

SOURCES OF GEMINATION AND GEMINATION AS A MORPHEME IN BOLE¹

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1. Introduction

In his monumental reference grammar of Hausa, Paul Newman (2000:397) states, “Geminates in Hausa ... are extremely prevalent.” He goes on to note, however, that nearly all occurrences of geminate consonants in Hausa come about by active phonological rules, they descend from historical sound change, or they are loanwords. Some of the major sources of gemination in Hausa are the following:

Obligatory assimilation of C2 in C1VC2 reduplication:

Pluractional verbs:	rarràbā < *rab-ràbā	‘share out’ (< rabā ‘divide’)
	kanannàdē < *kanad-nàdē	‘coil up’
Derived adjectives:	zàzzākā < *zāk-zākā	‘sweet’ (< zākī ‘sweetness’)
Lexically frozen nouns:	kùduddufī < *kùduf-dufī	‘borrow pit’

Obligatory or optional assimilation across morpheme boundaries:

Nasal assimilation:	gidammù < /gidā-n-mù/	‘our home’
	sum mântā < /sun mântā/	‘they forgot’
Obstruent assimilation:	nā fišshē shì < /...fit-shē.../	‘I removed it’ (< fita ‘go out’)
Assimilation of /ř/: ²	ƙasan nàn < /ƙasa-ř nàn/	‘this land’
	řìgakkà = řìgarkà	‘your (m) gown’
	hay yànzū = hař yànzū	‘even now’
	gaddamà = gařdamà	‘dispute’

Historical syncope (with assimilation of C1 to C2 if C1 ≠ C2):

Noun plurals:	zàbbā < *zōbàbā	‘rings’ (< zōbē ‘ring’)
Past participles:	dàfaffē < *dàfē-dafē ³	‘cooked’ (< dafā ‘cook’)

¹ Information on Bole has been developed in collaborative work with Dr. Alhaji Maina Gimba, a former graduate student in linguistics at UCLA and now a member of the English Department faculty at the University of Maiduguri. Work on Bole is supported by a National Science Foundation grant (#BCS9905180, Russell G. Schuh, Principal Investigator). I would like to thank the University of California, Berkeley for covering my travel expenses to ACAL 32.

² Complete assimilation of trilled /ř/ to the following consonant is optional (obligatory before /n/ across a morpheme boundary). In normal speech for “Standard Hausa” speakers—more than likely for all speakers—assimilation is far more common than realization as [ř]. In the *Hausar Baka* video series, well over 90% of phrase medial /ř/’s are assimilated, regardless of morphological or syntactic environment.

³ The development would be *dàfē-dafē > dàfē-dfe > dàfē-ffe > dàfaffē. The latter shifts of short /e/ to [a] and Lo-Hi (= Rising) tone to Hi are still productive processes in Hausa. Newman (2000:19) proposes this historical derivation, which is supported by comparative data from Kanakuru, where the comparable construction still uses a fully reduplicated verb root.

Borrowed words, mainly from Arabic, some from Fulfulde and perhaps other languages:

Arabic:	dabbà	‘animal’
	bayyàná	‘explain’
Fulfulde:	dattijò	‘respected older man’

Despite the frequent lexical and textual occurrence of gemination in Hausa, Newman notes that gemination in apparently underived native roots is not common, and even in many words with synchronic lexical geminates, a derived source is likely, e.g.

Lexicalized plurals:	kâbbà < *kâbàbà	‘syphilis’ (cf. plural of <i>zōbè</i> above)
Remnant suffixes:	kunnà < *kum-na	‘light fire’ (cf. Bole <i>kùmā</i> ‘be hot’)

Newman concludes by saying,

“This suggests that at an earlier period there were probably no geminates in monomorphemic words. All geminates now in [Hausa] would thus have come from internal morphological or phonological (assimilatory) processes or from loanwords If this is so, it would set Hausa apart from its sister Chadic languages, like Bole, where gemination is quite common.”

But is the assumption underlying Newman’s assertion correct, i.e. that the ancestral language of Hausa and its sisters had lexical gemination, a feature lost in the early history of Hausa but preserved in other languages? Following a brief discussion of this historical Chadic issue, I will look at gemination in Bole. The main issues that I will consider are the sources of gemination in Bole, the development of morphemes which are, themselves, /G/, i.e. gemination of a consonant, and the source of lexical gemination in general.

2. The Non-Reconstructability of Lexical Gemination in Chadic

Did the language ancestral to Hausa and its sisters have lexical gemination? The answer is, “No.” Proto-West Chadic probably had no lexical geminates at all, and even derived geminates were probably not very common.⁴ I support my negative answer to this question by citing the facts of gemination from two rather distantly related languages (actually two language groups) from the “B” branch of West Chadic and a language from the “A” branch of West Chadic, the branch to which Hausa belongs.

Miya (West-B): “Geminate sequences do not occur within a root, though geminates are possible across morpheme boundaries” (Schuh 1998:26). Even across morpheme boundaries, only geminate sonorants appear, e.g. *gwàbàsan-na* ‘thick (masc)’. Obstruents may not close a syllable in Miya, even in a geminate sequence.

Bade and Ngizim (West-B): In Ngizim, “geminates of any kind are disallowed in [-foreign] words” (Schuh 1971:14). In Bade, the only geminates in non-foreign words are in ideophones and adverbs, e.g. *città* ideophone for ‘red’, *della* ‘very near’.

Karekare (West-A): M. Schuh (1973), in a wordlist of over 1000 Karekare items, lists only two items with geminates (*àdda* ‘sword’ < Hausa and *shâgga* ‘wild animal’).

