

Sound Change, Misanalysis, and Analogy in the Bantu Causative

1. Introduction

The purpose of this study is to show how a particular set of Bantu sound changes, which I refer to as “frication”, leads to cases of synchronic misanalysis, which are in turn analogized to new environments.¹ These sound changes have been treated by a number of researchers over the years (e.g. Meinhof 1932, Bourquin 1955, Guthrie 1967-71, Schadeberg 1995, Hyman 1997, Labroussi 1998ab, Mpiranya 1997, Zoll 1995, among others). Just prior to the introduction of frication, most Bantuists assume the Proto-Bantu (PB) consonant and vowel systems in (1) as the starting point:

(1) Proto-Bantu (Meeussen 1967)

	Consonants					Vowels				
a.	p	t	c	k	b.	i̥	u̥	c.	i	u
	b	d	j	g		i	u		ɪ	ʊ
	m	n	ɲ			e	o		ɛ	ɔ
						a			a	

As seen in (1a), PB had a relatively simple consonant system involving three series of non-continuant consonants: voiceless, voiced, nasal.² The PB seven-vowel system is typically transcribed as in (1b) and assumed to have the phonetic values in (1c). The restriction of a tense-lax (or advanced tongue root) opposition among high vowels only is quite rare in the world’s languages.³ Among the several hundred Bantu languages spoken today, some maintain exactly the 7V system in (1b), e.g. Rimi, while others have reanalyzed it as the more canonical 7V system /i, e, ε, u, o, ɔ, a/, e.g. Mongo.⁴

However, a large number of Bantu languages have merged *i̥/*i and *u̥/*u to yield the 5V system /i, e, u, o, a/. All 5V Bantu languages except Lengola (Stappers 1971) “fricate” stops before *i̥ and *u̥ as do some 7V languages (Schadeberg 1995). As a result, what started out as an opposition between [±ATR] high vowels, is transphonologized to a consonantal opposition. Thus, for example, *ki̥ may be realized as [si] and *k̥u̥as [fu], while *ki and *ku are realized as [ki] and [ku], and so on.

In (2) I show some of the more widely attested effects of (non-palatalizing) frication before *i̥ in different Bantu languages:

¹This paper was originally inspired by a seminar on analogy taught by Andrew Garrett at Berkeley in Fall 1997 and presented at the workshop on analogy held on December 5, 1997.

²Stewart’s (1989) proposal that there may have been an additional fortis/lenis contrast in both voiced and voiceless obstruents has not been confirmed. In more recent work (Stewart 1999), he has quite plausibly suggested that PB may have had implosives, inherited from his Proto-Bantu-Potou-Tano *ɓ and *ɗ, i.e. the same consonants I once reconstructed for “Proto-Benue-Kwa” (Hyman 1972).

³Maddieson (1984) lists only three languages which have the 7V system in (1b): Kpelle, Dani and Kunama. Concerning these, Kunama does not have this vowel system, but rather a 5V system with tense and lax (Lionel Bender, personal communication).

⁴See Hyman (1999) for discussion of the difficulties in interpreting Bantu 7V systems and their description in the literature.

(2)	Sound changes: “frication” before *i, e.g.	7V	>	(5V)
a.	*p _i > ph _i > pf _i		>	f _i > fi
	*b _i > bh _i > bv _i		>	v _i > vi
b.		> ps _i > (ts _i)	>	s _i > si
		> bz _i > (dz _i)	>	z _i > zi
c.	*t _i > th _i > ts _i		>	s _i > si
	*d _i > dh _i > dz _i		>	z _i > zi
d.	*k _i > kh _i > ks _i > (ts _i)		>	s _i > si
	*g _i > gh _i > gz _i > (dz _i)		>	z _i > zi
e.	*c _i > ch _i		>	s _i > si
	*j _i > jh _i		>	z _i > zi

I indicate the first change as *C_i > Ch_i, where Ch is used as a cover symbol for “noisy release” due to the constriction of the [+ATR] high vowel, possibly involving aspiration, full voicing (causing “depressor consonant effects”), or palatalization in the case of *i.⁵ This in turn leads to affrication. In the case of *p/*b, the frication may maintain the place of articulation of the consonant, as in (2a), or it may fricate the coronality of *i, as in (2b). Affrication yields a Cs_i/Cz_i stage in the case of coronals and velars in (2c, d). As indicated in parentheses, heterorganic affricates may become homorganic, e.g. ps_i/bz_i > ts_i/dz_i, or may directly de-affricate (> s_i/z_i). As a last stage, *i/*i and *u/*u merge to produce a 5V system.

Examples showing the reflexes of *p, *t, *k before *i are given from Ganda in (3).

(3) Illustration from Ganda

	Proto-Bantu		Ganda		Correspondence	
a.	*-p _i dá	‘pus’	>	(ma)-sílà	‘pus’	*p > s
	*-kap _i	‘oar’	>	(n)-kasî	‘oar’	*p > s
	*-b _i n-	‘dance (v.)’	>	-zín-a	‘dance (v.)’	*b > z
	*-b _i mb-	‘swell (v.)’	>	-zím-b-a	‘swell (v.)’	*b > z
b.	*-t _i d-	‘rub, grind’	>	-sil-a	‘rub, pulverize’	*t > s
	*-d _i m-	‘extinguish’	>	-zím-a	‘extinguish’	*d > z
c.	*-k _i d-	‘be silent’	>	-sílík-a	‘be silent’	*k > s
	*-g _i d-	‘be taboo’	>	-zil-a	‘be taboo’	*g > z

As seen, *p, *t, *k > [s] and *b, *d, *g > [z]. In addition, Ganda and many other Bantu languages realize *c as [s] not only before *i, but in fact before all vowels, e.g. *-cek- > -sek- ‘laugh’, *-con- > -son- ‘sew’. While *j is realized palatal in Ganda, it has the reflex [z] in certain other languages, e.g. *-bajj- ‘carve’ > Ganda -bajj-, Tonga -bez-. In short, [s] and [z] frequently represent the historical merger of several different consonants in fricating Bantu languages. As we shall now see, these mergers have significant

⁵Comparable frications take place before *u, e.g. *k_u > kh_u > kf_u > (pf_u) > f_u.

morphophonemic effects on verbs when frication is conditioned by the causative suffix *-j-.

2. Causative Frication

In (3) we saw that all stops are fricated before tautomorphemic *j̥ in Ganda, i.e. within roots. In fact, PB provided four potential contexts for frication in the daughter languages, which Bastin (1983) organizes into the following hierarchy:

- (4) Hierarchy of contexts for frication: d c b a
- | | | | |
|----|---------------|---|---------------------------------|
| a. | + ...Cj̥... + | : | before tautomorphemic |
| b. | C + j̥ + FV | : | before causative suffix *-j̥- |
| c. | C + j̥] | : | before nominalizing suffix *-j̥ |
| d. | C + j̥d-e | : | before perfective suffix *-j̥d- |

As seen in (4a), the most conducive environment for frication is when C and *j̥ occur successively within the same morpheme, as in the Ganda examples seen above in (3). The next most conducive environment in (4b) concerns the causative suffix (“extension”) *-j̥-, which is normally followed by the inflectional final vowel morpheme (FV). The third environment concerns the deverbal nominalizing suffix *-j̥ in (4c), which frequently derives agentive nouns, e.g. Ganda *mu-lez-i* ‘nurse, guardian (of child)’ < PB *-ded-, Ganda *-lel-* ‘raise, nurse (child)’. Finally, perfective *-j̥d-, which is accompanied by the FV -e may also condition frication. Bastin’s hierarchy manifests itself in at least three ways (cf. Labroussi 1998ab): First, as indicated, frication may be totally lacking in a context lower in the hierarchy without affecting the higher contexts. Many Bantu languages fail, for instance, to fricate before perfective *-j̥d-e. Second, frication may be optional or affect only certain roots in the lower context, but be obligatory or affect more roots in a higher one. Finally, all consonants may be fricated in a higher environment vs. fewer consonants in the lower. In Ganda, as documented in Hyman (1997), coronal and velar consonants are fricated in all four environments in (4), while labials are fricated only tautomorphemically. Thus, *-ded-j̥-a > -lez-y-a > -lez-a ‘cause to nurse, raise’, but *-kúb-j̥-a > -kúb-y-a ‘cause to hit, beat’. It is the frication conditioned by causative -j̥- that is of concern in this study.⁶

I begin by citing some causative forms from Nande, an underlying 7V language which does not have frication:

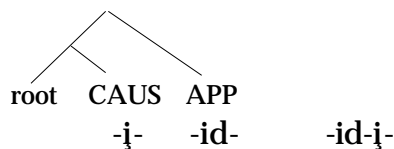
- (5) Nande -an-j̥-, -ir-j̥-
- | | | | |
|----|--------------|---------------|--|
| a. | -tsap- | [tsap-a] | ‘get wet’ (intr.) |
| | -tsap-j̥- | [tsap-y-a] | ‘wet [something]’ (=cause to get wet) |
| | -tsap-an-j̥- | [tsap-an-y-a] | ‘wet each other’ |
| | -tsap-ir-j̥- | [tsap-ir-y-a] | ‘wet (sth.) for (s.o.; reason)/at (place)’ |

⁶The hierarchy in (4) is possibly explained in the following terms (see also Bastin 1983, Hyman 1997, Labroussi 1998b): The most fricating environment, naturally, occurs when the Cj̥ belongs to the same morpheme (root or affix). The least fricating environment concerns perfective *-j̥d-e, which is inflectional, hence the least semantically integrated of the three suffixes in (4). Finally, since causative *-j̥- is almost always followed by the FV, e.g. -a, it will glide to y, whose greater constriction may, in turn, lead to more likely frication (than with agentive -j̥).

b.	-búl-	[búl-a]	‘wonder’
	-búl-ᵢ-	[bᵢl-y-a]	‘ask’ (< cause to wonder)
	-búl-an-ᵢ-	[bᵢl-an-y-a]	‘ask each other’
	-búl-ir-ᵢ-	[bᵢl-ᵢr-y-a]	‘ask (s.o.) for (s.o.; reason)/at (place)’
c.	*-song-		
	-song-ᵢ-	[sᵒŋg-y-a]	‘gather’ (tr.)
	-song-an-ᵢ-	[sᵒŋg-an-y-a]	‘gather each other’
	-song-er-ᵢ-	[sᵒŋg-ᵛr-y-a]	‘gather (sth.) for (s.o.; reason)/at (place)’

The underived and “extended” verb bases are given in the first column. In the second column, the FV -a has been added. We observe that -ᵢ- glides to y before -a, as well as passing on its [+ATR] to preceding non-low vowels (marked by a cedilla). What needs to be observed here is that the causative extension occurs last in the sequence: the third example of each set shows that the reciprocal extension -an- must precede -ᵢ-, while the fourth example of each set shows that applicative -ir- (-er- after mid vowels), which licenses a benefactive, circumstance, or locative, must also precede -ᵢ-. The examples are chosen to show that this order is required independent of the semantics of the extended verb, i.e. even if reciprocal -an- or applicative -ir- has scope over causative -ᵢ-. Thus, búl-ᵢ- ‘wonder’ in (5b) is a lexicalized causative, while -song-ᵢ- ‘gather (tr.)’ is a “pseudo-causative” whose verb root -song- does not independently exist. As seen, the morpheme order does not reflect compositionality. Recognizing this, Meeussen (1959) represents examples such as these as -y-an- and -y-ir- and indicates that the semantically predicted order had to be reversed. Working on Shi, Polak (1975) proposes a rule “Transfer of Causative” to metathesize the applicative and causative suffixes. In (6) I represent Meeussen’s and Polak’s insight concerning the potential mismatch between morphosyntactic structure and surface suffix orders, which had to be already present in PB:

(6) PB basic template *-id-ᵢ-



As will be seen in a moment, rather than metathesis, another interpretation is that -id- is “interfixed” to the causative verb, appearing between the root and -ᵢ-. This immediately raises the following question concerning fricating languages: If the structure of an applicativized causative is as in (6), and especially if -ᵢ- is first spelled out right after the root (see below), what will happen in the case of fricating languages? As we shall now see, one of several things may happen.

