CAUSATIVES, SPIRANTIZATION, AND PERFECTIVE ALLOMORPHY IN SILOZI[*]

Lee Bickmore
University at Albany, University of the Free State

Silozi, a Bantu language spoken in Zambia, Botswana, Zimbabwe, and Namibia, exhibits an l~z alternation in multiple verbal suffixes. We show that while in some cases the trigger of this l>z spirantization can clearly be attributed to the short causative /-y/, this is not as obvious in other cases, where the change seems to be due to the place and manner of articulation of the root-final consonant. Based on a large corpus of newly collected data, the pattern of the target /l/s affected by this change which emerges is also quite curious—often being just the peripheral /l/s in a string of /lV/ syllables. We consider both a phonological as well as more morphological analysis of the facts, highlighting the challenges of both. Finally, it is shown that some instances of spirantization cases are due to the perfect suffix having both a long as well as a short allomorph.

Key words: phonology, spirantization, allomorphy, causative

1. Introduction

Silozi is one of Zambia's seven official regional languages, and is also spoken in parts of Botswana, Zimbabwe, and Namibia. Ethnologue estimates there are approximately 734,000 speakers overall. While originally classified by Guthrie (1967-71) as K.21, more recent work suggests that it is more appropriately part of the Sotho-Twana branch of Zone S (Gowlett 2003, Nurse & Philippson 2003). In this paper we examine a spirantization process which changes /l/ to [z] in certain environments. To this end we examine a range of data, with a particular focus on the role of the short causative extension as well as the perfective suffix. While the principal goal of this paper is a descriptive one—to fully explore the full range of spirantization patterns, we sketch out the outlines of several possible analyses, noting the advantages and disadvantages of each.

The data presented here were all elicited from Mr. Mubiana Liswaniso, a 70 year old native speaker of Silozi from Mongu, Zambia, currently residing in Lusaka.[1] In terms of existing literature, there are a number of good works which provide some basic phonological and morphological descriptions of the language: Jalla (1937), Gowlett (1967) , Mwisiya (1977), Yukawa (1987), Fortune (2001), Kamwengo (2008), inter alia.[2] They served as a useful foundation for this study, though none of these contained many of the crucial, newly presented, data below without which a full accounting of the spirantization facts is not possible.

Silozi has a five vowel system, shown in (1). The consonant inventory is given in (2). [3]

---

1 All data were elicited from late 2022 to mid 2023 via online interaction.

[2] I also greatly benefited from an online Silozi-English dictionary (http://www.barotseland.net/sil-eng1.htm). It is listed as being copyrighted and maintained by barotseland.net, but beyond that I was not able to ascertain any additional bibliographic information.

[3] The data here is presented in the practical orthography. Deviations from the IPA are: <j>=[ɟ], <ñ>=[ɲ], <sh>=[ʃ], <y>=[j], <b> = [b] post-nasally, and otherwise [β]. <n> is realized homorganically with the following consonant.

(1)

	Front	Back
High	i	u
Mid	e	o
Low		a

(2)

	Bilabial	Labio-dental	Alveolar	Palatal	Velar	Glottal
Stops	p		t	c	k	
	b		d	j	g	
Fricatives		f	s	sh		h
			z			
Nasals	m		n	ny	ñ	
Liquids			l			
Glides				y	w	

2. Spirantization in causative and non-causative forms

Silozi has both a long causative and a short causative. Examples of the long causative /-is/ are shown below in infinitival forms whose structure is ku-Root-Extension(s)-a. [4]

(3) a. kù-sáb-à   'to be frightened'   kù-sàb-ís-à   'to scare'
     b. kù-kèn-à   'to be clean'   kù-kèn-ìs-à   'to clean (tr)'
     c. kù-lút-à   'to teach'   kù-lùt-ís-à   'to cause to teach'
     d. kù-sèh-à   'to laugh'   kù-sèh-ìs-à   'to cause to laugh'
     e. kù-bìl-à   'to boil (intr)'   kù-bìl-ìs-à   'to boil (tr)'
     f. kù-kàtál-à   'to be tired'   kù-kàtál-ìs-à   'to cause to be tired'

While more restricted, Silozi also has what is often referred to as the short causative, which is sometimes realized as simply [y], as illustrated in the forms below.

(4) a. kù-kén-à   'to enter'   kù-kén-y-à   'to make enter, insert'
     b. kù-lìkàn-à   'to equal'   kù-lìkàn-y-à   'to make equal'
     c. kw-àlùhàn-à   'to separate (intr)' kw-àlùhàn-y-à   'to separate (tr)'
     d. kù-bàpàn-à   'to be near'   kù-bàpàn-y-à   'to put side by side to compare'
     e. kù-kòpàn-à   'to meet'   kù-kòpàn-y-à   'to combine, mix'

There are a large number of verb pairs that stand in a causative relationship which exhibit an l~z alternation. Some representative examples are presented in (5).

(5) a. kù-tál-à   'to be full (intr)'   kù-táz-à   'to fill'
     b. kù-lìl-à   'to cry'   kù-lìz-à   'to ring (bell), play instrument'
     c. kù-fél-à   'to come to an end'   kù-féz-à   'to finish, end (tr.)'
     d. kù-lòbàl-à   'to go to sleep'   kù-lòbàz-à   'to put to sleep'
     e. kù-kàtál-à   'to get tired'   kù-kàtáz-à   'to tire, annoy'
     f. kù-fòkól-à   'to be weak'   kù-fòkóz-à   'to weaken'

---

[4] For more on the use of causatives within Bantu more broadly, see, inter alia, Bostoen (1986) and Schadeberg & Bostoen (2019).

g.	kù-hùpúl-à	'to remember'	kù-hùpúz-à	'to remind'
h.	kù-fùtúmàl-à	'to get warm'	kù-fùtúmàz-à	'to warm'
i.	kù-lèmál-à	'to get used to'	kù-lèmáz-à	'to make familiar'
j.	kù-zìbáhàl-à	'to become known'	kù-zìbáhàz-à	'to make known'

One way to analyze the forms in (5), and the one I adopt here, is to posit that the causative forms are derived from the basic forms through the addition of the short causative /-y/, independently motivated above in (4). The /-y/ suffix ultimately causes the underling root-final /l/ to become /z/. There are no surface instances of [zy] in the language. This process is referred to by various names in the Bantu literature, including frication (Hyman & Merrill 2015), consonant mutation (Zoll 1995), and spirantization (Downing 2007). We use the latter here. After this change, the /y/ deletes. So, e.g. /kutal-y-a/ (5a) > kutazya > kutaza.[5]

The applicative extension generally appears as /-el/, as can be seen in the forms below (where the morphological structure of the verb is Infinitive.Prefix-Root-(Extension)-Final Vowel). [6]

(6)	a.	kù-lút-à	'to teach	kù-lùt-él-à	'to teach for'
	b.	kù-sók-à	'to cook'	kù-sòk-él-à	'to cook for'
	c.	kù-páng-à	'to make'	kù-pàng-él-à	'to make for'
	d.	kù-lìf-à	'to pay'	kù-lìf-èl-à	'to pay for'
	e.	kù-séh-à	'to cut'	kù-sèh-él-à	'to cut for'
	f.	kù-lìm-à	'to farm'	kù-lìm-èl-à	'to farm for'
	g.	kù-sép-à	'to trust'	kù-sèp-él-à	'to trust for'
	h.	kù-yól-à	'to write'	kù-yòl-él-à	'to write for'

Let us now examine how verbs with short causatives, such as those above in (5), surface in the applicative, as well as the perfective.