⁴ I speak only of West Chadic languages because these are the languages I know best, and I will only illustrate from West Chadic languages, but from what I know of other branches, they would not present a radically different picture.

Karekare is only distantly related to Hausa within West Chadic “A”. If we accept Newman’s reconstruction of Hausa as originally having no lexical gemination, this means that we have four Chadic languages representing about the greatest genetic distances that can be found in the West Branch, none of which have lexical gemination. Without evidence to the contrary, the most credible reconstruction of proto-West Chadic would not include consonant gemination as a possible phonological feature of native roots. As a corollary to this reconstruction, we must explain gemination in languages that have it as coming from sources other than genetic inheritance. Newman has done this for Hausa. In the following sections of this paper, I will attempt to do the same for Bole.

3. Gemination in Bole

As Newman correctly states, gemination in Bole is “quite common”. Here are rough counts of lexical items with geminate consonants from a database of over 3400 items (Schuh and Gimba, in progress):

Total lexicon: 11.63% (400 out of 3439 items)
 Verbs: 20.26% (155 out of 765 items)
 Non-verbs: 9.2% (245 out of 2674 items)
 Nouns: 9.1% (203 out of 2229 items)
 Adjectives: 8.57% (9 out of 105 items)
 Adverbs: 5.56% (3 out of 54 items)
 Ideophones: 7.25% (10 out of 138 items)

These figures include some items with geminates derived by morphological processes specific to certain lexical items (a few noun plurals and pluractional verbs—see below) but do not include any geminates derived through productive morphological processes or purely phonological assimilations.

I do not have comparable figures from any other Chadic language, but without a doubt, the figures for Bole would comparatively be very high. As I noted above, West Chadic languages of the B subbranch have essentially no geminates. Even though geminates in Hausa are not uncommon, it is unlikely that the figures would be this high as percent of total lexicon, and as Newman points out, most geminates in native Hausa items result from transparent phonological or morphological processes. Even within the group of languages to which Bole is most closely related, the Bole-Tangale group, Bole stands out. I have mentioned the infrequency of geminates in Karekare above. In Schuh (1984:206-219), I list 250 roots reconstructable for Bole-Tangale with their reflexes in 7 languages (Karekare, Bole, Ngamo, Kirfi, Galambu, Geruma, and Kanakuru). Bole has geminates in 7 items among the 165 non-verb entries (4.24%) and 14 items among the 85 verbs (16.47%). The only other language that has ANY geminates in this word list is Kirfi, the language from this sample which, along with Ngamo, appears to be most closely related to Bole. Kirfi has 11 non-verbs and 13 verbs with geminates, about the same proportions as those in Bole. Interestingly, in this wordlist the two languages SHARE cognates with geminates in only 3 non-verbs and 5 verbs.

In short, not only is pervasive lexical gemination as found in Bole (and Kirfi) not typical of West Chadic, it is not even typical of the much lower level subgroup. This raises the question of the source of all these geminates.⁵

⁵ The only information available on Kirfi is the short, selective sketch in Schuh (1978). Judging from the lexical data just described, we can guess that Bole and Kirfi probably share parallel developments that were set in motion in their immediate ancestor. Further research on Kirfi would be necessary to test this hypothesis.

3.1. Assimilation

Productive assimilatory processes CANNOT account for the large number of geminates in Bole. Relatively few geminate consonants in connected speech and essentially no geminates in lexical items result from productive or even semi-productive processes where a phonologically specifiable underlying consonant assimilates completely to another consonant. The only cases of transparent phonological assimilations in Bole are the following:

Non-labial nasal assimilation

$\left[\begin{array}{l} +\text{nasal} \\ -\text{labial} \end{array} \right] \rightarrow G / \text{---} \left[\begin{array}{l} +\text{consonantal} \\ +\text{sonorant} \end{array} \right]$ (G = a geminate copy of the next consonant)

/gòjján .../ ‘they bought a ...’	
gòjján tàkà	‘they bought a shoe’
gòjján nîm	‘they bought a neem tree’
gòjjám máatò	‘they bought a car’
gòjjál lékídè ⁶	‘they bought a ladle’
gòjjár riyá ⁶	‘they bought a bow (for shooting)’
gòn	‘good’
gòl láká ⁶	‘very good’

d assimilation

$d \rightarrow G / \text{---} C$

The sequence $-dC-$, in practice, can arise in only a limited set of morpholexical situations, but where it does arise the assimilation is regular.

/kúf-ká-wó/ → kúkkáwó ‘he dislikes you’
 /kúf-mú-wó/ → kúmmúwó ‘he dislikes us’
 /dídó + kò/ → díkkò ‘your neck’
 /dídó + mù/ → dímmù ‘our neck(s)’

“all” assimilation

There are two words meaning ‘all’, which, contrary to normal Bole phonotactics, end in an obstruent before pause. When a noun complement follows, the final consonants for both words completely assimilate to the next consonant:

sháp *but* shám mí’y’yà, shát témká, shá’ ’úwwà, shák kòmshíné
 ‘all the people, all the sheep, all the goats, all the cattle’

gít *but* gím mí’y’yà, gíb bàrkínshé, gíl làbâr
 ‘all the people, all the goats, all the news’

⁶ The underlying nasal is still evident in nasalization of the vowel preceding the assimilated consonant. No nasalization is evident on *gòl láká*, an expression which many speakers feel to be a single word.