The first possibility is that -ᵢ- fricates only the *d of the applicative suffix. This is seen in the Mongo examples in (7), taken from Hulstaert (1965):

(7) Mongo causatives and applicativized causatives

	root		root+causative 'cause to ...'	root+applicative+causative 'cause to ... for/at'
a.	kɔt-	'cut'	kɔts-ɨ-	kɔt-ɛj-ɨ-
	kút-	'cool'	kúts-ɨ-	kút-ɛj-ɨ-
b.	kál-	'dry'	káj-ɨ-	kál-ɛj-ɨ-
	kɛl-	'flow'	kɛj-ɨ-	kɛl-ɛj-ɨ-
c.	kɛnd-	'go'	kɛnj-ɨ-	kɛnd-ɛj-ɨ-
	kínd-	'eat one's fill'	kínj-ɨ-	kínd-ɛj-ɨ-

In Mongo, only three consonants fricate before $-ɨ$.⁷ In (7a), /t/ is realized *ts* before causative $-ɨ$. The voiced counterpart of /t/ is [l] if there is no prenasalization, otherwise [nd]. In (7b) *l* alternates with *j* [dʒ], while in (7c), *nd* alternates with *nj*. In the applicative+causative column, where applicative $-el-$ / $-ɛl-$ appears between the root and $-ɨ$, only the applicative is fricated. This result is automatically produced by applying frication non-cyclically to the derived verb stem, as in (8).

(8) Apparent non-cyclic frication in Mongo (but cf. below)

Root	Morphology	Phonology
/-kínd-/	kínd-ɨ-	kínd-el-ɨ- kínd-ɛj-ɨ- [kínd-ɛj-a]

In (8) I have shown the root $-kínd-$ 'eat one's fill' first being causativized and then applicativized (via the interfix interpretation briefly mentioned above). Whether spelled out cyclically, as in (8), or all at once as $-el-ɨ-$, it is important that only the *l* of the applicative suffix undergoes frication.

This contrasts dramatically with the second possibility. As documented in considerable detail in Hyman (1994), Bemba shows multiple frication in such cases. First, note the frications conditioned by causative $-ɨ-$ in (9).

(9) Frication before $*-ɨ-$ in Bemba

a.	-leep-	'be long'	-leef-ɨ-	[leef-y-a]	'lengthen'
	-lub-	'be lost'	-luf-ɨ-	[luf-y-a]	'lose'
b.	-fiit-	'be dark'	-fiis-ɨ-	[fiiš-y-a]	'darken'
	-cind-	'dance'	-cins-ɨ-	[cinš-y-a]	'make dance'
	-lil-	'cry'	-lis-ɨ-	[liš-y-a]	'make cry'
	-buuk-	'get up (intr)'	-buus-ɨ-	[buuš-y-a]	'get [s.o.] up'
	-lúng-	'hunt'	-lúns-ɨ-	[lúnš-y-a]	'make hunt'

⁷Since $-ɨ$ is followed by a FV and glides, and since frication also occurs before [w] in Mongo, we can assume that frication applies whenever *t*, *l* or *nd* are followed by a glide. In the case of $-ɨ$, the glide is actually absorbed into the preceding affricate, i.e. $t-ɨ-a$, $l-ɨ-a$, $nd-ɨ-a$ > *tsya*, *jya*, *njya* > *tša*, *ja*, *nja*. I address glide absorption in §5 below.

In (9a) we see that labial obstruents fricate to *f*, while the coronal and velar obstruents in (9b) fricate to *s*. (Bemba does not have the voiced fricatives [v] or [z].) A subsequent change converts all instances of *s* to [š] before both **ɨ* and **i* and hence is not part of the frication process itself. The [y] that is transcribed in brackets may be absorbed into the preceding [š], hence the orthography *fiisha*, *cinsha* etc.

In (10) we see the result obtained when the fricated ROOT-*ɨ*- forms of (9) are inputted to the applicativization process:

(10) Applicativization of causatives in Bemba

a.	-leef- <i>ɨ</i> -	-leef-es- <i>ɨ</i> -	[leef-eš-y-a]	‘lengthen for/at’
	-luf- <i>ɨ</i> -	-luf-is- <i>ɨ</i> -	[luf-iš-y-a]	‘lose for/at’
b.	-fiis- <i>ɨ</i> -	-fiis-is- <i>ɨ</i> -	[fiiš-iš-y-a]	‘darken for/at’
	-cins- <i>ɨ</i> -	-cins-is- <i>ɨ</i> -	[cinš-iš-y-a]	‘make dance for/at’
	-lis- <i>ɨ</i> -	-lis-is- <i>ɨ</i> -	[liš-iš-y-a]	‘make cry for/at’
	-buus- <i>ɨ</i> -	-buus-is- <i>ɨ</i> -	[buuš-iš-y-a]	‘get [s.o.] up for/at’
	-lúns- <i>ɨ</i> -	-lúns-is- <i>ɨ</i> -	[lúnš-iš-y-a]	‘make hunt for/at’

As in Mongo, the *l* of applicative -*il*-/-*el*- fricates to yield -*is*-/-*es*-. What is different is that the fricated root-final consonant of the input is MAINTAINED in the applicativized form. In contrast with the non-cyclic Mongo derivation in (8), a cyclic, interleaving account will produce the multiple frications:⁸

(11) Cyclic analysis with interfixing of applicative -*il*- (Hyman 1994)

	UR	Morphology	Phonology	Morphology	Phonology
a.	-lub- ‘be lost’	-lub- <i>ɨ</i> -	-luf- <i>ɨ</i> - ‘lose’	-luf- <i>il</i> - <i>ɨ</i> -	-luf-is- <i>ɨ</i> - ‘lose for/at’
b.	-lil- ‘cry’	-lil- <i>ɨ</i> -	-lis- <i>ɨ</i> - ‘make cry’	-lis- <i>il</i> - <i>ɨ</i> -	-lis-is- <i>ɨ</i> - ‘make cry for/at’

As seen, the verb root first undergoes a morphological process which spells out causative -*ɨ*-. The causativized base is then submitted to the phonology, which, in this case, fricates /*b*/ to [f] and /*l*/ to [s]. This output is then submitted again to the morphology, which spells out the applicative as -*il*-. The applicativized causativized base is then submitted anew to the phonology, and frication changes -*il*- to -*is*-.

The above analysis relies crucially on causativization “preceding” applicativization. As in Nande, there is considerable evidence for this precedence. Examples are given in (12a) of lexicalized causatives, followed in (12b) by pseudo-causatives:

⁸The cyclic interpretation of Bemba has been implemented within sign-based phonology by Orgun (1996) and in terms of output-output correspondence in Benua (1995).

(12) Lexicalized and pseudo-causatives in Bemba

a.	-pól-	'be well'	-pós-ǰ-	'greet' (lit. cause to be well; heal)
	-láb-	'forget'	-láf-ǰ-	'delay' (lit. cause to forget)
	-tamb-	'stare, watch'	-tamf-ǰ-	'drive off'
	-túm-	'send, order'	-túm-ǰ-	'organize a work party'
b.	*-pamp-, *-pamb-		-pamf-ǰ-	'press, urge'
	*-pán-		-pán-ǰ-	'miss, fail to catch'
	*-búuC-		-búus-ǰ-	'enquire'
	*-en-		-en-ǰ-	'be hard to please'
	*-ap-, *-ab-		-af-ǰ-	'cause trouble, be troublesome'

Even though the causative verbs in (12) must be listed as such in the lexicon, an applicative which has scope over these lexicalizations must nevertheless appear between the root and -ǰ-, and must also undergo frication, as seen in (13).

(13) Applicative -il-/ -el- comes between root and “frozen” -ǰ-

a.	-pós-ǰ-	-pós-es-ǰ-	'greet for/at'
	-láf-ǰ-	-láf-is-ǰ-	'delay for/at'
	-tamf-ǰ-	-tamf-is-ǰ-	'drive off for/at'
	-túm-ǰ-	-túm-is-ǰ-	'organize a work party for/at'
b.	-pamf-ǰ-	-pamf-is-ǰ-	'press, urge for/at'
	-pán-ǰ-	-pán-is-ǰ-	'miss, fail to catch for/at'
	-búus-ǰ-	-búus-is-ǰ-	'enquire for/at'
	-en-ǰ-	-en-es-ǰ-	'be hard to please for/at'
	-af-ǰ-	-af-is-ǰ-	'cause trouble, be troublesome for/at'

Again, I assume derivations such as -pós-ǰ- -pós-el-ǰ- -pós-es-ǰ-, etc.

To summarize thus far, we have seen two different responses to frication in applicativized causativized verbs. In Mongo, frication appears to apply non-cyclically to the applicative /l/, while in Bemba it applies cyclically, first to the root-final consonant, then to the applicative /l/. The question is why there should be these two different responses. Upon reflection, it turns out that there are both advantages and disadvantages to cyclic frication. With the introduction of frication, C₁VC₂-il-ǰ- applicativized causatives present two potential problems involving opacity: First, from the point of view of the surface output, frication of the root-final consonant involves “action at a distance”: frication should be limited to the /l/ of the applicative, since only in that case are the target and trigger adjacent. Second, although frication may introduce a new sound before *ǰ which does not otherwise exist in the language, e.g. the [f] in Bemba or the [z] in Ganda, by allowing cyclic frication, we now obtain sequences of [f] followed by the [i] or [e] of the applicative, e.g. leef-es-ǰ- ‘lengthen for/at’.⁹ Whereas Bemba thereby acquires an otherwise unattested [fe] sequence, as

⁹Meeussen (1967) and other Bantuists have set up the applicative as *-id- in PB, whereas I have speculated that for vowel harmony reasons it might better be reconstructed as *-ed- (Hyman 1999).

seen in (14), Nyakyusa interfixing of reciprocal *-an-* creates an opaque [fa] sequence (Schumann 1899:79):¹⁰

(14) Nyakyusa cyclicity with infixing of reciprocal *-an-*

UR	Morphology	Phonology	Morphology	Phonology
-sob-	-sob- <i>j-</i>	-sof- <i>j-</i>	-sof-an- <i>j-</i>	n/a
'get lost'		'lose'	'lose each other'	

If avoidance of opacity is an issue, then it should be an inhibiting factor in the development of cyclic frication.

There are, however, important ADVANTAGES to cyclic frication. As shown in (15), cyclic frication can be defined as producing a more direct correspondence between the surface causative and applicativized causative forms:

(15) Direct correspondence between causative and applicativized causative verb forms

[root] 'be long'	[[root] CAUS] 'lengthen'	[[[root] CAUS] APPL] 'lengthen for/at'
leep-	leef- <i>j-</i>	leef-es- <i>j-</i>

The advantage of this correspondence is not just phonological, but also semantic: The applicativized causative is more closely related, semantically, to its immediate base, the causativized verb, which, as we have seen, may have lexicalized meanings and/or exist without a base root in the case of so-called pseudo-causatives. A direct correspondence with the base root, as in (16), therefore represents greater semantic and derivational distance—and poses a problem for any pseudo-causative that literally lacks a root with which to establish a correspondence:

(16) Direct correspondence between root and applicativized cause verb forms

[root] 'be long'	[[root] CAUS] 'lengthen'	[[[root] CAUS] APPL] 'lengthen for/at'
leep-	leef- <i>j-</i>	leef-es- <i>j-</i>

Although the non-cyclic phonological correspondence in (16) avoids the two opacity problems, speakers are thus obligated to reach more deeply into the hierarchical morphosyntactic structure to make the indicated identity. This doesn't yet account for why frication is cyclic in Bemba vs. non-cyclic in Mongo. There is good reason for this difference, as we shall see in the next section.

