The phonology of noun-class and gender markers, with special reference to Western Koromfe (North Central Gur)

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HANDOUT

1 Introduction

1.1 Noun-class markers with phonological substance and no phonology

(1) Some common phonological properties of noun classes in Bantu and many other Niger-Congo languages:
   a) The noun-class marker is a single CV syllable (sometimes only V, sometimes a syllabic nasal).
   b) The vowel of the noun-class marker is phonologically **short** (even if the language has long vowels), **oral**, **non-ATR** and **mono-elemental** (i.e. one of the three vowels /ɪ, ʊ, a/). Mid vowels, being bi-elemental, are excluded.
   c) The vowel of the noun-class marker has no tone of its own, but is assigned a tone either by a general rule, or idiosyncratically by the noun stem. (This tone is identical for all noun class markers attached to any given noun stem, and is therefore a lexical property of the noun stem.)
   d) The phonological shape of the noun-class marker does not assimilate to any property of the noun stem except ATR in ATR-harmony systems.
   e) Some nouns can have more than one noun-class marker.

1.2 Noun-class markers with phonological substance and phonology

(2) The most common violations of the properties in (1) at the lexical/underlying level:
   a) More complex segment structure: C may be a contour segment; V may be mid or ATR (either lexically or by phonological process).
   b) More complex syllable structure (Atlantic languages allow markers of the shape CVC; Koromfe has one marker with VCV).
   c) Especially with suffixal noun-class markers, fusion, nasalization and other phonological processes may occur.

1.3 Noun-class markers with phonology but no phonological substance: mutations

2 Noun classes in (Tshi)Venḓa

(3) The consonants of Venda (without palatalised and labiovelarised). Venda data comes from Murphy (1997), Neubarth & Rennison (2005), van Warmelo (1989) and my own research.

pʰ		t̪ʰ	tʰ			kʰ	
p		t̪	t			k	
b		d̪	d			g	
m		n̪	n			ŋ	
ᵐb		ⁿ̪d̪	ⁿd			ᵑg	
pᶠʰ			tˢʰ	tʃʰ			
pᶠ			tˢ	tʃ			
bᵛ			dᶻ	dʒ			
ᵐbᵛ			ⁿdᶻ	ⁿdʒ			
ɸ	f		s	ʃ		x	
β	v		z	ʒ			
	ᵐv		ⁿz	ⁿʒ			
			r				
		l̪	l				
w					j		ɦ

(4) The noun classes of Venda (based partly on Nurse & Philippson 2003). M=mutation.

Class	*on noun*	*subj.agr.*	*obj.agr*
1	mu-	u-/a-	mu-
1a	ma- / ∅		
2	βa-	βa-	βa-
2a	βo-	βa-	βa-
3	mu-	u-	u
4	mi-	i-	i-
5	l̪i- / ∅ / M1	l̪i-	l̪i-
6	ma-	a-	a-
7	tʃi-	tʃi-	tʃi-
8	zwi-	zwi-	zwi-
9	M2	i-	i-
10	M2	dzi-	dzi-
11	lu-	lu-	lu-
14	βu-	βu-/ɦu-	βu-
15	u-	ɦu-	ɦu-
20	ku-	ku-	ku-

2.1 *Mutation 1 in Venda*

(5) Examples of Mutation 1 (noun class 5).[1] (Data from Neubarth & Rennison 2005)

unmutated			*Mutation 1*		
word	*class*	*gloss*	*word*	*class*	*gloss*
mupani	3	mopani tree, ironwood tree	bani	5	plain covered mostly w/ mipani trees
mat̪alerʷa	6	wild dogs	d̪alerʷa	5	wild dog
matemba	6	big, wide-mouthed calabashes for flour storage	demba	5	wide-mouthed calabash for storing flour; xylophone resonator
makumba	6	eggs	gumba	5	egg
mukʷama	3	large pocket, satchel	gʷama	5	big pouch, satchel
muramba	3	wild orange	ʃamba	5	fruit of muramba
maluβa	6	flowers	dzuβa	5	flower, blossom
maβemba	6	pieces of cloth	vemba	5	piece of cloth

2.2 *Mutation 2 in Venda*

(6) Examples of Mutation 2 (noun classes 9 and 10)[2]

unmutated			*Mutation 2*		
word	*class*	*gloss*	*word*	*class*	*gloss*
mupimo	3	measure	pʰimo	9	measure
mut̪ovuma	3	Ekebergia Meyeri Presl. tree	t̪ʰovuma	9	fruit of the mut(tm)ovuma
mut̪ʷari	3	Croton gratissimus Burch. tree	t̪ʰʷari	9	fruit of the mutwari
matuᵐba	6	ruins of huts	tʰuᵐba	9	temporary hut
lukena	11	notch	kʰena	10	notches
lukʷea	11	sickle w/ long handle	kʰʷea	10	sickles w/ long handles and small semi-circular blades
tʃʰiboɦo	7	certain note in Venda reed-flute ensemble; certain counter in mafuvha game	ᵐboɦo	9	bull or other male animal; certain star in East; certain counter in mufuvha; certain note in reed-flute ensemble
mud̪alo	3	abundance; feast after a victory	ⁿd̪alo	9	plenty, abundance
madaᵐbi	6	misfortune sent to an enemy by sorcery	ⁿdaᵐbi	9	calamity, disaster
ged̪ane	5	chain	ᵑged̪ane	9	chain
lufuko	11	light dust	pᶠuko	9	molerat; tuberculosis in glands
musen³e	3	cabbage tree	tˢʰen³e	9	marrow of horn; cabbage tree fruit
muʃato	3	sausage tree	tʃʰato	9	fruit of mushato

[1] Mutation 1 occurs mainly on the first stem-consonant of nouns of class 5 and precludes any noun-class prefix; but not all nouns of Class 5 are obligatorily mutated: some remain unmutated and take no noun-class prefix, and others remain unmutated and take the noun-class prefix /li-/. In reduplicated words, the second occurrence of the stem-initial consonant is usually not mutated (in contrast with Mutation 2, where it sometimes is).

