The Bua Group languages (Chad, Adamawa 13): A comparative perspective

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Pascal Boyeldieu[1], Raimund Kastenholz[2], Ulrich Kleinewillinghöfer[3], and Florian Lionnet[4]

To the memory of
Claude Pairault (1923-2002) and
Pierre Palayer (1922-2014)

Introduction

The aim of the present paper is to sketch a state of the art regarding the Bua languages of Chad, a genetically related linguistic group that remains relatively little-known. Section 1 presents and lists the different languages that belong to this genetic unit. A historical review of the documentation is presented in Section 2. Section 3 lays out a lexicostatistical approach to the internal relationships of the languages, complemented by some other discriminating features. Some salient phonological and morphological features are discussed in Section 4 that gives a particular attention to the crucial noun class system of Kulaal. Section 5 deals with problems of comparison, correspondences and reconstruction within the Group. Lastly a word will be said about the current Bua languages comparative project in Section 6.[5]

1. Presentation and inventory

1.1. The linguistic groups

The languages of the Bua Group are spoken in the southern part of Chad, from the surroundings of Sarh to the South to the Guera Mountains to the North, i.e. approximately between the latitudes 9° and 11° North and longitudes 17° and 20° East (see Map 1). They mostly straddle adjacent parts of the *Guéra* and *Moyen Chari* administrative regions.

<insert Map 1 about here>

This entire family consists in a relatively compact group of some 13 languages spoken by very small communities, out of which three have in fact recently shifted to other languages (short wordlists for these now extinct languages were recorded in the 70s): Cini and Perim have been absorbed in the Lua community and Lɔɔ speakers have shifted to Sar, a surrounding Sara-Bongo-Bagirmi (Central Sudanic) language.

The speakers of the Bua languages are scattered in small villages in a region of low population density. After enduring the intermittent and heavy rule of the Bagirmi kingdom in the last two to three centuries, their traditional settlements remained relatively stable and peaceful during the French colonial period. This stability was probably disturbed by the conflicts that affected the country in the last decades, the effects of which on local populations are still little known.

Below is a list of the languages as they can be currently identified (most names apply to both the people and the language, possibly with a further specification in the latter case, e.g. *kùláá* /pl. *kùléé* 'human being, Gula' and *kùláál* 'Gula language', *ɓà* 'Ba' and *ɓà gǫ̀* 'Ba language', *bólgò* 'Bolgo' and *bólgònî* 'Bolgo language'; an approximate evaluation of the

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number of speakers is given at the right end of the line; main localities are indicated in brackets under the name(s) of the group/language):[6]

Lua (*luāà*) (or Niellim, Nielim) 5.000
[Niellim, Niou, Sarh]

Cini (*cĭnī*) ..... extinct
[Niellim]

Tun (*tŭn*) (or Tounia, Tunya) 2.000
[Sarh]

Perim (*pèrìm*) ..... extinct
[surroundings of Niellim]

Lɔɔ (*lɔ́ɔ̄*) (or Noy) ..... extinct
[Bedaya, Djoli, Balimba, Koumogo Koumra]

Kulaal (*kùlɑ́ɑ́l*, glossonym)[7] (or Goula d'Iro, Gula Iro) 3.500
[Masidjanga, Boum Kabir, Tiéou, Tiolé Kabir]

Bon Gula (Goula de Bon) (or Eeni) 1.200
[Bon, Ibir]

Zan Gula (Goula de Zan) (or Moraj, glossonym: More or Morre [*mɔrrɛ*]) 3.200
[Zan, Chinguil]

Ɓa (*ɓà*) (or Boua, Boa, Bua) 8.000
[Korbol, Lagouaye, Nyamko, Tigli, Tim, Bar, Sakre Deleb, Malbom,
Ladon and, more to the North, an isolated group in Gabil]

Korom/Kawãwãy (a dialect of Ɓa?) 60
[Bar, Sarabara, Sakré Deleb, Tilé Nougar]

Fanya (*fãỹa*) (Fanian) (Autonym: Ɛma /pl. Ɛiwɛ [*ɛma/ɛɪwɛ*] (Khalil Alio); in Tilé Nougar: Kulaanum /pl. Kulaaway [*kùlɑ́ːnúm/kùlɑ́ːwɔ̀y*], glossonym: Kulaale /pl. Kulaaru [*kùlɑ́ːlɛ̀/kùlɑ́ːɽʊ̀*] (F.Lionnet)) 1.000
[Karo, Ataway, Tilé Nougar, Timan, Sisi, Rim]

Bolgo, consisting of
Bolgo Dugag: 'small Bolgo': 1.000
– Tereu (*tērēù*, glossonym: *tērēùnī*)
[Aloa (IGN Alouna?)[8], Niagara (IGN Niakra?), Koya, Boli]
Bolgo Kubar: 'big Bolgo': 1.800
– Bolgo proper (*bólgò*, glossonym: *bólgònî*), and
– Bormo (*bòrmó*, glossonym: *bòrmónì*)
[Agrap, Gagne, Bedi, Moulouk, Hari, Kodbo]

Koke (or Khoke) 600
[Daguéla, Chobo]

[6] The main sources for this inventory are as follows: Boujol & Clupot 1941, Boyeldieu & Seignobos 1975, Faris & Marba Meundeung 1993a-e, Gabe [1950], Hersé 1947, Kastenholz 2017, Lewis, Simons & Fennig 2016, Pairault 1966, 1969, Palayer 1975a-b, de Rendinger 1949, *Carte de l'Afrique centrale au 1/200 000, République du Tchad* (sheets Guéra, Miltou, Dagéla, Lac Iro, Niellim, Fort Archambault), and personal documentation from the authors.

[7] Pairault (1969: 11) distinguishes four linguistic varieties (*dialectes*) within *kùlɑ́ɑ́l*, namely *pɑ́tɔ́ɔ́l*, *pòŋààl* (the author's reference dialect), *tíààlà*, and *tíítààl*.

[8] IGN stands for *Institut Géographique National*, the publisher of the *Carte de l'Afrique centrale au 1/200 000* (see references of Maps).

