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Morphology, Irregularity, and Bantu Frication: The Case of Lulamogi

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"D'après l'hypothèse néogrammarienne... tout changement des sons est conditionné à son début de façon strictement phonétique... Or les langues bantoues présentent quantité d'exemples où... l'état synchronique suggère que certaines langues bantoues ont effectué un changement phonétique de façon régulière tandis que dans d'autres langues soeurs un changement analogue n'apparaît que dans des contextes morphologiques précis." (Hyman 1997: 163)

1. Introduction

The purpose of this paper is to revisit a set of phonological changes that the first author addressed 18 years ago in the Journée d'Etudes of the Société de Linguistique de Paris, which continue to intrigue Bantuists as presenting apparent problems for the Neogrammarian hypothesis (see above citation). To begin, the elements of the Neogrammarian tradition can be summarized as follows:

(i) "Major" sound changes are "regular", that is, all of the targeted sounds that meet the conditions undergo the change.

(ii) Such major sound changes are phonetically conditioned. Specifically, morphological structure plays no role in their initiation.

(iii) Apparent counter-examples are due to two other factors: First, sound changes which are "irregular" may be the result of borrowings due to contact. Second, changes which invoke morphology are due to other mechanisms, e.g. analogy.

(iv) The study of sound change requires rigorous application of the comparative method and internal reconstruction.

While most of the Neogrammarian tradition was devoted to the study of Indo-European, a Bantu Neogrammarian tradition has existed for at least 150 years:

"In Bantu studies... research by Bleek, Meinhof, Guthrie, Meeussen and their students has a distinctly comparative and diachronic character that begins more neogrammarian than structuralist." (Hyman 2005: 22)

Thus, the reconstruction of Bantu lexicon and morphology traces back at least to Bleek (1862, 1869). As reported by Schadeberg (2002:184), since this time different Bantuists have reconstructed the following number of Proto-Bantu (PB) and regional lexical items (with larger numbers admittedly including a number of doublets):¹

Meinhof (1899)	270	Meeussen (1969)	2200
Meinhof (1910)	470	Guthrie (1967-71) (CB)	2700
Bourquin (1923)	1450	Guthrie (1967-71) (PB)	670
Homburger (1913)	540	CBOLD (ca. 1996)	4000
Homburger (1925)	+235	BLR 3 (2002)	10,000

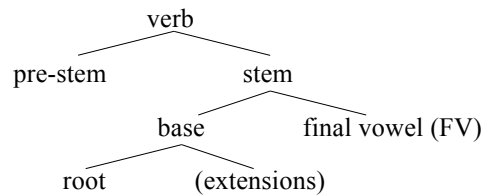
¹ Guthrie's CB = Common Bantu, PB = Proto-Bantu; CBOLD = Comparative Bantu On-Line Dictionary; BLR = Bantu Lexical Reconstructions (Bastin et al).

In addition, a number of studies have established widespread sound changes reminiscent of Indo-European, often identified as “laws” (Schadeberg 2003, Hinnebusch et al 1981):

Dahl’s Law	T V T V > <u>D</u> V T V	(voicing dissimilation)	(Davy & Nurse 1982)
Meinhof’s Law	N D V N D V > <u>N</u> V N D V	(nasal+consonant simplification)	(Schadeberg 1987)
Luhya Law	*p, *t, *k > f, ɸ, x	(spirantization and devoicing)	(Hinnebusch et al 1981)
	*b, *d, *g > p, t, k	(cf. Grimm’s Law)	
Katupa’s Law	Th V Th > <u>T</u> V Th	(dissimilation of aspiration)	(Schadeberg 1999)
		(cf. Grassmann’s Law)	

Concerning the Neogrammarian hypothesis, Bantu languages offer a gold mine for studying the the tension between regular sound change and other mechanisms of change which affect lexical items and phonological systems. First, there are many (ca. 500) closely related Bantu languages whose sound systems have been studied. Second, these Bantu languages have a complex morphological structure which appears at first glance to be implicated in phonological change (Hyman 1997, Hyman & Moxley 1996). They are known, for example, for a complex agglutinative verb structure which Meeussen (1967) reconstructs as in (1).

(1)



The following illustrates the structure with a Luganda example:

- (2) *pre-stem* *root* *extensions* *FV*
 a- bá- tá- lí- kí- léèè -ér -ágán -á ‘those who do not bring it to each other’
 AUG-they-NEG-FUT-it- bring- APPL- RECIP- FV (AUG = augment; APPL = applicative; FV = final vowel)

With the above established, we now turn to the issue of Bantu frication.

2. Frication before the high vowels *i, *u

The consonant and vowel systems reconstructed by Meeussen (1967), Schadeberg (2003) and others for Proto-Bantu are presented in (3):²

- (3) a. consonants b. vowels (three interpretations)
- | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| p | t | c | k | i | ɨ | i | u | i | u |
| b | l | j | g | ĩ | u | ɪ | ʊ | e | o |
| m | n | ɲ | | e | o | ɛ | ɔ | ɛ | ɔ |
| | | | | a | | a | | a | |

² Although there are two alternative interpretations of the oral voiced series, *b, *d, *j, *g and *β, *ɓ, *y, *ɣ, we shall cite these as stops, except for *l (which is typically realized [d] after a nasal, most commonly otherwise as a liquid). *c and *j were most likely affricates ([tʃ, dʒ]), but are often realized as [s, z]. For further discussion of the vowel system see also Hyman (1999). Finally, two tones, *H and *L are reconstructed (Greenberg 1948).