Monomoraic nouns with pronominal clitics

Bole has five monomoraic nouns⁷—*bá-* ‘daughter’ (always used with a genitive complement), *’yá* ‘thing’, *ló* ‘meat’, *jó* ‘running’, *kó-* ‘head’ (cf. citation form *kòyí*). These nouns geminate the consonant of genitive pronominal clitics. There are two possible explanations for this. Gemination of the consonant may be in compensation for the fact that Bole, like other West Chadic languages, disprefers monomoraic substantive words (though three of the five nouns here have monomoraic citation forms). Alternatively, the geminate consonant may be the historical remnant of the assimilation of a genitive linking morpheme, probably **-t-*. The first two nouns listed above (and a number of others which do not geminate clitics) add a linker *-ti* before a nominal genitive:⁸

bánnò	‘my daughter’	básshì	‘your (f) daughter’	bá-tí Bámói	‘Bamoi’s daughter’
’yàkkò	‘your (m) thing’	’yàttò	‘her thing’	’yà-tí Bámói	‘Bamoi’s thing’
lònnì	‘his meat’	lòmmú	‘our meat’	ló Bámói	‘Bamoi’s meat’
jókkò	‘your (m) running’			jó Bámói	‘Bamoi’s running’
kókkò	‘your (m) head’	kónnì	‘his head’	kó Bámói	‘Bamoi’s head’

3.2. Pluractional verbs⁹

Some verbs in Bole form pluractionals by geminating C2. This is not a productive process in that it is limited to a subset of verbs with CVC- root structure. Gimba (2000:164) reports that 20 out of a sample of 43 verbs with the appropriate root structure admit such pluractionals, e.g.

Simple verb Pluractional

bótú	bòttú	‘snap off, break off’
đólú	đòllú	‘swallow’
póđú	pòđđú	‘remove, take out’
bùlǎ	bùllǎ	‘dig out’
pàtǎ	pàttǎ	‘go out’

The figures for lexical gemination above show that over 20% of verbs include a geminate consonant. Such verbs virtually all have roots of the form C1VC2C2-, i.e. the form taken by geminated pluractionals, but a substantial majority have no counterpart of the form C1VC2- in modern Bole, e.g.

bòkkú	‘burn’ (but no <i>*boku</i>)
fiillú	‘etch’ (but no <i>*bilu</i>)
điissú	‘skin, flay’ (no <i>*đisu</i> , though cf. <i>điishí</i> ‘skin, hide’)
gòjjú	‘buy’ (but no <i>*goju</i> or <i>*gozu</i>)
kàppú	‘plant’ (but no <i>*kapu</i>)
sùrrú	‘fry’ (but no <i>*suru</i>)
ìnnǎ	‘see’ (but no <i>*ina</i>)

⁷ There are other monosyllabic nouns, but they all have long vowels, e.g. *bè* ‘son’, *bò* ‘mouth’.

⁸ These two alternative explanations for gemination may actually be a single explanation. If a linker were at one time used in all, or a substantial subset of genitive constructions but eventually fell out of use, its trace may remain in just those cases where its absence would have left a monomoraic root with a monomoraic clitic.

⁹ See Gimba (2000:Chapter 10) for a full discussion of the phonology and semantics of pluractional verbs in general and geminate and infixing pluractionals in particular.

Newman (1990:70), speaking of Bole, says,

“Although geminate pluractionals are rare synchronically, it seems that this was not the case earlier. One of the distinctive characteristics of Bole is the large number of verbs in the language that contain a geminate consonant. These verbs are most likely frozen pluractionals that, like many of the frozen pluractionals in Hausa, have lost their distinctive semantic properites.”

Though I have no information on modern pluractional formation in Kirfi, the relatively large proportion of verbs with geminate C2 in citation form noted above suggests that a similar comment could apply to that language, and Newman (1990:70) provides evidence that the same holds true for Kanakuru. This hypothesis gains credibility from the fact that many other West Chadic languages have verbs that are lexicalized with a productive pluractional pattern while the simple root is lost, e.g. Hausa *babbàkē* ‘sing’ but no **bake*—cf. Bade *bàkú* ‘burn’ and the Bole form for ‘burn’ above.

By far the most common method for pluractional formation throughout Chadic is reduplication of the initial CV- of the root (see Newman (1990:59-64) for examples from the main Chadic subgroups). Gimba (2000:156-160) likewise describes this as the productive method of pluractional formation in Bole for all classes of verbs:

<u>Simple verb</u>	<u>Pluractional</u>	
kónú	kókónú	‘pick up’
dàppú	dàdàppú	‘gather’
bòngìrú	bòbòngìrú	‘turn around’
bùlá	bùbùlá	‘dig out’
tí	títí	‘eat’
pá	pápá	‘close’

Newman (1990:69) appears to suggest that pluractional formation by gemination and by reduplication are distinct processes. This is obviously true in at least some of the modern Bole-Tangale languages—both processes are available for some Bole verbs, and the two can even be combined (Gimba 2000:Chapter 10):

<u>Simple verb</u>	<u>CV reduplicaton</u>	<u>Gemination</u>	<u>CV + gemination</u>	
dólú	dódólú	dòllú	dòdòllú	‘swallow’
bùlá	bùbùlá	bùllá	bùbùllá	‘dig out’

Historically, however, I believe that they have a common origin, with the geminate arising in the following way:

Root Reduplication Syncope Assimilation

*dólu > *dó-dólu > *dó-dlu > dólú

The main reason for questioning distinct historical origins for reduplicated and geminate plurals is the apparent absence of even remnants of gemination as a pluractional forming process in West Chadic outside the closely related members of the Bole-Tangale group. Innovation in this one subgroup seems a more likely scenario than disappearance of geminate pluractionals without a trace anywhere except in this group. Viewed this way, the only real innovation is reinterpretation of the geminate consonant itself as being the mark of pluractionality rather than being the surface outcome resulting from the application of

phonological rules. As we will see below, similar reinterpretations of gemination as a morphological rather than a phonological process have taken place elsewhere in Bole.

