Aspects of Non-Concatenative Morphology in Kikisi

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Abstract. This paper describes non-concatenative morphology in Kikisi (kiz), a largely undocumented language spoken on the northeastern shores of Lake Nyasa (also known as Lake Malawi). The paper demonstrates that the predominantly agglutinative language displays templatic structure in demonstratives, dissimilation, and templatic interrogative pronoun 'which,' multiple exponence in perfect aspect marking, and reduplication. The templates are specified in terms of syllables creating non-linear structures. The phenomena have implications for how morphemes are defined and what materials build the smallest meaningful units in Kikisi. The paper also demonstrates how Kikisi morphological typology, like all languages, is not a pure type.

1.0   Introduction

Bantu languages are known for their agglutinative morphology. Verbs, nouns, and adjectives are formed by adding affixes before or after the root, like adding beads to a string. However, as noted by (Katamba 1978) and (Kosch 2005), there is also a considerable amount of fusion, cumulative exponence, and multiple exponence. Such morphology has not attracted enough attention among Bantuists, although its existence in Bantu is well known in computational linguistics, for example, in the work of (Hurskainen 2005) on Swahili. Various aspects of non-concatenative morphology are noted in studies on reduplication, fusion, and templatic morphology (Downing 1999; Hyman 1992, 2003).

The objectives of this paper are two-fold. First, the paper describes non-concatenative phenomena in Kikisi, a Bantu language spoken in southern Tanzania. Secondly, it contributes to the discussion on the nature of morphemes by identifying the linguistic materials that make morphemes in non-linear morphology. The objectives are achieved by addressing the following questions.

(a) What are the aspects of morphology in Kikisi that can be identified as non-concatenative?
(b) What materials are responsible for contrasting meanings in the non-concatenative morphology of Kikisi.
(c) What is the role of prosody and phonotactics in defining non-concatenative structures?

These questions are answered in the following five sections. Section 2 presents the defining features of concatenative and non-concatenative morphology. Kikisi language is introduced in §3, followed by a description of several phenomena in Kikisi that are shown to be non-concatenative, namely, templatic demonstratives, imbrication, and reduplication in §4. The implications of the non-concatenative morphology in defining the minimal units of meaning are discussed in §5, followed by concluding remarks in §6.

2.0   Concatenative and Non-Concatenative Morphology

Kikisi morphology is predominantly concatenative. This section outlines the features that characterize concatenative morphology as generally recognized by morphologists (Bye & Svenonius 2012; Haspelmath 2009; Plank 1999; Spencer 1991). Operations that appear inconsistent with those features or lacking them are considered non-concatenative. The features need not apply to every non-concatenative phenomenon.

The first feature of concatenative morphology is that it is linear. Morphemes are ordered one after another without overlapping. This can be illustrated with an example from Kikisi.

(1)   βa-ka-let-ile
        2SM-MOT-bring-PRF[1]
        'They brought (it).'

In this example, the word is built on the root *let* 'bring.' Added to it are inflectional prefixes for subject marking (2SM) and tense (MOT), and the inflectional suffix of perfect aspect (PRF). All four morphemes appear in a sequence.

The second feature is the contiguity and integrity of the morphemes. Each morpheme consists of segments that are contiguous without gaps between them. For example:

(2)   a. li-kayamba
           5-tortoise
           'tortoise'

        b. ku-hoɣol-a
           INF-give.birth-FV
   'to give birth'

In (2a), the word is made up of two morphemes *li-* and *kayamba* 'tortoise.' Each consists of segments that are contiguous and not interrupted. The six segments of the root in (2a) appear knit together. Likewise, in (2b), the multiple segments that form the prefix and the root are contiguous.

The third feature can be discerned from these two features in that building words linearly adds morphemes in a sequence, thus forming a hierarchical structure such as the one for the noun *ligulilu* 'marketplace.'

(3)   a. li-gul-il-u
           5-buy-APPL-NOMNZ
           'marketplace'

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[1] The abbreviations used in this article include the following: **APPL** (Applicative), **AUX** (Auxiliary), **CAUS** (Causative), **COMP** (Complementizer), **COND** (Conditional), **EXT** (Extension), **FV** (Final Vowel), **INF** (Infinitive), **MOT** (Motional), **NOMNZ** (Nominalizer), **OM** (Object Marker), **PRF** (Perfect Aspect), **PRS** (Present Tense), **PST** (Past Tense), **SM** (Subject Marker), and **TNS** (Tense Marker).