There has been considerable discussion concerning what the nature was of the distinction between the first vs. second degree high vowels in PB:

- (4) a. *₁i, *₁u superclosed vs. *i, *u closed (Meinhof 1910, Bourquin 1955)
 b. *₁i, *₁u noisy vs. *i, *u clear (Connell 2007; Merrill & Faytak 2013)
 c. *i, *u tense vs. *₁i, *₁u lax (or [±ATR]; Hyman 1999)
 d. *i, *u high vs. *e, *o mid-high (Guthrie 1967)
 e. *yi, *wu glide + V vs. *i, *u simple (Janson 2007; cf. Zoll 1995 [±cons])

What is crucial is that consonants often undergo a wide range of “frication” processes (also known as “Bantu spirantization”) before *₁i, *₁u:

- (5) *p₁i > p^hi, pfi, fi, psi, tsi, si *p₁u > p^hu, pfu, fu, ču
 *b₁i > bvi, vi, bzi, dzi, zi *b₁u > bv^hu, vu, žu
 *t₁i > t^hi, tsi, si *t₁u > t^hu, tsu, su, tfu, pfu, fu, ču etc.
 *l₁i > di, dzi, zi *l₁u > du, dzu, zu, dvu, vu, žu
 *k₁i > k^hi, tsi, si *k₁u > k^hu, kxu, xu, kfu, pfu, fu, ču
 *g₁i > dzi, zi *g₁u > gv^hu, bv^hu, vu, žu

Most, but not all of the languages which undergo these changes also merge the first and second degree high vowels: *₁i, *₁u > [i] et *₁u, *₁u > [u] (Schadeberg 1994-5). Although we will be citing examples from languages with the resulting five-vowel system, we will continue to transcribe *i*, *u* for [i, u] which derive from the PB first degree vowels *₁i and *₁u and *i*, *u* where [i, u] derive from the PB second degree vowels **i* and **u*.

3. The problem

The problem which we face with respect to the Neogrammarian regularity of sound change will now be illustrated from Luganda, where PB **t*, **l*, **k*, **g* > [s, z] before *₁i in all four of the possible morphological environments:

- (6) within root : *₁-t₁l- ‘rub, grind’ > -sil-a ‘rub, pulverise’ **t* > *s*
 *₁-k₁l- ‘be silent’ > -s₁lik-a ‘be silent’ **k* > *s*
 *₁-l₁m- ‘extinguish’ > -z₁m-a ‘extinguish’ **d* > *z*
 *₁-g₁l- ‘be taboo’ > -zil-a ‘be taboo’ **g* > *z*
 causative -i₁- : *₁-lóot- ‘dream’ > -lóos-a ‘make dream’ < -lées-y-
 *₁-j₁l₁luk- ‘run’ > -ddus-a ‘make run’ < -ddus-y-a
 *₁-bal- ‘count’ > -baz-a ‘make count’ < -baz-y-a
 *₁-j₁g- ‘learn’ > -yíz-a ‘make learn’ < -yiz-y-a
 agentive *₁-i₁ : *₁-lóot- ‘dream’ > mu-lóos-i ‘dreamer’ < -lóot-i₁
 *₁-j₁l₁luk- ‘run’ > mú-ddus-i ‘fugitive’ < -ddúk-i₁
 *₁-j₁g- ‘learn’ > mu-yíz-i ‘apprentice’ < -yíz-i₁
 perf. *₁-il-e *₁-lóot- ‘dream’ > a-lóos-e ‘he has dreamt’ < -lóos-y-e
 *₁-j₁l₁luk- ‘courir’ > á-ddùs-e ‘he ran’ < -ddús-y-e
 *₁-bal- ‘count’ > a-baz-ê ‘he has counted’ < -baz-y-e
 *₁-j₁g- ‘learn’ > a-yíz-e ‘he has learned’ < yiz-y-e

As seen in the above forms, *i₃ glides to y before another vowel, but then is “absorbed” into the preceding [s] or [z]. While the above changes are consistent in all four environments, (7) shows that *p₃i and *b₃i become [si] and [zi] only within a morpheme:³

(6) within root :	*-p ₃ ílá	‘pus’	>	ma-sírà	‘pus’	*p > s
	*-kap ₃ í	‘oar’	>	n-kasî	‘oar’	*p > s
	*-p ₃ íu	‘knife’	>	ki-sô	‘knife’ (< -syô)	*p > s
	*-b ₃ ímb-	‘swell’	>	-zím-b-a	‘swell’	*b > z
	*-b ₃ íi	‘excrement’	>	ma-zî	‘excrement’	*b > z
causative -i ₃ - :	*-puup-	‘blow’	>	-fuuy-a	‘make blow’	< -fuuw-y-a
	*-lip-	‘pay’	>	-liy-a	‘make pay’	< -liw-y-a
	*-láb-	‘look’	>	-láb-y-a	‘make look’	
	*-kúb-	‘beat’	>	-kúb-y-a	‘make beat’	
agentive *-i ₃ :	*-puup-	‘blow’	>	mu-fuuy-i	‘horn blower’	
	*-j ₃ íb-	‘steal’	>	mû-bb-i	‘thief’	
	*-gab-	‘distribute’	>	mu-gab-i	‘generous person’	
	*-l ₃ ub-	‘fish’	>	mu-vub-i	‘fisherman’	
perf. *-i ₃ l-e :	*-j ₃ íb-	‘steal’	>	á-bb-y-e	‘he has stolen’	
	*-gab-	‘distribute’	>	a-gab-y-ê	‘he has distributed’	
	*-kúb-	‘beat’	>	a-kúb-y-e	‘he has beaten’	

It is generally assumed that the above four contexts constitute a hierarchy of most to least likely environments to produce frication (Bastin 1983; Hyman 1997; Labrousse 1999):

- (7) a. + C₃i + : before tautomorphic *i₃
 b. C + -i₃- + V : before the causative *-i₃- suffix, which, followed by a vowel, glides to [y]
 c. C + -i₃ : before the agentive *-i₃ derivational suffix
 d. C + -i₃l-e : before the perfective *-i₃l-e inflectional suffix

If correct, the expected implicational hierarchy would be as in (8).