(7)	a.	kù-táz-à	'to fill'	kù-tàz-éz-à	'to fill for'
	b.	kù-lìz-à	'to ring (bell)'	kù-lìz-èz-à	'to ring (bell) for'
	c.	kù-féz-à	'to end (tr)'	kù-fèz-éz-à	'to end for'

As can be seen, in each of the verbs in (7), not only has the root-final /l/ spirantized to [z], but the /l/ in the applicative suffix has spirantized as well.

The perfective ending in Silozi is generally /-ile/ as seen in the Recent Past Forms below, whose structure is Subject.Marker-Root-Extension(s)-ile.

(8)	a.	lù-lùt-ílè	'we taught'
	b.	lù-sòk-ílè	'we cooked'

---

[5] One might also analyze this as y-absorption. For formal accounts of this process, see, inter alia Hyman (2003b), Bostoen (2008). This l~z alternation is seen in other parts of Silozi as well. For example, the class 10 noun class prefix, subject marker and object marker are all /li-/. Before the associative /a/ or the distal demonstrative root /ale/, however (which would induce gliding in the /i/), the class 10 agreement prefix is realized as [z]. Finally, we note here that in addition to n~ny and l~z alternations induced by the short causative, there is a third, very limited h~s alternation which does not go beyond the causative. E.g. kù-zúh-à 'to awaken (intr)', kù-zús-à 'to wake up (tr); kù-lèmúh-à 'to notice, kù-lèmús-à 'to cause to notice'; kù-pòtólòh-à 'go around', kù-pòtólòs-à 'to cause to go around'. Silozi exhibits no surface *[hy] or *[sy] sequences.
[6] For an excellent survey on the structure and use of the applicative suffix across Bantu, see Schadeberg & Bostoen (2019)

c. lù-pàng-ílè   'we made'
d. lù-lìf-ílè   'we paid'
e. lù-sèh-ílè   'we cut'
f. lù-lìm-ìlè   'we farmed'

If, however, the short causative is also present, then as seen in (9), both the root-final /l/, as well as the /l/ in the suffix spirantizes, exactly the same pattern we found in the causative applicatives (7).

(9)   a. lù-tàz-ízè   'we filled'
        b. lù-lìz-ìzè   'we rang (the bell)'
        c. lù-fèz-ízè   'we ended'

It turns out that the underlying /l/ in these two suffixes also surface as [z] outside the context of causative forms. As seen in (10) and (11) applicative and perfective suffixes surface as [ez] and [ize] respectively in synchronically non-causative forms when the immediately preceding final C of root is a (non-vocoid) palatal or alveolar sibilant, viz. /z, s, c, j, ny, sh/.[7]

(10)   a. kù-bìz-éz-à   'to call for'
        b. kù-bùz-éz-à   'to ask for'
        c. kù-tìs-èz-à   'to bring for'
        d. kù-cìs-éz-à   'to burn for'
        e. kù-cìnc-èz-à   'to change for'
        f. kù-pwàc-èz-à   'to break for'
        g. kù-bànj-èz-à   'to dish out food for'
        h. kù-sìny-éz-à   'to spoil/waste for
        i. kù-mény-èz-à   'to smile for'
        j. kù-kásh-èz-à   'to push for'
        k. kù-bùlásh-èz-à 'to brush for'

(11)   a. lù-tìs-ìzè   'we brought'
        b. lù-bìz-ízè   'we called'
        c. lù-bùz-ízè   'we asked'
        d. lù-cìnc-ìzè   'we changed'
        e. lù-bànj-ìzè   'we dished out foot'
        f. lù-sìny-ízè   'we spoiled
        g. lù-bùlásh-ìzè   'we brushed'

We note that what is important in terms of the location of the triggering consonant is that it immediately precede the verbal suffix. It can belong to the root as seen in (10) and (11), or a suffix, such as the long causative /-is/, as shown in (12).

(12)   a. lù-bìl-ìs-ìzè   'we boiled (tr)'
        b. lù-sàb-ís-ìzè   'we scared'
        c. lù-kèn-ìs-ìzè   'we cleaned'

---

[7] While the term "spirantization" in Bantu is often used narrowly to mean a consonant change due to a following high/close vowel, I use it here to include all l>z changes in Silozi, as the exact motivation for this change is not entirely clear (as will be discussed below).

We note that this spirantization process is morphologically sensitive, as it only affects certain suffixes. We have seen above that it affects the applicative /-el/ and perfective /-ile/, and will see one additional example (the /-elel/ completive) further below. But as seen in (13), the process does not apply morpheme-internally (i.e. spirantizing a root-final /l/ due to a preceding tautomorphemic spirantizing trigger) (13a-e), nor does it affect the verbal suffix /-ul/ (13f-h).

(13)   a.   kù-pàzùl-à   'to tear'
       b.   kù-fùzél-à   'to blow on a fire'
       c   kù-fùzèl-à   'mix milk and porridge'
       d.   kù-fàsùl-à   'release a trap'
       e.   kù-kwàshúl-à   'to hurry'
       f.   kù-fàs-úl-à   'to snap (tr.)'   Cf. kù-fàs-úk-à   'to snap (intr)'
       g.   kù-làs-úl-à   'to make pop out'   Cf. kù-làs-úk-à   'to pop out'
       h.   kù-kùsh-úl-à   'to eat sweet potatoes & milk'   Cf. kù-kùsh-úk-à   'to eat morning meal'

We now turn to Recent Past forms which contain the short causative, applicative, and perfective suffixes (cf. (5a,b)).

(14)   a.   lù-mù-tàz-él-ízè   'we filled for him/her'   Cf. (5a)
       b.   lù-mù-lìz-èl-ìzé   'we rang for him/her'   Cf. (5b)

The presence of the causative /-y/ in these forms triggers spirantization on the root-final /l/ as well as the /l/ in the perfective suffix, but does *not* affect the intervening /l/ in the applicative. The same pattern obtains in non-causative verbs ending in one of the six spirantization-triggering consonants (cf. (10), (11)).