Figure 1: *Tree Structure of (3)*
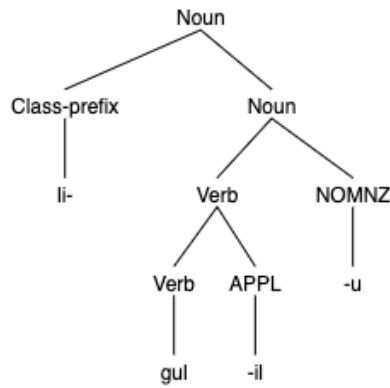
The tree structure represents the hierarchy building from the root *gul* 'buy.' First, the verb is derived into an applicative with the suffix *-il* and then nominalized with the suffix *-u*. This noun then must be assigned a noun class prefix which it does with the prefix *li-*.

The morphologically complex verb in Bantu is analyzed as one such hierarchy. Mchombo (2004), for example, has the following tree structure representation for Chichewa used here with a Kikisi verb.

(4) βa-ka-li-sɛl-ɛsj-a
2SM-PST-5OM-float-CAUS-FV
'They made it float.'

Figure 2: *Tree Structure of (4)*
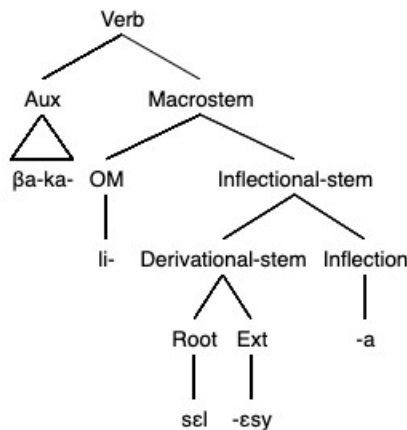
In this structure, an inflected verb consists of two main parts, the macrostem and the auxiliary. The macrostem is the domain of object marking, and the inflectional stem is made up of the verb stem and final inflection. The auxiliary is the domain built around tense with subject marking, negation, and other verbal prefixes.

The fourth feature, which one must have noticed in the three features already mentioned, is that concatenative morphology is additive. Beginning with the root, morphemes are added as prefixes or suffixes. It does not delete nor just change some segments of the morpheme. In English, for example, the plural of *goose* /gu:s/ is *geese* /gi:s/. While the initial and final consonants of the word appear in both singular and plural, the plural formation is derived by changing the internal vowel. This is non-concatenative.

Therefore, another feature is that concatenative morphology preserves the morphemes when others are added. Morphemes do not overwrite existing morphemes. The sixth feature is that morpheme segments are autonomous and are not determined by other morphemes or words.

When these features are violated, we get non-concatenative morphology. For example, discontinuous morphemes, such as those interrupted by infixes or templatic morphology, are non-concatenative. Such morphological structure is non-hierarchical and non-linear. Sometimes the word structure consists of templates which get their segmental material from another morpheme. Furthermore, in some languages, autosegmental features may be morphemes.

Prototypical cases of non-concatenative morphology are Semitic root-and-pattern morphology. In languages such as Arabic, roots are prototypically triconsonantal. Inflections and derivations are based on patterns of vowels and templates that define the C and V positions. In the following examples from Arabic, roots are represented by XYZ. In other words, X is the first consonant, Y is the second consonant, and Z is the third consonant. Inflected or derived verbs are shown to have templates that specify where the vowels are inserted and the sequence of consonants and vowels required.

*(5) Arabic Morphology (Kenstowicz 1994)*

	'study'	'carry'	'draw'	Template
a.	darasa 'he studied	hamala 'he carried'	rasama 'he drew'	XaYaZa
b.	darrasa 'he taught'	hammala 'he loaded'	rassama 'he made draw'	XaYYaZa
c.	darraasun 'student'	hammaalun 'porter'	rassaamun 'draftsman'	XaYYaaZun
Root	drs	hml	rsm	

Three roots are found in this set of examples, *drs* 'study,' *hml* 'carry,' and *rsm* 'draw.' To inflect the third-person and past tense, the template *XaYaZa* is used. The vowels for this tense are *-a-a-a*. The causative verb in the past tense calls for the template *XaYYaZa* in (5b). The nouns in (5c) are built on the *XaYYaZun* template.

In these examples, the inflections and derivations are not done linearly, adding one affix after another. The internal structure of the words does not reveal a hierarchy. Instead, inflectional vowels are inserted into the

root. The root is thus discontinuous. The structure of Arabic morphology is represented in tiers, as shown in (6) below.

(6) The Morphology of Arabic Verbs (McCarthy 1981)
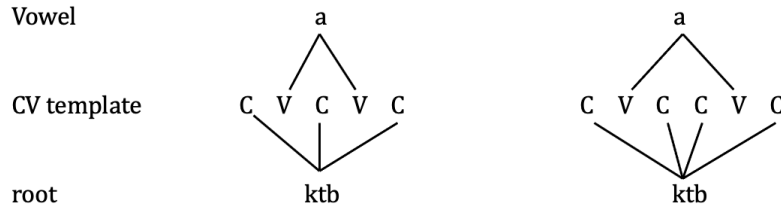
This representation shows the discontinuous nature of the roots and the vowel melodies. In the inflected and derived forms, the three consonants of the root are not contiguous because they are interrupted by the inflectional vowels.