(8)	(7d)	⊃	(7c)	⊃	(7b)	⊃	(7a)
	+		+		+		+
	+		+		+		
	+		+				
	+						

In this case, the diachronic analog would be the reverse: frication begins within morphemes, then extends out: (7a) > (7b) > (7c) > (7d). This position has been taken by both Hyman and Labrousse:

“C’est-à-dire la fricativisation aurait commencé à l’intérieur des morphèmes avec des extensions successives touchant les trois suffixes un à un: causatif, agentif, perfectif.” (Hyman 1997:173)

³ Note that *p > w, y (according to the front-backness of the following vowel), but remains [p] after a preceding nasal: *pá- > wá- ‘give’ vs. m-pá- ‘give me’.

“The various processes that constitute the phonological change globally refer[r]ed to as ‘spirantisation’ are first triggered off morpheme-internally, that is, where no morphological boundary is blocking the influence of the tense high vowels on preceding consonants.” (Labroussi 1999: 364)

For a sound change to have begun exclusively within morphemes, hence with reference to grammatical information, would constitute a serious challenge to the Neogrammarian hypothesis that major sound changes are regular, i.e. apply generally without restriction to morphological structure.⁴

A more Neogrammarian alternative has however proposed by both Downing (2007) and Bostoen (2008). Frication would have begun as a regular sound change, but a counter-force (“paradigm regularization”) would have favored the non-fricated base forms, thereby creating new derivatives in competition with the old fricated forms. As a result, certain languages would have lost frication in the derived contexts, specifically before perfective $*-j\bar{l}-e$, agentive $*-j$, and causative $*-j$ (presumably in this order). According to this interpretation, $*p_j$, $*b_j$ would have originally become [si, zi] in Luganda in all contexts. However, by paradigm regularization, the root final consonants [p] and [b] would also have been produced as alternate competing forms gradually replacing [s] and [z], as schematized in (9).

(9)	<i>Proto-Bantu</i>		<i>Stage I</i>		<i>Stage II</i>	
a.	*ku-b _j n-a	‘to dance’	>	ku-z _j n-a	>	ku-z _j n-a (frication)
b.	*ku-k _j ub-a	‘to beat’	>	ku-k _j ub-a	>	ku-k _j ub-a
c.	*mu-k _j ub- _j	‘beater’	>	mu-k _j ub- _j ~ mu-k _j uz- _j	>	mu-k _j ub- _j
d.	*ku-k _j ub- _j -a	‘make beat’	>	ku-k _j ub- _j -a ~ ku-k _j uz- _j -a	>	ku-k _j ub- _j -a
e.	*a-k _j ub- _j l-e	‘he has beaten’	>	a-k _j ub- _j l-e ~ a-k _j uz- _j l-e	>	a-k _j ub- _j l-e

} (frication + defrication)

Would such an interpretation have been acceptable to the Neogrammarians? We know that Hermann Paul and others were conscious of the effects of the paradigm and of analogy as confounding variables (Morpurgo Davies 1978:44). However, two questions arise concerning the Luganda situation:

First, why don’t we find (more) vestiges of $*b_j > [zi]$? An extensive search through Snoxall (1967) has produced only one apparent case:

- (10) a. o-ku-naab-a ‘to bathe (oneself)’
 b. o-ku-naaz-a ‘to bathe someone’ (causative)

This is assuming that the [z] in (10b) derives from $*-naab-j-$ rather than having an irregular allomorph with $*l$: $*-naal-j-a > -naaz-j-a > -naaz-y-a > -naaz-a$.

The second question is why the labial $*p$ and $*b$ would have been the only consonants to undo the original frication to $*s$ and $*z$? Perhaps we can attribute this to phonetic distance (Comrie 1979): the alternation $b\sim z$ is phonetically greater and considerably less attested cross-linguistically than either $d\sim z$ or $g\sim z$. Another idea is that the labials were subject to a proportional analogy. As seen in (11), the labial nasal /m/ is one of only two consonants which do not alternate before $*j$ in Luganda (the other is /n/):

⁴ It should be noted that Labroussi justifies this analysis in part in comparison with velar palatalization ($*k, *g > \check{c}, \check{j}$) which she assumes also to have begun intramorphemically. If correct, this too would be a problem for the Neogrammarian hypothesis. However, for a quite different analysis invoking analogy, see Hyman & Moxley (1996).

We shall argue that cases of [zi] are due to contact rather than a direct Lulamogi reflex of PB **lj*. There are three arguments that **lj* escaped frication in “proper” Lulamogi. First, [zi] > [li] is not a natural phonetic sound change. Second, one cannot claim a process of undergoing [zi] to [li], since cases of [zi] which derive from **jj* remain [zi], e.g. PB **-jjj* > *á-má-ízi* ‘water’, not **á-má-ili*. Finally, Lulamogi is surrounded by languages where **lj* > *zi* (> *si* in Kijita and Lubukusu). Only Lugwere and certain dialects of Lusoga share the [li] reflex with Lulamogi. Cases where Lulamogi has [zi] corresponding to PB **lj* are thus certainly due to contact.