3. Analogy

In this section I will be expanding coverage of applicativized causatives to consider still another resolution to the problem. Once done, an important generalization will

¹⁰Bemba does not interfix *-an-*, but rather places it after causative *-j-*. However, in this case, *-j-* must be doubled after *-an-*: luf-*j-* 'lose' luf-*j-*-an-*j-* 'lose each other' (cf. Hyman 1994 for further examples and discussion).

emerge: In fricating Bantu languages, applicativized causative verbs show correspondence to causative verbs—not to input roots. How they do this may, however, vary in interesting ways—and, as we shall see in this and the next section, Bantu speakers do not always get it “right”. Importantly, there is very little evidence that the underlying root plays a role at all. In fact, I shall ultimately raise the question of whether frication is non-cyclic in Mongo, as we have thus far assumed.

In §2 we saw evidence for cyclic frication in Bemba: the frication of a previous cycle is carried over intact to the next cycle. Before moving on to consider another strategy in dealing with applicativized causatives, I want to support the Bemba analysis by showing that another language, Mambwe, allows more than two cycles. In (17) I present plain, causative, and applicativized verb stems from Mambwe (Halembe 1994) as they occur both with and without perfective *-il-e*:

(17) Cyclic frication in Mambwe

	non-perfective (-a)		perfective (-il-e)
a.	-kuk-a	‘move elsewhere’	-kus-ɨl-e
	-kus-ɨ-a	‘cause to move elsewhere’	-kus-ɨz-ɨ-e
	-kus-iz-ɨ-a	‘cause to move elsewhere for/at’	-kus-iz-ɨz-ɨ-e
b.	-ul-a	‘be in need’	-uz-ɨl-e
	-uz-ɨ-a	‘deprive (cause to be in need)’	-uz-ɨz-ɨ-e
	-uz-iz-ɨ-a	‘deprive for/at’	-uz-iz-ɨz-ɨ-e

The non-perfective forms on the left are virtually identical to Bemba, except that voiced linguals fricate to [z], rather than s (> [š]) in Bemba. Thus, the [k] of *-kuk-* ‘move elsewhere’ fricates to [s] before *-ɨ-* in (17a). When the applicative is added, the [s] is carried forward, and *-il-* fricates to *-iz-*. In (17b), the [l] of *-ul-* fricates to [z] before *-ɨ-*, and is then also carried forward into the applicativized causative, where *-il-* also fricates to *-iz-*. If we observe the corresponding perfectives, we see that the *-ɨl-* of *-ɨl-e* also conditions frication (which isn’t the case in Bemba). In the causative forms we see that perfective *-ɨl-* interfixes before *-ɨ-* exactly like applicative *-il-*. The third examples in each set are particularly telling: Here we see the applicative and perfective in sequence, each one of them fricated. It appears that we therefore need the three cycles in (18).¹¹

(18) Three cycles in Mambwe

Morphology	Phonology	Morphology	Phonology	Morphology	Phonology
kuk-ɨ-	kus-ɨ-	kus-il-ɨ-	kus-iz-ɨ-	kus-iz-il-ɨ-	kus-iz-iz-ɨ-

I therefore take it as non-controversial that Bemba, Mambwe, and many other Bantu languages like them show clear cyclic effects in just the way we have seen. One thing that hasn’t been said is that Bemba, Mambwe and Ganda are all 5V languages—and what I transcribe as *-ɨ-* is really an abstraction: There are two types of /i, u/ in these

¹¹In (17) I cite examples where an *-iz-iz-* sequence is reported in Halembe (1994). Some of his entries, however, appear to involve “imbrication” (Bastin 1983, Hyman 1995), a process by which expected sequences such as *-ir-ir-* and *-iz-iz-* are fused as *-iir-* and *-iiz-*, or, if vowel length is not permitted, as *-ir-* and *-iz-*.

languages: those which condition frication (and do not undergo height harmony to [e, o]) vs. those which do not condition frication (but do undergo height harmony: /i/ [e] after [e, o] and /u/ [o] after [o]). This is illustrated in (19) from the 5V language, Haya (Byarushengo 1975; Dalgish 1977):

(19) Realization of abstract *j vs. *i in Haya (5V)

Root	Applicative (PB *-id-)	Perfective (PB *-jɪd-e)
/gul-/ 'buy'	gul-il-	guz-il-e
/kól-/ 'work'	kól-el-	kóz-il-e

On the other hand we have investigated the 7V language Mongo, which has non-cyclic frication. Perhaps cyclicity is a morphological (e.g. diacritic?) property, not a phonological one, since some abstractness is required.¹² In Bemba it is in fact only causative -i- which conditions frication synchronically. However, since frication also occurs in certain 7V languages, where the issue of abstract vowel representation does not arise, I will now show that phonologically predictable frication is also cyclic—and that a cyclic interpretation is, in fact, compatible with the Mongo facts in (7).

In order to do so, I now turn to another resolution of the frication problem in Bantu, this time drawing on important observations of Maganga & Schadeberg (1992) concerning the 7V Nyamwezi-Sukuma dialect cluster.¹³ The Nyamwezi frications are summarized in (20).

(20) Frication (palatalization) in Nyamwezi

a. consonants palatalizing before -j-			b. consonants not palatalizing before -j-		
i.	k	c	p	t	h
	s	š	β	d	
	n	ɲ	mb	nd	
ii.	l, g	j	m		
	nz, ŋg	ɲj	mh		
	nh, ŋh	ɲh			

In (20a.i.) we see that /k/, /s/ and /n/ palatalize to [č], [š] and [ɲ], respectively. In (20a.ii), /l/ and /g/ neutralize to [j], /nz/ and /ŋg/ neutralize to [ɲj], and /nh/ and /ŋh/ neutralize to [ɲh]. The consonants in (20b) do not palatalize, i.e. labials, alveolar stops (other than /n/), and /h/.

Now consider the forms in (21), where I have changed Maganga & Schadeberg's vowel transcription to conform with (1b).

¹² See Herbert (1976) for a treatment of Ganda as having 7V underlyingly, but 5V on the surface.

¹³ Although called different languages, Nyamwezi and Sukuma are dialects of the same language. I am grateful to Herman Batibo for clarifying a number of issues, as well as providing critical data to test my claims.

(21) C₂ consonant in C₁VC₂-il-*j*- is never palatalized

	-root-		-root- <i>j</i> -		-root-il- <i>j</i> -
a.	-βak-	‘shine, burn (intr.)’	-βac- <i>j</i> -	‘light’	-βak- <i>ij</i> - <i>j</i> -
	-og-	‘bathe intr.’	-oj- <i>j</i> -	‘bathe (s.o.)’	-og-é <i>j</i> - <i>j</i> -
	-zeeng-	‘build’	-zeeŋ <i>j</i> - <i>j</i> -	‘have built’	-zeeng-é <i>j</i> - <i>j</i> -
	-nyũŋh-	‘smell’	-nyũŋh- <i>j</i> -	‘make smell’	-nyũŋh- <i>ij</i> - <i>j</i> -
b.	-βiš-	‘hide’	-βiš- <i>j</i> -	‘make hide’	-βiš- <i>ij</i> - <i>j</i> -
	-βon-	‘see’	-βon- <i>j</i> -	‘make see’	-βon-é <i>j</i> - <i>j</i> -
c.	-gul-	‘buy’	-guj- <i>j</i> -	‘sell’	-gug- <i>ij</i> - <i>j</i> -
	-kaánz-	‘wash’	-kaáŋ <i>j</i> - <i>j</i> -	‘have washed’	-kaáŋ <i>g</i> - <i>ij</i> - <i>j</i> -
	-buúnh-	‘swim’	-buúnh- <i>j</i> -	‘make swim’	-buúnh- <i>ij</i> - <i>j</i> -

In (21a), the root-final velar consonants palatalize before *-j*-, but appear non-palatalized in the right column where applicative *-il-/-el-* intervenes (itself becoming *-ij-/-ej-*). In (21b) the root-final alveolar consonants /s/ and /n/ palatalize to [š] and [ŋ] before *-j*-, but not when *-ij-/-ej-* intervenes. This much is consistent with a non-cyclic interpretation where only the /l/ of applicative *-il-* palatalizes. Now note the forms in (21c). The root-final alveolars palatalize before causative *-j*-. However, in the boxed forms, when *-ij-* intervenes, these same roots end in velars!

These data raise an important question: If Nyamwezi-Sukuma is non-cyclic, why are the underlying root-final alveolar consonants replaced with velars in the box in (21c)? In fact, as Maganga & Schadeberg (1992) show, the Nyamwezi-Sukuma derivations ARE cyclic: The causativized verbs are first derived. These then undergo applicativization with “depalatalization”, as shown in (22).

(22) Cyclicity + Depalatalization in Nyamwezi

a. replacive alveolars:	-βiš-	-βiš- <i>j</i> -	-βiš- <i>ij</i> - <i>j</i> -
	-βon-	-βon- <i>j</i> -	-βon-é <i>j</i> - <i>j</i> -
b. replacive velar = etymological:	-og-	-oj- <i>j</i> -	-og-é <i>j</i> - <i>j</i> -
c. replacive velar etymological:	-gul-	-guj- <i>j</i> -	-gug- <i>ij</i> - <i>j</i> -

In (22a), the root-final consonants /s, n/ are palatalized to [š, ŋ] before causative *-j*-. In the third column, the /l/ of applicative *-il-/-el-* is palatalized to [j], and [š] and [ŋ] are depalatalized. Since the [š] and [ŋ] in the input causative forms unambiguously derive from /s/ and /n/, respectively, Nyamwezi-Sukuma speakers have no difficulty “undoing” the palatalization rule and restoring [s] and [n]. When frication is neutralizing, which is the normal case, speakers face the complexity of having to FIND the “restored” consonant from among the different possibilities. In (22b) the velar /g/ palatalizes as [j] and then depalatalizes back to [g]. It is however examples such as in (22c) which tell us that the cyclic derivation is the correct interpretation: Here /l/ first palatalizes to [j]. This results in the neutralization enclosed in the box: Both /g/ and /l/ palatalize as [j]. As seen, both cases of [j] depalatalize and we get a non-etymological restored [g] in (22c). The same is true of the other alveolars in (21c) which merge with velar counterparts. In each case there is an ANALOGY: the [j] of (22c) is undone with an

unetymological [g] on analogy with the etymological [g] in (22b). It is this analogy that reveals the cyclic nature of the morphology-phonology interface in Nyamwezi-Sukuma. However, instead of getting multiple frication as in Bemba and Mambwe, the second cycle involves DEFRICATION (depalatalization).

We now can appreciate the relation to Mongo. On the one hand, Mongo and Nyamwezi-Sukuma share the property of not allowing multiple frication (vs. Bemba, Mambwe etc.). The difference between them is that frication is (potentially) neutralizing in Nyamwezi-Sukuma, whereas it is non-neutralizing in Mongo: [ts], [j] and [nj] unambiguously derives from *t*, *l* and *nd*, respectively. Thus, if we imagine the same cyclic derivation of causativization followed by applicativization, Mongo speakers will always know to restore [ts], [j] and [nj] with [t], [l] and [nd]. While a non-cyclic analysis will yield the same facts, Nyamwezi tells us that a cyclic account is also plausible in which [ts], [j] and [nj] surface in applicativized causatives not because speakers want to restore the underlying root consonant, per se, but because there is a unique solution available to them of transparently undoing frication.

Two questions still remain: First, why does Nyamwezi have depalatalization rather than cyclic palatalization? Second, why is palatalization undone towards the velar articulation, rather than the alveolar?

The first question has a ready answer: In Nyamwezi, there is a constraint *JVJ which prohibits palatals in successive syllables. As seen in (0.....), only five words (composed of four different roots) violate this constraint in Maganga & Schadeberg's lexicon of 2005 entries:

(23) In Nyamwezi, the constraint is *JVJ (no palatals in successive syllables).

