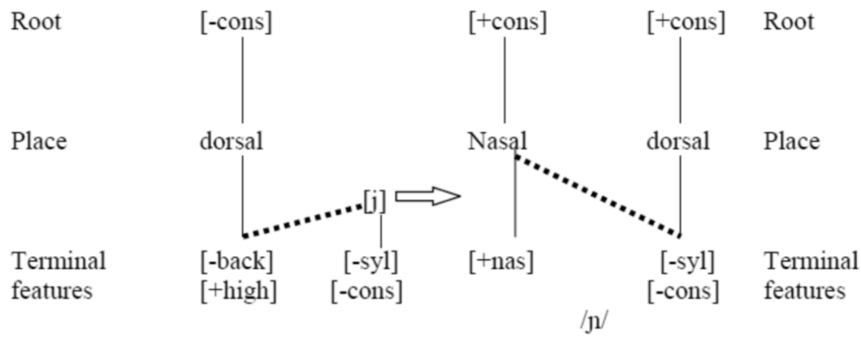


Nasal palatalization. Nasal palatalization is the process whereby non-palatal consonants (nasal) become palatalized before front ghost vowels especially [i] (Wa Mberia 2002). As such, consonants acquire secondary palatal articulation, or shift their primary place towards or close to the palatal region. This usually happens under the influence of an adjacent front vowel and or a palatal glide (e.g. ki→kji, tja→ʧa) (Alexei 2010). In majority of Bantu languages (Kɨβwanɟi inclusive), the noun class prefix for Cl 9 and Cl 10 begins with a nasal sound plus a vowel (*ni) at the underlying structure (Kahigi 1977, Massamba 1996). However, at the surface form, the nasal sound is phonologically affected and become palatalized consonant [ɲ].

(22)	(a)	[ni	+	ambe]	→	n^{j}ambe	→	/ɲambe/	*'a bag'*
	(b)	[ni	+	ola]	→	n^{j}ola	→	/ɲola/	*'nip'*
	(c)	[ni	+	aula]	→	n^{j}aula	→	/ɲaula/	*'take a bit'*
	(d)	[mu	+	niaɲu]	→	mun^{j}aɲu	→	/muɲaɲu/	*'a witch'*
	(e)	[pini	+	a	→	pin^{j}a]	→	/piɲa/	*'tie'*

Examples above suggest that the underlying /n/ surfaces as [ɲ] when followed by a high front vowel /i/. However, for these changes to happen, two processes have to be involved simultaneously, or in what can be called deep-down order. In the first place, the [+high, - back] changes to glide /j/, and then undergoes one further step to palatalization. The rule for this process would be as follows.

(23)



Thus: /n/ ⟶ [ɲ] / ___ [+high] [-back] + V

Labialization. In Kɨβwanɟi, labialization take place when the non-labial consonants precedes high back rounded vowel /u/ and followed by non-round vowel, as illustrated in (24).

(24)

(a) /ku+eβalyale/	→	[kʷeβalyale]	*'there was'*
(b) /lu+ake/	→	[lʷake]	*'his/hers'*
(c) /βiku+ingila/	→	[βikʷingila]	*'they are entering'*
(d) /ɣu+ikimihe/	→	[ɣʷikimihe]	*'a calm'*
(e) /su+eŋu/	→	[sʷeŋu]	*'gazelle'*
(f) /kuhu+anana/	→	[kuhʷanana]	*'to look alike'*

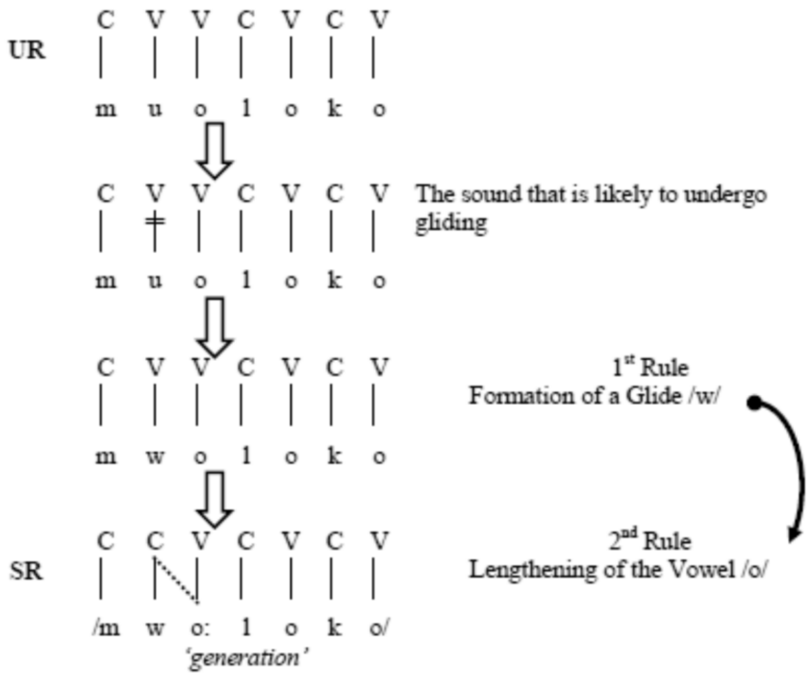
From the data, the consonants [l, s, k, ɣ, β, h,] that are naturally produced with spread lips underwent change and were rounded as they were anticipating the production of the adjacent rounded vowels. Therefore, we can assume the following phonological rule to account for the above phonological phenomenon.