1.2. Additional comments

i. According to different sources the term Mana (*mànáʔ*) is used by the Ɓa people to refer to the Fanya or, more widely, to the whole group composed of Bon Gula, Zan Gula, Kulaal speakers, and Fanya.

ii. It is not sure whether the name Fanya is used by the Fanya speakers themselves. Two autonyms have been recorded instead: Ɛma /pl. Ɛiwɛ (R. Kastenholz), and Kulaanum /pl. Kulaaway (F. Lionnet). The same two sources agree on the glossonym Kulaale /pl. Kulaaru[9] but, again, it is uncertain whether this name is acknowledged by all or only a part of the Fanya people. We will use the term *Kulaale* here to refer precisely to the lexical data recently recorded by Florian Lionnet, and will keep the term *Fanya* for other sources.

iii. According to information collected by Kastenholz (2017: 3), Fanya (*fãya*) refers more to a region than to a population or a language. Kulaal *fa̰ñ* means 'West' and *Fáñò* /pl. *Fóñè* 'Fanya person/people'. Pairault (1966: 178) speculates on whether the original meaning of the term(s) refer(s) to the geographical orientation or, conversely, to the ethnic group. But he has a preference for the second hypothesis, namely that the name of the Fanya country progressively shifted to a spatial meaning.

iv. Kobe is apparently an alternative name for the Fanya (Tucker & Bryan 1956: 42).

v. The distinction between *Bolgo Dugag* and *Bolgo Kubar* (qualifications from Arabic) is made by several authors (e.g. Boujol & Clupot 1941: 45-48), Kastenholz (2017: 3-4) being the source of the three pairs of names mentioned above. De Rendinger (1949) is the only one to make a distinction between *Bolgo Werel* (Daguéla region) and *Bolgo Mengo* (Aloa-Niagara region). The latter would then be equivalent to *Bolgo Dugag* only (but what about *Bolgo Kubar*?), and the former probably equivalent to Koke: indeed Hersé (1947: 67) reports that *Ourel* is the Koke name of Daguéla locality.

vi. The term *Koke* might refer to a Bolgo subgroup. That is at least what the Fanya of Tilé Nugar say. Note that the Kulaale language has only one word to refer to both Bolgo and Koke: [*mùŋgù*] /pl. [*mùŋgì*] (Lionnet, field notes).

vii. Korom is probably a dialect of Ɓa spoken in about four villages in the easternmost part of the Ɓa area. It is also spoken in Tilé Nougar by the Kawãwãy [*kàwa̰ːwàỳ*] (pl), a small group of a Fanya group belonging to the blacksmith caste (Lionnet, field notes). Since we only know Korom as it is spoken by the Kawãwãy, we will tentatively use the term *Kawãwãy* to refer to the Korom data presented in this paper.

As can be seen, much uncertainty remains regarding the exact form and/or extent of several names of groups/languages.

The relative importance of the Ɓa speakers – who might have integrated smaller groups that were linguistically related but originally ethnically distinct – as well as the fact that the locality of Korbol (formerly Magal) was the seat of a small sultanate (Nachtigal 1881; Gabe [1950]) certainly explains that the name *Boa* or *Bua* was retained as a cover term for the whole linguistic group (see Section 2 below). However the orthographic distinction between *Ɓa* and *Bua* for referring respectively to the language and to the language group will help avoiding ambiguity.

1.3. Linguistic environment

[9] "The adjective (if that is indeed the right term/analysis) *kòlɑ́ɑ́-lɛ̀/kòlɑ́ɑ́-ɽò* agrees in number with the noun it modifies or is an attribute of: (a) *ʔòn ˀyígrí kòlɑ́ɑ́lɛ̀* = I + speak + Fanian, (b) *ʔòò ˀyígrí kòlɑ́ɑ́ɽò* = we + speak + Fanian" (F. Lionnet). Note otherwise the formal similarity of Fanya [*kòlɑ́ːlɛ̀*] with the name of the *Kulaal* language (*kùlɑ́ɑ́l*, and probably, with determiner, *kùlɑ́ɑ́l(ɛ̀)*? See Section 4.6).

The Bua language group is surrounded by Sara-Bongo-Bagirmi languages (Kulfa, Na, Deme, Sar, Gulay, Bagirmi), Laal (an isolate), Eastern Chadic languages (Tumak, Ndam, Boor, Miltu, Barein, Saba, Mogum, Djonkor, Toram), and Arabic (see Map *Les langues du Tchad* 2000). Bagirmi, which was, from the 17th to the 19th century, the language of a strong sultanate (Nachtigal 1881), exerted an influence on some Bua languages, namely Lua and Ɓa, probably through formerly frequent bilingualism.

2. Outline of the documentation

The first, chiefly lexical data on Bua languages were collected between 1850 and 1910 by travellers like H. Barth, G. Nachtigal[10], Dr J. Decorse, Duke A.F. zu Mecklenburg and the missionary H.K.W. Kumm.

Barth's vocabulary of Ɓa (*Bua*) was published in Benton (1912). Kumm's vocabularies of Lua (*Nilim*) and Ɓa (*Korbol*) were published by their author in Kumm (1910). Decorse's vocabularies of Ɓa (*Boa*), Lua (*Niellim*), Mana, and Tun (*Tounia*) were published in Gaudefroy-Demombynes (1906) under the label *Groupe Boa*. Finally, Nachtigal's vocabularies for Ɓa (*Bua*), Lua (*Nielim*), and Koke as well as zu Mecklenburg's wordlist for Ɓa (*Bua*) were published by Lukas (1937) under the common heading *Bua-Gruppe*. This last reference was obviously the source of Greenberg (1963) who grouped *Bua*, *Nielim*, and *Koke* together as his 13th subgroup of Adamawa languages.

A second group of works then appeared from 1930 to 1960, mainly written by colonial administrators. Such are Joly (1935), Boujol & Clupot (1941), Hersé (1947), de Rendinger (1949), Gabe ([1950]), Blondiaux (1951), and Mouchet (1958). They too consist essentially in lexical information not only on already known languages but also on Bon Gula, Zan Gula, Fanya, and Bolgo.