	š	č	ǰ	ɲ	ɲj
š	2	---	1	1	---
č	---	---	1	---	---
ǰ	---	---	---	---	---
ɲ	---	---	---	---	---
ɲj	---	---	---	---	---

Exceptions: šooša 'answer (v.)', i-šooša 'answer (n.)' šǰǰja 'twin', jšǰǰná 'play (v.)', čǰja = causative of čǰlwa 'hate')

In (23) I have mapped out the number of forms that have an earlier palatal onset (arranged vertically) followed by a palatal onset in the next syllable (arranged horizontally). The five exceptions are listed below the table. As seen, all of these involve the causative structure /CVC-ǰ-a/, and all involve successive palatal consonants in the first two syllables of the stem. Since Nyamwezi-Sukuma cannot depalatalize C1 consonants, nor can it fail to palatalize an appropriate consonant before causative -ǰ-, there is no way to avoid successive palatals in the forms.

The second question is a little less clear: why does depalatalization favor the velar place of articulation? It is clear that alveolars are more widespread than velars in Nyamwezi-Sukuma, and that IVJ sequences are more common than gVJ sequences—

there is an unproductive -*ilij-* verb suffix in fact, whereas non-initial -*gij-* sequences may only result from depalatalization. Another possibility is historical: velar palatalization appears to be older than alveolar palatalization. First, palatalization hits all of the velars vs. the exemption of alveolar stops noted in (21b). Second, palatalization of alveolars takes place only before a [+ATR] /*i*/ which glides to [y], but not before an /*i*/ that does not glide or a [y] that comes from [-ATR] /*i*/. Velars palatalize in all three environments. So, perhaps the velar-palatal relation was already established at the time palatalization of alveolars produced the neutralizations. It would in this case have been natural to confuse the newer pattern with the older, more established one. Finally, it is possible that there is a phonetic reason: Some speakers pronounce *c, j* closer to [k^y, g^y]. If *c, j* are really dorsal, then they share a feature with velars that they do not share with alveolars.¹⁴

It is not clear that phonetic similarity will always predict the outcome, however. Defrication has been reported in other languages which fricate voiced consonants to [z], and which have a constraint *zVz. One such case which has received attention concerns Haya (Dalgish 1977, Goldsmith 1988). As seen in (24), this 5V language shows frication before both causative -*ij-* and perfective -*il-e*:

(24) *[zVz] in Haya

	non-perfective (-a)			perfective (-il-e)	
a.	-gul-a	[gul-a]	'buy'	-gul- <i>il</i> -e	[guz-il-e]
	-guz- <i>ij</i> -a	[guz-a]	'sell' (cause to buy)	-gul- <i>ijl</i> - <i>ij</i> -e	[gul-iz-e]
	-gul-iz- <i>ij</i> -a	[gul-iz-a]	'sell for/at'	-gul- <i>ijz</i> - <i>ij</i> -e	[gul-iiz-e] ¹⁵
b.	-baj-a	[baj-a]	'carve'	-baj- <i>il</i> -e	[baiz-il-e]
	-baiz- <i>ij</i> -a	[baiz-a]	'cause to carve'	-baj- <i>ijl</i> - <i>ij</i> -e	[bail-iz-e]
	-bail-iz- <i>ij</i> -a	[bail-iz-a]	'cause to carve for/at'	-baj- <i>ijl</i> - <i>ij</i> -e	[bail-iiz-e]

In the non-perfective, causative-*ij-* fricates alveolar /*l*/ and palatal /*j*/, glides, and is absorbed into the resulting [z]. The perfective non-causatives show that -*il-e* also conditions frication. We therefore expect that the input /-gul-*il*-*ij*-e/ 'sell + perfective' in (24a) should surface as *[guz-*iz*-e], since both /*l*/s are followed by a [+ATR] /*i*/. The resulting [ziz] must be dissimilated to [liz] despite the fact that each /*l*/ occurs in the right environment to undergo frication. As the perfective of 'cause to carve' shows in (24b), the constraint *zVz requires the first [z] to dissimilate to [l] even when the input consonant is a palatal. Thus, the Duke of York effect (Pullum 1976), l z l, has a ready explanation.

¹⁴The following can be said about the two palatal consonants which are not "undone" as velars: [š] could not have been depalatalized to [x], since this consonant doesn't exist in the language; [ɲ] could not have been depalatalized to [ŋ], since this consonant has a very marginal status when occurring prevocally in Nyamwezi-Sukuma. In other words—and as expected, given its analogical nature, depalatalization is structure-preserving

¹⁵The perfective of the applicative, which should have a sequence -*il-ijl-*, undergoes a fusion known as imbrication (Bastin 1983), thereby simplifying to -*ijl-*. With with causative -*ij-* following the one surviving /*l*/, this latter is realized [z]. In phonetic brackets I have provided the 5V transcriptions without abstract /*j*/.

Although Haya limits frication to coronal consonants, nearby and closely related Ganda fricates all non-labials, including velars, before causative -i-. As a result, non-etymological [l] may surface, particularly in the case of pseudo-causatives. Compare the Haya and Ganda forms in (25).

(25) Reflexes of PB *-jog- ‘bathe (intr.)’ in Haya and Ganda

	Haya		Ganda	
a.	-og-	[og-a]	---	‘bathe (intr.)’
b.	-og-i-	[og-y-a]	-oz-i-	‘wash (tr.)’
c.	-og-ez-i-	[og-ez-a]	-ol-ez-i-	‘wash (tr.) for/at’
d.			cf. ky-og-er-o	‘earthware washbasin for baby’

The PB root *-jog- ‘wash’ is realized with a velar in Haya, with or without the causative extension. Ganda does not have the intransitive verb root, but the transitive verb -oz-i- exists as a pseudo-causative. When the applicative is added to -oz-i- in Ganda in (25c), the [z] is undone as an [l], i.e. differently from the etymological *g. Not only do we have evidence of this *g from PB and from nearby Haya, but Ganda itself has the related lexicalized noun derivative, ky-og-er-o, in (25d), which still shows the original velar consonant. It is clear that we are dealing with the consonant correspondences in (26a).

(26) Non-etymological defrication of [z] in two languages

	root	root-i-	root-il-i-	
a.	g	z	l	e.g. Ganda
b.	l	z	g	e.g. Shi [r]

Again, the analogical undoing of [z] to [l] is due to the fact that [z] represents the neutralized fricated realization of the voiced linguals /l, d, j, g/ in Ganda.

While [l] may be argued to be the closely non-fricated consonant to [z], phonetically, the reverse in (26b) is also attested, by which [z] is undone as [g]. In Shi (Polak 1975), /t/ and /k/ fricate to [s], while /d/ (most often realized [r]) and /g/ fricate to [z]. An example is given in (27a).

(27) Differential behavior of causatives and pseudo-causatives in Shi

- a. Non-cyclicity of “true” causatives, which “never have a palatalized consonant before the applicative suffix” (p.180), hence:

mir-	‘swallow’	miz-i-	‘make swallow’
mir-ir-	‘swallow for/at’	mir-iz-i-	‘make swallow for/at’

- b. (Cyclic) restored consonant of pseudo-causatives, which have no corresponding non-causative root, is always a velar, e.g.

doos-i-	‘ask (questions)’	dook-ez-i-	‘ask (questions) for/at’	(doos-ez-i-)
yuus-i-	‘finish’	yuuk-iz-i-	‘finish for/at’	(yuus-iz-i-)
shuz-i-	‘answer’	shug-iz-i-	‘answer for/at’	(shuz-iz-i-)
loonz-i-	‘want, intend’	loong-ez-i-	‘want, intend for/at’	(loonz-ez-i-)

As seen, the underlined [r] in ‘make swallow for/at’ is restored in the applicativized causative, i.e. exactly as [l] is in Haya in (24). Shi therefore has the same *zVz constraint.¹⁶ In the case pseudo-causatives in (27b), however, a fricated consonant [s] or [z] is undone as a velar. As Polak indicates, this is true even of pseudo-causatives which have related forms that indicate a related form with an alveolar. Thus, the pseudo-causative hoz-i- ‘lend, borrow’, which forms its applicative with a velar, hog-ez-i- ‘lend, borrow for/at’, is related to the verb holool- ‘give back what one has borrowed’. Although neither *hol- nor *hog- exist on their own, holool- shows that the etymological C2 consonant of the root is [l].

Finally, concerning the parenthetical alternative forms to the right in (27b), Polak explains: “It was also observed that some informants (the less traditional ones) had [s] and [z] in all pseudo-causative forms, with possibly the form with the velar stop as a free variant in some cases... [The s/z cyclic forms are] not considered correct by all speakers.” (p.179)

This last observation brings us to the following position: Cyclic frication and defrication are two different responses to the speakers’ need for each stage in a derivation to be transparent, i.e. “inside out”. This “ideal” is related to Vennemann’s (1972) “principle of the dominance of semantically primitive categories”. In the cases we have seen, languages have followed one of the two strategies schematized in (28).

(28) Derivational transparency in the Bantu applicativized causative

(a)	(b)	(c)	(d)
CVl-	CVz-i-	{ CVz-iz-i- , CVl-iz-i- }	
		Mambwe	Haya

A Bantu verb root in (28a) is causativized with frication in (28b). When speakers choose to interfix an applicative suffix into a fricated causative verb, they have one of two options: either they can carry the prior frication forward, in which case we get the multiple frication in (28c), or they can fricate the /l/ of the applicative and defricate the [z] (etc.) that precedes the applicative. As where the frication represents a neutralization of two or more input consonants, as it usually does, the defrication process can proceed non-etymologically—by means of generalizing, or analogizing on the basis of one of the fricated/non-fricated patterns. What I would like to claim is in (29).

(29) Replacement of C’ (= fricated C) by “plain C” is always done transparently on the basis of the surface C’ (i.e. there is no need to know the underlying C)

I have as yet not found an unambiguous case where defrication regularly restores the underlying root-final consonant in applicativized causatives. Where this appears to be the case, either the data has not been fully presented (e.g. Shi), or speakers are hesitant as to the forms they might use (e.g. Ganda). In any case, almost all of the fricating

¹⁶Polak implies that the etymological consonant will be restored, although she does not demonstrate this for different consonants. My suspicion is that speakers might still have a hard time with these, as Francis Katamba and I discovered in Ganda—and may try to avoid applicativized causatives in certain cases.

languages show a tendency to establish a convention for turning causatives into applicativized causatives.

4. Misanalysis

Whereas we have thus far cited cases where non-etymological consonants surface as the result of cross-paradigmatic analogy, in this section we go one step further and observe how speakers of certain Bantu languages go one step further, drawing a “wrong” inference from the alternations produced in applicativized causatives.

In a number of Bantu languages in Tanzania and Mozambique the applicativized causative imposes a single REPLACTIVE consonant, e.g. [h] in Pangwa (Stirnemann 1983), [k] in Nyakyusa (Schumann 1899, Meinhof 1932) and Matuumbi (Odden 1996), [c] (/k/) in Mwera (Harries 1950) and Yao (Ngunga 2000). Representative examples are provided from Nyakyusa (7V) in (30).