(15)   a.   lù-mù-bìz-él-ìzè   'we called for him/her'
       b.   lù-mù-bùz-él-ízè   'we asked for him/her
       c.   lù-mù-lòz-èl-ìzè   'we sharpened for him/her'
       d.   lù-mù-bànj-èl-ìzè   'we dished out food for him/her'
       e.   lù-mù-tìs-èl-ìzè   'we brought for him/her'
       f.   lù-mù-cìnc-èl-ìzè   'we changed for him/her'
       g.   lù-mù-ùzw-él-ìzè   'we stole for him/her'
       h.   lù-mù-kàsh-él-ìzè   'we pushed for him/her'
       i.   lù-mù-mèny-él-ìzè   'we smiled for him/her'

This interesting pattern can also be seen in verbs with the /-elel/ completive extension which gives the sense of doing something completely, once and for all, or for the last time. E.g. *kù-lùt-élél-à* 'to teach for the last time', *kù-lìf-èlèl-à* 'to pay for the last time'. (This is the third and last verbal suffix I have found containing an /l/ which can spirantize. E.g. recall from (13) that the /l/ in /-ul/ does not.) This is illustrated below for infinitive forms with the short causative.

(16)   a.   kù-tàz-élèz-à   'to fill for the last time'
       b.   kù-lìz-èlèz-à   'to ring for the last time'

As was the case in (14), the root-final /l/, as well as the rightmost /l/ in the word spirantize, but the second of the 3 consecutive /l/s does not. In the non-causative forms below where the root ends in a spirantizing trigger, we see again that the second/middle /l/ is not spirantized, but the final one is.

(17)   a.   kù-bìz-élèz-à   'to call for the last time'
        b.   kù-bùz-élèz-à   'to ask for the last time'
        c.   kù-tìs-èlèz-à   'to bring for the last time'
        d.   kù-kàsh-élèz-à   'to push for the last time'

Next, we turn to Recent Past forms with a short causative, the completive as well as the perfective suffix.

(18)   a.   lù-tàz-élél-ìzè   'we filled for the last time'
        b.   lù-lìz-élél-ìzè   'we rang for the last time'

Here there are four underlying /l/s: one at the end of the root, two in the completive and one in the perfective suffix. What we find is that only the two peripheral /l/s become spirantized. The middle two do not.

In analogous forms with a root-final spirantizing trigger, we see the same pattern. The rightmost /l/ spirantizes, but the two /l/s in the completive do not. [8]

(19)   a.   lù-bìz-élél-ìzè   'we called for the last time'
        b.   lù-bùz-élél-ìzè   'we asked for the last time'
        c.   lù-tìs-èlèl-ìzè   'we brought for the last time'
        f.   lù-kàsh-élél-ìzè   'we pushed for the last time'

These same patterns are also seen when the long causative and completive are present, as shown below.

(20)   a.   kù-bìl-ìs-èlèz-à   'to boil for the last time'
        b.   kù-kèn-ìs-èlèz-à   'to clean for the last time'

(21)   a.   lù-mù-bíl-ís-èl-ìzè   'we boiled for him/her'
        b.   lù-mù-kén-ís-èl-ìzè   'we cleaned for him/her'

(22)   a.   lù-bìl-ìs-èlèl-ìzè   'we boiled for the last time'
        b.   lù-kèn-ìs-èlèl-ìzè   'we cleaned for the last time'

Up to this point we have only considered /CVC/ roots before the short causative. (And most, though not all, of the non-causative roots were CVC as well.) Below we present forms with /CVCVl/ roots along with the short causative, followed by the applicative, completive, and perfective suffixes.

---

[8] Interestingly, the structure of the applicatives of the verbs in (19) does not differ—i.e. no additional /-el/ is added. Thus,
(19a) expresses both 'we called for the last time' as well as 'we called for the last time for', the meaning being determined by context.

(23) a. kù-lòbàl-à   'to be asleep'
      b. kù-lòbàz-à   'to put to sleep'
      c. kù-lòbàl-èz-à   'to put to sleep for'
      d. kù-lòbàl-èlèz-à   'to put to sleep for the last time'
      e. lù-lòbàl-ìzè   'we put to sleep'

(24) a. kù-kàtál-à   'to be tired, annoyed'
      b. kù-kàtáz-à   'to tire, annoy'
      c. kù-kàtál-èz-à   'to tire/annoy for'
      d. kù-kàtál-élèz-à   'to tire/annoy for the last time'
      e. lù-kàtál-ìzè   'we tired, annoyed'

(25) a. kù-fòkól-à   'to be weak'
      b. kù-fòkóz-à   'to weaken'
      c. kù-fòkól-èz-à   'to weaken for'
      d. kù-fòkól-élèz-à   'to weaken for the last time'
      e. lù-fòkól-ìzè   'we weakened'

As can be seen, the patterns here are similar to, but not the same as, those seen above in forms with /CVC/ roots with a short causative. In forms with a /CVC/ root and a short causative, both the root-final /l/, as well as the rightmost /l/ in the form spirantize. In forms with /CVCVC/ roots with a short causative, the generalization is that only the rightmost /l/ in the verb spirantizes. When just the short causative is present with no other suffixes, then the root-final /l/, being the rightmost /l/ in the verb, will spirantize. Where we see the difference is when both the short causative as well as one or more suffixes (containing /l/) are present. In those cases, just the rightmost /l/ spirantizes, while the underlying root-final /l/ does not.

We note here that the language also has /CVCVz/ roots, where there is no synchronic evidence of a short causative (i.e. there is no attested corresponding /CVCVl/ root). As seen below, these exhibit the same patterns as the causative forms in (23)-(25) in that 1) the rightmost /l/ spirantizes, and 2) the root-final consonant surfaces as [l] when any /-Vl/ suffix follows.

(26) a. kù-sèbéz-à   'to work'   (Cf. kù-sèb-él-à 'to slander for')
      b. kù-sèbél-èz-à   'to work for'
      c. kù-sèbél-élèz-à   'to work for the last time'
      d. lù-sèbél-ízè   'we worked'

(27) a. kù-tàtéz-à   'to wind up, coil'   (*kù-tàtél-à)
      b. kù-tàtél-èz-à   'to wind up, coil for'
      c. kù-tàtél-élèz-à   'to wind up, coil for the last time'
      d. lù-tàtél-ìzè   'we wound up, coiled'

(28) a. kw-èkèz-à   'to add'   (*kw-ekel-a)
      b. kw-èkèl-èz-à   'to add for'
      c. kw-èkèl-èlèz-a   'to add for the last time'
      d. lw-èkèl-ìzè   'we added'

(29) a.   kù-làkáz-à   'to desire'   (*ku-lakal-a)
      b.   kù-làkál-èz-à   'to desire for'
      c.   kù-làkál-élèz-à   'to desire for the last time'
      d.   lù-làkál-ìzè   'we desired'

We see the same patterns in Recent Past forms with both the applicative and perfective suffixes.