CV- reduplication must have continued as an active process, probably renewed generation after generation, while pluractionals of certain verbs have become lexicalized in forms that arose from phonological processes that became inactive. Bole has another, now non-productive pluractional type which also seems to have arisen from reinterpretation of CV reduplication, viz. *-gi-* infixation (in the Fika dialect—the Gadaka dialect infixes *-ki-*). Like C2 gemination, this pattern is limited to CVC- roots, but, even more restrictively than C2 geminate pluractionals, to roots where C2 is a sonorant or *d'* (Gimba 2000:161-163). Also like C2 gemination, there is a substantial number of verbs with medial *-gi-* (or *-ki-*) whose origins can probably be traced to this pluractional pattern though the simple root no longer exists.

<u>Simple verb</u>	<u>Pluractional</u>	
ngóru	ngògìrú	‘tie’
ngáďá	ngàgìďú	‘eat (meat)’
’àwá	’àgìwá	‘open’
*zolu	zògìlú	‘stir a thin substance’
*badu	bàgìďú	‘pound grain a second time to make flour finer’
*motu ¹⁰	mòkìtú	‘moisten’
*bulu	bùkùlú	‘roll along’

This is certainly not a reconstructable pattern. As far as I know, it is not a pattern that is found even in the languages most closely related to Bole. It must have arisen through CV-pluractionals such as *gùgùwá* < *gùwá* ‘forge’, where the medial syllable was interpreted as an infixed *-g* + epenthetic vowel and generalized to roots with initial consonants other than a velar.¹¹

To conclude this section, it is worth noting that along with lexicalization of C2 geminate and infixed pluractionals in Bole, semantic differentiation from the productive reduplicated CV-pluractionals has taken place. CV-reduplicated pluractionals may refer to plural action of any kind—one subject acting several times, several subjects acting in turn, etc. The exact distribution of the unproductive pluractionals remains poorly understood, but roughly speaking, transitive verbs require plural objects and intransitive verbs require plural subjects (Gimba 2000:§10.1.3). In Kanakuru, this distribution is now grammatically obligatory for verbs with reflexes of *C1VC2V vs. *C1VC2C2V pairs (Newman 1974:72).

3.3. Gemination in nouns

The only *process* resulting in gemination in Bole nouns is a fairly common plural pattern which geminates C2 of the root, in conjunction with a final vowel change (most commonly to *-e*, but sometimes to *-i* or *-a*) and a change in tone pattern. There are no productive noun pluralization processes in Bole, and most nouns do not admit a morphological plural at all. Of the 147 nouns in our database for which we have recorded plurals, 30 (20.41%) have a geminated plural, e.g.

¹⁰ There is an unrelated verb *mótú* ‘die’.

¹¹ Reinterpretation of a reduplicated syllable as an affix, with resultant generalization of a single consonant to all contexts, may explain some other rather strange looking pluractionals in West Chadic. For example, Junraithmayr (1991:41) describes an infix *-p-* as one of several pluractional patterns in Tangale. Newman (1990:72ff.) describes a number of suffixal pluractionals in various Chadic languages, none of which can be historically reconstructed as such.

bòwú	bòbbè	‘father(s)’
gázà	gájjé	‘rooster(s)’
kòsúm	kóssé	‘mouse/mice’ (note loss of root final <i>-m</i> in the plural)
yàwí	yàbbí	‘chicken(s)’
òshí	úwwà	‘goat(s)’ (both from a root *ak ^w -)

Unlike the situation with geminate pluractional verbs, there is no evidence within Bole or even within the Bole-Tangale group that geminate plurals might have a source in reduplication. Bole has no nominal plurals that incorporate reduplication, nor, as far as I have been able to discover, do other Bole-Tangale languages. This contrasts with the picture outside Bole-Tangale, where plural patterns incorporating reduplication are common.¹² For example, the most productive pattern of plural formation in Ngizim reduplicates the final root consonant and adds a suffix *-in* (*gùvù/gùvàvín* ‘corpse/corpses’—Schuh 1972:13), and the productive nominal plural in Miya has a similar pattern with a suffix *-aw* (*dàm/dàmamáw* ‘tree/trees’). Many of the nominal plural classes of Hausa involve reduplication, e.g. *hanyà/hanyōyī* ‘road/roads’, *wurī/wuràrē* ‘place/places’, *gārī/garūruwà* ‘town/towns’. On the other hand, gemination as a mark of nominal plurality is rare outside Bole-Tangale (Newman 1990:46), and may not exist at all from a historical point of view. For example, Hausa has one plural type with a geminate root consonant, as in *zōbè/zābbā* ‘ring/rings’, *gēmù/gyammā* ‘beard/beards’, but Newman (2000:197) points out that this plural pattern derives historically from reduplication, with syncope of the short vowel in the reduplicant, viz. *zōbè*, pl. **zōbàbā* > *zābbā* (productive phonological rules shorten and lower the root **ō* in the closed syllable created by syncope, and the Hi-Lo tones of the first two syllables of the plural contract onto the resultant single syllable).

In the introduction to section 3 of this paper, I noted that 203 nouns in our current Bole electronic database have geminate consonants (9.1% of noun entries). Proportionately, this figure is already less than half as large as that for verbs containing geminates, and when we examine nouns with geminates, it turns out that the geminates in at least half of these entries (probably well over half if we had full etymologies) have sources other than from base geminates in the lexicon.