This representation of morphology was inspired by developments in phonology, specifically, autosegmental phonology. Evidence from tones showed that tones are not necessarily identified with specific segments (Goldsmith 1976; Leben 1973). An important lesson that was drawn from this theory was that some linguistic structures could be represented in autonomous tiers. This discovery led to morphological representation in tiers, as illustrated in (6), in which the three tiers capture the cumulative exponence.

Most of the morphology in Kikisi is consistent with the defining features of concatenative morphology. However, some phenomena are non-concatenative. The phenomena are described after introducing Kikisi.

3.0   Introducing Kikisi

Kikisi (iso 639-3 code *kiz*) is a Bantu language spoken on the northeastern shores of Lake Nyasa (also known as Lake Malawi) and the slopes of Kipengere Mountains. It is one of the languages of the Southern Tanzania Highlands, together with Pangwa, Bena, Hehe, Kinga, Sangu, Wanji, and Manda (Nurse 1988). It is coded G67 in Guthrie's classification (Guthrie 1967-71). This paper is based on data collected during fieldwork between 2006 and 2011 while working with speakers from Makonde village.

The vowel inventory of Kikisi consists of seven (7) vowels, as presented in the following chart.

(7) The Vowel Inventory

	Front	Back
High	i	u
	ɪ	ʊ
	ɛ	ɔ
Low	a	

There are three front vowels /i, ɪ, ɛ/, and three back vowels /u, ʊ, ɔ/, and a central low vowel /a/. Vowel lengthening tends to happen in penultimate syllables. Kikisi does not exhibit phonemic tone.

There are twenty-five (25) consonants that appear in a symmetrical consonant chart, as shown below.

Table 1: *Kikisi Consonant Inventory*

	Labial	Alveolar	Palatal	Velar	Glottal
Voiceless stops	p	t	c	k	
Voiced stops	b	d	ɟ	g	
Approximants	β	ɾ	j	ɣ	
Fricatives	f	s			h
Nasal stops	m	n	ɲ	ŋ	
Prenasalized stops	ᵐb	ⁿd	ⁿɟ	ᵑg	
Glides	w		j		

There is no standard orthography for this language. For this reason, we shall use phonetic symbols to represent data. Besides, since this article is a study of morphological processes, phonetic symbols are more revealing.

The syllable structure in Kikisi is simple, with the following four forms as the most common and indigenous.

(8)   a   V
       b.   CV
       c.   CGV
       d   N̩

Some syllables are made up of only the vocalic nucleus (8a). Most syllables consist of a consonant and a vowel (8b). Also found are syllables whose onset is made up of an obstruent followed by a glide and a vowel (8c). The fourth syllable structure is made up of a syllabic nasal (8d). All these forms are exemplified in the following words.

(9) a. a.gwi.lɛ   'she/he has fallen'
    b. ku.gu.bi.ki.la   'to cover'
    c. m̩.lya.ŋgu wa.ŋgu   'my door'

In example (9a), the initial vowel *a-* stands as a syllable, as does *gwi* (CGV) and *lɛ* (CV). An example of a syllabic nasal *m̩* is found in (9c).

Another essential feature is nominal morphology. As in other Bantu languages, nouns in Kikisi are categorized into grammatical classes. Three features characterize the classes. The first feature is agreement patterns that define each class. The second feature is that each noun class is identified by a prefix shared by the nouns of the class. The third feature is that for nouns classified as count in the language, singular and plural nouns also form pairs that distinguish classes. Some classes may have similar nominal prefixes but are distinguished from each other by the agreement markers they trigger. Consider, for example, the following noun phrases.

(10)   a. mɛnɛ jangu   'my goat'
         b. mɛnɛ sangu   'my goats'
         c. mljangu wangu   'my door'

The nouns in (10a) and (10b) have an identical shape mɛnɛ, but they are singular and plural, respectively. Singular and plural nouns belong to different classes. In the example, they trigger different markers on the first-person singular possessive pronoun.

In Bantu linguistics, each class is assigned a number following a tradition established by Bleek (1869) and Meinhof (1932). The following table contains all the noun classes in Kikisi with the appropriate class numbers and the agreement prefixes for the subject marker, possessive pronouns, and adjectives.