The same thing is true of certain words containing suffixes with **j*. As seen in (14), the agentive suffix **-j* produces doublets, where the form with [zi] has a specialized meaning:⁷

(14)	<i>verb</i>		<i>reflex = [li]</i>		<i>reflex = [zi]</i>	
	ó-ku-lamúl-á	‘to judge’	ó-mú-lámúl-i	‘judger’	ó-mú-lámúz-i	‘judge’
	ó-ku-tuund-á	‘to sell’	ó-mú-túúnd-i	‘seller’	ó-mú-túúnz-i	‘salesman’

As seen, the fricated variants refer to specific professions, while the forms with [li] simply refer to a person who judges or who sells. This pattern seems to have caught on for the purpose of creating new professional derivatives. Thus, from the verb *ó-ku-sal-á* ‘to cut’, one can produce both *ó-mú-sál-i* ‘a cutter, someone who cuts’ and *ó-mú-sáz-i* ‘a cutter, e.g. someone who cuts cloth professionally’. (Luganda has only *o-mu-sáz-i* ‘one who cuts’). On the other hand, it isn’t possible to produce a fricated derivative in the absence of a dedicated profession, e.g. *ó-ku-byaal-á* ‘to give birth’ can only become *ó-mú-byáál-i* ‘a child bearer’, not **ó-mú-byáz-i*. Similarly, *ó-ku-bal-á* ‘to bear fruit’ can only become *ó-mú-bál-i* ‘fruit-bearing’, not **ó-mú-báz-i*.

The situation concerning the causative suffix **-j-* is even more telling. It is clear that the productive causatives are produced with [l]:

(15)	<i>infinitive</i>		+ <i>causative -j-</i>	
	ó-ku-sal-á	‘cut’	ó-ku-sal-y-á	‘make cut, cut with (instrument)’
	ó-ku-kol-á	‘work’	ó-ku-kol-y-á	‘make work, work with (instrument)’
	ó-ku-hal-á	‘scratch’	ó-ku-hal-y-á	‘make scratch, scratch with (instrument)’

In addition, the causative suffix does not fricate an *l*-final suffix:

(16)	<i>causative</i>		+ <i>applicative -il/-el-</i>	
	ó-ku-sal-y-á	‘make cut’	ó-ku-sal-íl-y-á	‘make cut for (someone)’
	ó-ku-kol-y-á	‘make work’	ó-ku-kol-él-y-á	‘make work for (someone)’
	ó-ku-hal-y-á	‘make scratch’	ó-ku-hal-íl-y-á	‘make scratch for (someone)’
	<i>causatif</i>		+ <i>intensive -ilil/-elel-</i>	
	ó-ku-sal-y-á	‘make cut’	ó-ku-sal-ílíl-y-á	‘make cut continuously’
	ó-ku-kol-y-á	‘make work’	ó-ku-kol-élél-y-á	‘make work continuously’
	ó-ku-hal-y-á	‘make scratch’	ó-ku-hal-ílíl-y-á	‘make scratch continuously’

However, at the same time there are causative doublets where the form with [zya] has a direct or specialized meaning:

⁷ The corresponding Luganda nouns are *o-mu-lamuz-i* and *o-mu-tuunz-i*. Recall that **l* is pronounced [d] after [n], hence Lulamogi *óku-tuund-á*, Luganda *oku-tuund-a* ‘to sell’.

(17)	<i>verb</i>		<i>reflex = l-y-a</i>		<i>reflex = z-y-a</i>	
	ó-ku-bal-á	count'	ó-ku-bal-y-á	'make count'	ó-ku-baz-y-á	'calculate'
	ó-ku-bol-á	get wet'	ó-ku-bol-y-á	'make wet'	ó-ku-boz-y-á	'dampen'
	ó-ku-taangáál-á	shine'	ó-ku-taangáál-y-á	'make shine'	ó-ku-taangááz-y-á	'clarify'
	ó-ku-tegéél-á	know'	ó-ku-tegéél-y-á	'make know'	ó-ku-tegééz-y-á	'inform'

The same type of doublets are also found with other root-final consonants, e.g. *k:

(18)	<i>verb</i>		<i>reflex = k-y-a</i>		<i>reflex = s-y-a</i>	
	ó-ku-sek-á	'laugh'	ó-ku-sek-y-á	'make laugh'	ó-ku-ses-y-á	'entertain'
	ó-ku-luk-á	'weave'	ó-ku-luk-y-á	'make weave'	ó-ku-lus-y-á	'weave in and out'
	ó-ku-tuuk-á	'arrive'	ó-ku-tuuk-y-á	'make arrive'	ó-ku-tuus-y-á	'until' < 'to reach' ⁸

Even if one cannot identify a meaning difference, the doublets often have a different lexical structure which one sees when a transitive verb is causativized. For example, the verb *ó-ku-sik-á* 'to pull' can be causativized as either *ó-ku-sik-y-á* or *ó-ku-sis-y-á* 'to make pull, to pull with (instrument)'. However, as seen in (19), their ability to license arguments is different:

(19) a.	ó-ku-sik-y-á	→	nyaBa-ku-sik-y-á	émótoká	ómúgúha	'I will pull the
b.	ó-ku-sis-y-á	→	nyaBa-ku-sis-y-á	émótoká	<u>na</u> ómúgúha	car with a rope'
			I.go-INF-pull-CAUS-FV	car	with	rope

While there is some variation, a transitive verb which is causativized without frication becomes ditransitive, as in (19a), while a verb which is causativized with frication remains monotransitive, thus requiring the preposition *na* 'with' in (19b). What this shows is that forms with frication are lexicalized and are, in fact, borrowings.⁹