(30) a.   bá-lú-lòbàl-èl-ìzé mw-ànà   'they put the child to sleep for us'
      b.   bá-lú-kàtàl-èl-ìzé mw-ànà   'they annoyed the child for us'
      c.   bá-mú-sèbél-él-ìzè   'they worked for him/her'
      d.   bá-mú-tàtél-él-ìzè   'they coiled for him/her'

These forms are similar to those seen in (23)-(29) in that the only /l/ to spirantize is the one in the final suffix, here the Perfective /-ile/. This is true whether the form has the short causative (30a,b) or not (30c,d).

We note that when the root ends in a spirantization trigger other than [z], it surfaces unchanged at the end of the base. As is true in other cases, only the rightmost /l/ spirantizes to [z].

(31) a.   lù-mù-bùlásh-él-ìzè   'we brushed for him/her'
      b.   lù-mù-bákány-èl-ìzè   'we arranged for him/her'
      c.   lù-mù-kópány-èl-ìzè   'we combined (something) on their behalf'
      d.   lù-mù-lúmélìs-èl-ìzè   'we greeted for him/her'
      e.   lù-mù-pòtólós-èl-ìzè   'we made (someone) go around for him/her'

The fact that root-final /sh/ in (31a) does not change is perhaps unsurprising as it does not have a non-spirantized counterpart in the same way that /z/ has /l/. However, we also see that /ny/ (31b,c) and /s/ (31d,e) remain unchanged here, which is perhaps more interesting, since the forms in (4) show that /ny/ and /n/ stand in a similar relationship in this respect to /z/ and /l/, as do (to a lesser extent as noted in fn. 5) /s/ and /h/.

3. Effects of the reciprocal extension on spirantization

To see a complication in the spirantization pattern described above, let us consider forms which contain both the reciprocal as well as the applicative suffixes. To begin let us examine such forms which do not contain the short causative or a root-final spirantization trigger.

(32) a.   kù-lùt-él-án-à ~   'to teach for each other'
            kù-lùt-án-èl-à
      b.   kù-lìf-èl-àn-à ~   'to pay for each other'
            kù-lìf-àn-èl-à
      c.   kù-sòk-él-án-à ~   'to cook for each other'
            kù-sòk-án-èl-à

As can be seen there is variation in the order of the applicative and reciprocal extensions, both orders yielding the meaning 'to verb for each other'. As Hyman (2003a) notes in his cross-Bantu study of extension order, in many Bantu languages the relative ordering of these extensions reflects the semantic scope of each, i.e. /-el-an-a/ being used to indicated 'verb for each other', while /-an-el-a/ is used for 'verb each other for'. While in other Bantu languages the order is fixed. When asked to reflect

on the two variants, our consultant said that both orders (to mean 'to verb for each other') are heard in the Silozi speaking area, and he himself spontaneously produced both types. Depending on the verb he would sometimes have a preference, and when this was the case, it was more likely to be the /-el-an-a/ form. When asked about producing a form such as 'to teach each other on behalf of someone' our consultant provided the plain reciprocal form (i.e. ending in [lut-an-a]) and expressed 'on behalf of' syntactically with a following adjunct phrase.

Turning to cases where the completive (meaning 'for the last time') is combined with the reciprocal, in some cases the same variation in ordering is found, while in others, only the form with the reciprocal at the end was accepted.

(33)   a.   kù-lùt-élél-àn-à ~   'to teach each other for the last time'
              kù-lùt-án-élèl-à
        b.   kù-lìf-élél-àn-à   'to pay each other for the last time'
        c.   kù-bòn-élél-àn-à   'to see each other for the last time'

We now turn to analogous forms with CVC roots where the short causative is present (34a), the root ends in a spirantization trigger (34b-d), or the root is followed by the long causative (34e). Such applicative reciprocals as seen below exhibit the same variation in affix ordering as seen in the forms in (32).

(34)   a.   kù-lìz-àn-èl-à ~   'to ring for each other'
              kù-lìz-èz-àn-à
        b.   kù-bùz-án-él-à ~   'to ask for each other'
              kù-bùz-éz-àn-à
        c.   kù-bìz-án-èl-à ~   'to call for each other'
              kù-bìz-éz-àn-à
        d.   kù-tìs-àn-èl-à ~   'to bring for each other'
              kà-tìs-èz-àn-à
        e.   kù-bìl-ìs-àn-èl-à ~   'to boil for each other' (cf. (3e))
              kù-bìl-ìs-èz-àn-à

Verbs ending in a spirantization trigger with the reciprocal and the completive are shown in (35). As was generally true of the forms with non-spirantization triggers (33), the reciprocal follows the completive.

(35)   a.   kù-bìz-éléz-àn-à   'to call each other for the last time'
        b.   kù-bùz-éléz-àn-à   'to ask each other for the last time'
        c.   kù-cìs-éléz-àn-à   'to feed each other for the last time'

Looking at the spirantization patterns exhibited in (34) and (35), the emerging generalization is that when the applicative or completive *precedes* the reciprocal, we find the exact same spirantization patterns as above. If the verb has the short causative (34a), then both the root-final /l/ as well as the /l/ in the immediately following suffix is spirantized. In forms with CVC roots where the root-final C is a spirantization trigger ((34b-e), (35)) we again see that the rightmost following /l/ is spirantized. But when the applicative *follows* the reciprocal, the /l/ in the applicative does *not* spirantize. Thus, the correct generalization is *not* that the presence of a short causative or a root-final spirantization trigger will have the effect of changing the rightmost /l/ in the word to [z]. The intervening presence of the

reciprocal /-an/ seems to block this. The revised generalization is that when a short causative or a root-final spirantization trigger is present, the rightmost /l/ in an *uninterrupted span* of /lV/ syllables will surface as [z].

This pattern also obtains in the Recent Past, containing the reciprocal and perfective suffixes, as seen below.[9]

(36)   a.   lù-tàz-án-ìlè   'we filled each other'
        b.   lù-bùz-án-ìlè   'we asked each other'
        c.   lù-bìz-án-ìlè   'we called each other'
        d.   lù-tìs-àn-ìlè   'we brought each other'
        e.   lù-cìs-àn-ìlè   'we burned each other'
        f.   lù-cìnc-àn-ìlè   'we changed each other'
        g.   lù-kàsh-án-ìlè   'we pushed each other'

Whether the form has a short causative (36a) or a root-final spirantization trigger (36b-g), the presence of the reciprocal /-an/ blocks the word-final /l/ (in this case belonging to the perfective suffix) from spirantizing.

Finally, we consider /CVCVC/ stems with a reciprocal suffix. The form in (37a) has the short causative (cf. (23)), while the one in (37b) is /z/-final (cf. (26)).

(37)   a.   kù-lòbàz-àn-èl-à ~   'to put to sleep for each other'
              kù-lòbàl-èz-àn-à
        b.   kù-sèbéz-án-èl-à ~   'to work for each other'
              kù-sèbél-éz-àn-à

The patterns here are consistent with the previously fashioned generalizations. When the applicative precedes the reciprocal, we find that the root-final C surfaces as /l/, while the /l/ in the immediately following applicative surfaces as [z], exactly as we did in (23c) and (26b). When the reciprocal precedes the applicative, it blocks spirantization of the /l/ in the applicative, and only the root-final /l/ is realized as [z].