Table 2: *Noun Classes*

Class	Prefix	Example	Gloss	Subj. Agreement	Poss. Agreement	Adj. Agreement
1	mu-	mu-ndu	'person'	a-	ɣw-	n-
2	βa-	βa-ndu	'persons'	βa-	β-	βa-
3	m-	m-ljangu	'door'	u-	w-	m-
4	mi-	mi-ljangu	'doors'	ji-	j-	mi-
5	li-	li-jani	'baboon'	li-	lj-	li-
6	ma-	ma-jani	'baboons'	ɣa-	ɣa-	ma
7	ki-	ki-jɛgu	'folktale'	ki-	kj-	ki-
8	fi-	fi-jɛgu	'folktales'	fi-	fj-	fi-
9	N-	mɛnɛ	'goat'	ji-	j-	N-
10	N-	mɛnɛ	'goats'	si-	s-	N-
11	lu-	lu-tɛfu	'mat'	lu-	lw-	lu-
12	ka-	ka-mɛnɛ	'little goat'	ka-	ka-	ka-
13	tu-	tu-mɛnɛ	'little goats'	tu-	tw-	tu-
14	βu-	βu-dɛsi	'lie, lies'	βu-	βw-	βu-
15	ku-	ku-jisa	'to come, coming'	ku-	kw-	ku-
16	pa-	pa-kihɔlɔ	'at the river'	pa-	pa-	pa-
17	ku-	ku-kihɔlɔ	'to the river'	ku-	kw-	ku-
18	mu-	mu-kihɔlɔ	'in the river'	mu-	mw-	mu-
20	ɣu-	ɣu-mɛnɛ	'huge goat'	ɣu-	ɣw-	ɣu-

Although the nominal prefixes provide clues for the noun classes, they may have the same shape for different classes. For example, Classes 9 and 10 are marked as having N as the prefix. This represents nasal and prenasalized segments and often shows no recognizable prefix. On the table *mɛnɛ* is the word for 'goat' and 'goats.' However, their agreement patterns distinguish the two. The singular triggers *ji-* subject prefix, while the plural triggers *si-*, as in *mɛnɛ jigwilɛ* 'the goat fell' and *mɛnɛ sigwilɛ* 'the goats fell.'

The class numbers are used in glosses to indicate the noun class and the agreement triggered by the respective nominals. For example:

(11)   a. mu-ndu   a-gwi-lɛ
            1-person   1SM-fall-PRF
            'a person fell'

b. ma-yani   ɣa-gwil-ɛ
    6-baboon   6SM-fall-PRF
    'the baboons fell'

The subject in (11a) is a Class 1 noun that triggers the use of *a-* for the subject prefix. The same verb appears with the prefix *ɣa-* in (11b) in agreement with a Class 6 noun. Such agreement requirements trigger the dissimilation process we consider here.

     The verb structure can be represented in the following structure, which is made up of seven slots or position classes.

(12)   COMP- SM-   TNS-   OM-   Root   - EXT   - Final
             1   2   3   4   5   6   7

The first slot, COMP is the location of the relative marker and conditional marker. The subject marker (SM) is the second position, while the third position (TNS) may be filled with tense, aspect, or negation. The object marker (OM) appears immediately before the root. The root is followed by derivational suffixes, also known as extensions (EXT). The extensions include applicative, causative, reciprocal, reversive, stative, and passive. Note that verb roots are either monosyllabic, as in *-la* 'eat' (-V-), disyllabic *–tama* 'sit' (-CVC-), or polysyllabic, as in *–kalaŋga* 'fry' (-CVCVC-). All verb extensions are -VC-.

     These elements need not all be realized in each verb. The following examples illustrate these elements in different verbs.

(13)   a. nga -   tu – βa – βwɛn-i   'we could have seen them'
       COND-we-3OM-see-PF
       1   2   4   5   7

       b. βa – ka – bɛn - ilɛ   'they harvested'
       2SM-PST-harvest-PRF
       2   3   5   7

The first example has five elements, while the second example is made up of 4 elements.

     These examples reveal the agglutinative structure. The different morphological segments have clear boundaries built from the root outwards. However, as the following section reveals, not all word categories display such one-to-one exponence.

4.0   Kikisi Non-Concatenative Morphology

In Kikisi, features that characterize non-concatenative morphology described earlier in §2 appear in the morphology of: (a) Templatic structure of demonstratives, (b) dissimilation in interrogative pronoun, (c) Imbrication, and (d) Reduplication. This section describes these structures, their non-linear nature, and instances of multiple exponence.

4.1 *The Morphology of Demonstratives*

Based on spatial contrasts, the demonstrative system in Kikisi can be shown to have four terms.

(14)	a. βana aβa	'these children'	**(Proximal)**
	b. βana aβɔ	'those children (near you)'	**(Medial)**
	c. βana βala	'those children (over there)'	**(Distal)**
	d. βana βaala	'those children (way over there)'	**(Remote)**

The meanings presented here are prototypical. There are many different readings and functions some of which are not based on physical or spatial contrast. For example, distal demonstratives are often used for anaphoric references. Himmelman (1996) has an extensive discussion on the universal functions of demonstratives. Such functions are also attested in Kikisi. However, a more detailed discussion of the meanings and functions of the demonstratives is beyond the scope of the present paper. This paper focuses on the form of the demonstratives.