(30) Replactive [k] in Nyakyusa

a.	-sat-	‘be in pain’			
	-sas- <u>i</u> -	‘give pain’		-s <u>a</u> k-is- <u>i</u> -	‘give pain for/at’
	-gel-	‘measure’			
	-ges- <u>i</u> -	‘try’		-g <u>e</u> k-es- <u>i</u> -	‘try for/at’
	-buj-	‘come back’			
	-b <u>u</u> s- <u>i</u> -	‘bring back’		-b <u>u</u> k-is- <u>i</u> -	‘bring back for/at’
	-sok-	‘go out’			
	-sos- <u>i</u> -	‘take out’		-s <u>o</u> k-es- <u>i</u> -	‘take out for/at’
	-ag-	‘run out [alle werden]’			
	-as- <u>i</u> -	‘make run out’		-a <u>a</u> k-is- <u>i</u> -	‘make run out for/at’
b.	-keend-	‘go by’			
	-kees- <u>i</u> -	‘make go by’		-ke <u>e</u> k-es- <u>i</u> -	‘make go by for/at’
	-joong-	‘run away’			
	-joos- <u>i</u> -	‘make run away’		-joo <u>o</u> k-es- <u>i</u> -	‘make run away for/at’

In each set of verb forms, the left column shows the root and causativized root, with the corresponding applicativized causative appearing to the right of the latter. In (30a) we observe that /t, l, j, k, g/ all become [s] before causative -i-, as in Bemba. As seen to the right, when these causatives are applicativized, this [s] is uniformly undone as [k]. The same causative derivation is observed in (30b). The expected causative forms, -kens-i- and -jons-i-, are first derived by frication. This is followed by nasal effacement before fricatives, with preservation of the predictable length that is found before NC clusters. The length of the resulting causative outputs -kees-i- and -joos-i- is then carried over into the applicativized forms -keek-es-i- and -jook-es-i-. We can hypothesize that Nyakyusa began as Mongo, with a stage of non-neutralizing frication which could be transparently undone. Later, frication became neutralizing, and was probably undone in a mixed way, such as in Nyamwazi. The current stage with a single fixed [k] was then obtained by generalizing s → k to all applicativized causatives, analogizing on cases of etymological k → s → k such as -sok- ‘go out’ in (30a).

However, as seen in (31), Nyakyusa speakers did more than generalize:

(31) Replacive [k] with labial-final verb roots

- | | | | | |
|----|-----------------------|----------------|--------------------------|--------------------|
| a. | -tup- | ‘become thick’ | | |
| | -tuf- _i - | ‘thicken’ | -tuk-if- _i - | ‘thicken for/at’ |
| b. | -olob- | ‘become rich’ | | |
| | -olof- _i - | ‘make rich’ | -olok-ef- _i - | ‘make rich for/at’ |

In these examples, [k] again appears as the generalized root-final consonant. However, in this case, the [f] that would be root-final in the causative forms seems to have replaced the /l/ of the applicative extension. I represent these apparent consonant replacements as in (32).

- | | | | |
|---------|-------------------------|----|-------------------------|
| (32) a. | -CVs-il- _i - | b. | -CVf-il- _i - |
| | k s | | k f |

As indicated, the fricated [s] or [f] is replaced by [k]. In (32a), the [l] of the applicative suffix becomes [s] by regular sound change. However, note that the input/output relation in (32a) has another interpretation: Root-final [s] is replaced by [k] but “reappears” as a replacement of applicative [l]. If we assume that speakers adopted this second interpretation, in effect a misanalysis and restructuring of the historical events, we can explain the input/output relations in (32b): Again, root-final [f] is replaced by [k]. However, instead of applicative [l] being fricated to [s], as it should be before causative *-_i-, the [l] is replaced by [f] on analogy with the reinterpretation of (32a). There thus are two analogies involved: (i) generalization of replacive [k]; (ii) change of -is-_i- to -if-_i-.

Earlier Bantuists were quite aware of the significance of these facts. Thus, Meinhof (1932) states:

Combinations of different verb endings occur very frequently. As the causatives of -il- and -ik- [i.e. applicative and stative] would... be identical, viz. -is-_i-, the use of the latter ending with two meanings would obviously have been the cause of misunderstandings. To prevent them, it has become the rule that -is-_i- (and -es-_i-) have only got applicative meaning when preceded by -ik-/-ek-.... Causative applicative meaning has now become inseparably associated with the ending -k-es-_i-. In some cases it then seems as if -ke-, -ki- even penetrate into the stem of a verb, e.g. -jong- ‘run away’ has the regular causative -jos-_i-... but the caus. of the applicative is -jok-es-_i- instead of *jong-es-_i-....” (pp. 148-149)

Before Meinhof, Schumann (1899) had proposed an analysis of applicativized causatives whereby -ki- or -ke- is infixes before the [s] or [f] of the causative form, as in (33).

- | | | | | | |
|---------|-------------------------|--------------------|----|-------------------------|------------------|
| (33) a. | -sak-is- _i - | ‘give pain for/at’ | b. | -tuk-if- _i - | ‘thicken for/at’ |
| | -sa s- _i - | | | -tu f- _i - | |

-ki-

-ki-

On the other hand, Endemann (1900) responded in favor of a strictly phonological analysis. Be this as it may, there is no doubt that there is a templatic requirement that an applicativized causative have the sequence -kis-/-kes- or -kif-/-kef-. Evidence for this is seen quite clearly in (34).

(34) Extra morph -ik- with non-fricating root-final consonants

- | | | | | |
|----|------------------|------------------|---------------------------------|-------------------------|
| a. | -lim- | ‘cultivate’ | | |
| | -lim- <u>ɨ</u> - | ‘make cultivate’ | -lim- <u>ik</u> -is- <u>ɨ</u> - | ‘make cultivate for/at’ |
| b. | -lum- | ‘bite’ | | |
| | -lum- <u>ɨ</u> - | ‘make bite’ | -lum- <u>ik</u> -is- <u>ɨ</u> - | ‘make bite for/at’ |

The two roots -lim- ‘cultivate’ and -lum- ‘bite’ end in an /m/, which is one of the few non-fricating consonants in the language. If their corresponding causatives, -lim-ɨ- and -lum-ɨ-, respectively, were to serve as inputs to applicativization—and assuming that non-fricating /m/ cannot be replaced by [k]—we would expect the outputs *-lim-is-ɨ- and *-lum-is-ɨ-. Instead, as seen, an extra morph -ik- is found in the applicativized causatives, thereby confirming Meinhof’s conjecture that such forms must contain a -kis-/-kes- or -kif-/-kef- sequence.

But where does the extra -ik- (~ -ek-) come from? In Nyakyusa the most widespread causative suffix is -ɨ-, as we have seen. Other Bantu languages have a longer causative -is-ɨ-, which is typically required after -CV- roots. In many Bantu languages, -is-ɨ- (or simply -is-) became the only productive causative (Bastin 1986). I hypothesize that causatives such as -lim-ɨ- and -lum-ɨ- may not directly undergo applicativization. This is because of the following conflict: an output [k] is required, but /m/ cannot be replaced by [k]—only [s] or [f] can. Thus, there must be a special causative base that serves exclusively for the purpose of applicativization: -lim-is-ɨ- and -lum-is-ɨ- become -lim-ik-is-ɨ- and -lum-ik-is-ɨ- by the regular processes outlined in (32a).

In the above account I have relied on the ambiguity inherent in (32a) and the consequent misanalysis that this ambiguity encouraged. There is other evidence from perfective *-ɨd-e that this is the correct interpretation of what happened in the history of Nyakyusa (also Mwera and Yao). In some Bantu languages, e.g. Bemba, the morph *-ɨd- of the perfective has the same properties as applicative *-id- (Bastin 1983). The forms in (35) thus show that cyclic interfixing of applicative -il- and perfective -il- are equivalent in Bemba:

(35) Same realization (interfixing) of applicative *-id- and perfective *-ɨd- in Bemba

- | | | | | | |
|----|------------------|------------|---------------------|--------------|-------------------|
| a. | -lub- | ‘be lost’ | -luf-is- <u>ɨ</u> - | [luf-iš-y-a] | ‘lose + app’ |
| | -luf- <u>ɨ</u> - | ‘lose’ | -luf-is- <u>ɨ</u> - | [luf-iš-y-e] | ‘lose + perf’ |
| b. | -lil- | ‘cry’ | -lis-is- <u>ɨ</u> - | [liš-iš-y-a] | ‘make cry + app’ |
| | -lis- <u>ɨ</u> - | ‘make cry’ | -lis-is- <u>ɨ</u> - | [liš-iš-y-e] | ‘make cry + perf’ |

As seen in the bracketed forms, the applicative and perfective can often be told apart by the FV -a vs. -e with which each suffix tends to co-occur.

In other languages perfective *-ɨd- has a different realization from applicative *-id- when occurring on a causative base. As the forms in (36) demonstrate, Nyakyusa is one such language:

(36) Different realization of applicative *-id- and perfective *-ɨd- in Nyakyusa

a.	-sat-	'be in pain'	-sak-is-ɨ-	[sak-is-y-a]	caus+app
	-sas-ɨ-	'give pain'	-sas-ɨɨs-ɨ-	[sas-ɨɨs-y-e]	caus+perf
	-gel-	'measure'	-gek-es-ɨ-	[gek-es-y-a]	
	-ges-ɨ-	'try'	-ges-ɨɨs-ɨ-	[ges-ɨɨs-y-e]	
	-buj-	'come back'	-bujk-is-ɨ-	[bujk-is-y-a]	
	-bujɨs-ɨ-	'bring back'	-bujɨs-ɨɨs-ɨ-	[bujɨs-ɨɨs-y-e]	
	-sok-	'go out'	-sok-es-ɨ-	[sok-es-y-a]	
	-sos-ɨ-	'take out'	-sos-ɨɨs-ɨ-	[sos-ɨɨs-y-e]	
	-ag-	'run out of sth.'	-ak-is-ɨ-	[ak-is-y-a]	
	-as-ɨ-	'make run out'	-as-ɨɨs-ɨ-	[as-ɨɨs-y-e]	
b.	-keend-	'go by'	-keek-es-ɨ-	[keek-es-y-a]	
	-kees-ɨ-	'make go by'	-kees-ɨɨs-ɨ-	[kees-ɨɨs-y-e]	
	-joong-	'run away'	-jook-es-ɨ-	[jook-es-y-a]	
	-joos-ɨ-	'make run away'	-joos-ɨɨs-ɨ-	[joos-ɨɨs-y-e]	
c.	-tup-	'become thick'	-tuk-if-ɨ-	[tuk-if-y-a]	
	-tuf-ɨ-	'thicken'	-tuf-ɨɨf-ɨ-	[tuf-ɨɨf-y-e]	
	-olob-	'become rich'	-olok-ef-ɨ-	[olok-ef-y-a]	
	-olof-ɨ-	'make rich'	-olof-ɨɨf-ɨ-	[olof-ɨɨf-y-e]	
d.	-lim-	'cultivate'	-lim-ik-is-ɨ-	[lim-ik-is-y-a]	
	-lim-ɨ-	'make cultivate'	-lim-ɨɨs-ɨ-	[lim-ɨɨs-y-e]	
	-lum-	'bite'	-lum-ik-is-ɨ-	[lum-ik-is-y-a]	
	-lum-ɨ-	'make bite'	-lum-ɨɨs-ɨ-	[lum-ɨɨs-y-e]	

For each pair, the first form on the right is the applicativized causative, while the second form is the perfectivized causative. The two forms show three differences. First, there is no replacive [k] (or extra -ik-) in the perfectivized forms. Second, the degree 2 vowel of applicative *-id- undergoes vowel height harmony, while the degree 1 vowel of perfective *-ɨd- does not. And third, in the context of causative -ɨ-, perfective *-ɨd- occurs with a lengthened vowel, while applicative *-id- does not. As in the case of the applicativized causative, the *d of perfective *-ɨd-e is fricated to [s] or [f], which, since they are not undone in root-final position, appear to be "copied" rather than displaced. These differences are schematized in (37).

(37) a.	-CVC-il-ɨ-	(app)	b.	-CVC-ɨ-ɨl-ɨ-e	(perf)
	k f/s			f/s f/s	

We have already seen the applicativized causative in (37a). In (37b) I hypothesize that perfective *-*ɪd*- follows causative *-*ɪ*-, which is in turn copied after *-*ɪd*-, thereby providing the observed vowel length.¹⁷

The perfectivized causativizes which show s-s and f-f “agreement” in (36a-c) appear to have undergone a similar misanalysis and analogy to the applicativized causatives. This time, when an perfectivized causative input such as /CVk-*ɪ*-*ɪ*-/ is realized CVs-*ɪ*-*ɪ*-, instead of seeing this as two consonants /k/ and /l/ which independently become [s], speakers identify the second [s] as a copy of the first. This is natural, given that the corresponding non-perfective causative is CVs-*ɪ*-. Speakers therefore extend this “identity” to labial-final roots. Thus, as an analogy, an input such as /CVp-*ɪ*-*ɪ*-/, which should become CVf-*ɪ*-*ɪ*- is instead realized CVf-*ɪ*-*ɪ*-, where the second [f] agrees with the first. This interpretation is supported by the handful of other irregular perfectives which show similar agreements as in (38).