Geminate plurals: Sixteen of the 203 noun entries with geminates are plurals of the type described just above, listed as entries on their own. A noun must be marked as to whether or not it has a geminate plural, but the geminates in plurals are not base geminates. In addition to the geminate plurals that are associated with existing singulars, there are a number of nouns which probably are historically plurals, with the singular having been lost.

àmmá	‘water’ (a plural in many languages including Hausa)
kúkká	‘hoof’ (body parts that come in multiples are often lexicalized plurals)
màccà	‘calyxes of sorrel’
nzònní	‘twin sibling’ (cf. <i>nzónná</i> ‘twins’, probably a new plural from the original plural, lexicalized as a singular)
rédde	‘bush papaya’ (a plural referring to multiple fruits?—cf. <i>màccà</i> above)
sòwwò	‘hair’
tànnà	‘thunder’

¹² See Newman (1990:Chapter 2) for a survey of Chadic nominal pluralization processes.

Deverbal nouns: Fifty or more of the 203 nouns with geminates are deverbal nouns. For some, the verbs have been lost, but for most the verbs are still used, while the nominalizations have diverged semantically. The geminates in these words thus derive from whatever processes account for geminates in verbs, not from base geminates in nouns.

dìkkò	‘thatch grass’ < <i>dìkkú</i> ‘thatch’
kòd'dé	‘corpulence’ < <i>kòd'dú</i> ‘be fat’
láb'bó	‘welt, lump, clump’ < <i>làb'bú</i> ‘for a welt to raise’
wà''ì	‘something found unexpectedly’ < <i>wá</i> ‘get, receive, come across’
'yóppà	‘excrement’ < <i>'yòppú</i> ‘flow’
mèccé	‘traveling’ (but no verb <i>*mèccú</i>)
nòssà	‘dampness of ground’ (cf. probably unrelated <i>nòssú</i> ‘spend time, wait’)
pè''è	‘cupping with horn’ (but no verb <i>*pè''ú</i> —possibly from <i>pā</i> ‘open’)

Loanwords: Our database currently identifies 27 of the 203 nouns with geminates as loanwords from Kanuri or Hausa. There are probably other loans not yet identified as such. All but a handful of these loanwords have a geminate in the source language, e.g.

àddá	‘machete’ < Hausa
kéllèbí	‘headscarf’ < Hausa <i>kyallàbí</i>
sákkà	‘doubt’ < Hausa <i>shakkà</i> < Arabic
bàttí	‘fool’ < Kanuri
ràkkâ	‘heavy silver bracelet’ < Kanuri
wókkìl	‘representative’ < Kanuri <i>wákkìl</i> < Arabic
shittá	‘red pepper’ (a northern Nigerian <i>Wanderwort</i> —cf. Hausa <i>cittā</i>)

Bole usually replaces *ℓ* in Hausa loans with glottal stop. When the *ℓ* is medial, Bole realizes it as a geminate. Our database has two further Hausa loanwords with geminates in Bole corresponding to singletons in Hausa. It is perhaps significant that these words in Hausa end in a short vowel with concomitant final glottal stop, whereas most Hausa nouns end in a non-checked long vowel. It looks as if Bole has realized the Hausa -CV' as -GV.

hàb'burí	‘patience’ < Hausa <i>hàkurí</i> (with apparent shift of phonetic medial [kʷ] to <i>β</i> rather than expected [ʔ])
ò''órí	‘effort’ < Hausa <i>kò'karí</i>
tà''ámá	‘pride’ < Hausa <i>tà'kamā</i>
àgóggò	‘watch, clock’ < Hausa <i>àgōgo</i>
àkkú	‘parrot’ < Hausa <i>àku</i>

Names and titles: An unusually large proportion of proper names and titles have geminate consonants. Our current database shows 14 out of 65 names (21.5%) and 5 out of 34 titles (14.7%) with geminate consonants. While I would not call gemination of root consonants in these categories a morphological “process”, it appears that use of gemination has become characteristic of names and titles in the way that Hausa has developed special hypocoristic forms for proper names (Newman 2000:347ff.). Some examples of names and titles with gemination follow:

Ákkò	a man's name
Ámmà	variant name for a woman named <i>Halima</i>
Dàccú	variant name for a woman name <i>Adama</i>

Gòkkú	name for boy or girl born after a long barren period for parents
Kébbà	name for a hefty woman
Àccé	a traditional male title
Báttá	“princess”
Lúccù	a title for a member of a youth group

The categories above encompass well over half the nouns with geminate consonants in our current database. This leaves fewer than 100 apparently native Bole nouns of the 2229 nouns in the database (probably less than 4%) with geminate consonants that, given current knowledge, appear to be underived. Some examples follow:

àttí	‘gruel’ (= Hausa <i>kùnū</i>)
dàllà	‘middle’
dóbbó	‘small pot for sauce’
dàssàn	‘any worn out thing’
gòggò	‘road’
kínná	‘calf (i.e. offspring of a cow)’
kòccí	‘carrier’s head pad’
mòccí	‘locust-bean tree’
póccó	‘arrow’
wàyyà	‘animal’s tail used as fly whisk’
zòggìzò	‘disused farm’
zóttò	‘woman’s wrapper’

3.4. Two /G/ morphemes

In section 3.1, I discussed geminates resulting from assimilation of an identifiable underlying consonant to a following consonant. In sections 3.2-3, I discussed geminated root consonants, some of which come about through processes which geminate an underlying singleton, some of which seem to be lexical. Bole has two morphemes which, in the modern language, have to be specified /G/, i.e. the morphemes themselves have no underlying featural representation but are a geminate copy of a neighboring consonant, whatever it may be.