The demonstratives are characterized by agreement, templatic structure, and a specification of the number of syllables. The agreement can be observed in the different shapes depending on the noun classes identified earlier in §3. The demonstratives below show the shapes of the demonstratives for all noun classes.

Table 1: *Demonstratives*

Class	Example	Gloss	PROX	MED	DIST	REM
1	munu	'person'	ʊjʊ	ʊjwa	jʊla	jʊʊla
2	βanu	'people'	aβa	aβɔ	βala	βaala
3	mljangu	'door'	ʊɣʊ	ʊɣwa	ɣʊla	ɣuula
4	miljangu	'doors'	ɪjɪ	ɪjɔ	jɪla	jɪɪla
5	lijani	'baboon'	ɪlɪ	ɪljɔ	lɪla	lɪɪla
6	majani	'baboons'	aɣa	aɣɔ	ɣala	ɣaala
7	kijɛgu	'folktale'	ɪkɪ	ɪkjɔ	kɪla	kɪɪla
8	fijɛgu	'folktales'	ɪfɪ	ɪfjɔ	fɪla	fɪɪla
9	mɛnɛ	'goat'	ɪjɪ	ɪjɔ	jɪla	jɪɪla
10	mɛnɛ	'goats'	ɪsɪ	ɪsjɔ	sɪla	sɪɪla
11	lutɛfu	'mat'	ʊlʊ	ʊlwa	lʊla	lʊʊla
12	kamɛnɛ	'little goat'	aka	akɔ	kala	kaala
13	tumɛnɛ	'little goats'	ʊtʊ	ʊtwa	tʊla	tʊʊla
14	βudɛsi	'lie'	ʊβʊ	ʊβwa	βʊla	βʊʊla
15	kujisa	'to come'	ʊkʊ	ʊkwa	kʊla	kʊʊla
16	pakaja	'at the house'	apa	apɔ	pala	paala
17	kukaja	'to the house'	ʊkʊ	ʊkɔ	kʊla	kʊʊla
18	mgati	'inside'	ʊmʊ	ʊmɔ	mʊla	mʊʊla
20	ɣumene	'huge goat'	ʊɣʊ	ʊɣwa	ɣʊla	ɣʊʊla

In all cases, the demonstrative assumes different segmental shapes. The words for 'this/these,' for example, include *ʊjʊ, aka, ɪfɪ, ʊlʊ, apa,* etc. All of them have a VCV structure. The two vowels are identical. In many cases,

the shape of the proximal demonstrative copies the nominal prefix. For example, the nominal prefix for Class 2 is *βa-*. Its proximal demonstrative utilizes this syllable and copies the vowel to the initial position to get *aβa*. Note also the noun class prefixes that are not copied on the demonstrative, including Classes 3, 4, 6, 9, and 10. Depending on the class, these demonstratives use only three vowels /ɪ, a, ʊ/, and different consonants. These are summarized in (15).

(15)   ɪCɪ   (ɪjɪ, ɪlɪ, ɪfɪ, ɪsɪ)
        aCa   (aβa, aɣa, aka, apa)
        ʊCʊ   (ʊjʊ, ʊɣʊ, ʊlʊ, ʊmʊ)

The medial demonstrative is also made up of two syllables of VCV structure, the first syllable and the onset of the second syllable being the same as in proximal demonstrative. However, it appears the last syllable has a vowel that is different from the one that appears in the word-initial position. Thus, proximal *aβa* becomes medial *aβɔ,* proximal *ɪjɪ* becomes medial *ɪjɔ*, and *uɣu* becomes *uɣwa*. The template of the medial demonstrative is derived from the proximal demonstrative, as summarized in (16).

(16)   Proximal   Medial
        ɪCɪ   →   ɪCjɔ
        aCa   →   aCɔ
        ʊCʊ   →   ʊCwa

It appears there is a dissimilation process that affects agreement that has the back vowel /ʊ/. It triggers lowering to the open vowel /a/. Both mid-high vowels become glides in the medial demonstrative.

Distal and remote demonstratives do have templates with some segments specified. They are CVla for distal, and CVVla for remote demonstratives. The CV and CVV slots are filled with agreement material like those found in proximal demonstratives. The remote demonstrative is distinguished from distal demonstrative by an additional vowel position. The templates for the two demonstratives are as follows.

(17)   Distal   Remote
        Cɪla   Cɪɪla
        Cala   Caala
        Cʊla   Cʊʊla

The remote demonstrative differs from the distal demonstrative by a vowel position in the middle of the word. This syllable position is filled by the apparent lengthening of the nucleus of the first syllable.

Therefore, demonstratives exhibit a non-concatenative structure because it is templatic. There are slots or positions that are not specified with respect to segment. The positions get their segmental materials form the nominal prefixes or from agreement morphemes.