While the goal of this paper is mainly descriptive, let us now briefly consider how the above patterns might be accounted for. Two general approaches can be entertained: 1) a more purely phonological one or 2) a more morphological one. Under either approach, the presence of the short causative (e.g. /-y/) spirantizes an immediately preceding /l/ (though we noted that there is some morphological conditioning as at least one suffix, /-ul/ is not targeted).

In the phonological analysis, in forms with a short causative, a single /-y/ is added to the form. In the case of /CVl/ roots it is placed immediately after the root, causing the root-final /l/ to become /z/. All other l>z changes would then be attributed to a progressive consonant harmony process whereby a (non-vocoid) palatal or alveolar sibilant (/z, s, c, j, ny, sh/) would cause a following /l/ to become [z]. With regard to the effects of the reciprocal /-an/, while I will not do so here, it does not seem difficult to formalize the harmony process such that the presence of a consonant other than /l/ (in this case the /n/ in the reciprocal) would block the left to right consonant harmony. Setting that aside, two major challenges arise for this analysis. First, this is far from a straightforward assimilation process, as it does not seem possible to find a feature or node of features common to the triggers (/z, s, c, j, ny, sh/), which

---

[9] We will see below in section 4 that after the reciprocal extension the Perfective can be realized as either /-ile/ or /-i/. Only variants of the first type are shown here. Also, when the reciprocal is followed by the FV /-a/, it surfaces unchanged. E.g. kù-tàz-án-à 'to fill each other'.

then spreads to /l/, changing it into [z]. Second, and perhaps even more challenging, is formalizing the harmony process such that it only targets the rightmost /l/ in a string of consecutive /lV/ syllables, essentially skipping over intervening /l/s. It is unclear to me what formal device could be used to accomplish this. And typologically, we are not aware of other cases of a segmental phonological harmony processes where a trigger is followed by multiple (identical) targets, but only the last one undergoes the relevant change.[10] Finally, under this approach it is not obvious how to handle the /CVCVl/ cases ((23)-(25)). If the short causative is placed immediately after the root, then after the consonant harmony rule, in forms with /-Vl/ suffixes, a subsequent process would need to change the root-final /z/ to /l/ (in both the causative and non-causative forms), which has no clear phonological motivation.

Let us now consider other, more morphologically-driven approaches. One approach that has been suggested in the literature, which would nicely account for the Silozi verbs such as those in (7)-(9) where the short causative has the effect of spirantizing not only the root-final /l/, but the /l/ in one immediately following suffix, is that of "interfixation," proposed by Hyman (1994). Under this approach, a single short causative is added to the form, but can have the effect of inducing *multiple* instances of spirantization. For example, in the case of a form such as (7a) *kù-tàz-éz-à* 'to fill for', the short causative is initially suffixed onto the root yielding /tal-y/. Spirantization yields /taz-y/, after which the applicative /-el/ is *interfixed* between the /taz/ and the /-y/, yielding /taz-el-y/. Spirantization will then apply again, yielding /taz-ez-y/. The final vowel is then added, after which the /y/ deletes, yielding the attested surface string [tazeza]. The Recent Past form in (9a) *lù-tàz-ízè* 'we filled' would be derived analogously. The challenge for this approach (used successfully in a number of Bantu languages—e.g. Jita (Downing 2001)) is that when more than one suffix with /l/ follows the root, the default expected result regarding interfixation is that *each* following /l/ would be spirantized (something that indeed happens in the Bantu languages Hyman examined, which led to the introduction of this proposal). However, as we have seen in many examples above (cf (14)-(22)), only the peripheral /l/s in the string get spirantized, which may be a fatal challenge for this approach for Silozi.

A second morphologically-driven approach would be to posit that in many verbs the short causative is inserted *multiple* times (as opposed to the interfixation approach just described where the short causative is only inserted once). So, for example, in causative forms such as (18a) *kù-tàz-élèz-à* 'we filled for the last time', the morphology would insert two short causatives after the peripheral /l/s, i.e. the root-final one and the one in the final suffix: /ku-tal-y-elel-y-a/. Each would induce spirantization, deriving the correct surface pattern. This, of course, gives the morphology much more power than the phonological approach where the causative is inserted once, directly after the verb root. Under this analysis, when the verb has a short causative, in some cases it will be inserted just once, and in other cases twice. And this is not solely dependent on the number of /l/s in the form. As we saw earlier when the reciprocal /-an/ is present, then the domain within which the peripheral /l/s must be followed by the short causative, is a domain of uninterrupted /lV/ syllables. Thus, this morphological process must be phonologically sensitive in this respect. In forms with /CVCVl/ roots and a short causative ((23)-(25)) the /-y/ placement is a little different. Instead of /-y/s being placed after peripheral /l/s, it is only placed after the rightmost /l/. In the case of /z/-final roots such as those in (26)-(29) one could set these up as /CVCVl/ underlyingly with something in the lexical entry obligatorily triggering the insertion of a short causative, even though the semantics don't require it.

The major challenge for this approach, however, is accounting for spirantization in the non-causative forms with root-final spirantization triggers (e.g. (10),(11)). In these forms the insertion of a

---

[10] For more on consonant harmony cross-linguistically and how to implement notions of locality, see, inter alia, Shaw (1991), Rose & Walker (2004), and Finley (2011).

short causative /-y/ after the appropriate /l/ seems trickier. Under this approach the morphology seems to be required to insert a short causative /-y/ after the rightmost /l/ when either a) a short causative is found after the root (purely morphological conditioning), or b) when the root ends in one of the 6 triggering consonants (purely phonological conditioning). One might try to eliminate the phonological conditioning here by positing that these roots (as was suggested immediately above for the forms in (26)-(29)) had something in the lexical entry obligatorily triggering the insertion of a short causative, even though the semantics don't require it. This would mean, e.g., the UR of (10c) *kù-tìs-èz-à* 'to bring for' would not be /ku-tis-el-a/, but /ku-tis-y-el-a/, and the presence of the short causative after the root would trigger an additional short causative after the final /l/ in any string of /lV/ syllables. But if this process is lexical, then it's a strange coincidence that every CVC root ending in the 6 spirantizing consonants triggers the short causative (which in turn triggers spirantization of a preceding /l/), as there are no such CVC roots which do not. The same dilemma ensues if one were to try to simply posit a root-final /y/ as part of the UR—e.g. /tisy/, /kwacy/, /kashy/, etc. The determination of which consonants trigger spirantization does seem to be phonologically based (viz. a non-vocoid palatal or alveolar sibilant), rather than lexical. In summary, while it is apparent that the complex array of spirantization patterns have both phonological and morphological factors at play, finding a way to combine those in a coherent and plausible overall analysis remains challenging.