(25) [+cons] [- lab] → [+lab] / [+ syll] [-cons] [+ round] ___ V [-round]

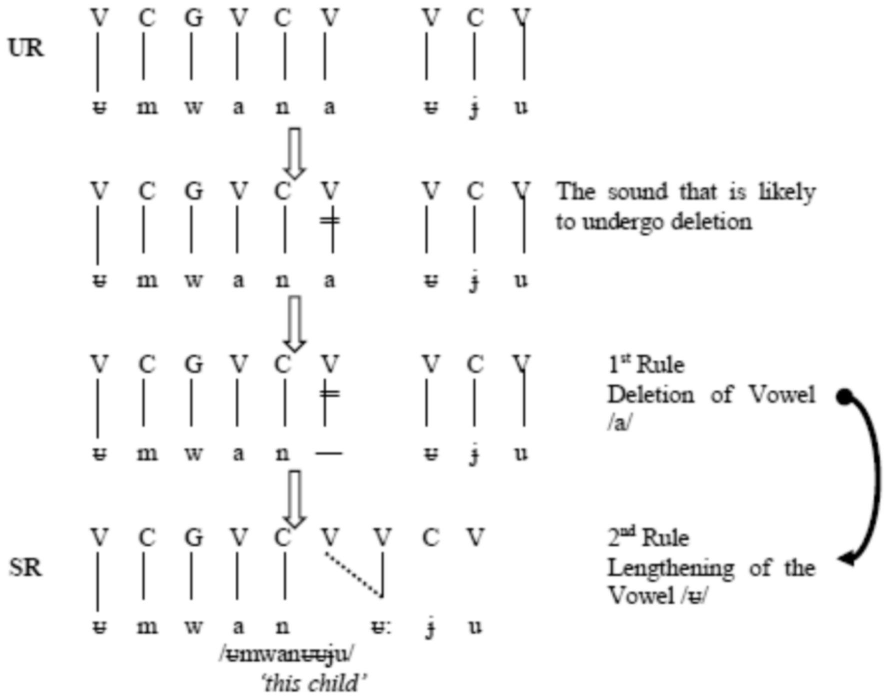
Phonological rule ordering

Phonological processes are rule-sensitive, entailing that they do not take place unevenly but in a number of restricted rules. However, in case more than one rule has to appear, the phonological processes are in a bleeding and/or feeding order (Samweli, 2008; Mekacha, 1985). Three sets of rules were found to be in a feeding order, i.e. glide formation and vowel lengthening, vowel deletion and vowel lengthening, glide formation and nasal palatalization.

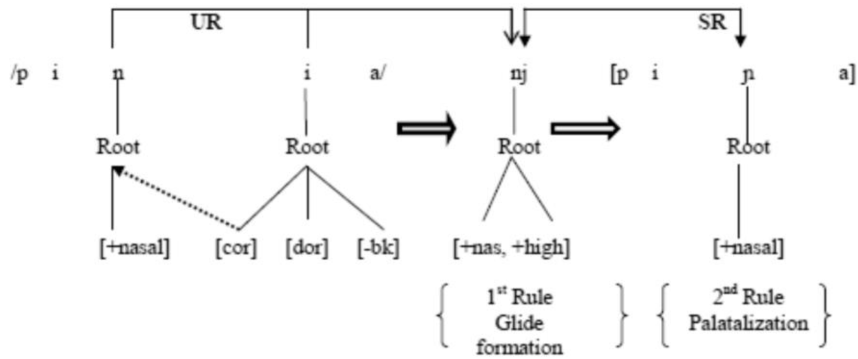
(26)



(27)



(28)



Conclusion

The main argument of this study is that the phonological processes which affect consonants and vowels in Kɨβwanɟi language are natural. They serve as the mechanism through which the native speakers are able to recognize and correctly pronounce acceptable words within the language by posing the phonological rules which are in conspiracy. However, this study must not be regarded as a complete phonological description of Kɨβwanɟi language. Many aspects, notably the status of voiceless nasals and the question of whether the language is loosing +/- ATR vowel qualities, are still unfounded. Many efforts have been devoted to describing just a single, albeit important, aspect of phonological processes. This narrow scope of analysis paves the way and welcomes other studies on the noted aspects of the language and on other grammatical aspects of the language such as morphology, syntax, as well as sociolinguistic aspects.

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