4.2   The Pronoun 'Which'

Templatic morphology characterizes the interrogative pronoun 'which.' The template consists of three syllables CVCVCV. The onsets of the second and third syllable are specified as /l/ and /k/, respectively, as the examples in the table show.

Table 2: *Forms of Interrogative 'which'*

Class	Nominal phrase	Gloss
1	mwana jʊlʊki?	'which child'
2	βana βalaku?	'which children'
3	ndjangu ɣʊlʊki?	'which door'
4	miljangu jɪlɪku?	'which door'
5	lijani lɪlɪku?	'which baboon'
6	majani ɣalaku?	'which baboons'
7	kijuni kɪlɪku?	'which bird'
8	fijuni fɪlɪku?	'which birds'
9	mɛnɛ jɪlɪku?	'which goat'
10	mɛnɛ sɪlɪku?	'which goats'
11	lutɛfu lʊlʊki?	'which mat'
12	kamɛnɛ kalaku?	'which little goat'
13	tumɛnɛ tʊlʊki?	'which little goats'
14	βudɛsi βʊlʊki?	'which lies'
15	kuhɛka kʊlʊki?	'which laughing'

The nuclei of the first and second syllables are determined by agreement. Here also, the three vowels in the nominal trigger the agreement vowels /ɪ, a, ʊ/. The final vowel of the pronoun cannot have the same [back] feature value as that of the agreement marker. Thus, we arrive at three primary forms of this interrogative pronoun, shown below.

(18)   a. Calaku
          b. Cɪlɪku
          c. Cʊlʊki

The primary final vowel is /ʊ/, which is not conditioned by the /**a**/ of the agreement affix. In (18c), this vowel changes to /ɪ/ to prevent the pronoun from having three identical vowels. The pronoun for a Class 3 item, therefore, is *ɣʊlʊki*.

4.3   Imbrication

Another morphological process that creates non-concatenative morphology involves a fusion known as imbrication. Bastin (2000) is credited with coining the term to refer to the fusion of the perfect aspect *-ile* to the last syllable of the verb, a feature noted in several other Bantu languages, such as Cibemba (Hyman 1992), Bena (Morrison 2011), and Ciyao (Ngunga 2000). Data from Kikisi reveal the process is sensitive to the length of the stem. Consider the following examples.

(19) a. kulja   'to eat'   βalilɛ   'they have eaten'
      b. kulɔβa   'to fish'   *alɔβilɛ*   'she/he has fished'
      c. kulɛta   'to bring'   βalɛtilɛ   'they have brought'
      d. kudɪnda   'to shut'   βadɪndilɛ   'they have shut'

These examples illustrate two kinds of stems to which the perfect aspect marker –*ilɛ* is attached. The first is short roots such as –*lj*- 'eat' found in (19a). The second kind of stem is bisyllabic as in (19b-d) –*lɔβ*- 'fish,' –*let*- 'bring' and –*dɪnd*- 'shut,' respectively. The suffix -*ilɛ* is attached in a concatenative manner, i.e., adding to the stem.

Stem that are made up of more than two syllables do not inflect for the perfect aspect in a concatenative manner. The following examples demonstrate using an affix whose boundaries are difficult to demarcate.

(20) a. kutɛlɛka   'to cook'   tutɛlikɛ   'we have cooked'
      b. kulɔβɛɣwa   'to be fished'   ukalɔβiɣwɛ   'it was fished'
      c. kudɪnduka   'to become open' ukadɪndwikɛ   'it got opened'
      d. kumaɲisja   'to teach'   kabhamaɲisjɛ   'she/he taught them.'

In these examples, there is a fusion of the last two syllables such that –*i*- appears in the penultimate syllable and –*ɛ* appears in the final syllable. Between the two vowels, there is the final consonant of the stem. The verbs are derived from the following stems.

(21) a.   -tɛlɛka   CVCVCV   'cook'
      b.   -lɔβɛɣwa   CVCVCwV   'be fished'
      c.   -dɪndula   CVCVCV   'open'
      d.   -maɲisja   CVCVCjV   'teach'

The list includes both root stems and derived stems. In the above examples, -*dɪndula* 'open' is derived from –*dɪnda* 'shut' by a reversive extension -*ʊl*. Another extension, causative, is found in (21d) –*maɲisya* 'teach,' which is derived from –*maɲa* 'know.' Therefore, the domain of imbrication is the stem that is three syllables or more in length. This perfect aspect creates structures that reveal multiple exponence as shown in (22) for *tɛlɛk* – PRF.

(22)

Stem

tɛl – i - k – ɛ

PRF
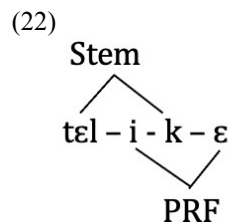
The segments of the stem are interrupted by the perfect aspect. The perfect aspect is also split with the final consonant of the stem between its two vowels.