Proof that such fricated causatives are borrowed is seen from the reflexes of PB *-jog-*j*- 'wash (someone)'. In the following examples root-initial **j* > Ø:

(20)	PB *-jog- 'bathe'	<i>Luhaya</i>		<i>Lulamogi</i>		<i>Luganda</i> * <i>l-j</i> -, * <i>g-j</i> - > [zi]
	'bathe, swim'	o-kw-og-a		---		---
	'wash'	o-kw-og-y-a	/-og- <i>j</i> -/	ó-kw-oz-y-á	o-kw-oz-a	/-ol- <i>j</i> -/
	'wash for (s.o.)'	-og-ez-a	/-og-el- <i>j</i> -/	o-kw-ol-ez-y-a	o-kw-ol-ez-a	/-ol-el- <i>j</i> -/

The most direct realizations of PB *-jog- 'bathe' are seen in Luhaya, which does not fricate velars. In Lulamogi we see that the **g* is realized [z] in *ó-kw-oz-y-á* 'to wash', as it is in Luganda (where, however, the related noun *e-ky-og-el-o* 'basin for washing a baby' retains the [g]). Neither Luganda nor Lulamogi have the non-causative verb. However, both show a non-etymological reflex [l] in 'wash for (someone)'. Lulamogi has also borrowed this reflex, which Luganda introduces to avoid fricatives in two successive syllables (Hyman 2003:71):

(21)	-CVg- <i>j</i> -	→	-CVz- <i>j</i> -	→	-CVz-el- <i>j</i> -	→	-CVz-ez- <i>j</i> -	→	-CV _l -ez- <i>j</i> -
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In fact, on the basis of the newly created non-etymological root *-ol-*, Lulamogi has introduced

⁸ Cf. Lugwere, which has less frication than Lulamogi: /ó-ku-tuuk-*j*-a/ → *ó-ku-tuuc̣-a*.

⁹ Recall from (12) that the Lulamogi reflex of *-*lj-ik-* 'bury' is *-liik-*. However, as further evidence of Lulamogi speakers adapting to surrounding speakers, our consultant volunteered that they sometimes use *-ziik-* to talk to speakers of Lutenga (the standard Lusoga dialect) so that they can understand better.

a competing causative form *ó-kw-ol-y-á* which, as in (19a) licenses two objects (vs. *ó-kw-oz-y-á* which takes only one object):

- (22) a. *ó-kw-ol-y-á* → *nyaBa-kw-ol-y-á éngoyé ósaabóoni* ‘I am going to wash
 b. *ó-kw-oz-y-á* → *nyaBa-kw-oz-y-á éngoyé na ósaabóoni* ‘clothes with soap’
 I.go-INF-wash-CAUS-FV clothes with soap

Thus, Lulamogi *ó-kw-ol-y-á* suggests a transitive, non-etymological root */-ol-/* whose causative derivative */-ol-ǰ-/* is ditransitive. On the other hand, *ó-kw-oz-y-á* is lexicalized and monotransitive. Just as in the case of agentives ending in [zi], causatives with [z-y-] are identified with lexemes (of which only a handful are ditransitive), while [l-y-] causatives are clearly derivational and quite productive. We conclude that [-ol-y-a] would have been very unlikely if two factors were not the case: First, the forms *-oz-y-a* and *-ol-ez-y-a* in (20) are borrowed (most likely from Luganda), which creates *-ol-ez-(y)-a* by the defrication of *-oz-ez-(y)-a* as in (21). Second, the extrapolation of the form *-ol-y-a* in (28a) is possible in large part because causative *-ǰ-* does not condition frication in the indigenous vocabulary of Lulamogi. Thus, the non-frication of *-ol-y-a* has nothing to do with paradigm regularization.

Finally, since we have not said anything about it, we note that Lulamogi never fricates before the perfective suffix **-ǰl-e* which undergoes vowel height harmony as if it derived from a degree-2 high vowel **i* (> [e] after mid vowels):

- (23) a. *y-a-lim-ilé* ‘s/he cultivated’ b. *y-a-sek-elé* ‘s/he laughed’
y-a-tum-ilé ‘s/he sent’ *y-a-kol-elé* ‘s/he worked’
y-a-βal-ilé ‘s/he counted’

5. Conclusion

The natural question to ask in light of the above discussion is how the Neogrammarian Hypothesis fares with respect to Bantu frication. We think quite well. From the evidence we have presented we can see that two confounding variables potentially play against the regularity of sound change in a Bantu language without frication: borrowing, which can introduce frication in a language without frication, and paradigm regularization, which can introduce non-fricated derivatives in a language with frication. Although paradigm regularization is often assumed to exert its effects against phonetic changes which have achieved completion, these effects can logically act from the very inception of regular sound changes (cf. Bostoen 2008:344). By this logic, irregular diachronic correspondences represent the natural interaction between Neogrammarian sound changes and Humboldt’s Universal “one meaning, one form” (Vennemann 1972).

This having been said, the fact that Lulamogi has **ǰl- > [li]* intramorphemically, coupled with examples like *-ol-y-*, show that contact also plays an important role, especially in languages or dialects which are so close to one another, but which differ in the degree of frication, schematized in (24).