[2] Mutation 2 occurs mainly on the first stem-consonant of nouns of classes 9 and 10 and precludes any noun-class prefix. In reduplicated words, the second occurrence of the stem-initial consonant is quite often mutated (in contrast with Mutation 1). In a small number of cases, both consonants of a CVCV noun stem can be mutated.

unmutated			*Mutation 2*		
word	*class*	*gloss*	*word*	*class*	*gloss*
luvi	11	single grey hair	ṃ^{m}b^{v}i / ṃ^{m}vi	10	grey hair
murap^{f}a	3	Grewia flava DC shrub; Grewia villosa Willd. shrub	t^{h}ap^{f}a	9	fruit of murapfa
mulolo	3	wild banana tree	^{n}dolo	9	fruit of mulolo tree
luɦaḏa	11	half a wooden knife sheath; mussel, oyster	k^{h}aḏa	9	mussel; wooden sheath for knife
luɦ^{w}iḏa	11	(archaic) sickle	k^{hw}iḏa	10	(archaic) sickles
luɸalaɸala	11	horn used as a trumpet	p^{h}alaɸala / p^{h}ala p^{h}ala	9	sable antelope; sable horn, used as trumpet
luβone	11	candle	^{m}bone	9	candle

(7) Mutations 1 and 2 schematically. (**Beware**: Do not read from left to right, but from the centre outwards!)

Mutation 1		*unmutated*		*Mutation 2*
b	←	p	→	p^{h}
b^{w}	←	p^{w}		
ḏ	←	ṯ	→	ṯ^{h}
	←	ṯ^{w}	→	ṯ^{hw}
d	←	t	→	t^{h}
g	←	k	→	k^{h}
g^{w}	←	k^{w}	→	k^{hw}
		b	→	^{m}b
		ḏ	→	$^{n̪}$ḏ
		d	→	^{n}d
		g	→	^{ŋ}g
		f	→	p^{f}
		s	→	t^{sh}
		ʃ	→	t^{ʃh}
		v	→	^{m}b^{v} / ^{m}v
ʃ	←	r	→	t^{h}
d^{z}	←	l	→	^{n}d
		ɦ	→	k^{h}
		ɦ^{w}	→	k^{hw}
		ɸ	→	p^{h}
v	←	β	→	^{m}b

2.3 Possible analyses

- **Mutation 1** is a floating L operator. It voices but does not nasalise. Apparently [ʒ] is not a possible outcome. Word-initial [ʒ] is far less common than [ʃ] in Venda.
- **Mutation 2** is a floating H operator and Stop head. If L is already present it must move to head position. The pre-existing head must nevertheless be realised, so a contour segment with the sequence "L-head, Stop-head" is formed (i.e. a prenasalised stop).

3 Noun classes in Yukuben

(8) The phonological structure of Yukuben noun-class prefixes

Syllable structure: (C)V
C can be: /b/ or /k/ (or ∅), V can only be mono-elemental (/i/, /u/ or /a/).[3]
But the combination /bi/ is excluded.

3.1 I/U assimilation from stem to prefix

(9) The vowel inventory of Yukuben. Schwa ([ə]) is absent because it is the result of a metrical reduction process affection only stem vowels. Final /Vŋ/ can optionally become [Ṽ]; otherwise there are no nasal vowels. The vowels /e/ and /o/ are **lexically/underlyingly** absent from the noun-class suffixes because they have more than one element of the set {I,U,A}. There are no phonological long vowels, but phonetically the vowels of the noun-class prefixes are usually long.

a. in general

lexical / /		*phonetic [ ]*		
i	u	i		u
e	o	e	ə	o
a		a		

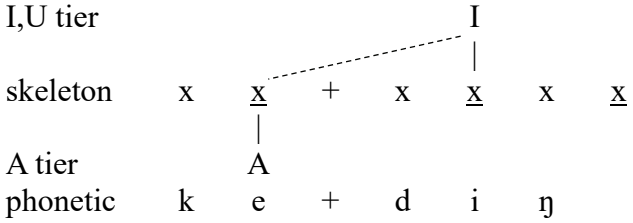
b. in noun-class prefixes

lexical / /		*phonetic [ ]*	
i	u	i	u
		e	o
a		a	

(10) Some sg.-pl. pairs of nouns in Yukuben. (Data taken from Rennison 2014). Small capital A indicates a floating A element (always stem-initial – see §3.2).