Imbrication is a non-concatenative morphological phenomenon. It creates non-contiguous segments of a discontinuous morpheme. Both the stem and perfect aspect marker becomes discontinuous.

4.4 *Reduplication*

Reduplication, the process or repeating parts of a word or entire words, has been studied extensively in Bantu languages (e.g. (Downing 1999; Hannah & Yoneda 2018; Hyman 2009; Inkelas & Downing 2015; Novotna 2000). Kikisi has partial and complete reduplication. An illustrative example of complete reduplication is deriving adverbs from adjectives in (23).

(23)	mbɪβɪ	'quick'	mbɪβɪmbɪβɪ	'quickly'
	mɔli	'slow'	mɔlimɔli	'slowly'
	kiɲɛmi	'silent'	kiɲɛmikiɲɛmi	'silently'
	hɔfjɔ	'haphazard'	hɔfjɔhɔfjɔ	'haphazardly'
	nɔfu	'good'	finɔfufinɔfu	'very well'

To derive the adverbs, the adjective is reduplicated. It is an instruction to copy materials from the base to the template. In this case, the template is the whole word. Not all adverbs are derived this way. Examples of adverbs that are not derived by this process include *lumulu* `probably,' *humbi* `probably,' and *βwaka* `without anything.'

Partial assimilation is also found in which only part of the base is copied. A good example is the verb stem repetition, a phenomenon widely attested in Bantu languages. For example:

(24) a. βa-gɛnd-a-gɛnd-a
          2SM-walk-FV-walk-FV
          'They continued walking.'

      b. i-tam-a-tam-a
          1SM.PRS-stay-FV-stay-FV
          'He continued staying.'

      c. ku-fiham-a-fiham-a
          INF-hide-FV-hide-FV
          'repeatedly hiding'

As in other Bantu languages, the inflectional prefixes are not part of the copied materials. Only the lexical base and the final vowel are repeated.

Much reduplication appears to be unproductive, but the examples of the repetition are plentiful. Here are some examples.

(25)	kisɛkɛsɛkɛ	'elbow'
	masungusungu	'ants'
	lindɔlindɔli	'bat'
	nungunungu	'porcupine'
	nyangɛnyangɛ	'white egret'

These also show the repetition of the stem. Thus, *kisɛkɛsɛkɛ* 'elbow' appears to repeat the two syllables *sɛkɛ* of the base without the nominal prefix. However, *sɛkɛ* is not a recognizable word in the language. That is true for

the other nouns too. The last two nouns belong to Class 9 whose prefix is not segmentable like the other noun classes.

5.0   Implications

In textbooks, the morpheme is often defined as simply the smallest meaningful unit that cannot be divided into smaller meaningful units (Aronoff & Fudeman 2011; Fromkin et al. 2000; Genetti 2019; Nida, 1949). In some textbooks, there are items listed as morphemes. Consider "the smallest meaningful part of a word; includes roots, affixes, clitics, and particles." (Genetti 2019:642). The authors of this textbook appear to privilege these four as morphemes. This leaves out other linguistic material that also contributes to meaning contrasts. Haspelmath & Sims (2010:34) notes that tones and patterns of vowel quality change (2010:34). They should be considered morphemes if meaning contrast is a defining feature. Consider the properties that define morpheme (Fábregas & Scalise 2012:22):

(a) A unit that can be identified and isolated from the rest of the word.
(b) The unit contrasts grammatically and semantically with other units.
(c) The unit recurs.
(d) The unit is associated with a specific meaning.

The features can be shown to be true of segmental as well as non-segmental linguistic materials. Consider, for example, tone in Igbo from Emenanjo (2015:112):

(26) a. ákwá   'cry'
     b. ákwà   'cloth'
     c. àkwá   'egg
     d. àkwà   'bed'
     e. ísí   'head'
     f. ísì   'smell'

These examples comprise the same segments; however, these words mean different things. The linguistic materials responsible for the meaning contrast cannot be segmented because they are autosegmental. In this case, the 'unit' that contrasts 'cry' from 'cloth' is not segmental but HH and HL tones. This pattern must be included in the definition of morpheme.

The commonly used definition is biased toward segmentable morphemes. Non-segmentable morphemes and patterns are not included. Haspelmath & Sims (2010:34) modify the definition to: "A morpheme, then, is a frequently occurring, special subtype of the morphological pattern." This definition, therefore, does not only include segments and segmentable morphemes but also non-segmentable ones, such as patterns. These patterns include vowel changes such as ablaut, autosegmental patterns, and templates.