3.4.1. Perfective feminine agreement /G/

If the subject of a verb in the perfective is 2nd or 3rd person feminine singular, it requires an agreement morpheme /(a)G/. This agreement pattern is paralleled by constructions with plural subjects in all persons, which require an agreement morpheme /(a)n/. I illustrate perfective verbs with non-feminine singular, feminine singular, and plural subjects to illustrate.¹³ The feminine and plural agreement morphemes are boldfaced. “Totality” -*tV* gives a sense of ‘thoroughly done’. See below the tables for an explanation of the morphology.

“Neutral”	‘... tied (it)’	‘... tied for him’	‘... tied a nanny goat’
non-f. sing.	ngór-wò-yí	ngór-nì-wó	ngórú bàrkè
fem. sing.	ngòr- ák -kò-yí	ngòr- án -nì-k-kó	ngòr- áb bàrkè
plural	ngòr- án -gò-yí	ngòr- án -nì-n-gó	ngòr- ám bàrkè

¹³ These constructions are described in detail in Lukas (1970-72) and Gimba (2000).

+ totality -tV	'... tied (it) well'	'... tied for him well'	'... tied a goat well'
non-f. sing.	ngór-tù-wó	ngór-nī-tì	ngór-tù bàrkè
fem. sing.	ngòr-át-tù-k-kó	ngòr-án-ní-t-tì	ngòr-át-tù- ḡ bàrkè
plural	ngòr-án-tù- ḡ -gó	ngòr-án-ní- n -tì	ngòr-án-tù- m bàrkè

Perfective clitic: → *wo* following a vowel or a liquid
 → *ko* following feminine singular agreement /G/
 → *go* following a nasal
 • “suppressed” if not phrase final, but still underlyingly present
 • tone → Hi after Lo, Lo elsewhere

Ø object -yí: “Neutral” transitive verbs with no overt object add -yí to the end of the verbal complex (i.e. verb root + all clitics)

Totality -tV: → *tù* when Perfective *wo/ko/go* is present underlyingly
 → *tì* elsewhere

Fem. sing. subject: /aG/ affixed to verb root before first clitic and /G/ repeated before any subsequent clitic other than -yí; note that with a noun object the perfective clitic is underlyingly present, conditioning the addition of /G/, but the clitic is suppressed on the surface, which causes /G/ to geminate the initial consonant of the object.

Plural subject: /an/ affixed to verb root before first clitic and /n/ repeated before any subsequent clitic other than -yí; note that with a noun object the perfective clitic is underlyingly present, conditioning the addition of /n/, but the clitic is suppressed; /n/ assimilates in place of articulation to a following consonant.

Assuming that feminine agreement /G/ developed from an earlier feature-ful consonant, the question is what that consonant was. Paul Newman and I independently have speculated that it was *t. This is a widespread feminine agreement element in Chadic (and in Afroasiatic), and though Bole has, by and large, lost grammatical gender, the presence of feminine *t is still very much in evidence, e.g. in the pronominal system, which does distinguish natural gender, and in the now gender-neutral -ti genitive linker mentioned in section 3.1. However, there is no direct internal evidence in Bole, nor is there any comparative evidence in the verbal systems of other Bole-Tangale languages, for the origin of /G/ in *t. Several Bole-Tangale languages have plural agreement like that in Bole, using the widespread Chadic (and Afroasiatic) plural *n, but the only other language with any trace of feminine agreement is Bele, which shows only a difference in verb stem vowel (*hì* *bàhíkò* ‘he shot’ vs. *tì* *bàhákò* ‘she shot’—Schuh 1978:21).

Modern Bole thus requires the analysis that perfective feminine singular subject agreement is /G/, a featureless segment which gets its realization from whatever follows it. Some realization is always assured because this clitic cannot appear phrase final. There is, however, evidence that Bole speakers are imposing an underlying fully featured specification /k(i)/ on this morpheme. In natural spoken discourse, speakers occasionally substitute -ki for /G/, e.g.¹⁴

¹⁴ These examples are from recordings of tales narrated by Yaka, a woman now in her 90’s, in Potiskum Nigeria. The first example is from the tale “Lawo ga Kuređi” [The Girl and the Snake] and the second from “Ani Ndolinka ga Ani Kufadi” [The Favored Wife and the Disliked Wife].

w-**ákíiii** ènnê ... w-**ák** kùrèdī ‘she found aaah “this one” ... she found a snake’
 ítá yáné bìkk-**ákí** dīshí yê (*rather than* ... bìkk-**ád** dīshí yê) ‘she then took the skin’

In the first example, the speaker has a momentary memory lapse, pauses before the object, lengthening the feminine agreement morpheme by inserting and drawing out [i], the default epenthetic vowel of Bole, and substituting the hesitation word, *ènnê* ‘this one’. The intended object does have initial /k-, so one might argue that the /k/ of the feminine agreement is in anticipation of the object initial consonant. This does not seem likely, however, because the very reason she hesitated was because she was searching for the word. Whatever the case in this example, the second example shows that this explanation for feminine agreement /k/ cannot work across the board, since the object begins with /d-/. Using /k/ rather than /G/ is infrequent. In over 40 pages of transcribed text from this speaker, there are only 5 or 6 cases with /k/ compared to dozens if not hundreds with /G/, and they all involve hesitation at the relatively large boundary between a verb and an object. There are no examples where feminine agreement [k] appears before an overt clitic.