(38) A few irregular perfectives in Nyakyusa which end exceptionally in Cy/Cw

a.	-oki-	[oky-a]	‘roast’	perf.	-ok- <i>ɪ</i> ky-e
b.	-befu-	[befw-a]	‘become ripe’		-bef- <i>ɪ</i> fw-e ¹⁸
c.	-ɪbu-	[ɪbw-a]	‘forget’		-ɪb- <i>ɪ</i> bw-e / -ɪbw- <i>ɪ</i> bw-e

As seen, these verb bases have in common that they end in a vowel, just as a causativized verb base CVC-*ɪ*- does.

What the Nyakyusa forms show is that the realization of complex verb stems may be subject to specific phonological requirements which, although showing cyclic effects, are in fact templatic in nature. The Tonga perfectivized causatives forms in (39) show this rather clearly:

(39) Perfective of causatives in Tonga N.64 must end in ...siz-*ɪ*- or ...ziz-*ɪ*-

a.	-búk-	‘awaken’		
	-bús- <i>ɪ</i> -	‘wake (tr.)’	-bus-iz- <i>ɪ</i> -	[bus-iz-y-e]
	-jal-	‘close’		
	-jaz- <i>ɪ</i> -	‘make close’	-jaz-iz- <i>ɪ</i> -	[jaz-iz-y-e]
	-káng-	‘fry’		
	-kánz- <i>ɪ</i> -	‘make fry’	-kanz-iz- <i>ɪ</i> -	[kanz-iz-y-e]
	-yeey-	‘think’		
	-yeez- <i>ɪ</i> -	‘remind’	-yeez-ez- <i>ɪ</i> -	[yeez-ez-y-e]

¹⁷This vowel length property of perfectivized causatives appears to be widespread in Bantu. I have found the same vowel lengthening in Bukusu, and it is latent in Ganda, where -lim-*ɪ*- ‘make cultivate’ has the applicative -lim-iz-*ɪ*- [lim-iz-a] vs. the perfective -lim-*ɪ*-zz-*ɪ*- [lim-i-zz-a]. However, the passive extension *-u- also causes such length in certain Bantu languages, e.g. Bukusu, Yao, and cannot be analyzed in this way: Yao dim- ‘cultivate’ dim-il-e, with a short vowel, but lam-*ɪ*- ‘save’ and -tum-u- ‘be ordered’ lam-*ɪ*is-y-e and tum-*ɪ*ig-w-e, with long vowels (Ngunga 2000:272-3, 287). The correct interpretation in such languages may, therefore, be that whenever the base ends in causative -*ɪ*- or passive -u-, the perfective has a double realization, -*ɪd*-*ɪd*-, which undergoes imbrication to -*ɪ*ɪd-, thereby accounting for the observed vowel length.

¹⁸Felberg (1996:11) enters the verb ‘be ripe’ as *bifwa*, hence -bifu- and gives two alternative perfective forms: *bifwifwe* and *bififwe*. He, however, only indicates *ibibwe* as the perfective of *ibwa* ‘forget’.

b.	-cis-	‘hurt (intr.)’		
	-cis-ɨ-	‘hurt (tr.)’	-cis-iz-ɨ-	[cis-iz-y-e]
	-bez-	‘carve’		
	-bez-ɨ-	‘make carve’	-bez-ez-ɨ-	[bez-ez-y-e]
c.	-ump-	‘burn (intr.)’		
	-ump-ɨ-	‘burn (tr.)’	-ump-iziz-ɨ-	[ump-iziz-y-e]
	-imb-	‘sing’		
	-imb-ɨ-	‘make sing’	-imb-iziz-ɨ-	[imb-iziz-y-e]
	-lúm-	‘bite’		
	-lúm-ɨ-	‘make bite’	-lúm-iziz-ɨ-	[lúm-iziz-y-e]
	-lét-	‘bring’		
	-lét-ɨ-	‘make bring’	-lét-ezez-ɨ-	[lét-ezez-y-e]
d.	-bót-	‘be good’		
	-bót-ɨ-	‘make good’	-bót-ezez-ɨ-	[bót-ezez-y-e]
	-bós-ɨ-	‘proclaim good’	-bós-ez-ɨ-	[bós-ez-y-e]

The verb roots in (39a) causativize with frication to [s] or [z]. Their corresponding perfective provided in the right column shows that *-ɨd- is interfixed with cyclic frication. As a result, one of the sequences -siz-, -sez-, -ziz- or -zez- surfaces. The same is true in (39b), when the root-final consonant is /s/ or /z/. In (39c), however, we see that when the verb root ends in a non-fricating consonant, perfective *-ɨd- has a double reflex -iziz-/-ezez-. What this indicates is that Tonga has imposed a phonological condition on all perfectivized causatives: They must all have one of the above four sequences: -siz-, -sez-, -ziz-, -zez-. This is seen most clearly in the minimal pair in (39d). The verb -bót- ‘be good’ has two causatives: -bót-ɨ- without frication, which has the transparent meaning ‘make good’, vs. bós-ɨ- with frication, which has the lexicalized meaning ‘proclaim good.’ As seen, the double reflex -ezez- is found only in -bót-ezez-ɨ-, where it is needed to satisfy the phonological condition.

Other Bantu languages show variations on the Tonga theme, and different phonological conditions may become part of an applicativized causative or perfectivized causative template—which, recall, includes the morphotactic requirement that causative *-ɨ- follow applicative *-id- or perfective *-ɨd-. The phonological requirement may impose doubling of one of these interfixes, but not necessarily double frication. Meeussen (1959:58-60) reports that in Rundi, applicativized causatives are produced by interfixing the sequence -ir-iz-, as in (40a).

(40) Applicativized causatives in Rundi

a.	-gum-	[gum-a]	‘be firm’
	-gum-ɨ-	[gum-y-a]	‘hold’
	-gum-ir-iz-ɨ-	[gum-ir-iz-a]	‘hold for (s.o.)’
b.	-fát-	[fát-a]	‘take’
	-fáš-ɨ-	[fáš-a]	‘help’ (< ‘cause to take’)
	-fáš-ir-iz-ɨ-	[fáš-ir-iz-a]	‘help for (s.o.)’
c.	-ráar-	[ráar-a]	‘spend the night’
	-ráaz-ɨ-	[ráaz-a]	‘put off to the next day’
	-ráar-iz-ɨ-	[ráar-iz-a]	‘put off to the next day for (s.o.)’

In (40a), the verb root -gum- ‘be firm’ ends in a non-fricating consonant. It is first causativized to get the meaning ‘hold’ (i.e. ‘make be firm’), and then applicativized to express a benefactive. As seen, -ir- is interfixed twice, the second occurrence fricating to -iz-. As Meeussen puts it, “une suite (-y-ir-), applicatif de causatif, est représentée comme si elle était (-ir-ir-y-), donc par -iriz-.”¹⁹ This is seen also in (40b), where the verb -fát- ‘take’ ends in a fricating consonant. As seen, frication appears to be cyclic: The root-final consonant fricates to [š], followed by interfixing of -ir-ir before -ɨ-, which then fricates to -ir-iz-. The examples in (40c) are particularly telling: Here we see that the root-final consonant of -ráar- ‘spend the night’ fricates to [z]. However, when the causative form is applicativized, we obtain -ráar-iz-ɨ-, not *-ráaz-ir-iz-ɨ- or *-ráar-ir-iz-ɨ-. The reason is that Rundi shows the widespread “mixed” pattern in forming applicativized causatives: the voiceless fricativized consonant of the causative, e.g. [s] in (40b), is carried forward to the applicative form, while the voiced counterpart [z] is “undone” to [r]. My interpretation of the forms in (40), which represent the productive

¹⁹Meeussen (1959:59) also reports that the causativize of the applicative does not show this doubling, e.g. -gum- ‘be firm’ -gum-ir- ‘hold at (some place)’ -gum-iz-ɨ- ‘make hold at (some place)’. Causativized applicatives are, however, rare in Bantu languages, and where they occur, the applicative is typically lexicalized with a special meaning. Thus consider the following two sets of forms from Mongo (Hulstaert 1965), where $j = [d_3]$:

a.	[[[verb] causative] applicative]	CVC-el-ɨ-	[CVC-ej-ɨ-]
	root	root+causative	root+applicative+causative
	-bómb- ‘keep’	-bómb-ɨ- ‘make/let keep’	-bómb-ej-ɨ- ‘make keep for/at’
	-kók- ‘suffice’	-kók-ɨ- ‘make suffice’	-kók-ej-ɨ- ‘make suffice for/at’
	-fúk- ‘move (intr)’	-fúk-ɨ- ‘move (tr)’	-fúk-ej-ɨ- ‘move (tr) for/at’
b.	[[[verb] applicative] causative]	CVC-el-ɨ-	[CVC-ej-ɨ-]
	root	root+applicative	root+applicative+causative
	-kó- ‘reach’	-kó-el- ‘progress’	-kó-ej-ɨ- ‘make progress’
	-otsw- ‘enter’	-otsw-el- ‘penetrate’	-otsw-ej-ɨ- ‘make penetrate’
	-it- ‘pour’	-it-el- ‘spill, spread (intr)’	-it-ej-ɨ- ‘spill, pour out (tr)’

The forms in (a) are similar to those seen in (7): A verb root is first causativized and then applicativized by interfix. As indicated, the forms in (b) do not involve an interfix. Instead, they are first applicativized and then causativized. However, note from the semantics of the applicative forms that they must all be listed with special meanings. Although the order *-id-ɨ- suggests a causativized applicative, it is typically difficult to derive this scope in a productive way in Bantu languages.

pattern, show that Rundi requires an applicativized causative to have an -riz- or -rez- sequence—much as Tonga requires double frication in the perfectivized causative. Where the root ends in the fricated consonant [z], this phonological condition is accomplished by defricating the [z] to [r], as in (40c). Where the root-final consonant is either non-fricating, as in (40a), or where the fricated consonant is other than [z], e.g. the [s] in (40b), -ir-ir- is interfixed so that the output will meet the -riz-/-rez- condition.²⁰

What the examples in this section show is that Bantu languages can impose phonological requirements on derived verb forms, such as applicativized or perfectivized causatives. This arises in the following way. First, a specific input provides the model that is generalized to other forms. In Nyakyusa, it was hypothesized that k-final roots provide the model that is analogized such that all applicativized causatives contain a -kis-, -kes-, -kif- or -kef- sequence. In Tonga, the requirement of a -siz-, -sez-, -ziz- or -zez- sequence in perfectivized causatives is generalized from fricating consonants, while in Rundi, the requirement of -riz-/-rez- in applicativized causatives is generalized on the basis of r-final roots which show the r z r pattern found throughout the Interlacustrine Bantu area, e.g. in Haya and Ganda in (24) and (25). In the next section we turn to a subset of these languages in Meeussen's zone J to show one last analogy that results from the frication conditioned by causative -i-.

5. Absorption

In a number of cases cited above it was indicated in passing that the [y] that derives from causative -i- may be “absorbed” into the preceding fricated consonant. As schematized for Ganda (5V) in (41), I conceptualize absorption as the last of a sequence of changes affecting lingual consonants followed by causative *-i- and a following FV:²¹

(41) Absorption of [y] after [s, z], e.g. Ganda

a.	*t-i-a	>	s-i-a	>	s-y-aa	>	s-aa	-a = FV
	*k-i-a	>	s-i-a	>	s-y-aa	>	s-aa	
b.	*d-i-a	>	z-i-a	>	z-y-aa	>	z-aa	
	*g-i-a	>	z-i-a	>	z-y-aa	>	z-aa	
c.	*c-a			>	š-a	>	s-a	
d.	*j-a			>	ž-a	>	y-a	(but = j after nasal)

As seen in (41a,b), when followed by *i, *t and *k fricate to [s], while *d and *g fricate to [z]. The vowel of causative -i- then glides to [y], at the same time conditioning compensatory lengthening on the following vowel. Since Ganda does not allow [sy] and [zy] sequences, the resulting [y] is absorbed into the preceding [s] or [z]. In (41c) we see that *c passes through a š stage (see below) and is also realized [s] in Ganda, i.e.