	phonetic	*lexical*	*gloss*
a.	ūᵑgāg	u- ᵑgāg	gazelle
b.	bāᵑgāg	ba-ᵑgāg	gazelles
c.	kíɟú	ki-ɟ́ú	seed
d.	íɟú	i-ɟ́ú	seeds
e.	ùtíg / ùtəx	u-̀tíg	hill
f.	kùtíg / kùtəx	ku-̀tíg	hill
g.	bètíg / bètəx	ba-̀tíg	hills
h.	kógú	ka-́gú	snake
i.	búgú	bu-́gú	snakes
j.	kēk͡pər / kēk͡pɽ́	ki-Āk͡púr	face
k.	āk͡pər / āk͡pɽ́	a-Āk͡púr	faces
l.	kēᵐbər / kēᵐbɽ̄	ki-Āᵐbār	belly
m.	āᵐbər / āᵐbɽ̄	a-Āᵐbār	bellies

(11) Yukuben assimilation of I or U from a noun stem into the noun-class prefix (Rennison 2018a). Lexical */kA-¯dìŋ/* 'NCL+good' is harmonised to *[kēdìŋ] / [kēdəŋ]*. Tone tier omitted.



[3] Since there is no ATR contrast in Yukuben, I use the simpler transcription

(12) Lexical */ka- ¯wūŋ/* 'NCl+liver' is harmonised to *[kōwūŋ] / [kōwāŋ]* (Rennison 2018a). Tone tier omitted.

I,U tier					U		
					|		
skeleton	x	x	+	x	x	x	x
		|					
A tier		A					
phonetic	k	o	+	w	u	ŋ	

3.2 Stem-initial floating A elements in Yukuben

(13) GP representation of Yukuben *[kēᵐbār]* 'belly' from lexical */kiᵢ-Āᵢᵐbār/* (only the vowels are shown)

I,U line		I					
		|					
skeleton	x	x			x	x	
						|	
A line				A		A	
lexical	k	i	+	Ā	ᵐb	ā	r
phonetic	k	ē			ᵐb	ə	r

(14) GP representation of Yukuben *[bōgùŋ]* 'eagles' from lexical */buᵤ-Āgùŋ/* (only the vowels are shown). Cf. also the alternate plural *[bāgùŋ]* from */baₐ-Āgùŋ/* and the singular *[ēgùŋ]* from */iᵢ-Āgùŋ/*.

I,U line		U				U	
		|			|	
skeleton	x	x			x	x	
A line				A			
lexical	b	u	+	Ā	g	ù	ŋ
phonetic	b	ō			g	ù	ŋ

3.3 What does this mean for the treatment of noun-class markers in general?

(15) The phonological shapes of Yukuben noun-class prefixes and their phonetic realisations: 8 expand to 57.[4]

/ /	[ ]
i	í, ī, ì, é, ē, è
a	á, ā, à, é, ē, è, ó, ō, ò
u	ú, ū, ù, ó, ō, ò
ki	kí, kī, kì, ké, kē, kè
ka	ká, kā, kà, ké, kē, kè, kó, kō, kò
ku	kú, kū, kù, kó, kō, kò
ba	bá, bā, bà, bé, bē, bè, bó, bō, bò
bu	bú, bū, bù, bó, bō, bò

[4] Recall that if the phonetic vowel is mid, there is no unique mapping to a single lexical vowel quality of the prefix (with the single exception of [be-], which is always a realisation of /ba-/ because there is no noun-class prefix /bi-/). Thus phonetic [e] in a noun-class prefix can result from /i/ or from/a/, and phonetic [o] from /u/ or /a/.

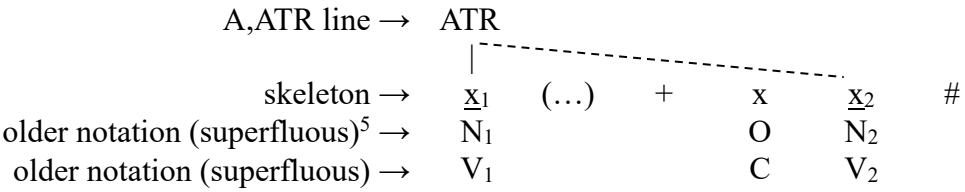
4 Noun classes in Mòoré

4.1 What happens to the suffixes (part 1)?

(16) Examples of ATR harmony in Mòoré. Only suffix vowels (/ɪ, ʊ, a/) can be harmonised. Vowels above the orange line have ATR harmony, those below it do not. Note, in particular, that /e/ and /o/ do not trigger ATR harmony, as in f. and g. The tones (H or L) of the noun-class suffix float at the end of the stem.

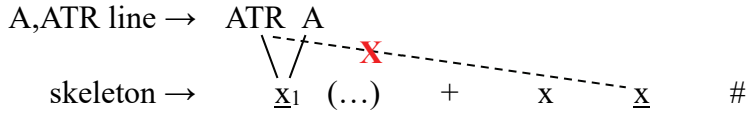
	phonetic	*lexical*	*gloss*	*stem vowel*	*suffix vowel*
a.	túsrí	tús ˊ-rɪ	thousand	/u/	/ɪ/ → [i]
b.	wúlgú	wúl ˊ -gʊ	fog	/u/	/ʊ/ → [u]
c.	bíigʌ́	bí ˊ-ga	child/fruit	/i/	/a/ → [ʌ]
d.	wóbgʊ̀	wób ˋ -gʊ	elephant	/ʊ/	/ʊ/ remains [ʊ]
e.	jɛ́lá	jíl ˊ -a	problems	/ɪ/	/a/ remains [a]
f.	bòosí	bò ˊ-sɪ	goats	/o/	/ɪ/ remains [ɪ]
g.	bétʊ́	béd ˊ -dʊ	sorrel (pl.)	/e/	/ʊ/ remains [ʊ]
h.	láasí	lá ˊ -sɪ	plates	/a/	/ɪ/ remains [ɪ]

(17) GP representation of ATR-harmony in Mòoré (adapted from Rennison 1996)



x̲1 can effectively only be /i/ or /u/. Any number of CV pairs may intervene between x̲1 and x, provided that their x̲ has no melody. x may also be empty. x̲2 may be /ɪ/, /ʊ/ or /a/ (the only 3 vowels occurring in the noun-class suffixes of Mòoré).[6] This process takes precedence over A-umlaut (described below).