Although modern Bole evidence may suggest underlying /(a)k/ for the feminine singular subject agreement marker, this must be a reanalysis rather than phonetic emergence of the historical source of /G/. There is no comparative evidence of any kind to support a source *k for this morpheme. The likely source for modern Bole feminine agreement surfacing as [k] is the geminate [kk] that appears when the perfective clitic directly follows it, e.g. *ngòr-ák-kò-yí* ‘she tied (it)’ (cf. the table above), *pàt-ák-kò* ‘she went out’ (an intransitive verb without the Ø object clitic -yí). The perfective clitic comes from *ko (cf. Karekare *mú bàsán-kàu* ‘we shot’, Ngamo *mù bàsán-kò* ‘we shot’). In Bole, this clitic has weakened to -wò after a vowel or liquid and to -gò after a nasal, but the feminine agreement /G/ has protected original *ko from weakening in this way. The fact that the -ko allomorph now appears only in feminine agreement contexts makes it appear that the [k] IS the feminine agreement, allowing its extension to the hesitation contexts described above.¹⁵

3.4.2. Ventive subjunctive and imperative /G/

Bole, like many Chadic languages, has a “ventive” construction whose function is to signal that an action took place or had its inception at a distance but has effect at the place of reference (usually the location of the speaker), e.g. *àl-á-wò-yí* ‘he took (it there)’ vs. ventive *èl-én-gò-yí* ‘he brought (it here)’.¹⁶ In the subjunctive and the imperative, /G/ shows up as part of the ventive extension. I will illustrate with only the subjunctive. The facts are essentially the same for the imperative. It will be useful to compare the ventive subjunctive with the ventive perfective. Addition of the ventive to a perfective verb neutralizes the masculine/feminine/plural agreement pattern discussed in the preceding section.

Ventive only	‘... tied (it)’	‘... tied for him’	‘... tied for you (m)’
Subjunctive	ngòr- út-tù -yí	ngòr- ín-nì	ngòr- k-kò
Perfective	ngòr- úŋ-gò -yí	ngòr- ín-nì-ŋ-gó	ngòr- ín-ká-ŋ-gó

¹⁵ A linguistic analysis might take its cue from this hesitation form of the feminine agreement marker and analyze it as underlying /k/. This would not provide a more general description than the /G/ analysis, however. The latter requires an ad hoc rule /G/ → [ki] in hesitation, but the /k/ analysis would require an equally ad hoc stipulation “/k/ → [G] EXCEPT in hesitation”. The phonologically regular process to avoid a [k-C] sequence in Bole is epenthesis, not assimilation.

¹⁶ The oft-stated definition of the ventive as “motion toward the speaker” is inaccurate. Verbs that involve no inherent motion can freely take the ventive, e.g. ‘ask’ + ventive would mean “ask and come with the answer”. Lukas’s (1971:4) term *Entfernungserweiterung* for the Bole extension is a more apt label than the now commonly used “ventive”, but I will continue to use the widespread English term.

+ totality -tV	‘... tied (it) well’	‘... tied for him well’	‘...tied for you (m) w.’
Subjunctive	ngòr-ít-tì	ngòr-ín-ní-t-tì	ngòr-ík-ká-t-tì
Perfective	ngòr-ún-tù-ŋ-gó	ngòr-ín-ní-n-tì	ngòr-ín-ká-n-tì

Comparing these tables to those for the feminine singular and the plural agreement markers in the preceding section shows a striking parallel. The two agreement morphemes and the ventive all share the same pattern:

V-root + VC_x (+ clitic + C_x + clitic) ...

where C_x is the consonant particular to the morpheme (/n/ for perfective plural and perfective ventive, /G/ for perfective feminine and subjunctive ventive). An anomaly is the clitic *-tu-* which shows up in the ventive subjunctive when no pronominal clitic is present. This is seen in *ngòr-út-tù-yi* in the column ‘... tied (it)’, but it also shows up, for example, if there is a nominal rather than a pronominal object, e.g. *ngòr-út-tù tèmshí* ‘he tied a sheep’. The source of this *-tu-* is, at present, a mystery.¹⁷

The primary difference between the subjunctive ventive and the perfective ventive is that where the perfective has /n/, the subjunctive has /G/. In fact, this is the ONLY difference when a pronoun clitic is present together with the totality extension. The most likely reconstruction for the ventive is **n*, a ventive form found elsewhere in Chadic, e.g. Ngizim *á ràurén* ‘call (here)!—cf. non-ventive *á ràurí*. What, then, is the source of Bole ventive subjunctive /G/? The answer seems to lie in the forms with pronoun clitics. Three of the eight pronominal clitics have an initial nasal, viz. *-no* ‘me’, *-ni* ‘him’, *-mu* ‘us’. If we reconstruct **n* as the primary ventive marker, the result in subjunctive verb + pronoun will be a geminate nasal for all three of these pronouns. It appears that these forms were reanalyzed from /n + nasal/ to /G + nasal/. Once this reinterpretation took place, then /G/ became the representation for subjunctive ventive before all clitics. I illustrate the path with the singular indirect object paradigm:

	Original	Reinterpretation	Modern Result
1 singular	*ngòr-ín-nò	ngòr-íG-nò	ngòr-ín-nò
2 masc. sing.	*ngòr-ín-kò	ngòr-ín-kò	ngòr-ík-kò
2 fem. sing	*ngòr-ín-shì	ngòr-ín-shì	ngòr-ísh-shì
3 masculine	*ngòr-ín-nì	ngòr-íG-nì	ngòr-ín-nì
3 feminine	*ngòr-ín-tò	ngòr-ín-tò	ngòr-ít-tò
no clitic	*ngòr-ún-tù-yí	ngòr-ún-tù-yí	ngòr-út-tù-yí

This scenario does not answer the question of why the same reinterpretation did not take place in the perfective, which has exactly the same set of pronominal clitics as the subjunctive and hence the same fulcrum for change of **n* to /G/. The answer seems to lie in the fact that the perfective will ALWAYS at least one clitic which does not have an initial nasal (the perfective marker *-go* or the totality *-tV*). Even when the ventive /n/ abutted a nasal clitic (as in the column labeled ‘... tied for him’), there would have always been another nasal later in the verb complex to “remind” the speaker that the first half of the ventive was /n/, not /G/.