4. Allomorphy of the Perfective suffix

While we have presented to this point a number of Recent Past forms with the perfective suffix /-ile/, we have not yet considered Recent Past forms containing the applicative where the root-final consonant is *not* a spirantization trigger. Examples of these are presented below.

(38)   a.   lù-lùt-éz-ì   'we taught for'
        b.   lù-ñòl-éz-ì   'we wrote for'
        c.   lù-bùl-èz-ì   'we peeled for'
        d.   lù-sòk-éz-ì   'we cooked for'
        e.   lù-pàng-éz-ì   'we made for'
        f.   lù-lìf-éz-ì   'we paid for'
        g.   lù-sèh-éz-ì   'we cut for'
        h.   lù-bùlúk-èz-ì   'we kept for'
        i.   lù-kàndèk-èz-ì   'we told stories for'
        j.   lù-pòtólóh-èz-ì   'we went around for'

Based on what we have seen thus far, we might well posit that each root is underlyingly followed by /-el-ile/ (the applicative followed by the perfective as in (14))). Curiously the language assiduously avoids forms surfacing with word-final [elile].[11] The Recent Past forms reviewed prior to this point contained a short causative or a root-final spirantization trigger which, regardless of the root length, caused applicative forms to end in [el-ize]. There is no short causative or spirantization trigger in the forms in (38), so another tack must be taken to avoid the verb ending in [elile]. We know that in many Bantu languages when an extension appears before the Perfective /-ile/ suffix, a process known as "imbrication" (Bastin 1983) occurs which often changes input /-VC-ile/ to [-ViCe]. E.g. in Cilungu (Bickmore 2008), stem /olol-uk/ 'to become straight' in the perfective is /olol-uk-ile/. This imbricates to /ololuike/ and finally due to a productive gliding process (and compensatory lengthening)

---

[11] More specifically, it avoids the [elile] ending when preceded by another syllable in the stem (e.g. a CVC root). The language does permit this sequence when the initial [el] is part of a CVC root—e.g. lí-mél-ìlè 'they germinated' (39b).

[ololwiike]. Thus surface [elile] (or [ilile]) is also avoided in the many languages exhibiting this kind of imbrication. But that is not what happens in Silozi, which does not exhibit this type of /-VC-ile/ to [-ViCe] imbrication, as already seen in the reciprocal perfectives in (36) which end in [an-ile]. In Silozi, instead of the full /-ile/ suffix being realized after the applicatives in (38), only the vowel /-i/ appears here. While not widespread, it is not unprecedented in Bantu to have the perfective suffix sometimes appear as /-ile/ and sometimes as /-i/. Such is the case, e.g. in Ndebele where Sibanda (2004) shows that while /-ile/ is the default, there are a set of roots which subcategorize for /-i/. See Bastin (1983) for additional examples.[12]

Next, the Applicative suffix in these forms is realized as [ez]. While we know from the many examples above that this is an attested allomorph of /-el/ in Silozi, it is odd to find it here since it is not followed by the short causative /-y/. We know that the first vowel of the Perfective -ile suffix was "close" in Proto Bantu, and induces spirantization (or consonant mutation more generally) in many Bantu languages (Bastin 1983). In modern Silozi, however, the full /-ile/ suffix does not in fact induce spirantization. As can be seen below, when added to /l/-final roots, the /l/ remains unchanged.

(39) a. lù-bùl-ìlè   'they peeled'
      b. lí-mél-ìlè   'they (C8) germinated'
      c. lù-lìl-ìlè   'they cried'
      d. lí-fèl-ílè   'they (C8) came to an end'

We also note that the nominalizing suffix /-i/, also historically close and inducing spirantization in many Bantu languages, does not induce any phonological changes in Silozi.[13]

(40) a. mù-bàpál-ì   'player'   Cf. kù-bàpàl-à   'to play'
      b. mù-lùmél-ì   'believer   Cf. kù-lùmèl-à   'to believe'
      c. mù-ñól-ì   'writer'   Cf. kù-ñól-à   'to write'

Synchronically, we propose that the Perfective suffix (present in all the Recent Past forms) has two allomorphs in Silozi, a long variant /-ile/ which begins with a high front vowel that does not induce any spirantization, and a second, short variant seen in (38), which is a single high front vowel which does induce spirantization. I leave it as an open question as to how to implement this formally. One possibility is that the short allomorph could be /-yi/, where the /y/ portion would trigger spirantization. (See Bickmore's (2007) analysis of Cilungu, a five vowel language like Silozi, on approaches to account for the fact that some /i/-initial suffixes induce spirantization while others do not.) The long Perfective /-ile/ can be considered the default allomorph. It appears as [ile] when the base does not contain the applicative (e.g. (8), (36)), and as [ize] when the form contains an applicative and a spirantization trigger. In the event the root has no spirantizing trigger, and is followed by the applicative

---

[12] Bastin (1983) discusses other languages where /-i/ is used in addition to /-ile/, and notes in many cases the former is often used with verbs which intrinsically have a more stative meaning. See also Nurse (2008), and Nurse & Watters (2022). It's difficult to determine with any certainly why Silozi doesn't simply employ the long allomorph /-ile/ when the applicative is also present (as it does after the reciprocal). With regard to why it doesn't exhibit /VC-ile/ to [-ViCe] imbrication, the underlying applicative perfective sequence /el-ile/ might well ultimately surface as [i:le]. But as Silozi has lost vowel length contrast, any shortening of the penult might risk a merger with the non-applicative perfective, which is simply [ile]. Using /-i/ instead of /-ile/ in such cases avoids any possible neutralization.
[13] Silozi also has the negative final vowel /-i/, which does not induce any consonant mutation. E.g. *à-bá-lìl-ì* 'they are not crying'

/-el/ , then to avoid a word-final [elile] sequence, the short allomorph of the Perfective is chosen, ultimately yielding [ez-i] as the short Perfective induces spirantization.

In (41) we show some Recent Past forms with both the applicative and the reciprocal.[14]

(41) a. lù-lùt-án-èz-ì   'we taught for each other'
      b. lù-lìf-àn-èz-ì   'we paid for each other'
      c. lù-sòk-án-èz-ì   'we cooked for each other'

These forms follow the same pattern as in (38), i.e. since the last extension is the applicative, the short Perfective allomorph is chosen to avoid *elile.

Below we present the Recent Past applicative reciprocal forms with roots ending in a spirantization trigger. As in (41) the reciprocal precedes the applicative extension. Recall from (36) and (37) that the reciprocal blocks the spirantization of an /l/ to the right of the /n/. Thus /-el-ile/ will not become [-el-ize] as it did in (14)-(15). To avoid [el-ile], the short Perfective allomorph is chosen.