(18) GP representation of the failure of a mid vowel to trigger ATR-harmony in Mòoré (adapted from Rennison 1996). Here the ATR element cannot spread without crossing the association between A and x̲1.



[5] In the brand of Government Phonology used here, which was formulated in Rennison & Neubarth (2003), all phonological syllables are now called sylls because they are short. A syll consists of a C(onsonant) V(owel) pair, also often termed "O(nset) N(ucleus) pair", and are represented on the skeleton by unheaded (x) or headed (x̲) points. The syll thus has the x-bar structure:

and we can all save a lot of ink. O=C=x and N=V=x̲. Also, the term "syllable" can now be used for phonetic syllables of the traditional types, on the understanding that syllable structure is not syll structure.

[6] I am aware that there is a deverbal noun that is claimed to have the suffix /e/. At the moment I have insufficient reliable data to advance an analysis.

4.2 What happens to the stems?

(19) Examples of I-umlaut in Mòoré (Rennison 2018a).[7] The parts of vowels affected by I-umlaut are **red**, bold and underlined.

sg. phonetic	*sg. lexical*	*pl. phonetic*	*pl. lexical*	*gloss*
bɔ̃ãŋgá	bɔ̃ŋ ˊ+ga	bɔ̃ĩ̲ŋsí	bɔ̃ŋ ˊ+sɪ	donkey
zɔ̃ãŋgá	zɔ̃ŋ ˊ+ga	zɔ̃ĩ̲ŋsí	zɔ̃ŋ ˊ+sɪ	blind

NB: Both of the singular forms given here are subject to A-umlaut.

(20) Examples of Mòoré U-umlaut. Only */i, ɪ, e, a/* can be harmonised; parts of vowels affected by U-umlaut are shown **red**, bold and underlined.

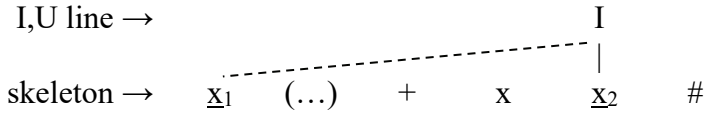
sg. phonetic	*sg. lexical*	*pl. phonetic*	*pl. lexical*	*gloss*
kíu̲u̲gù	kí ˋ+gʊ	kítù	kí ˋ+dʊ[8]	moon
tíʊ̲gó	tí ˊ+gʊ	tíɪdó	tí ˊ+dʊ	luggage
béʊ̲dgó	bé ˊ+gʊ	bétó	bé ˊ+dʊ	sorrel
ráʊ̲ʊ̲gó	rá ˊ+gʊ	ráadó	rá ˊ+dʊ	male (animal)

(21) Examples of Mòoré A-umlaut. Only /ɪ/ and /ʊ/ can be harmonised; the (parts of) vowels affected by A-umlaut are **red**, bold and underlined.

sg. phonetic	*sg. lexical*	*pl. phonetic*	*pl. lexical*	*gloss*
bɛ̀ndá	bìnd ˊ+a	bìndsí	bìnd ˊ+sɪ	loincloth
bíŋgrì	bíŋg ˋ+rɪ	bɛ́ŋgà	bíŋg ˋ+a	bean
kóa̲a̲dà	kó+d ˋ+a	kʊáa̲dbá	kó+d ˋ+bá[9]	farmer
nóbrí	nób ˊ+rɪ	nóa̲bá	nób ˊ+a	nut

NB: The +ATR high vowels /i/ and /u/ cannot be affected by A-umlaut; instead, ATR-harmony occurs. Thus, we have [bi̱igʌ́] 'child', and not *[be̱egá] or *[be̱egʌ́] or *[bíigá]

(22) GP representation of I-umlaut in Mòoré (adapted from Rennison 2016).



x̲1 must have a melody (i.e., effectively, must be attached to a U or A element). Any number of sylls may intervene between x̲1 and x, provided that their x̲ has no melody.

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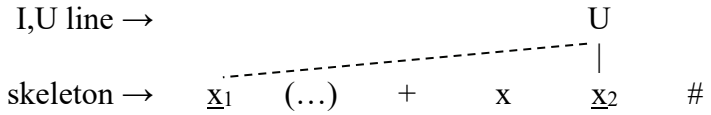
7 The transcriptions of Mòoré used here are close to IPA and do not conform to the official orthography. In particular the vowel qualities and tones differ. However, the convention of doubling the last vowel of a long diphthong is kept. Thus, for example, in (21) [ʊa] is short and [ʊaa] long.
In the examples given here, the velar nasal following the harmonisation site is palatalised by the newly "inserted" (i.e. additionally interpreted) I element which precedes it.