In 1966 C. Pairault published an ethnographic study devoted to the *Goula d'Iro* – the Kulaal speakers –, shortly followed (1969) by a collection of *kùlάάl* texts with a phonological introduction. Both books contain a lexical list and represent the first modern, scientific contribution to the study of the Bua language group. They also offer an accurate identification of the numerous ethnic groups/languages that are known as *Goula* (or *Gula*) in this region where three borders meet (Sudan/Chad/CAR), showing that only *Goula d'Iro* (Kulaal speakers) and *Goula du Guéra* (i.e. Bon Gula and Zan Gula) belong to the same linguistic unit (Pairault 1966: 24-29; 1969: 12-14). In the following years research was conducted on Tun (Palayer 1975a), on the then nearly extinct Lɔɔ (Palayer 1975b), and on Lua (Boyeldieu 1985). Faris & Marba Meundeung (1993a-e) published reports on several little known languages (Bolgo, Bon Gula, Zan Gula, Fanya, and Koke) with limited wordlists but interesting information about their geographical location. More recently Kastenholz (2017) conducted fieldwork on Bolgo. Further, unpublished data include wordlists for Ɓa (P. Boyeldieu), Fanya (A. Khalil), Bon Gula (Roberts 2004), Zan Gula (S. Sauer & M. Sauer). Finally Florian Lionnet, alongside a research project on Laal, is currently collecting texts and/or lexical data on Ɓa, Kawãwãy, and Kulaale.

As a general rule the original transcription adopted by the authors has been respected, which explains possible variations in the notation principles (e.g. *ny*, *ñ*, or *ɲ* for the palatal nasal, *aa* or *a:* for a long vowel). An exception is the nasality tilde that has been systematically placed under the vocalic character in the Kulaal data in order to make the tone diacritics more legible (e.g. *ó̱* instead of *ő*).

Comparative work was initiated by Boyeldieu (1980, 1983, 1986a, 1986b) but only little was published at that time. In more recent years both Pascal Boyeldieu and Raimund

[10] According to Gaudefroy-Demombynes (1906: 107) and Lukas (1937: 52), Nachtigal (1881: 674, 689) first pointed out the relationship between *Bua* and *Nielim*.

Kastenholz developed, on their own, comparative databases that are now being merged in a common project (see Section 6).

To sum up, our knowledge of the Bua languages has appreciably improved in the last fifty years, but several languages are still underdocumented and much remains to be done both in describing individual languages and in understanding their common history.

3. Classification so far

Kastenholz (2017: 2) proposes a preliminary classification of the Bua Group languages based on lexicostatistic counts.[11] His tree diagram is reproduced here in Table 1, and the similarity matrix, on which the tree branching is based by application of the branch average principle, is added in Table 2.

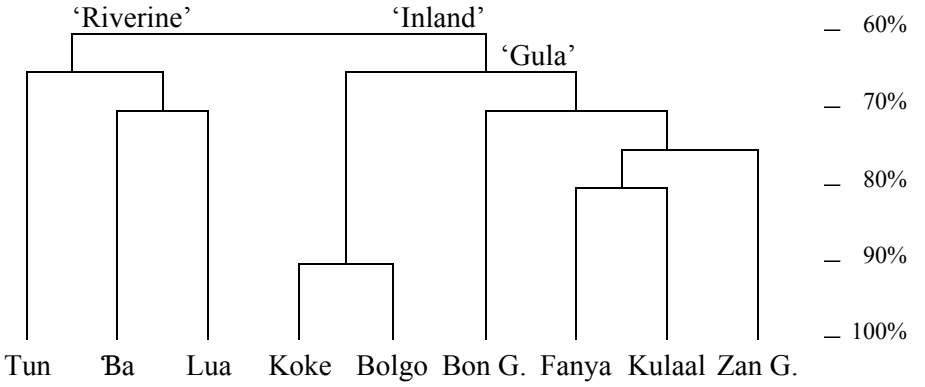


Table 1. Lexicostatistic classification (branch average)

	Bolgo	Koke	Fanya	Bon G.	Zan G.	Kulaal	Lua	'Ba
Koke	901							
Fanya	742	731						
Bon G.	598	636	733					
Zan G.	677	601	800	717				
Kulaal	660	712	816	678	722			
Lua	568	641	647	523	621	570		
'Ba	583	595	625	517	583	596	728	
Tun	582	636	627	553	615	607	629	652

Table 2: Lexicostatistics: similarity matrix[12]

It is noticeable that the similarity indices, taken as a whole, are rather elevated. The most striking figure is the similarity index between Bolgo and Koke, which, in lexicostatistical terms, defines the two varieties as virtually identical.[13]

Let us keep in mind, however, that lexicostatistic results are but a calculation of lexical distances, the historical significance of which may be extremely limited, and which needs to be supplemented, if not replaced, by evidence based on shared innovations. At present, such clues are difficult to identify for the Bua languages. However, we felt it useful to try to establish temporary correlations of the lexicostatistic figure with the distribution of some other significant features that are summarised in Table 3 and anticipate the following sections.

[11] See Kastenholz (2017) for a detailed account of the source data used in the survey.

[12] The computer programme used to calculate the Similarity Matrix and to draw the Tree Diagram is that of Schadeberg 1990. The indices are *per mille* figures.

[13] Only data from Bolgo proper were included in the survey. Koke is argued here to be part of a dialectally structured "Bolgo Complex", along with the Bolgo, Bormo (both, more often than not, referred to as "Bolgo Kubar", see Kastenholz 2017: 4), and Tereu ("Bolgo Dugag") varieties.

	‘Riverine’			‘Inland’					
						‘Gula’			
	Tun	Ɓa	Lua	Koke	Bolgo	Bon G.	Fanya	Kulaal	Zan G.
*h- >	h-	w-	h-	?	h-	?	w- ?	w-	w-
*c- >	s-	s-	s-	s-	s-	h-	h-	h-	s-
*s- >	s-	h-	h-	s-	s-	h-	h-	h-	s-
*p- >	h-	hw-/h-	p-/h-	h-	h-	h-	h-	f-	f-
*-z >	-r	-r	-r	-r ?	-r, -s	-r ?	-r	-s	-s
nasal vowel contrast	+	+	+	?	–	–	+	+	–
±ATR vowel contrast	–	–	–	?	+	+	+ ?	+ ?	+ ?
verb tone contrast	+	+	+	?	–	?	+	–	?
gender *-*l*/*-n*	+	+	+	?	–	+	–	+	–
gender *-*lE*/*-rU*	–	–	–	–	–	–	+	–	+