4. Some Conclusions

In this paper, I have tried to show that although geminate consonants are strikingly pervasive in Bole, they can, for the most part, be shown to derive from singletons through

¹⁷ There are no ventive morphemes with a consonant “t” outside Bole, as far as I know. It looks like the Bole totality *-tV-*, but the path by which the totality could take on a ventive function is also mysterious.

a variety of processes. In the last two sections, I have shown how such processes have created at least two morphemes in Bole whose representation is /G/, a segment entirely dependent on neighboring consonants for its phonetic realization. I offer two conclusions from this study of Bole, one having to do with gemination in Bole in general, the second having to do with reanalysis in a language by its native speakers.

4.1. Gratuitous gemination in Bole

The pervasiveness of geminate consonants in Bole results, historically, from the convergence of several sources. I argued that gemination as a method for forming pluractional verbs, and probably as a way for forming noun plurals, derives historically from reduplication and subsequent syncope of the vowel of the reduplicated syllable, leaving abutting identical consonants, i.e. geminates. This sequence of events took place early in the history of the Bole-Tangale group and has been inherited in languages throughout the group. Probably of more recent vintage are geminates that have arisen through phonological assimilations, such as nasal and *d* assimilation (section 3.1), which are still productive, and those that are not still productive, but come out as rules affecting certain morphemes, such as the words for ‘all’, certain genitives, and probably the perfective feminine agreement marker. Finally, Bole has borrowed words that had geminates in the source languages.

Despite this variety of sources for gemination, there are many words with geminates for which there is no obvious source. In the 2229 nouns of our current database there are 50-100 nouns with geminate consonants that cannot be obviously explained as coming from any of the sources above, and even allowing for lexicalized pluractional verbs, it is hard to believe that Bole would have lexicalized over 20% of its verbs as pluractionals. I speculate that because of the large number of geminate consonants which have worked their way into Bole through convergent processes that gemination has become part of the *Sprachgefühl* of the language, resulting in what I refer to as “gratuitous gemination”, i.e. sporadic gemination for no other reason than it “sounds good”. I have neither the information nor the space here to explore this in detail, but one fact supporting the notion of gratuitous gemination is the existence of Bole dialect variants differing only in gemination, e.g.

Fika dialect	Gadaka dialect	
bòlòu	bòlláu	‘two’
háccítà	hásítà	‘sneezing’
mésshékì	mésésékì	‘ <i>Guiera senegalensis</i> ’
rùtá	rùttá	‘work’
sàllú	sálú	‘hack off’
’yàllú	’yálú	‘become unhafted’

Gratuitous gemination may also be at work in closely related Kirfi. Recall that in the wordlist in Schuh (1984), both Bole and Kirfi have geminates in words where the other languages do not have geminates, but the words with geminates in Bole and Kirfi are not, for the most part, the same words.

If my hypothesis about gratuitous gemination in Bole (and Kirfi) is correct, this would be a sound change working item by item, contrary to the normal patterns of sound change that Neogrammarians such as myself like to see!

4.2. Native speakers of a language as linguists

As I repeatedly say to the students in my Introduction to Language course, “Everyone is a linguist.” Speakers are constantly analyzing their own languages. We do this every

day in recognizing speech errors of others and correcting our own, in recognizing regional and foreign accents, in interpreting jokes that rely on puns or ambiguity, and, of course, in parsing the strings of speech that we produce and hear. In linguistics, we teach our students to seek out generalizations in language data, and because the test of a good linguistic hypothesis is whether it predicts facts that were not part of the original data set, linguists are expected to be on the lookout for data that would prove (in both the sense of “test” and “demonstrate the correctness of”) their hypotheses. Native speakers likewise look for generalizations, but unlike professional linguists, they are under no burden to continue to check their hypotheses once they make them.

Such seems to have been the case for the /G/ morphemes in Bole. Speakers seem to have analyzed feminine agreement /G/ as /k/ for use in hesitation forms not because it correlates with feminine agreements (typically “t”) elsewhere in Bole but because it shows up in the fairly frequent collocation with the perfective marker as [k]. Moreover, there is no evidence that this /k/ is being generalized to environments other than that as a hesitation form between a verb and a non-clitic object. On the other hand, because of sound change, the three forms of the perfective marker, *-wo/-go/-ko*, correlate exactly with the non-feminine singular/ feminine singular/ plural agreement pattern. It may be this correlation which has reinforced the choice of [k] over the other consonants of geminate pairs that one might choose from.

In the case of the subjunctive/imperative ventive /G/, speakers have blithely ignored the clear ventive marking by /n/ in the perfective and have destroyed the cross-paradigm generalization by reanalyzing subjunctive and imperative ventive as /G/, apparently on the basis of the form that the ventive morpheme takes when used with a few pronoun clitics. On the other hand, this reanalysis has had the effect of making the perfective and subjunctive ventive distinct when the totality extension is present together with object clitics, a distinction in aspect which would otherwise be neutralized.

One can never be sure what the “real” motivation behind speakers’ reanalyses such as these might be. From the point of view of analytical insight, these reanalyses would probably get C’s in a course in phonology, but on the other hand, if the observations I have made about correlations with facts not directly related to the reanalyzed elements themselves are correct, the reanalyses bring about useful functional realignments that might count for more than a maximally tight linguistic analysis.

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