- (24) *Less frication* $\xrightarrow{\hspace{10em}}$ *More frication*
 Lugwere < Lulamogi < Lusoga (Lupakoyo) < Lusoga (Lutenga) < Luganda

In this context we consider one final idea in the form of a question: Given the counter-pressure of the paradigm, would it be possible in such a continuum of dialects where speakers recognize cognates so easily, for “borrowed” frication to be limited to the intramorphemic context? If so, the resulting situation could produce another deceptive

counterexample to the Neogrammarian Hypothesis. There is much more to be said, and so we end as modestly as the first author did 17 years ago:

“...nous présentons notre idée prudemment et même timidement en attendant que les données de fricativisation dans les autres langues bantoues soient examinées comme nous avons fait pour le lu-GANDA.” (Hyman 1997: 174)

Appendix

In this appendix we present the reflexes of PB **p*, **t*, **k*, **b*, **d*, **g* before **i*, and **u*, with brief discussion. Proto-Bantu roots are glossed only where they differ significantly from the Lulamogi meaning. All PB roots are found in the BLR 3 (Bastin et al 2002). The reconstructions marked with ‘Tv’ (proposed by the team at the Royal Museum for Central Africa, Tervuren) are local to the languages in and around Zone J. (In what follows **d* is used instead of **l* to be consistent with BLR.)

Certain CV sequences (**pi*, **ki*, **gi*, **pu*, **ku*) develop in the same way in Lulamogi and all surrounding languages. However, in other cases (**bi*, **di*, **tu*, **bu*, **du*, and perhaps **ti* and **gu*), the regular Lulamogi reflex differs from that of some other language(s) in the area (most notably Luganda). In these cases, extensive borrowing has led to a situation where a single **CV* sequence appears to have two reflexes in Lulamogi. In some cases, the borrowed vocabulary outnumbers the native vocabulary.

<i>*pi</i> :	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	áma-sirá	‘pus’	<i>*pídá</i>	
	én-sigó	‘kidney’	<i>*pígò</i>	
	éki-so	‘knife sp.’	<i>*píó</i>	
	óku-siinyá	‘press w/ finger or fist’	<i>*pìni</i>	
	éi-sigá	‘cooking stone area’	<i>*pígà</i>	‘cooking stone’
vs.	ókw-oohyá	‘tempt’	<i>*jòp-ì</i> (Tv)	
	éki-tahisyó	‘vessel for drawing water’	<i>*táp-ìci-ò</i> (Tv)	

PB **pi* regularly develops to *si*. The two examples with *h* involve a causative suffix, and thus the roots were likely leveled to the non-causative form with final *h* < **p*.

<i>*ti</i> :	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	éki-síki	‘log’	<i>*tìkí</i>	‘stump’
	óku-siþá	‘tie’	<i>*tìþ</i>	‘stop up/shut’
	óku-siindíká	‘push’	<i>*tíndik</i>	
	óku-simá	‘dig w/ stick’	<i>*tím</i>	‘dig’
	óku-sigálá	‘stay’	<i>*tígad</i>	
	ókw-esíitáálá	‘be startled’	<i>*tìttad</i>	‘stumble’
	óku-siníká	‘show teeth’	<i>*tìnik</i>	
	áma-siindé	‘field plowed for first time’	<i>*tíndé</i>	‘stubble’
	óku-sisímúká	‘wake up violently’	<i>*tìtìmuk</i>	‘be startled/wake up’
	éki-fuunsí	‘fist’	<i>*kùntí</i>	
vs.	óm-pití	‘hyena’	<i>*pítí</i>	
	éi-kóti	‘neck’	<i>*kòti</i>	
	óku-tyeerérá	‘slipe/slip/glide’	<i>*tìedid</i>	

The three instances of *ti* are difficult to explain away, as they appear in rather basic vocabulary. It may be that *ti* was in fact the regular reflex of **tj*, and that the words with *si* are borrowings, but this case is much more difficult to make than with the voiced counterpart **dj*. In Lugwere the situation is much the same, but note *ei-tinde* for Lulamogi *áma-siindé*.

<i>*kj</i> :	<i>Lulamogi</i>		<i>Proto-Bantu</i>
	óβu-sirú	‘stupidity’	*kǐdù
	ékí-sígi	‘eyebrow’	*kǐgè
	óku-siriká	‘be quiet’	*kǐdik (Tv)
	ómw-oosí	‘steam/smoke’	*jókǐ
	éki-suulé	‘tree sp.’	*kǐjude (Tv)
	óku-sikíimbá	‘sniffle’	*kǐkimb (Tv)
	éi-siindó	‘foot stomping’	*kǐndò
	én-siingó	‘long neck’	*kǐngó ‘neck’
	éki-siinzíró	‘heel’	*kǐngǐdò

Proto-Bantu **kj* regularly develops to *si*.

<i>*bj</i> :	<i>Lulamogi</i>		<i>Proto-Bantu</i>
	óku-byaalá	‘give birth’	*bǐad
	áma-bí	‘excrement’	*bǐǐ
	óku-biimbá	‘swell’	*bǐmb
	óku-βiná	‘dance’	*bǐn
	óku-βisá	‘hide’	*bǐc
vs.	ékí-ziimba	‘clot/boil’	*bǐmbà ‘abces/swelling’
	én-ziró	‘wax’	*bǐdò ? ‘soot/dirt’
	óku-ziríingá	‘constrict by surrounding’	*bǐding
	ómú-zíru	‘African plum tree’	*bǐdu ‘medlar tree’
	én-gózi	‘cloth to carry child in’	*gòbǐ

It is likely that *bi/βi* is the regular reflex, with *zi* (the Luganda reflex) appearing in borrowings.