[*p- > Ɓa *hw(E/a)- / h(O)-*, Lua *p(E/a)- / h(O)-*]

Table 3. Distribution of some significant features within the Bua group

Starting with sound changes, the word initial glottal fricative *h-*, which appears in most languages,[14] may reflect four historical correspondence formulas, namely **h-*, **c-*, **s-*, and **p-* (see 5.3 below). While *h-* reflecting **c-* is indeed limited to the ‘Gula’ subgroup only, instances of *h-* from **h-* are attested both in ‘Riverine’ and Koke-Bolgo, instances of *h-* from **s-* are observed both in ‘Riverine’ and ‘Gula’, while *h-* reflecting **p-* appears in the three major subgroups, ‘Riverine’, Koke-Bolgo and ‘Gula’. Conversely *w-* from **h-* appears in Ɓa and ‘Gula’, *p-* from **p-* is attested in Lua (before front vowels as well as *a*), and *f-* from **p-* is attested both in Kulaal and Zan Gula, while *s-* from **s-* is attested in the three subgroups. In other words, nothing in the way in which the three formulas developed into their current reflexes seems to parallel the tree diagram. It is true that similar sound changes do not necessarily point to shared innovations but may appear by chance in distant languages and even more so if they represent common phonetic processes such as the weakening of *[c]*, *[s]*, or *[p]* towards *[h]*. Interestingly, variation in these sound changes may be observed between varieties of the same language. For instance, the consonants *h-* from **s-* and *f-* from **p-* (Table 3 above) in the *pòŋààl* dialect of Kulaal (Pairault’s reference dialect), are realised as *s-* and *h-* respectively in the *tíààlà* and *tííṭààl* dialects (Pairault 1969: 11, 25, 26), the latter varieties being closer to Zan Gula on these points. Ɓa is another case: Table 4 lists words that were respectively recorded by Gustav Nachtigal (around 1880, published in Lukas 1937, Ɓa variety unidentified) and Pascal Boyeldieu (in 1984, with a speaker from Korbol). While the latter has regularly *hw-* (before front vowels and *a*) and *h-* (before back vowels), the former has most often *f-*, sometimes *ph-*, more rarely *h-* or even *Ø-*.[15]

	Ɓa (Nachtigal)	Ɓa (PB)	
*p- >	f-, ph-, (h-, Ø-)	hw-E/a/h-O	
	[yű́]fē	hwí:	‘here’
	[yú]fō	hô:	‘there’
	[ńá]phal	hwa̱: /pl. hwi̱:	‘egg’
	[m]fō	hŏ̱ /pl. hŏŋ	‘nose’

[14] *h-* does not appear in Zan Gula, except in de Rendinger (1949), where it represents a reflex of **ʔ-* (e.g. *hālé* ‘neck, nape’, *ho* ‘to fear’), corresponding to *ʔ-* or *Ø-* in the three other Zan Gula sources.

[15] Less regular correspondences of *h-* with *f-* may be observed also among Fanya varieties.

[m]phílli ‘body’	hūlī	‘belly’
húmo	hùmū	‘flour’
hĩāl	hyà̰:l /pl. hḭ̀:l	‘red’
om	hóm	‘to eat (sp.?)’

[Ɓa (Nachtigal): *[yǘ]fē* = ‘[run(?)]here’; *[yú]fō* = ‘[run(?)]there’; *[ńá]phal* = ‘[bird]egg’; *[m]fō* = ‘[your]nose’; *[m]phílli* = ‘[your]body’]
Table 4. Reflexes of **p-* in two Ɓa sources (a selection)

Another type of sound correspondences is remarkable: whereas **-z* reflexes are *-r* in most languages, Kulaal and Zan Gula consistently have *-s* while Bolgo may have either (conditioning, if any, is unclear).

The existence of a vowel contrast of nasality is a further feature differentiating the Bua languages (see 5.4 below): this contrast is absent in Bolgo, Bon Gula, and Zan Gula, all languages from the ‘Inland’ subgroup. However the reverse is not true: the ‘Inland’ languages Fanya and Kulaal have contrastive nasal vowels.

The vocalic ±ATR feature is absent from the ‘Riverine’ languages, while it is present in Bolgo and Bon Gula, and probably also in Fanya, Kulaal, and Zan Gula (see 4.3 below). As for several other features, the situation of Koke is not known.

While Tun, Ɓa, and Lua again show their linguistic closeness in contrasting mood/aspect by tone changes on the verb, Bolgo and Kulaal lack this process (see 4.8 below). The only ‘Inland’ language that seems to share this feature is Kulaale/Fanya. We still do not know what the situation is in the other ‘Inland’ languages.

Lastly the complementary distribution of nominal genders **-l/*-n* and **-lE/*-rU* brings out Fanya and Zan Gula as opposed to the other languages (see 5.6.3 and 5.6.7).

To sum up this review of tentative clues, ‘Riverine’ Tun, Ɓa, and Lua show a marked cohesion and significantly contrast with the ‘Inland’ languages. The latter as a whole might be distinguished by ±ATR vowel systems while *-s* from **-z*, the absence of verb tone contrast and the extension of gender (variant?) **-lE/*-rU* are less consistent, even considering the sole ‘Gula’ languages.

4. Salient phonological and morphological features

This section presents some salient phonological and morphological features that are of particular relevance from a comparative point of view.[16] Due to the nature of the data, the validity of many features is currently limited to a restricted number of languages, namely Lua, Tun, Ɓa, Kulaal, and Bolgo.

4.1. Consonants

Consonant systems are usually characterised by the presence of injectives (*ɓ* and *ɗ*),[17] the absence of labial-velars, and a noticeable reduction of the consonant phonemes apart from the word initial position, i.e. in the coda position (Cv*C*(-)) as well as in the onset position of a non-initial syllable (-*C*v(C)). This reduction results chiefly from a loss of the voiceless/voiced/glottal/prenasalised contrasts in plosives. The situation is illustrated below by the systems of Lua (1a) and Bolgo (1b):

[16] We made the choice to concentrate here on the features – chiefly lexicon, sound correspondences, noun class system, and verb morphology – that have been considered so far in the comparative study (Section 5).