²⁰I therefore see no need to assume an earlier -ir-ir- interfix in (40c), followed by haplology, as Good (2001) considers.

²¹While *p and *b fricate to [s] and [z] within morphemes in Ganda, as was exemplified in (3a), labials are not affected when a morpheme boundary intervenes, e.g. -láb-y-a ‘cause to see’. See Hyman (1997) for further discussion.

potentially merging with the [s] that derives from frication. While *j remains an affricate in *nj sequences, it otherwise is realized [y], hence not neutralizing with [z].

The issue of interest here is the effect of absorption on the input sequence *sy*. In the case of verbs, there are potentially three criteria that can tell us whether an [sV] sequence is from /sV/ or from syV: (i) vowel length; (ii) applicative formation; (iii) perfective formation. This is seen in (42), where the indicated extra length on the FV is realized in specific phrase-medial positions:

(42) Testing for an absorbed [y]

a. (C)VC- verb base

-láb-	[láb-a]	‘see’	-láb-ir-	[láb-ir-a]	‘see + APP’
			-láb-ɪr-	[láb-y-ee]	‘see + PERF’
-ák-	[ák-a]	‘blaze, burn (intr)’	-ák-ir-	[ák-ir-a]	‘blaze + APP’
			-ák-ɪr-	[ás-ee]	‘blaze + PERF’

b. (C)VC-ɪ- verb base without frication

-láb-ɪ-	[láb-y-aa]	‘make see’	-láb-iz-ɪ-	[láb-iz-aa]	‘make see + APP’
			-láb-ɪ-ɪr-ɪ-	[láb-izz-aa]	‘make see + PERF’

c. (C)VC-ɪ- verb base with frication

-ás-ɪ-	[ás-aa]	‘make blaze’	-ás-iz-ɪ-	[ás-iz-aa]	‘make blaze + APP’
			-ás-ɪ-ɪr-ɪ-	[ás-izz-aa]	‘make blaze + PERF’

The forms in (42a) which involve a (C)VC- verb base are given as a control, while those in (42b) show the behavior of a non-absorbed *y*. The test case is (42c), where the *y* is absorbed. The question is whether these *s*-final bases will behave like a single C or a Cy sequence. We see clearly that it is the latter.

First, consider the criterion of vowel length. Ganda is well-known for its rule of final vowel shortening (FVS), whose complexities need not concern us here.²² While an underlying /VV/ will be realized short before pause, as seen in (43), it will be “protected” by one of several enclitics, e.g. =ki ‘what’, =kô ‘a bit’:

(43) a.	ku-láb-à =kí	‘to see what’
	kw-áák-à =kô	‘to blaze a bit’
b.	ku-láb-y-àà =kí	‘to make see what?’
	ku-láb-y-àà =kô	‘to make see a bit’
c.	kw-áás-àà =kí	‘to make blaze what?’
	kw-áás-àà =kô	‘to make blaze a bit’

The FV -a is short in (43a), but long in both (43b), where there is a surface Cy sequence, and in (43c), where the *y* has been absorbed.

The second and third criteria are morphological. While a (C)VC- verb root will suffix -ir- (-er- after a mid vowel) to form its applicative, as in (42a), the same applicative

²²See Hyman & Katamba (1990) for a comprehensive description of FVS in Ganda.

morph will be interfixed when the base has the structure CVC-*j*-, as in (42b,c). As a result, the applicative will be realized -iz- (-ez- after a mid vowel), not -ir- (-er-). Thus, if a verb stem having the shape CVs-a in pre-pause position forms its applicative as CVs-iz-a, we know that its underlying structure is /CVC-*j*-/. If, instead, it forms its applicative as CVs-ir-a, the input base should be analyzed as /CVs-./.

A similar argument can be made, based on the perfective. Although the Proto-Bantu form of the perfective was **-j*d-e (Bastin 1983), the **d* is not realized in Ganda when the base ends in a consonant, e.g. *láb-y-e* ‘see + PERF’, not **láb-ir-e*.²³ On the other hand, when the verb base ends in a vowel, e.g. causative -*j*-, as in (42b,c), we obtain something similar to the Nyakyusa long-vowel phenomenon seen above in (36). The analysis proposed for Ganda is essentially the same: CVC-*j*-*j*r-*j*-, i.e. with the causative suffix appearing both before and after the perfective suffix. The second -*j*- of course fricates the preceding *r* to *z*. However, rather than deriving a long vowel, the vowel *j* of the perfective suffix geminates the following *z*.²⁴

With these three criteria in place, we can now consider verbs in Ganda which end in (short) [sa] before pause. As shown in the boxes in (41) above, we expect short [sa] to derive from two underlying structures: CVs-*j*-a and CVs-a. However, what we find in Ganda is that all *s*-final verb bases act as if they had⁰ the first structure, i.e. as if they were causatives! Thus, all Ganda verbs ending in [sV] have a long vowel before the appropriate enclitics, all form their applicative with -iz-/-ez- and all form their perfective with -izz-/-ezz-. This is illustrated in (44).

(44) Etymological *CVc- verb roots in Ganda

- a. PB **-dác-* ‘cast, throw aside, shoot (arrow)’ > Ganda -*lás-* ‘shoot (arrow)’
- | | | | |
|----------------------|------------------|-------------------|----------------|
| <i>ku-lás-àà =kí</i> | ‘to shoot what?’ | <i>lás-iz-aa</i> | ‘shoot + APP’ |
| <i>ku-lás-àa =kô</i> | ‘to shoot a bit’ | <i>lás-izz-aa</i> | ‘shoot + PERF’ |
- b. PB **-píc-*, **-bíc-* ‘hide’ > Ganda -*bis-* ‘hide’
- | | | | |
|----------------------|------------------|-------------------|----------------|
| <i>ku-bis-aa =kí</i> | ‘to shoot what?’ | <i>bis-iz-aa</i> | ‘shoot + APP’ |
| <i>ku-bis-aa =kô</i> | ‘to shoot a bit’ | <i>bis-izz-aa</i> | ‘shoot + PERF’ |

As seen, all three criteria establish that PB **-CVc-* roots, pronounced -CVs- in Ganda, have been reanalyzed as -CVs-*j*-, that is, as pseudo-causatives. This is true even of the few CVs- verbs which are intransitive, and hence not likely to be morphological causatives at all, e.g. *kuus-a* ‘be hypocritical’, *myáasa* ‘flash’ (of lightning).

The analogical reanalysis of /-CVs-/ as /-CVs-*j*-/ is a direct result of the absorption process, which causes the two historical representations to merge. Languages such as Yao, in which **c* > *s*, but which maintain [sy] sequences do not show such a merger. Nor does Haya, a language closely related to Ganda, which exhibits the following distribution of Proto-Bantu **c*, **j* (Byarushengo 1975):

²³This might suggest that the underlying form of the perfective is /-*j*-e/ in Ganda. However, evidence for /-*j*d-e/ is seen when the base ends in a vowel, whether causative *j*-, passive -*u*-, or the vowel of a CV- root, e.g. /*gu-j*d-e/ [gudde] ‘fall + PERF’.

²⁴See Ashton et al (1954) re Ganda verb morphology. For more on the role of the mora, compensatory lengthening, and gemination, see Tucker (1962), Clements (1986), and Hyman & Katamba (1999).

(45) Distribution of [s, š] and [z, y, j] by following vowel in Haya

a.	si	šu	b.	zi	yu (nju)
	še	šo		ye (nje)	yo (njo)
	ša			ya (nja)	

We are concerned with the realization of *c in (45a). As seen, there is a single voiceless sibilant phoneme in Haya which is realized [s] before /i/, otherwise as [š]. In Haya, which also has y-absorption, we can therefore distinguish /-CVs-a/ and /-CVs-*i*-a/ not only in the ways indicated in Ganda, but also with respect to the [s] vs. [š] distribution:

(46) Absorption of causative -*i*-: syV [sV]

a.	-sáas-	[šáaš-a]	‘hurt (intr), ache’
	-sáas- <i>i</i> -	[šáas-a]	‘hurt (tr), give pain’
b.	-gend-es- <i>i</i> -	[gend-es-a]	‘cause to go’
	-gend-es-ez- <i>i</i> -	[gend-eš-ez-a]	‘cause to go for/at’

In (46a), both sibilants of the intransitive verb base -sáas- are realized palatal, since each is directly followed by /a/. In the causative counterpart, however, the underlying /-*i*-/ glides to y and is absorbed—but not before it has conditioned the [s] allophone of the one underlying sibilant in the language.²⁵ The same is seen in (46b). When the “long causative” allomorph -es- is immediately followed by -*i*-, as in the first example, the result is [-es-]. When the applicative is interfixed between -es- and -*i*- in the second example, the result is [-eš-].

While the s/š distinction has prevented confusion between *c and frication conditioned by causative -*i*- in Haya, the situation is quite different in mutually intelligible Nyambo, which, as seen in (47a), has [s] throughout:

(47) a.	Nyambo (Rugemalira 1993)	b.	Haya (Byarushengo 1977)
	sik-a ‘inherit’		sik-a ‘inherit’
	sek-a ‘laugh’		šek-a ‘laugh’
	suum-a ‘go downhill’		šuuk-a ‘descend’
	son-a ‘sew’		šón-a ‘sew’
	sár-a ‘cut’		šál-a ‘cut (up)’

In fact, a reanalysis of -CVs- à la Ganda is currently in progress in Nyambo (Rugemalira 1993), as can be seen from the forms in (48):

²⁵Trithart (1977) also shows that [sV] sequences which derive from absorption of y show similar length properties to those seen earlier in Ganda.

(48) Reanalysis of CVs- currently in progress in nearby Nyambo

	Nyambo root	Nyambo root + APP	Kiga root
a.	Consistent Pseudo-Causative: Nyambo /s/ = Kiga s (4 exx.)		
	as-a 'chop'	as-iz-a	as-a 'chop'
	báas-a 'be able to'	báás-iz-a	báas-a 'be able, may'
	págas-a 'work for wage'	págas-iz-a	pákas-a 'hire, be hired'
	têns-a 'confer, plot'	téns-ez-a	têns-a 'confer'
b.	Consistent non-causative: Nyambo /s/ = Kiga [š] (6 exx.)		
	ges-a 'harvest'	ges-er-a	gyeš-a 'reap'
	ós-a 'omit, skip a day'	ós-er-a	óš-a 'omit a day'
	sígis-a 'stir'	sígis-ir-a	šigiš-a 'stir'
	sees-a 'spill'	sees-er-a	šeeš-a 'spill'
	siis-a 'spoil'	siis-ir-a	šiis-a 'spoil, sin'
	saas-a 'ache, hurt'	saas-ir-a	šaaš-a 'be in pain'
c.	Inconsistent (in transition): Nyambo /s/ ~ /s-ĩ-/ = Kiga [š] (2 exx.)		
	héés-a 'forge'	héés-er-a	héeš-a 'forge'
		héés-ez-a	
	rás-a 'shoot'	rás-ir-a	ráš-a 'shoot'
		rás-iz-a	
d.	Reanalyzed: Nyambo /s-ĩ-/ = Kiga [š] (1 ex)		
	ógos-a 'twist, weave rope'	ógos-ez-a	ógoš-a 'twist rope'

The Nyambo forms in the first column represent the base plus FV -a, while an applicative is added in the second column of data. These forms should be compared to those from Kiga (Taylor 1959) in the last column, which has the same s/š distribution as Haya—although also a right-to-left sibilant harmony process which complicates the situation (Hansson 2001). The Nyambo verbs in (48a) all take an applicative -iz-/-ez-, and hence presumably have an underlying -ĩ-, e.g. -as-ĩ- 'chop'. This is consistent with the Kiga forms, which have [s]. The Nyambo verbs in (48b) all take -ir-/-er- for their applicative, which indicates no underlying -ĩ- in these bases—which is consistent with the [š] in the corresponding Kiga verbs. Rugemalira (1993) also lists the two verbs in (48c), which are inconsistent, marking their applicative as either -ir-/-er- or -iz-/-ez-. The Kiga forms suggest that these verbs were not causatives, but that Nyambo speakers are in the process of reanalyzing them as having an underlying -ĩ-. The reanalysis is complete in the case of the one verb in (48d): This is an etymologically non-causative verb which now must be recognized as /ógos-ĩ-/ 'twist'.