8 In Mòoré CV stems gain an extra empty CV immediately after the first vowel in order to fulfil the minimal length requirement of 3 CV pairs. Usually it is the first vowel (here /i/) that associates to the V position this new empty CV pair; but in this word (and several others with the same suffix) it is the initial consonant of the suffix that spreads to the left into the C position of the new CV pair, producing a geminate *d+d* which is realised as phonetic [t]. In this table we have two examples each of vowel lengthening and consonant gemination.

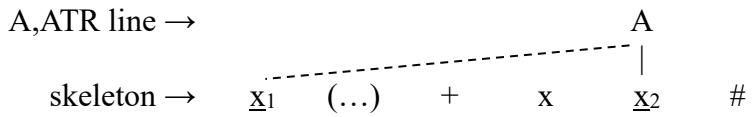
9 Normally, all noun-class suffixes of Mòoré are toneless, and their tone specification is determined (lexically) by the noun stem. In a few rare cases, the noun-class suffix /-ba/ seems to have its own H tone; however, such words could be analysed as a 3-tone stem. The singular can only realise two tones, but the plural is long enough to realise three.

(23) GP representation of U-umlaut in Mòoré.



$\underline{x}_1$ must have a melody (i.e., effectively, must be attached to an I or A element). Any number of sylls may intervene between $\underline{x}_1$ and x, provided that their $\underline{x}$ has no melody.

(24) GP representation of A-umlaut in Mòoré.



$\underline{x}_1$ must have a melody (i.e., effectively, must be attached to an I or U element). Any number of sylls may intervene between $\underline{x}_1$ and x, provided that their $\underline{x}$ has no melody. x may also be empty. ATR-harmony takes precedence over this process.

4.3 What happens to the suffixes (part 2)?

(25) Mòoré stem vowels preserving the identity of lost vowels of noun-class suffixes

a. mʊàag zɑ́ràmé (from /mʊ+g**a**/)
Mossi person be far away
'The Mossi person is far away'

b. mòʊg zɑ́ràmé (from /mʊ+g**ʊ**/)
Mossi country be far away
'Mossi country is far away'

The first word of sentence a. underwent A-umlaut before its final vowel was lost.

4.4 What does this mean for the treatment of noun-class markers in general?

5 Noun classes in Koromfe

5.1 What happens to the suffixes

(26) Phonological processes affecting noun-class suffixes in Western Koromfe. (Details omitted for speed; they are given in (29) below.)

Nasalization of consonants (/b/ → [m], /d/ → [n], /g/→ [ŋ])
Nasalization of vowels
Fusion (/bb/ → [p], /dd/ → [t], /gg/ → [k], /bg/ → [k])
/l+d/ → [ll]
Simplification of geminates except after the first stem vowel
Final high vowel deletion after [ŋ]
Realisation of unlicensed empty nuclei with an A element and subsequent vowel harmony

(27) Western Koromfe noun class suffixes with the most frequent sg.-pl. pairings in the same row. ATR harmony is not noted here (it is regular and well behaved). These are lexical/underlying forms of the suffixes with well-behaved examples. For their other phonetic realisations, see (28) below.

Sg.	*Pl.*	*Proto-Bantu ??*		*other info*	*example*[10]		
		Sg.	*Pl.*		*Sg.*	*Pl.*	*gloss*
ɔ / ɪɔ	ba	1	2	human	seno	senəbʌ	‘young’
					arɪɔ	arba	‘blacksmith’
a	ma / ammã	1a	2a	special human (kinship)	bara	barama	‘husband’
					ɲã	ɲãmmã	‘mother’
ʊ	ɪɪ	3	4	long thin & animals (horse, sheep)	bãŋsʊ	bãŋsɪɪ	‘spear’
	fɪ	3	8	long thin	bərʊ	bərəfɪ	‘road’
dɛ	a / ɪa / aʊ	5	6	Sg. also N → abstract N and V → action N; Pl. also used by some V → action N	honde	honʌ	‘bean’
					gomde	gomʌu	‘box’
					dɛgrɛ	dɛgɪa	‘load’
gʊ	ɪ / hĩ / ĩã	15	4	Pl. also = collective, *-ĩã* only in a small set of adjectives.	komgu	komi	‘kind of tree’
					sərgʊ	sərhĩ	‘other’ NON-HUMAN
					bãŋnəgʊ	bãŋnəhĩ	‘hammer’
					pɔ̃nɔ̃ŋ	pɔ̃nĩã	‘white’
	sʊʊ		8	mainly tree names, = Mòoré *–se* (/sɪ/)	dʊləgʊ	dʊləsʊʊ	‘crow’
ga	nɪ	12		diminutive	jergʌ	jerəni	‘rabbit’
fɛ		19		singulative / language	koromfe		‘Koromfe’
					tife	tii	‘elephant’
m		6		amorphous (water, flour)	ɲãm		‘blood’
am		?6		infinitive	laram		‘to look for’
ʊ		14		action nouns from verbs, = Mòoré ‹*–bo*› (/bʊ/)	dɪʊ		‘eating’
fa		16		locatives (from impv. verb stem)	samməfa		‘place for washing’
ɪ / ɪɪ				V/N → abstract N	dəɪ		length
					sɪgfɪɪ		‘silence’
aɪ / ɛɪ / ɛ̃ĩ				(harmonised by ɪ or ʊ in the preceding V) N/V → abstract N	ɲãŋaɪ		‘resemblance’
					kãĩmɛ̃ĩ		‘age’
					bərəmɛ̃ĩ		‘softness’
lɛɪ				N → abstract N, V infinitive.	dɛɪlɛɪ		‘to be able to, ability, power’
mãð				V → result N	tɔkmãð		‘clearance’
	sɪ		?8	V → repeated action noun (from pfv. stem)	timsi		‘tries, attempts’

[10] Schwas in Koromfe are phonologically irrelevant and can safely be ignored in the data presented here. They are only obligatory (i.e. unavoidable) in two pronouns that contain no lexical vowel, [mə] ‘I, me, my’ and [də] ‘he/she, etc.’).