[17] Both Palayer (1975: 141, 146-147) for Tun and Boyeldieu (1985: 44, 52-53) for Lua mention the particular realisation of the injectives *ɓ* and *ɗ* as preglottalized nasals, *[ʔm]* and *[ʔn]*, when followed by both phonetic and phonological nasal vowels. The same property characterises Ɓa (e.g. */ɓą́:/* /[ˀmą́:] ‘child’) and Kulaale (*/ɓą́ɾ̨ǫ́/* [ˀmą̰́ɾ̨ǫ́] ‘shin’, Lionnet, field notes).

(1a) Lua (Boyeldieu 1985: 65, 74, 85, 93, 99)

Initial onset					Coda and non-initial onset			
p	t	c	k					
b	d	j	g		b		j	g
ɓ	ɗ			ʔ				
	s			h				
mb	nd	nj	ng					ng
m / w̃	n	ɲ			m / w̃	n	ɲ	ŋ
w	l	y			w	l	y	
	r					r		

(1b) Bolgo (Kastenholz 2017: 4-5, 8-9)

Initial onset					Coda and non-initial onset			
	t		k					
b	d	j	g	(ʔ)	b	d	j	g
ɓ	ɗ							
	s			h		s		
m	n	ɲ	ŋ		m	n	ɲ	ŋ
	l					l		
w	r	y			w	r	y	

A similar situation holds for Tun (Palayer 1975: 137-160) and Ɓa (Boyeldieu, pers. doc.) and probably nearly all languages, judging from the consonants appearing in non initial position. Kulaal however is interpreted in a somewhat different way. Pairault (1969: 16-28, 42-44) does not identify any injective and considers that voiceless/voiced obstruents are in complementary distribution in such a way that *[b]*, *[d]*, *[ḍ]* (post-alveolar or retroflex), *[z]*, and *[g]*, which appear in intervocalic position or following a nasal consonant in an internal cluster (e.g. *[-mb-]*, *[-nd-]*, etc.), represent allophones of */p/*, */t/*, */ṭ/*, */s/*, and */k/* respectively, realised as voiceless in initial and final position. His table of consonant phonemes (including outsiders) is presented as follows (place and manner labels omitted):

(2) Kulaal (Pairault 1966: 422; 1969: 44)

			/r/		
/p/	/f/	/t	/ṭ/	/s/	/k/
/m/		/n/		/ñ/	/ŋ/

out of frame: /l/, /h/, (/y/?, /w/?)
offside: ǒ[18]

4.2. Vowels

Ɓa, Tun, and Lua have similar vowel systems that usually contrast seven vowel qualities[19] in initial syllable, augmented by two correlations of length and nasality (nasal vowels however may be reduced in number). This is what Palayer (1975a: 162) calls a 'full vocalic system' (*un système vocalique complet*). However some initial syllables and all non-initial syllables display different types of reductions that may affect the number of contrastive vowel qualities and in any case exclude long and nasal vowels. The conditioning of these reductions

[18] Pairault (1969: 40) considers the rare *ǒ* – a bilabial trill (i.e. IPA *[ʙ]*) – as being of 'ideophonic' nature.
[19] Ɓa and Lua have a further vowel – */ɨ/* – that has no long or nasal counterpart. However Palayer's analysis of Tun may suggest that this vowel does not in fact belong to the 'full system'.

(or neutralisations) may be extremely complex as shown by Palayer (1975a:162-181) for Tun. As illustrations, we present only the full systems of Tun (3a) and Ɓa (3b):

(3a) Tun (Palayer 1975a: 162-163)

/i/		/u/	/i̱/		/u̱/
/e/		/o/			
/ɛ/		/ɔ/	/ɛ̱/		/ɔ̱/
	/a/			/a̱/	
/ii/		/uu/			/u̱u̱/
/ee/		/oo/			
/ɛɛ/		/ɔɔ/	/ɛ̱ɛ̱/		/ɔ̱ɔ̱/
	/aa/			/a̱a̱/	

(3b) Ɓa (Boyeldieu, pers. doc.)

i	ɨ	u	i̱		u̱
(i)e		o	(i)ɛ̱		o̱
ia ~ ɛ	a	ua ~ ɔ	ia̱ ~ ɛ̱		ua̱ ~ ɔ̱
iː		uː	i̱ː		u̱ː
(i)eː		oː	(i)ɛ̱ː		o̱ː
iaː	aː	uaː	ia̱ː	a̱ː	ua̱ː

Kulaal – as well as Kulaale for this specific point – share with Ɓa, Tun, and Lua a common behaviour concerning the status of vocalic nasality: while oral/nasal vowels contrast in final position, e.g.

(4)	Kulaal	tòò	'to kick'	tó̱ó̱	'to pluck'
	Ɓa	kǎː	'grandparent'	ka̱ː	'grass'
	Tun	ùù	'person, human being'	ū̱ū̱	'thing'
	Lua	ɓɨ̀	'paternal aunt'	ɓɨ̱̀	'small (pl.)'
	Kulaale	tô	'house'	hɔ̱̀	'nose'

in all five languages the contrast is strongly restricted in the context of a following consonant (final or not) in such a way that phonological nasal vowels can only occur before subsequent *-r(-)* in Lua, subsequent *-r(-)* and *-l(-)* in Ɓa and Tun, subsequent *-r(-)*, *-l(-)*, *-ṭ(-)*, *-k(-)*, *-p(-)*, and *-s-* in Kulaal, and subsequent *-l-*, *-ɾ̃-*, *-r-* (most likely two variants of one phoneme), *-ɽ-*, and *-b-* in Kulaale:[20]

(5)	Lua	kuàr	'river bank'	kua̱r	'buffalo'
	Ɓa	tāːr	'to hunt'	ta̱ːr	'gronder, tonner'
		bīːrgī	'to twist'	ɓi̱ːrgī	'to (let) roll'
	Tun	kɔ̱́	'kind of bird'	kɔ́	'cry, shout'
		jɛ̄ɛ̄lɛ̀	'to awake'	jɛ̱́ɛ̱́lɛ̄	'to insult'
	Kulaal	fééré	'proclamation'	fɛ̱̀ɛ̱̀ró̱m	'spider cocoon'
		kál	'divination sp.'	ká̱l	'kind of grass'
		pòòṭ	'pubes'	hɔ̱̀ɔ̱̀ṭ	'to engrave'
		táákí	'to lose'	tá̱á̱kìl	'rock hyrax'
		tàpà	'kob'	tà̱à̱pà	'red stone'
		kààsɔ̀	'to bypass'	kà̱à̱sɔ̀	'to burst'

[20] In the latter, further instances of a nasal vowel before *-b-* are *hɨ̱ːbɛ̀* 'urine' and *ke̱ːbá* 'nail'.