(42) a. bá-bùz-án-èz-ì   'they asked for each other'
      b. bá-bìz-án-èz-ì   'they called for each other'
      c. bá-lóz-àn-èz-ì   'they sharpened for each other'
      d. bá-cínc-àn-èz-ì   'they changed for each other'
      e. bá-ùzw-án-èz-ì   'they stole for each other'
      f. bá-líz-àn-èz-ì   'they rang for each other'
      g. bá-táz-àn-èz-ì   'they filled for each other'
      h. bá-bùlásh-án-èzì   'they brushed for each other'
      i. bá-bíl-ìs-àn-èz-ì   'they boiled for each other'

Returning to the distribution of the two Perfective allomorphs, we have suggested above that the short variant is used to prevent a word from ending in [elile] (preceded by at least one syllable in the stem). The data below in (43) suggest that the prohibition is in fact a little more general in that what is avoided is any [Vlile] sequence in this position (i.e. not only when that first vowel is /e/). Thus, roots of the shape /CVCVl/ take the short Perfective allomorph.[15]

(43) a. bá-hùpúz-ì   'they remembered'   Cf. kù-hùpúl-à
      b. bá-cókòz-ì   'they husked'   kù-còkòl-à
      c. bá-hòtóz-ì   'they coughed'   kù-hòtól-à
      d. bá-kòbóz-ì   'they pounded vegetables'   kù-kòból-à
      e. bá-ámbòz-ì   'they chatted'   kù-àmbòl-à
      f. bá-fùzéz-ì   'they blew on fire'   kù-fùzél-à
      g. bá-bùléz-ì   'they said'   kù-bùlél-à

Not surprisingly, when a /CVCVl/ root is followed by an applicative suffix, the short Perfective suffix is also used to avoid the word-final [Vlile] sequence.

---

[14] With regard to the order of the extensions, in such perfective forms my consultant generally ordered the reciprocal first, though noted that in some cases it's also possible to order the applicative first. E.g. *lù-bès-àn-èz-ì ~ lù-bès-èz-àn-ìlè* 'we roasted (something) for each other'. In the second variant, the long allomorph of the perfective is used as it will not result in word-final [elile].

[15] While it's quite possible that the final VC in these forms was an extension historically, synchronically the corresponding verbs without the final VC are not attested in my consultant's speech.

(44) a. lù-mù-còkól-èz-ì   'we husked for him/her'
      b. lù-mù-hòtól-èz-ì   'we coughed on him/her'
      c. lù-mù-kòból-èz-ì   'they pounded vegetables for him/her'

In the event a multisyllabic base ends in /al/, then instead of the expected output [az-i], one finds [ez-i].[16]

(45) a. lù-lòbèz-ì   'we went to sleep'   /lu-lobal-i/
      b. lù-kàtéz-ì   'we were tired'   /lu-katal-i/
      c. lù-sùpéz-ì   'we were old'   /lu-supal-i/
      d. lù-hòlófèz-ì   'we got hurt'   /lu-holofal-i/

Another environment where we find the short causative is after verbs of the shape /CVCun/ and /CVCon/.

(46) a. kù-shènùn-à   'to grin (show teeth)'
      b. lù-shènùz-ì   'we grinned'
      c. kù-tàmùn-à   'eat first fruits'
      d. lù-tàmùz-ì   'we ate the first fruits'
      e. kù-lòlòmòn-à   'to dissolve'
      f. lù-lòlòmòz-ì   'we dissolved'
      g. kù-shòkòmòn-à   'to bring out (something that was hidden)'
      h. lù-shòkòmòz-ì   'we brought out (something that was hidden)'

In the forms above, the Perfective allomorph used is the short one, /-i/, but curiously it seems to have changed the base-final /n/ to [z]. One possible way to analyze these forms would be to posit /l/-final roots, viz. /shenul/, /tamul/, /lolomol/, /shokomol/. Given these we would expect that the short Perfective would be selected, as it was in (43). To derive the infinitival forms we would then need to posit a nasal harmony rule whereby the root-final /l/ becomes nasalized due to the preceding nasal (e.g. /lomonol-a/ > [lomonon-a]), a process attested in a number of Bantu languages. (See, inter alia Doke (1922) on Lamba, and Kula (2002) for Bemba.) The progressive nasal harmony process would need to be morphologically constrained however perhaps just targeting /ul/ and /ol/, as nasalization harmony does not apply more generally.

(47) a. kù-lìm-èl-à   'to farm for'   (*kulimena)
      b. lù-lìm-ìlè   'we farmed'   (*lulimine)
      c. lù-còn-ìlè   'we waited'   (*luconine)
      d. kù-fùtúmàl-à   'to get warm'   (*futumana)
      e. kù-lèmál-à   'to be accustomed, familiar' (*kulemana)

---

[16] See also (49b). We have examined /CVCVl/ roots where the second vowel is /e/, /u/, /o/ and /a/. Such roots where the second vowel is /i/ are rare in Silozi. The Barotseland.net dictionary (cf. fn. 2) lists 3, none of which were in our consultant's vocabulary: -haila 'to cause great destruction', -capwaila 'to paddle slowly' and -babaila 'to walk with difficulty'. The Perfective of the first, as listed in the dictionary, is -hail-ile, the second -capwaez-i and the third varies between -babail-ile and -babaez-i. Thus when [-iz-i] would be expected one finds [ez-i] instead. Finally, there are some lexical cases of verbs ending in /al/ (usually longer ones of three syllables or more) which can in fact take the long perfective. E.g. *lù-fùtúmál-ìlè* 'we got warm'.

Verbs ending in /-an/ (whether that be the synchronic reciprocal /-an/ or not) show variation in being able to take either the long or short perfective suffix. For some of these my consultant had a slight preference for one over the other, but this seems purely lexical.

(48)   a.   lù-lùt-án-ìlè ~   'we taught each other'
              lù-lùt-án-ì

        b.   lù-sèp-án-ìlè ~   'we trusted each other'
              lù-sèp-án-ì

        c.   lù-bùz-án-ìlè ~   'we asked each other'
              lù-bùz-án-ì

        d.   lù-bòn-án-ìlè ~   'we saw each other'
              lù-bòn-án-ì

Finally, there are a small number of verbs that take the short perfective which do not obviously fall into the cases previously discussed. A few are presented below (all of which end in a coronal sonorant).