(28) Three Koromfe singular noun-class suffixes and their phonetic sub-types. (The plural forms of the example words are regular.)

	Class (sg./pl.)	*Sub-type*	*Example*		
			Sg.	*Pl.*	*Gloss*
a.	dɛ/a	[dɛ]	gʊmdɛ	gʊma	‘piece’
b.		[lɛ]	sʊllɛ	sʊla	‘eagle’
c.		[nɛ]	j̃ɛ̃mmənɛ	j̃ɛ̃mmã	‘tooth’
d.		[ndɛ]	hɛ̃mɛ̃ndɛ	hɛ̃mɛ̃j̃ã	‘crocodile’
e.		[rɛ]	jabrɛ	jaba	‘march’
f.		[tɛ]	hʊtɛ	hʊra	‘soul’
g.	gʊ/ɪ	[gʊ]	pogu	poi	‘claw’
h.		[kʊ]	fɛkʊ	fɛbɪ	‘tree’
i.		[ŋgʊ]	nuŋgu	numi	‘millstone’
j.		V+[ŋ]	joroŋ	joroi	‘large pot’
k.		[Ṽŋ]	bɔ̃nɔ̃ŋ	bɔ̃nɪ	‘goat’
l.	ga/nɪ	[ga]	hɔ̃sga	hɔ̃snɪ	‘well’
m.		[ŋa]	fʊllaŋa	fʊllanɪ	‘Fulani (person)’
n.		[ka]	sɔka	sɔgnɪ	‘small’
o.		[laŋa]	jɪllaŋa	jɪllaʊ	‘breast’

(29) Individual derivations of the words given in (28) above.

a. dɛ/a [dɛ] gʊmdɛ gʊma ‘piece’
Sg. lexical: /gʊm+dɛ/. No phonological processes applied.
Pl. lexical: /gʊm+a/. No phonological processes applied.

b. dɛ/a [lɛ] sʊllɛ sʊla ‘eagle’
Sg. lexical: /sʊl+dɛ/. /d/ → [l]. (Phonetic [d] occurs only word-initially or after a nasal consonant; but also many /d/’s after a nasal are nasalised. Elsewhere, /d/ → [r].)[11]
Pl. lexical: /sʊl+a/. No phonological processes applied.

c. dɛ/a [nɛ] j̃ɛ̃mmənɛ j̃ɛ̃mmã ‘tooth’
Sg. lexical /j̃ɛ̃mm+dɛ/. /d/ → [n] after a nasal stem vowel, and /d/ → [n] after a nasal (optionally but often).
Pl. lexical /j̃ɛ̃mm+a/. V → Ṽ (here /a/ → [ã]) after a nasal stem-vowel.

d. dɛ/a [ndɛ] hɛ̃mɛ̃ndɛ hɛ̃mɛ̃j̃ã ‘crocodile’
Sg. lexical /hɛ̃mɛ̃+dɛ/. /d/→ [nd] after the V of the second syllable if the first stem-vowel is nasal.
Pl. lexical /hɛ̃mɛ̃+a/. A /j/ is inserted to break the hiatus between stem and suffix. After a nasal stem and second vowel, the entire sequence /ja/ is nasalised.

e. dɛ/a [rɛ] jabrɛ jaba ‘march’
Sg. lexical /jab+dɛ/. /d/ → [r] everywhere except word-initially or after a nasal consonant.
Pl. lexical /jab+a/. No phonological processes applied.

[11] The distribution of the [d] and [r] allophones in the /dɛ/ suffix of Koromfe suggest that in fact the underlying consonant is an /r/ which is hardened to a stop word-initially and after a nasal consonant. Considering that Mòoré has an underlying /r/ here, this probably reflects the historical situation. However, verbs tell a different story, and the situation is very complex.

f. dɛ/a [tɛ] hʊtɛ hʊra ‘soul’
Sg. lexical /hʊd+dɛ/. /d+d/ → [t] after the first stem-vowel.
Pl. lexical /hʊd+a/. /d/ → [r] everywhere except word-initially or after a nasal consonant.

g. gʊ/ɪ [gʊ] pogu poi ‘claw’
Sg. lexical /po+gʊ/. ATR harmony, otherwise no phonological processes applied.
Pl. lexical /po+ɪ/. ATR harmony, otherwise no phonological processes applied.

h. gʊ/ɪ [kʊ] fɛkʊ fɛbɪ ‘tree’
Sg. lexical /fɛb+gʊ/. /b+g/ → (/gg/ →) [k] after the first stem-vowel before suffix /+gʊ#/.
Pl. lexical /fɛb+ɪ/. No phonological processes applied.