<i>*dj</i> :	<i>Lulamogi</i>		<i>Proto-Bantu</i>
	ómu-kalí	‘woman’	*kádǐ
	ómw-eerí	‘month’	*jédǐ
	óm-bulí	‘goat’	*búdǐ
	áma-ligá	‘tears’	*dǐga (Tv)
	éi-zuulí	‘day before yesterday’	*júúdǐ
	éci-díβa	‘man-made pond’	*dǐbà ‘pond/well’
	éki-balí	‘swamp’	*bádǐ ‘open space’
	éi-kolí	‘hawk’	*kódǐ
	óku-kalíká	‘grill’	*kádǐng
	ókw-edíímá	‘protest/rebel’	*dǐem (Tv)
	ómú-li	‘medicinal herb, long root’	*dǐ ‘root’
	óku-liiká	‘bury’	*dǐIk
vs.	ólu-sozǐ	‘mountain’	*códǐ
	ómw-eezǐ	‘moon’	*jédǐ
	óku-ziingá	‘roll/wrap/surround’	*dǐng
	ómu-zimú	‘ghost/witchcraft’	*dǐmù ‘spirit/god’

-zíto	‘heavy’	*dìtò	
-gazí	‘wide’	*gáđì	
ókw-aazíká	‘lend’	*jádìm	‘borrow’
óku-zìbá	‘block’	*dìb	
óku-zíká	‘be overgrown’	*dìk (Tv)	
éki-ziingá	‘island’	*dìnga (Tv)	
óku-zìbírírá	‘close eyes’	*dìb (Tv)	
óku-zuungá	‘walk aimlessly’	*dìfung	‘wander around’
ómu-zúùngú	‘white man’	*dìúngù	
éki-zyá	‘lower body hair’	*dìja	
éki-zìβu	‘hardship/difficulty’	*dìbù	

As discussed above, *li/di* is taken to be the regular reflex, with *zi* appearing in borrowings.

*gì:	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	ómú-zíro	‘tribal taboo’	*gìdò	
	ámá-zíma	‘truth’	*gìmà	‘whole/healthy’ (‘truth’ in J)
	ón-zíge	‘locust’	*gìgè	
	ómu-zigó	‘tooth gap’	*gìgò	‘molar’
	ólú-zízi	‘swarm of buzzing insects’	*gìgì	
vs.	éki-siinzíró	‘heel’	*kìngìdò	

Proto-Bantu *gì regularly develops to *zi*.

*pù:	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	óku-faanána	‘resemble’	*pùanan	
	óku-fuuhá	‘blow’	*pùɥp	
	éí-fúlo	‘foam’	*pùdò	
	óku-fuukúlá	‘uproot’	*pùɥkud (Tv)	
	óku-fuuhá	‘despise/underrate’	*pùɥp (Tv)	
	áka-fuunjó	‘hemorrhoid sp.’	*pùInjo (Tv)	‘incurable wound’
	óku-faabírírá	‘concentrate/put heart into’	*pùabidid (Tv)	‘work hard’
	óku-faabágáná	‘go bad/become spoiled’	*pùabagan (Tv)	‘yield under own weight’
	óku-fukúmúlá	‘shake (dirt) off of sth.’	*pùkumud	‘overturn’
	ém-fúka	‘hoe’	*pùkà (Tv)	
	ómú-fúko	‘bundle/load’	*pùkò	‘bag’
	óku-fuumbá	‘steam (food)’	*pùmb (Tv)	
	ómu-fuumbé	‘tree sp.’	*pùmbè	
	óku-fuungúlá	‘dilute’	*pùngud	
	óku-footóká	‘be misshapen (dented)’	*pùotok (Tv)	‘be soft’
	óku-nyafúlá	‘beat into submission’	*nyápud (Tv)	‘beat with switch’
vs.	óku-huukúlá	‘uproot’	*pùɥkud (Tv)	
	óku-huuhá	‘despise/underrate’	*pùɥp (Tv)	
	ón-taahú	‘castrated animal’	*tàapɥ (Tv)	
	ómu-hwá	‘thorn tree’	*jupɥe (Tv)	
	óku-nyahúlá	‘beat into submission’ (var.)	*nyápud (Tv)	‘beat with switch’

The regular reflex of **pu* seems to be *fu*. The examples with *hu* are somewhat puzzling. The first two are free variants of *fu*-initial roots, but it is not clear why this variation exists. The adjectival form *-taahu* is derived from a verb root *-taah-*, and was likely subject to leveling.

<i>*tu:</i>	<i>Lulamogi</i>		<i>Proto-Bantu</i>
	éi-sumó	‘spear’	<i>*túmò</i>
	óku-suumbá	‘cook’	<i>*túmb</i>
	óku-suná	‘get/possess’	<i>*tún</i> ‘desire’
	ii-swe	‘1st person pronoun’	<i>*itue</i>
	óku-sumítá	‘stab’	<i>*túmit</i>
	ón-swááswa	‘spitting snake’	<i>*tú</i> ‘spit’
	óku-swiikáná	‘cross a limit/boundary’	<i>*túikanɿ</i> (Tv) ‘cross’
	óku-sulíká	‘turn upside down’	<i>*túdik</i> (Tv)
	óku-suundá	‘churn in gourd’	<i>*túnd</i> (Tv)
vs.	óku-fuujá	‘spit’	<i>*túij</i>
	óku-fuumbírwá	‘get engaged’ (‘be cooked for’)	<i>*túmb</i> ‘cook’
	óku-funá	‘get/possess’	<i>*tún</i> ‘desire’

The regular reflex of **tu* is *su*. The words with *fu* are borrowings, likely all ultimately from Luganda.