From the comparison of Nyambo and Kiga in (48) we can see how the process of merger may have also diffused within the Ganda lexicon, which is now consistent: All s-

final verb bases act “as if” they are causatives.²⁶ The motto we can adopt, therefore, might read, “If it sounds like a causative, it must be a causative.”

6. Summary and conclusion

In the preceding sections I have outlined a number of misanalyses and analogical processes which have resulted from the class of sound changes I have termed frication. These all have in common the generalization of properties induced by the PB causative suffix *-i-. The reanalyses which different Bantu languages have imposed are generally of two types: First, the effects of causative frication become a mark of a morphological construction, specifically, applicativized or perfectivized causatives. Second, the effects of causative frication cause phonetically identical non-causative forms to take on causative morphology/phonology. In both cases the inherited system is restructured under the influence of the fricated pattern. The phenomena illustrated in the preceding sections not only show the effects of frication in general, and of causative frication in particular, but perhaps hint at a larger issue—the primacy of causative forms in Bantu verb derivation. Nothing comparable has occurred with respect to the two other morphemes whose *i also potentially conditions frication: perfective *-id-e and the deverbal (agentive) nominalizer *-i. Rather than spreading to new environments, or causing analogical reanalyses, these two suffixes tend to lose their fricating properties. Any of the three suffixes may eventually be lost from a Bantu language, but even in loss, the causative appears to leave behind many more traces. I attribute this not only to the fact that it is highly lexical in nature, with many pseudo-causatives having to be listed, but also that it participates in a rich derivational system of verb extensions that typically survives its loss. Neither of the other two suffixes has both of these properties.

References

- Ashton, E.O., E.M.K. Mulira & E.G.M. Ndawula. 1954. *A Luganda grammar*. London: Longmans, Green & Co.
- Bastin, Y. 1983. *La finale -IDE et l'imbrication en bantou*. (Annales, Série IN-8, Sciences Humaines, no. 114). Tervuren: Musée Royal de l'Afrique Centrale.
- Bastin, Y. 1986. Les suffixes causatifs dans les langues bantoues. In *Africana Linguistica X*, 55-145. Annales du Musée Royale de l'Afrique Centrale. Série IN-8, Sciences Humaines. N. 121. Tervuren.
- Benua, Laura. 1995. Identity effects in morphological truncation. In J. Beckman, S. Urbanczyk & L. Walsh (eds), *Papers in optimality theory*. Amherst: GLSA.
- Bourquin, W. 1955. Notes on the "close vowels" in Bantu. *African Studies*, 14. 49-62.

²⁶ Although taking us further afield than this paper, Francis Katamba and I have also determined that certain other final consonants that condition y-absorption are just now undergoing the same reanalysis in Ganda. Verb stems pronounced [CVy-a] before pause, for instance, show both patterns in their applicatives, e.g. bey-a 'loiter' bey-er-a vs. oy-a 'desire, long for' oy-ez-a. In addition, speakers seem to be unclear—and inconsistent—about how to analyze [CVCya] verb stems where the [y] exceptionally fails to fricate the preceding (fricable) consonant. For example, the verbs [sótya] 'walk with caution' and [sokya] 'push sth. between bark and tree trunk' form the applicatives sóty-er-a and soky-er-a (with exceptional short [e!]) rather than *sót-ez-a/*sok-ez-a. However, the perfectives are, respectively, sót-y-e and sok-ezz-a. From these and similar examples, it appears that the applicative resists reanalysis more than the perfective.

- Byarushengo, Ernest Rugwa. 1975. An examination of the segmental phonology of Haya. Unpublished M.A. Thesis, University of Dar es Salaam.
- Byarushengo, Ernest Rugwa. 1977. Word list. In Ernest Rugwa Byarushengo, Alessandro Duranti & Larry M. Hyman (eds), *Haya grammatical structure*, 205-213. Southern California Occasional Papers in Linguistics 6. Los Angeles: University of Southern California.
- Clements, G.N. 1986. Compensatory lengthening and consonant gemination in Luganda. In W.L. Wetzels & E. Sezer (eds), *Studies in compensatory lengthening*, 37-77. Dordrecht: Foris Publications.
- Dalgish, Gerald M. 1977. Past tense formation in olu-Haya. *African Languages* 3.78-91.
- Endemann, K. (1900). Zur Erklärung einer eugenthümlichen Verbalform im Konde. *Mitteilungen des Orientalische Seminars zu Berlin* 3, 93-95.
- Felberg, Knut. 1996. *Nyakyusa-English-Swahili & English-Nyakyusa Dictionary*. Cape Town: Creda Press.
- Goldsmith, John. 1988. Paper on Haya past tense formation presented at U.C. Berkeley.
- Good, Jeffrey. 2001. Causativization and applicativization in Bantu: Evidence for an evolutionary approach to morpheme ordering restrictions. Ms. University of California, Berkeley.
- Halemba, Andrej. 1994. *Mambwe-English dictionary*. Ndola, Zambia: Mission Press.
- Hansson, Gunnar Ólafur. 2001. Theoretical and typological issues in consonant harmony. Doctoral dissertation, University of California, Berkeley.
- Harries, Lyndon. 1950. *A grammar of Mwera*. Johannesburg: Witwatersrand University Press.
- Herbert, R.K. 1976. A reanalysis of Luganda vowels. *Afrika und Übersee* 59.113-124.
- Hombert, Jean-Marie & Larry M. Hyman (eds). *Bantu historical linguistics: Theoretical and empirical perspectives*. Stanford: Center for the Study of Language & Information.
- Hulstaert, G. 1965. *Grammaire du Lomongo*. Ile Partie, Morphologie. Tervuren: Musée Royal de l'Afrique Centrale.
- Hyman, Larry M. 1972. Nasals and nasalization in Kwa. *Studies in African Linguistics* 3.167-205.
- Hyman, Larry M. 1994. Cyclic phonology and morphology in Cibemba. In Jennifer Cole & Charles Kisseberth (eds), *Perspectives in Phonology*, 81-112. Stanford: C.S.L.I.
- Hyman, Larry M. 1995. Minimality and the prosodic morphology of Cibemba imbrication. *Journal of African Languages & Linguistics* 16.3-39.
- Hyman, Larry M. 1997. La morphologie et la 'fricativation' diachronique en bantou. *Mémoires de la Société de Linguistique de Paris, Grammaticalisation et reconstruction*, Tome V, 163-175.
- Hyman, Larry M. 1999. The historical interpretation of Bantu vowel harmony. In Jean-Marie Hombert & Larry M. Hyman (eds), 235-295.
- Hyman, Larry M. & Francis X. Katamba. 1990. Final vowel shortening in Luganda. *Studies in African Linguistics* 21.1-59.
- Hyman, Larry M. & Francis X. 1999. The syllable in Luganda phonology and morphology. In Harry van der Hulst & Nancy A. Ritter (eds), *The syllable: Views and facts*, 349-416.
- Labroussi, Catherine. 1998a. Vowel systems and spirantization in Southern Tanzania. In J.-M. Hombert & L. M. Hyman (eds), 335-377.

- Labroussi, Catherine. 1998b. *Le couloir des lacs: Contribution linguistique à l'histoire des populations du sud-ouest de la Tanzanie*. Doctoral dissertation, Institut National des Langues et Civilisations Orientales, Paris.
- Maddieson, Ian. 1984. *Patterns of sounds*. Cambridge: Cambridge University Press.
- Maganga, Clement, & Schadeberg, Thilo C. 1992. *Kinyamwezi: grammar, texts, vocabulary*. Cologne: Rüdiger Köppe Verlag.
- Meinhof, C. 1932. *Introduction to the phonology of the Bantu languages* (translated by N. J. van Warmelo ed.). Berlin: Dietrich Reimer Verlag.
- Meeusen, A.E. 1959. *Essai de grammaire rundi*. Tervuren: Musée Royal du Congo Belge.
- Meeussen, A.E. 1967. Bantu grammatical reconstructions. *Annales du Musée Royal de l'Afrique Centrale, Série 8, Sciences Humaines*, 61.81-121. Tervuren.
- Mpiranya, Fidèle. 1997. Spirantisation et fusion vocalique en Bantu: Essai d'interprétation fonctionnelle. *Linguistique Africaine* 18.51-77.
- Ngunga, Armindo. 2000. *Lexical phonology and morphology of Ciyao*. Stanford: Center for the Study of Language and Information.
- Odden, David. 1996. *The phonology and morphology of Kimatuumbi*. Oxford: Clarendon Press.
- Orgun, Orhan. 1996. *Sign-based phonology and morphology, with special attention to optimality theory*. Ph.D. dissertation, University of California, Berkeley.
- Polak [-Bynon], Louise. 1975. *A Shi grammar, surface structures and generative phonology of a Bantu language*. Tervuren: Musée Royale de l'Afrique Centrale.
- Pullum, Geoffrey K. 1976. The Duke of York gambit. *Journal of Linguistics* 12.83-102
- Rugemalira, Josephat M. 1993. *Runyambo verb extensions and constraints on predicate structure*. Ph.D. dissertation, University of California, Berkeley.
- Schadeberg, Thilo C. 1995. Spirantization and the 7-to-5 vowel merger in Bantu. In Marc Domincy, & Didier Demolin (eds), *Sound change*. *Belgian Journal of Linguistics* 9.73-84.
- Schumann, C. 1899. Grundriss einer Grammatik der Kondesprache. *Mitteilungen des Orientalische Seminars zu Berlin* 2.3:1-86.
- Snoxall, R. A. 1967. *Luganda-English dictionary*. Oxford: Clarendon Press.
- Stappers, L. 1971. Esquisse de la langue lengola. *Africana Linguistica* V, 255-307.
- Stewart, John M. 1989. Fortis-lenis and vowel length in proto-Bantu. *Journal of African Languages & Linguistics* 11.45-88.
- Stewart, John M. 1999. Nasal vowel creation without nasal consonant deletion and the eventual loss of nasal vowels thus created: The pre-Bantu case. In Jean-Marie Hombert & Larry M. Hyman (eds), 207-233.
- Stirnemann, Hans. 1983. *Praktische Grammatik der Pangwa-Sprache (SW-Tanzania)*. Freiburg: Universitätsverlag Freiburg, Switzerland.
- Taylor, C. 1959. *A Simplified Runyankore-Rukiga-English and English-Runyankore-Rukiga Dictionary*. Kampala: The Eagle Press.
- Trithart, Lee. 1977. Causatives and instrumentals. In Ernest Rugwa Byarushengo, Alessandro Duranti & Larry M. Hyman (eds), *Haya grammatical structure*, 73-98. *Southern California Occasional Papers in Linguistics* 6. Los Angeles: University of Southern California.
- Tucker, A.N. 1962. The syllable in Luganda: a prosodic approach. *Journal of African Languages* 1.122-166.
- Vennemann, Theo. 1972. Rule inversion. *Lingua* 29.209-242.
- Zoll, Cheryl. 1995. Consonant Mutation in Bantu. *Linguistic Inquiry* 26.536-545.