i. gʊ/ɪ [ŋgʊ] nuŋgu numi ‘millstone’
Sg. lexical /num+gʊ/. /m/ → [ŋ] before suffix /+gʊ#/. ATR harmony.
Pl. lexical /num+ɪ/. ATR harmony, otherwise no phonological processes applied.

j. gʊ/ɪ V+[ŋ] joroŋ joroi ‘large pot’
Sg. lexical /joro+gʊ/. /g/ → /ŋ/ between vowels, /ʊ/ is deleted word-finally after /ŋ/. ATR harmony.
Pl. lexical /joro+ɪ/. ATR harmony, otherwise no phonological processes applied.

k. gʊ/ɪ [Ṽŋ] bɔ̃nɔ̃ŋ bɔ̃nɪ ‘goat’
Sg. lexical /bɔ̃d+gʊ/. /d/ → /n/ after nasal stem-vowel, /g/ → /ŋ/ after nasal stem-vowel, /ʊ/ is deleted word-finally after /ŋ/, vowel A is inserted between /n/ and final /ŋ/ and I/U harmonised from the stem vowel, giving the second [ɔ̃].
Pl. lexical /bɔ̃n+ɪ/. No phonological processes applied.

l. ga/nɪ [ga] hɔ̃sga hɔ̃snɪ ‘well’
Sg. lexical /hɔ̃s+ga/. No phonological processes applied.
Pl. lexical /bɔ̃n+ɪ/. No phonological processes applied.

m. ga/nɪ [ŋa] fɪllaŋa fɪllanɪ ‘Fulani (person)’
Sg. lexical /fɪlla+ga/. /g/ → /ŋ/ between full vowel and suffix /+ga#/.
Pl. lexical /fɪlla+nɪ/. No phonological processes applied.

n. ga/nɪ [ka] sɔka sɔgnɪ ‘small’
Sg. lexical /sɔg+ga/. /g+g/ → [k].
Pl. lexical /sɔg+nɪ/. No phonological processes applied.

o. ga/nɪ [laŋa] jɪllaŋa jɪllaʊ ‘breast’
No phonological processes applied. (Handful of words.)

5.2 What happens to the stems?

5.3 What does this mean for the treatment of noun-class markers in general?

5.4 Invariant noun-class suffixes

(30) Two invariant noun-class suffixes which never attach to simple nouns. Both occur on deverbal nouns derived from the imperfective stem of a verb.

	Class suffix	*Derivation type*	*Example*		
			Sg.	*Pl.*	*Gloss*
p.	fa	location noun: place where Xing occurs	dɪrfa	(dɪrfafɪ)[12]	'eating place'
q.	sɪ	diminutive plural (agent or instrument)	–	dɪrsɪ	'small things to eat'

5.5 Grammatical gender

5.5.1 Word-initial noun-class markers

(31) Comparison of a) demonstrative adjectives (also used as the definite article), b) deverbal derivations from the imperfective stem (regular suffix /-d/ or /-f/),[13] c) pronouns, and d) noun-class markers on simple nouns (from (27) above).

		a. word-initial		*b. word-final*		*c. initial **and** final*		*d. final*
		short demonstr.	*long demonstr.*	*/dɪ/ 'eat'*	*deverbal derivation*	*subj. pron.*	*obj. pron.*	*ncl. on simple noun*
1.	*human sg.*	hoŋ	hoŋgo	dɪrɔ	*agent sg.*	də	dɪ	/-ɔ/
2.	*human pl.*	bɛŋ	bɛŋgɛ	dɪrba	*agent pl*	ba	ba	/-ba/
3.	*non-hum. sg.*	koŋ	koŋgo	dɪrgʊ	*instr. sg.*	gʊ	gʊ	/-gʊ/
4.	*non-hum. pl.*	hɛ̃ŋ	hɛ̃ŋgɛ	dɪrhĩ / dɪrhɛ̃	*instr. sg.*	ɪ	hĩ / hɛ̃	/-ɪ/
5.	*dimin. sg.*	kɛ̃ŋ	kɛ̃ŋgɛ	dɪrga	*agent/ instr. dimin. sg.*	ga	ga	/-ga/

Cf. also the 1st person plural pronoun: subject /ʊ/ and object /hʊ̃/ or /hɔ̃/.

The demonstrative adjectives/pronouns, given in (31a), are quite similar to the corresponding morphemes in (31b-d). But it is their differences that I find most interesting.

(32) The diminutive suffix /-ga/ becomes /-ka/ after a stem-final /b/, e.g. /gab+ga/ → [gabka] 'small knife'; /sub-ga/ → [subkʌ].

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12 Words derived with /–fa/ typically take the passe-partout plural suffix /-fɪ/.