Kulaale	tá:ɽɔ̀	‘three’	tà̰:ɽɔ̰̀	‘rocks’
	kàrɛ̀	‘do’	ká̰lɛ̀	‘lion’
	tí:ré	‘cooking pots’	tḭ́:lè	‘acidic’
	hó:bù	‘sun’	hyɔ̰̀:bà	‘fish’
	tì:bà	‘ten’	kḭ́:bá	‘nail, claw’

Before all other consonants the vocalic oral/nasal contrast is neutralised and the vowel’s phonetic realisation depends on the consonant environment (i.e. the vowel is more or less nasalised by a preceding or following nasal: *m*, *n*, and particularly *ɲ*, *ŋ*).

However Kulaal differs from the preceding languages in that it contrasts more numerous vowel qualities. Pairault presents its system in the following way, speaking only of vowel height and not mentioning any harmony principle (as tense/lax, not to speak of ±ATR):

(6) Kulaal (Pairault 1966: 422; 1969: 44-46)

1	/i/ /u/ /ii/ /uu/	
2	/ɪ/ /ʊ/ /ɪɪ/ /ʊʊ/	
3	/e/ /o/ /ee/ /oo/	/ḛ/ /o̰/ /ḛḛ/ /o̰o̰/
4	/ɛ/ /ɔ/ /ɛɛ/ /ɔɔ/	
5	/a/ /aa/	/a̰/ /a̰a̰/

4.3. On ± ATR systems

For quite some time it had been generally assumed that the phenomenon of ±ATR vowel harmony was not present in the languages of the Adamawa branch of Niger-Congo (see Boyd 1989: 197). Kleinewillinghöfer (1990, 1991a, 1994) has shown that vowel harmony of that type does exist in the languages of the Waja-Tula Group (Nigeria), and in (geographically) western Adamawa languages like Longuda and Bikwin. Referring to Pairault (1969), Elders (2000: 55) considers that Kulaal has a ±ATR vowel harmony system.

More recent research suggests that such a system is also present in Bolgo and Bon Gula at least.[21]

Kastenholz (2017: 6-7) argues that Bolgo – which has neither long nor nasal vowels – is definitely characterised by a harmony principle, “probably of the ±ATR type, that defines two subsystems of five vowels” as in (7):

(7) Bolgo (Kastenholz 2017: 5-7)

+ATR	–ATR
i u	ɪ ʊ
e o	ɛ ɔ
a	ʌ

For Bon Gula, Roberts (2004: 1) states that it can be taken for granted that “an ATR harmony system exists in this language”. The data made available in his paper indeed speak in favour of such an assumption. Two cases in point (among others) are the following:

[21] Zan Gula should most probably be added to the list; the data (made available by Sauer & Sauer) are suggestive of such a harmony system. A very preliminary survey of Kulaale *[kòlá:lɛ̀]* (one of the Fanya varieties) based on a 250 word list is also suggestive of a ±ATR system (Lionnet, field notes).

a) Suffixes for singular and plural with nouns have an effect of harmonization on the stem vowel in a number of cases (Roberts 2004: 4, 7):

(8)	Bon Gula	tʊkɔ	/pl.	tuki	‘arm’
		tɔnɔ		tone	‘thigh’
		dɪrmɔ		dirme	‘rib’
		dɔyɔ		doye	‘horse’

b) The quotation form for verbs presented in the data rather clearly is a verbal noun (infinitive?) consisting (in most cases) of the verb root or stem and a suffix. This suffix takes the form *-ɪn* (sometimes also *-ɛn*) after stem vowels *ɪ*, *ʊ*, *ɛ*, and *ɔ*, but surfaces as *-in* elsewhere:

(9)	Bon Gula	root/stem	verbal noun	
		oy	oyin	‘to see’
		mil	milin	‘to swallow’
		ɔr	ɔrɪn	‘to smell’
		kɔɽ	kɔɽɪn	‘to build’

It seems that the presence vs. absence of a ±ATR contrast and ATR-harmony is to be added to the list of features that distinguish riverine vs. inland Bua languages (cf. Section 3). Indeed, riverine languages such as Ɓa (including Kawãwãy), Lua, and Tun do not have any ATR contrast or harmony, whereas it seems to be a fundamental feature of the phonology of inland languages such as Bolgo and the three Gula varieties, and possibly Kulaale/Fanya as well.

The fact that non-ATR Bua languages cluster to the west of the area, whereas ATR ones are all in the eastern half of the Bua-speaking area is particularly interesting, if one relates this fact to the general distribution of ATR vowel systems in Northern Sub-Saharan Africa. As shown in Rolle et al. (2017), in this vast area, languages with an ATR contrast/harmony system form two ATR zones: one to the West of Lake Chad, and one in East Africa, stretching from the northern half of Chad to an area north and east of Lake Victoria. These two ATR zones are separated by a vast area centred around the Cameroon/Chad border, where languages lack an ATR contrast, but tend to have interior vowels (front rounded, non-low central, back unrounded), either contrastively or at least phonetically. This interior vowel zone covers much of Cameroon, parts of adjacent Nigeria, most of southern Chad, and parts of the northern fringe of the Central African Republic, as shown on Map 2.

<insert Map 2 about here>

As seen, the Bua languages closer to the centre of gravity of the interior vowel zone tend to have interior vowels but no ATR contrast: phonemic */ɨ, ə/* in Lua (Boyeldieu 1985: 136), allophonic */i/ → [ɨ] / _C(C)a* in Ɓa (Boyeldieu, field notes; Lionnet, field notes), reduced *[ɨ ~ ə ~ ʉ]* in Tun[22] (Palayer 1975a: 171–172). On the other hand, the easternmost Bua languages, further away from the interior vowel zone and relatively closer to the East ATR zone, all seem to have a ±ATR contrast and ATR-harmony, but no central vowels. If Proto-

[22] Note that this vowel reduction pattern found in Tun is reminiscent of neighbouring Sar (and other Sara-Bongo-Bagirmi languages), and likely due to prolonged contact with Sara speakers. Some of the 43 Lɔɔ words collected by Palayer (1975b) also contain the interior vowels *[ə]* and *[ʉ]*, suggesting the same vowel reduction process as in Tun and Sar.