(49)   a.   kù-lwál-à   'to carry
        b.   lù-lwéz-ì   'we carried'
        c.   kù-zwèl-à   'to come out
        d.   lù-zwèz-ì   'we came out'
        e.   kù-tál-à   'to become full
        f.   lù-téz-ì   'we became full'
        g.   kù-ñól-à   'to write'
        h.   lù-ñóz-ì   'we wrote'
        i.   kù-bón-à   'to see'
        j.   lù-bón-ì   'we saw'

Synchronically, it seems like these roots must lexically subcategorize for the short, rather than the long allomorph of the perfective suffix. Still, there may be a historical explanation for some of these. The verbs in (49a-f) all have more than one mora in Proto Bantu: *duad, *du-id, *jaadi (Bantu Lexical Reconstructions 3). Thus, even though there is no longer a vowel length contrast in Silozi, at an earlier stage of the language it might have been the case that the short Perfective Final Vowel appeared after any polymoraic, as opposed to polysyllabic base (cf. (43), (45)) ending in /l/ (<*d).[17]

5. Summary

In this paper we presented a wide range of newly elicited Silozi data bearing on an l/z alternation seen in Silozi verbal roots and suffixes. This trigger for this spirantization process could be either the inclusion of a short causative or the presence of one of six spirantization triggers. What was especially interesting in Silozi was the specific range of target /l/s which ultimately spirantize. In general what we found was that in a sequence of consecutive /lV/ syllables it was the peripheral /l/s which spirantized—e.g. the root-final /l/ as well as the last /l/ in the sequence. Intervening /l/s were not spirantized, and the presence of a consonant other than /l/ (e.g. /n/) blocked any /l/ to the right from being spirantized. We briefly considered several possible analyses, some being more phonological and others more morphological, but serious analytic challenges were noted for each. Finally, we examined

---

[17] The realization of the Perfective in verbs with CVVC roots is often analytically interesting and challenging in Bantu. See, inter alia, Hyman (1995) for Bemba and Bickmore (2007) for Cilungu.

the realization of the perfective suffix, suggesting it has a long (/-ile/) and a short (/-i/) variant. While the long one is the default, we suggest that the short one is used to avoid a word-final [elile] sequence. We finished by noting some additional cases where the short allomorph is also used, not motivated by this prohibition.

Abbreviations

C#   class (number)
INTR   intransitive
TR   transitive

References

Bastin, Yves. 1983. *La finale verbale-ide et l'imbrication en bantou* (Vol. 114). Tervuren: Musée royal de l'Afrique centrale.

Bickmore, Lee. 2007. *Cilungu Phonology*. Stanford: Center for the Study of Language and Communication.[https://web.stanford.edu/group/cslipublications/cslipublications/site/1575865505.shtml]

Bickmore, Lee. 2019. Unaltered morphemes as phonological triggers and targets in Rutooro. *Journal of African* Languages *and Linguistics* 40:1, 3-22.
[https://www.degruyter.com/document/doi/10.1515/jall-2019-0002/html]

Bostoen, Koen. 1986. Les suffixes causatifs dans les langues bantoues. *Africana Linguistica* 10: 55-145.

Bostoen, Koen. 2008. Bantu Spirantization: Morphologization, Lexicalization and Historical Classification." *Diachronica* 25: 299-356.

Doke, C. M. 1922. *The grammar of the Lamba language*. K. Paul, Trench, Trubner & Company, Limited.

Downing, Laura 2001. Liquid spirantisation in Jita. *Malilime: Malawian Journal of Linguistics* 2:1-27.

Downing, Laura. 2007. Explaining the role of the morphological continuum in Bantu Spirantization. *Africana Linguistica* 13: 53–78.
[https://www.africamuseum.be/en/research/discover/publications/africana-linguistica/vol13]

Finley Sara. 2011. The privileged status of locality in consonant harmony. *Journal of Memory and Language* 1;65(1):74-83. doi: 10.1016/j.jml.2011.02.006.

Fortune, George. 2001. *An Outline of Silozi Grammar*. Lusaka: Bookworld Publishers.

Gowlett, Derek. 1967. *Morphology of the verb in Lozi*. MA Thesis, Distributed by Witwatersrand University Press.

Gowlett, Derek. 2003. Zone S. In D Nurse, & G. Philippson (eds.), *The Bantu languages*. London: Routledge.

Guthrie, Malcolm. 1967-71. *Comparative Bantu*. (4 volumes). Farnborough: Gregg.

Hyman, Larry 1994. Cyclic Phonology and Morphology in Cibemba. In J. Cole & C. Kisseberth (eds) *Perspectives in Phonology*, 81–112. Stanford: CSLI.

Hyman, Larry 1995. Minimality and the prosodic morphology of Cibemba imbrication. *Journal of African Languages and Linguistics* 16.3-39.

Hyman, Larry. 2003a. Suffix Ordering in Bantu: a Morphocentric Approach. In G. E. Booij & J. van

Marle (eds) *Yearbook of Morphology*, 245-281. New York: Springer.

Hyman, Larry 2003b. Sound Change, Misanalysis, and Analogy in the Bantu Causative. *Journal of African Languages and Linguistics* 24: 55-90.

Hyman, Larry & J Merrill. 2015. Morphology, irregularity, and Bantu frication: The case of Lulamogi. *UC Berkeley PhonLab Annual Report*, 11(11).

Jalla, Adolphe. 1937). *Elementary grammar of the Lozi language, with graduated exercises*. London: United Society for Christian Literature (USCL).

Kamwengo, Monica Mataa. 2008. *Aspects of syntactic tones in Lozi*. MA Thesis. University of Zambia.

Kula, Nancy 2002. *The phonology of verbal derivation in Bemba*. PhD Dissertation. University of Essex.

Mwisiya, M. W. 1977. *Introduction to Silozi Grammar*. Lusaka: Kenneth Kaunda Foundation.

Nurse, Derek. 2008. *Tense and Aspect in Bantu*. Oxford: Oxford University Press.

Nurse, Derek. 2003. Towards a Historical Classification of the Bantu Languages. In D Nurse, & G. Philippson (eds.), *The Bantu languages*. London: Routledge.

Nurse, Derek. and John Watters. 2022. Tense in Proto-Bantu. In K. Bostoen, G.-M. de Schryver, R. Guérois & S. Pacchiarotti (eds.), *On Reconstructing Proto-Bantu Grammar*, 105-171. Berlin: Language Science Press.

Rose, Sharon. and Rachel Walker. 2004. A Typology of Consonant Agreement as Correspondence. *Language* 80:3: 475–531.

Schadeberg, Thilo, & Koen Bostoen. 2019. Word formation. In M. Van de Velde, K. Bostoen, D. Nurse, & G. Philippson (eds.), *The Bantu languages* (2nd ed.),172–203. https://doi.org/10.4324/9781315755946-6

Shaw, Patrick. 1991. Consonant harmony systems: The special status of coronal harmony. In Carole Paradis and Jean-Francois Prunet (eds) *The special status of coronals: Internal and external evidence, Phonetics and phonology* 2. 25-157. San Diego: Academic Press.

Sibanda, Galen. 2004. *Verbal phonology and morphology of Ndebele*. PhD Dissertation. University of California, Berkeley.

Yukawa, Yasutoshi. 1987. A Tonological Study of Lozi Verbs. *Studies in Zambian Languages*. Tokyo: ILCAA.

Zoll, Cheryl. 1995. Consonant mutation in Bantu. *Linguistic Inquiry* 26. 536–545.