13 In addition to the five categories shown here, there is a diminutive plural formed with /-sɪ/.

5.5.2 *Pronouns vs noun-class markers*

(33) Two words with the five grammatical noun classes.

human singular	*human plural*	*non-human singular*	*non-human plural*	*diminutive singular*	*word category*
nandɪ	namba	naŋgʊ	nahĩ / nahẽ	naŋga	deictic adjective
ndeendɪ	ndeemba	ndeeŋgʊ	ndeehĩ / ndeehẽ	ndeeŋga	interrogative adj., 'which?'[14]

6 Mòoré and Koromfe: a brief comparison

(34) Shared properties of Koromfe and Mòoré noun-class markers. (Data from Rennison (1997; 2018b), Nikièma (1989) and my ongoing research.)

a. On nouns, the noun-class markers are suffixes.
b. A stem-final consonant can fuse with an identical suffix-initial consonant immediately after the (first) stem vowel (especially /d+d/ → [t] and /g+g/ → [k], but also, rarely, /b+b/ → [p]). Fusion of /g+g/ → [k] also later in the word (e.g. [mətɔka], pl. M. [mətɔgsɪ], K. [mətɔgsʊʊ])
c. Geminates permitted after the first stem-vowel but nowhere else.
d. /a/ is permitted as a noun-class marker.
e. /m/ is permitted as a noun-class marker.

(35) Divergent properties of Koromfe and Mòoré noun-class markers.

Koromfe	*Mòoré*
Vowel set /ɪ,**ɛ̲**,a,**ɔ̲**,ʊ/	Vowel set /ɪ,a,ʊ/
Vowel short or **long**	Vowel only short
Vowel can be lexically **nasal**	Vowel cannot be nasal
Vowel be **nasalised** from the stem	
Consonant can be **nasalised**	Consonant cannot be nasalised
Syllable structures: (C)V, /m/, **/am/**	Syllable structures: (C)V, /m/, but not /am/
Has **no lexical /r/**; [r] is an allophone of /d/.	Has lexical /r/ (and has [d] in environments where it would be impossible in Koromfe)
Does not always lose the final V in medial contexts (*pace* N+N compounds). Also: many final vowels are epenthetic (pre-pausally)	Always **loses the last V** in all non-utterance-final positions. (Sometimes this V can be reconstructed from an umlauted stem V.)
Across the stem-suffix boundary allows geminates [ll], [mm], [nn] plus long fortis stops from geminated lenis stops.	Across the stem-suffix boundary allows geminate [ll] and long fortis stops from geminated lenis stops, but not geminate [mm] or [nn].
…	…

[14] Note that all forms of this word are ATR-disharmonic. Also, the initial /nde/ could be the question-word 'where?'.

7 Conclusions

7.1 It's not as bad as it could be…

7.2 … but it's bad enough

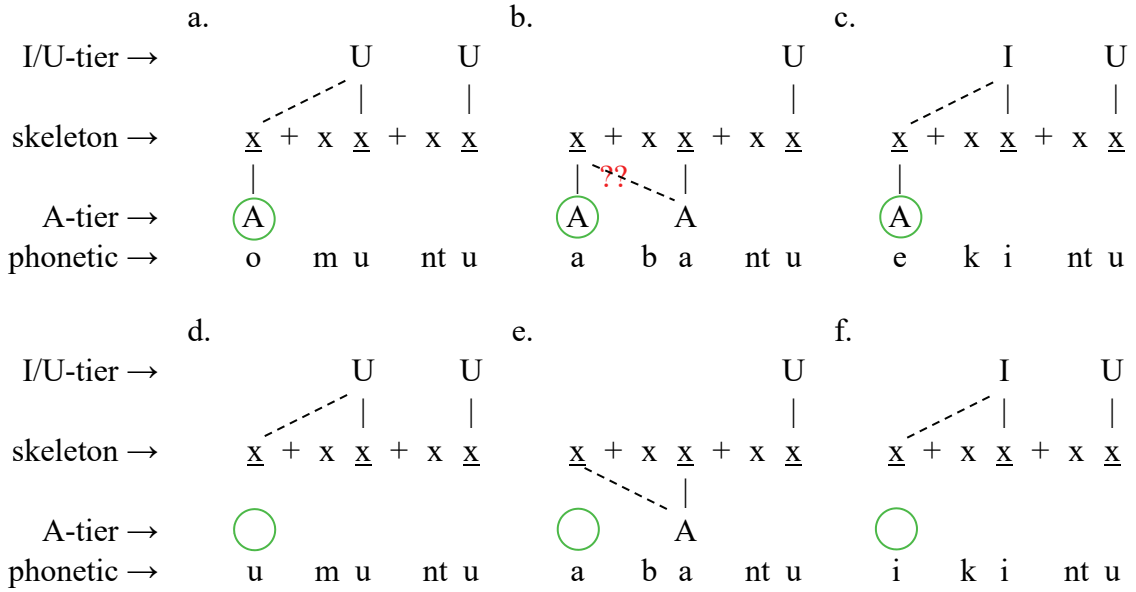
8 Postscript: Pre-prefixes

8.1 Pre-prefixes in Bantu languages

(36) I/U-harmony in the pre-prefix of Luganda and Kinyarwanda (from Rennison (2018a) – Luganda data from Katamba (1984)).

a) Luganda				b) Kinyarwanda			
o-	mu-	ntu	'person'	**u-**	mu-	ntu	'person'
a-	ba-	ntu	'people'	**a-**	ba-	ntu	'people'
e-	ki-	ntu	'thing'	**i-**	ki-	ntu	'thing'

(37) Right-to-left I/U/A-harmony in the pre-prefix of Luganda (a-c) and Kinyarwanda (d-f), based on Rennison (2018a). Dashed lines are associations introduced by the harmony process. Green circles indicate the differences in the lexical representation of the pre-prefix in the two languages.



8.2 "Pre-prefixes" in Koromfe

(38) The pre-nominal /a/ of Koromfe is the pre-prefix of Niger-Congo languages.

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