Bua were to be reconstructed with a ±ATR contrast and ATR-harmony and no interior vowels, the loss of this ATR system and the development of interior vowels could be ascribed to a strong areal effect. Interestingly, the languages that riverine Bua languages are in contact (or geographical proximity) with to the east, north, and south all have interior vowels: the isolate Laal (Boyeldieu 1982, Lionnet field notes), the Chadic languages Ndam (Broß 1988), Tumak (Caprile 1975) and Boor (Lionnet field notes), but also the Sara-Bongo-Bagirmi languages Barma (Keegan & Djibrine 2016) and Sar (Palayer 1989). One possible hypothesis is that the ancestors of the riverine Bua speakers arrived in the area they currently occupy from elsewhere, possibly a region further east, and changed their phonological profile through contact with the local populations, whose languages all conform to the Interior Vowel zone typological profile.[23] We unfortunately know too little about the history of the Middle-Chari region, and of the Bua spread zone in general, to test this (or any other) hypothesis.

4.4. Tones

Ɓa, Lua, Tun, and Bolgo have tone systems with three contrastive heights (Low, Mid, and High), with frequent contour tones (e.g. L͡H H͡M, M͡L, etc.), not restricted to long vowels. Tone may have both a lexical and a grammatical function. An illustration of the former is given for Tun (10):

(10) Tun (Palayer: 1975: 182)

Level tones				
LL	lùù	‘white clay’	sàm	‘madness’
MM	tūū	‘pestle’	sām	‘fermented drink’
HH	súú	‘story, tale’		
Rising tones				
LM	gùū	‘refuse, waste’	mùl̄	‘kind of bird’
LH	lùú	‘Parinari sp.’ (tree)	mùĺ	‘kind of ant’
MH	sṵ̄ṵ́	‘caterpillar’	lūń	‘kind of skin disease’
Falling tones				
ML	jāà	‘who’	tēǹ	‘shea butter tree’
HM	ɓáā	‘speech’	cén̄	‘hippo’

Lua verb classes offer an example of the morphological role of tones. Despite a few rare exceptions, Lua verbs contrast Indicative and Injunctive tone patterns, the alternations of which justify the identification of eight verb classes, e.g.:

(11) Lua (Boyeldieu 1985: 356-362, 1987)

cl. 1	L/ML	ŕ tò	‘he takes’	ŕ tô	‘let him take!’
		ŕ dùgà	‘he comes back’	ŕ dùgâ	‘let him come back!’
cl. 2	L/H	ŕ tàg	‘he spits’	ŕ tág	‘let him spit!’
		ŕ kù:nà	‘he pulls’	ŕ kú:ná	‘let him pull!’
cl. 5	H/M	ŕ tó:	‘he pounds’	ŕ tō:	‘let him pound!’
		ŕ tén	‘he finds’	ŕ tēn	‘let him find!’

[23] Data collected by Pascal Boyeldieu from a Ɓa speaker in 1984, corroborated by data collected by Florian Lionnet and Rémadji Hoïnathy in Chad between 2011 and 2016, seem to show that the Ɓa speakers used to occupy an area to the east of the area they currently occupy, and gradually moved closer to the Chari river over the last two or three centuries.

Kulaal, however, differs from all these languages in that it has only two tones (Pairault 1966: 423; 1969: 49-54). Furthermore, in his fieldwork revisiting book *Retour au pays d'Iro*, Pairault (1994: 29, note 14) writes:

> "I am now convinced that my 'tonology' of *Kulaal* should be revised thoroughly: indeed this language has, I think, two contrastive heights, but I am not sure that it is, for all that, a 'tone language', that is to say a language in which each syllable bears a relevant pitch height." [translation PB/FL]

4.5. Noun morphology

All Bua languages display various nominal number markers that can be, for the greater part, interpreted as remnants of a former noun class system. Some limited examples for Ɓa and Bolgo are presented in (12):

(12)			
	Ɓa	hōw /pl. hwēy	'moon'
		guà:l /pl. gʊ̀i:n ~ gʊ̀i:l	'male (of some animals, e.g. billy goat)'
		ɓa̰: /pl. ɓí:m	'child'
	Bolgo	téú /pl. téí	'tree'
		hǒl /pl. hòdí	'mat'
		ɓá /pl. ɓén	'child'

Table 5 summarises, in a simplified way, the numerous morphological processes (suffixes or stem vowel changes) that can be identified in Lua, Tun, Kulaal, Ɓa, and Bolgo.[24]

Lua sg. / pl.	Tun sg. / pl.	Kulaal sg. / pl.	Ɓa sg. / pl.	Bolgo sg. / pl.
-a / -i		-a / -e	-a / -i	-a / -i
				-Ø / -I
-IA/A/UA- / -E/Ə/O-	-ɛ/e/ə- / -i-	-Ɛ/A/Ɔ- / -E/O-	-A/Ɛ - / -E/I-	-A- / -E-?
		-U(-) / -I(-)	-U(-) / -I(-)	-U / -I
				-Ø / -U
-l(a) / -ni	-y/ɲ / -n	-(I)l / -(U)n	-l(V) / -n	--- / -n?
	-(y̰) / -(v)n			
	-y / -Ø	-l / - Ø	-l(-) / -Ø	-l / -Ø
-l/n(a) / -ri	-Ø / -ri		-l(V) / -r(-)	-l / -dI
				-Vl/r / -rV
				-l / -I
--- / -m	-Ø / -m	--- / -m	--- / -m	
		-m / -ṭe		
		/ ˷ṭe		
-aː / -oybɨ				
-Ø / -(n)gɨ	-Ø / -ngi/u	-Ø / -kì	-Ø / -gī	-Ø / -gI
	-Ø / -ˀē		-Ø / -ɓé	
				-I / -Al
				-(U) / -Iɲ

Table 5. Main processes of noun number marking in Lua, Tun, Kulaal, Ɓa, and Bolgo

In a similar way, the deverbative noun forms (verbal nouns or infinitives) may be marked by suffixes that represent further traces of former class markers. These processes are marginal