<i>*ku:</i>	<i>Lulamogi</i>		<i>Proto-Bantu</i>
	ómú-nófu	‘slice of meat’	<i>*kúidu</i> (Tv) ‘meat’
	óku-fá	‘to die’	<i>*kú</i>
	ém-fúúfu	‘dust’	<i>*kùùkù</i> (Tv)
	éki-fubá	‘chest’	<i>*kúbà</i>
	óku-fukámirá	‘kneel’	<i>*kúkam</i>
	óku-fuunzyá	‘narrow a gap’	<i>*kúnd</i> ‘be narrow’
	óku-fíirwá	‘mourn/miss s.o.’	<i>*kúidu</i> (Tv)
	óku-fulúká	‘return’	<i>*kúduk</i> ‘come back’
	óku-fulúmúká	‘dash off’	<i>*kùdumuk</i> (T)
	óku-fuumúlá	‘pierce hole through’	<i>*kúmul</i> (Tv)
	óku-fuumbátá	‘embrace’	<i>*kúmbat</i> ‘hold in arm’
	óku-fuumpúlá	‘pound to demolish’	<i>*kumpud</i> (Tv)
	ómú-fúmu	‘doctor’	<i>*kúmú</i>
	éki-fúúndo	‘knot’	<i>*kúndò</i>
	éki-fuundíkó	‘cover’	<i>*kùndikidjo</i>
	óku-fuunzyá	‘fold’	<i>*kúny</i> (Tv)
	óku-fuunyalá	‘crumple’	<i>*kùnjad</i> (Tv)
	éki-fuunsí	‘fist’	<i>*kùntí</i>
	áma-futá	‘oil’	<i>*kútà</i>
	ómú-hófu	‘blind (figuratively) person’	<i>*pòkù</i> ‘blind’
vs.	ón-kudú	‘tortoise’	<i>*kúðù</i> (<i>kúðù</i> , <i>kúðù</i>)

Proto-Bantu **ku* regularly develops to *fu*. The form of ‘tortoise’ perhaps suggests a local variant **kúðù* with two second degree vowels, though even Lugwere has *o-fudu*.

<i>*bu:</i>	<i>Lulamogi</i>	<i>Proto-Bantu</i>
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	éí-zu	‘ashes’	*bú	
	ólu-zwí	‘white hair’	*bùì	
	óku-zwaangá	‘do in disorderly manner’	*búang	‘mix’
	óku-zuzúlá	‘spit in disgust’	*bùbud (Tv)	
	óku-zuβátá	‘chew noisily’	*bùbat (Tv)	
	óku-zulúgá	‘disrupt sth.’	*bùdug (Tv)	‘stir/mix’
	óku-zulúgútá	‘bobble head’	*bùdugut (Tv)	‘stir/mix’
	óku-zulúmúká	‘do hurriedly’	*bùdumuk (Tv)	‘grow quickly’
vs.	áma-savú	‘fat’	*cábú	
	mu-sáánvu	‘seven’	*càmbù	
	óku-vwaatá	‘eat greedily’	*bùat (Tv)	
	óku-vulúgá	‘disrupt sth.’ (var.)	*bùdug (Tv)	‘stir/mix’
	óku-vulúmúká	‘do hurriedly’ (var.)	*bùdumuk (Tv)	‘grow quickly’
	ómú-vúle	‘tree sp.’	*bùde (Tv)	
	óku-vugá	‘imitate drum or car’	*búg	‘resound’
	óku-vugútá	‘fan fire’	*bùgut	
	óku-vuná	‘break’	*bún	
	óku-vunáánízyá	‘give responsibility’	*bunan (Tv)	‘be responsible for’
	óku-vuungá	‘fold up’	*búng	‘wrap up’
	éí-vuunjá	‘insect sp.’	*bunja (Tv)	
	éí-vuunyó	‘maggot’	*bunyu (Tv)	
	ókwa-aavúlá	‘crawl’	*jábùd (Tv)	

It appears that *zu* is the native Lulamogi reflex, which is shared by no other language in the area. Thus, these cannot be borrowings, while the words with *vu* could be borrowed from any of the surrounding languages.

*d̥u:	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	óku-zwí	‘knee’	*d̥uí	
	óku-zugá	‘drive vehicle’	*d̥úg	‘paddle’
	óku-zumá	‘insult/abuse’	*d̥úm	
	óku-zwaalá	‘wear’	*d̥úad	
	én-kozú	‘scar’	*kód̥ù	
	óku-zwá	‘come from’	*d̥ù	
	óku-ziikírá	‘stop up (jug)’	*d̥úik	
	óku-zulírá	‘make reference to’	*d̥údid	‘testify’
	óku-zukútá	‘fan fire’	*d̥ùkut	
	ém-pazú	‘hole sp. (for cooking)’	*pàd̥ú (Tv)	
vs.	óku-vugá	‘paddle’	*d̥úg	
	óku-vuβá	‘fish (w/ net)’	*d̥úb	
	ómú-lévu	‘beard’	*d̥èd̥ù	
	ém-bavú	‘side of rib’	*bàd̥ù	

Proto-Bantu **d̥u* regularly develops to *zu*. The words with *vu* must be borrowings, perhaps from Luganda in which *vu* is the regular reflex.

*g̥u:	<i>Lulamogi</i>		<i>Proto-Bantu</i>	
	ón-jóvu	‘elephant’	*jòg̥ù	
	óku-vuundá	‘rot’	*g̥ùnd	

	óku-vuumbúlá	‘discover/uncover’	*gùmbud
vs.	ékí-zúma	‘seed’	*gùmá (Tv)
	óku-zuná	‘help’	*gún

It may be that as with **bu* and **du*, the regular Lulamogi reflex is *zu*, but there is too little data to be sure.

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