Once such non-segmentable morphemes are included in the definition, descriptions of non-concatenative morphology gain more prominence. Thus, the templates of the demonstratives in Kikisi can be said to signal meanings. They can be viewed as morphemes. The templates identified here differ from position classes, which are simply slots for groups of morphemes arranged in a specific order (Stump 1993). For example, the elements of the verb in Kikisi described in (12) above are such a template. Another example is Hyman's (2003) proposal of position classes of Bantu verb extensions. Such position classes can be shown to have structural motivation, such as the proposed structure shown in (27).

(27)   [CP [IP [VP]]]

The sentence is made up of three layers: (a) the complementizer layer (CP), (b) the inflectional layer (IP), and (c) the lexical layer (VP). The order of the root and the inflections is derived from this layered structure. When tense appears before the verb root, it follows the position classes created by this structure. Deviations can be shown to result from syntactic movement (Baker, 1985).

Unlike position classes, the templates discussed in non-concatenative morphology are arbitrary (Manova & Aronoff 2010) or cannot be shown to derive from such structural constraints. Consider, for example, the template for the interrogative pronoun described earlier and repeated here for convenience.

(18) a.   Calaku
            b. Cılıku
            c. Cɔlɔki

The different positions of the consonants and vowels are not determined by some structural principle. The dissimilation can be accounted for in phonological terms. But the fact that there is a consonant slot at the beginning or a CVCVCV structure cannot be explained.

The agglutinative nature of nouns, verbs, and adjectives in Bantu languages has obscured non-agglutinative aspects of their morphology. As noted by, among others, Katamba (1978) and Kosch (2005), there are many aspects of multiple exponence, cumulative exponence, and fusion in Bantu languages. These call for documentation and analysis. The traditional classification of languages into four morphological types, agglutinating, isolating, incorporating, and fusional, has fascinated linguists. It is also well-known that languages are not pure types (Haspelmath 2009; Plank 1999). The agglutinative Kikisi shows a considerable amount of fusion and non-concatenation. The data reveal that two types are attested in different categories in the same language. Nouns, adjectives, and verbs are generally agglutinating, while demonstratives are non-agglutinating. Furthermore, it is possible to find processes that create different types even within the same category. The verb is generally agglutinative. However, the perfect aspect reveals multiple exponence, fusing with the final syllables of the verb.

The significance of linguistic types lies in covariation (Plank 1999). More studies of non-concatenative morphology in Bantu may lead to important discoveries about covariation associated with the traditional types and generate more significant insights into morphological processes.

The study of non-concatenative morphology in Kikisi shows the syllable and its significance in organizing the morphology of the languages. One of the specifications of the demonstratives, for example, is the number of syllables. The template is partially defined in terms of syllables. Imbrication, which results in multiple exponence of the perfect aspect and the verb stem, targets the last syllables of polysyllabic verbs. It is not only in non-concatenative morphology that the syllable has a prominent role. Other words, too, may be defined using syllables. For example, the connective, also known as the associative, which roughly translates as 'of', comprises a single syllable whose nucleus is /a/. The onset is derived from agreement material. The fusion of the agreement material and the /a/ can only create one syllable, as the following table shows agreement for noun classes that use the nominal prefixes for agreement.

Table 3: *Associative Forms*

Class	Example	Associative
2	β-ana	βa
5	li-jani	lja
7	ki-juni	kja
8	fi-juni	fja
11	lu-tɛfu	lwa
12	ka-mɛnɛ	ka
13	tu-mɛnɛ	twa
14	βu-dɛsi	βwa
15	ku-jisa	kwa
16	pa-kaja	pa
20	ɣu-mene	ɣwa

The connective appears in such phrases as *βana βa songa* `the daughters of aunt.' The prefixes with high vowels derive glides before the vowel /a/, while those with low vowels delete the vowel. For example, *li-a* for Class 5 becomes *lja*, and *tu-a* for Class 13 becomes *twa*. Class 12 *ka-a* becomes *ka*. Therefore, the canonical syllable structure of the language is essential in defining the templates.

6.0   Conclusion

This paper set out to explore examples of morphological operations that exhibit multiple exponence, non-linear character, fusion, non-additive, and templatic structure. These features characterize non-concatenative morphology. Demonstratives in Kikisi are constructed on templates, as does the interrogative pronoun 'which.' Another non-concatenative operation involves the fusion of the perfect aspect with the polysyllabic stem creating discontinuous morphemes. Reduplication is also regarded as involving

templates with positions that copy segmental material from the base. The templates are positions that are deficient segmentally which need to be filled with segmental material from agreement or from other source according to the instructions. The morphology explored here reveals that segments, templates, and processes contrast meanings. The syllable is the most essential unit in defining the various templates. Reduplication and imbrication have received much attention in Bantu linguistics. However, other aspects of non-concatenative morphology need to be investigated further to get a bigger picture of Bantu morphology and the traditional morphological types.

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