[24] Note that the parallel that is roughly drawn here (as well as in Table 6) between formally similar processes does not necessarily mean that they are considered as historical cognates.

in Ɓa, Lua, and especially Tun, where the most frequent way of deriving a verbal noun consists in tonal change only (see 4.8 below). On the other hand they are systematic in Kulaal[25] and Bolgo, the latter having only one marker *-(V(:))l*.[26] This situation is illustrated in Tun, Kulaal, and Bolgo below (13):

		Verb	>	Verbal noun	
(13)	Tun	nūn̄		nùń	'to bite'
		ūú		ūlú	'to die'
		lēé		lèm	'to eat (soft things)'
	Kulaal	kúúkɔ̀		kùùkú	'to marry (man or woman)'
		hèè		hèèmá	'to go'
		hùùpɔ̀		hùùpìl	'to wash oneself'
	Bolgo	yé		yé-l [yéːl]	'to come'
		bɛ́l		bɛ́l-ɛ́l	'to ripen'
		nʊm		nʊm-ɔl[27]	'to bite'

Table 6 summarises, again in a simplified way, the different processes that may be used to mark deverbative nouns in Lua, Tun, Kulaal, Ɓa, and Bolgo.

Lua	Tun	Kulaal	Ɓa	Bolgo
tonal change	*tonal change*	*(tonal change +)*	*tonal change*	–
-Li		-a	-LV	
-La		-lV	-l	
	-y	-(a)l	-i	-(V(:))l
-aːl, aːr	-oo > -ɔɔ	ɔ > -ɔɔ	-V	
-m(a)	-(u)m	-m(a)	-m(V)	
-lu	-lu	-ne		
	-wa	-ʊ		
		-pa		

Table 6. Main processes of marking deverbative nouns in Lua, Tun, Kulaal, Ɓa, and Bolgo

4.6. Kulaal noun classes and concords

Additionally, and unlike most, if not all, other languages of the group, Kulaal has a system of agreement postposed determiners that usually come in sg./pl. pairs and are clearly, although not uniquely, correlated with the final segment(s) – i.e. suffixes – of the head noun they modify, e.g.:[28]

[25] In Kulaal the derivational process is never tonal only, the verbal noun marking involving at least a change of the final vowel as shown in (13) below.

[26] In fact one should distinguish between verbal noun (v.n.) and deverbative noun in Bolgo. The verbal noun (infinitive?) that is systematically derived from every verb is indeed always suffixed with *-(V(:))l*. But some nouns derived from verbs display other suffixes. Compare *ú* (v.n. *ú-l*) 'to die' and *údí* 'death' (a likely frozen plural, cf. *hŏl* /pl. *hòdí* 'mat', *súːl, súl* /pl. *súdí* 'head'), *léw* (v.n. *léw-él*) 'to sleep' and *lem* (*leːm*?) 'sleep [noun]', *woi* (v.n. *woi-el*) 'to cultivate' and *wɛl* 'field'. These sporadic suffixations should also find their place in Table 6 and the actual content of what we may call 'deverbative noun', 'verbal noun', and 'infinitive' definitely needs to be examined more closely.

[27] Some Bolgo data lack tone marking.

[28] Pairault (1966, 1969) always transcribes the determiner in parentheses, immediately after the noun it may be suffixed to, e.g. *tíl(lɛ̀)* /pl. *tín(ṭù)* 'handle of knife', *hɛ́ɛ́m(ɛ̀)* /pl. *hɛ́ɛ́nṭé(kì)* 'smoke'. For reasons of legibility we prefer to indicate here the *class symbol* (see Table 7 below) separated from the noun by a space: *tíl (lɛ̀)* /pl. *tín (ṭù)*. Where appropriate, the dropped consonant of the determiner is indicated in brackets: *hɛ́ɛ́m ([m]ɛ̀)* /pl. *hɛ́ɛ́nṭé (kì)*.

(14)	tó (kù)	/pl.	tú (kì)	‘ear’
	tíl (lɛ̀)	/pl.	tín (ṭù)	‘handle of knife’
	ì (kí)	/pl.	òm (mò)	‘thing’
	ì-hípàà (kí)	/pl.	òm-hípèè (mò)	‘snake (lit. thing bad)’

Pairault does not give much information about these *déterminatifs classificatoires*, as he calls them in the lexicons of his two volumes (1966: 421-437; 1969: 261-278). Obviously they may add a definite or known value to the modified noun, whether they are used alone or as a connective with a modifying noun or relative clause; the same forms are also used alone as deictic substitutes (Houis 1967: 125-129, 146-148; Boyeldieu1986b: 244, n. 4). Clearly, they are representative of noun classes, even if some of these prove to be reduced and vestigial.

The identity and relative importance of the nominal determiners/classes are detailed in Table 7 below, which includes some indications concerning the conditioning of determiner variants.[29]

Class/gender symbols	Determiners	Main final segments in nouns and realisation of determiner	Lexical tokens
kù/kì	-kù / -kì	-u/-i, -u/-ɪ, (also -o/-e, -ɔ/-e, -ɔ/-ɛ, -a/-e)	332
kɛ̀/kì	-kɛ̀ / -kì ~ -ɛ̀ / -ì	-a/-e, (-e/-e, -ɛ/-e, -ɔ/-o, -ɔ/-i) -VVk(-ɛ̀) / -VVk(-ì)	240
lɛ̀/ṭù	-lɛ̀ / -ṭù ~ -ɛ̀ / -ṭù ~ -ɛ̀ / -ṭù	-Vl(-lɛ̀) / -Vn(-ṭù) -VVl(-ɛ̀) / -VVn(-ṭù) -VVṭ(-ɛ̀) / -VVn(-ṭù)	142
kɛ̀/–	-kɛ̀ / –		120
kù/–	-kù / –		69
–/kì	– / -kì		35
lɛ̀/kì	-lɛ̀ / -kì ~ -ɛ̀ / -kì	-Vl(-lɛ̀) / -Vn(-kì), (-Vṭe[-kì]) -VVl(-ɛ̀) / -VV(-kì)	7
mɛ̀/kì	-mɛ̀ / -kì ~ -ɛ̀ / -kì	-Vm(-mɛ̀) / -VVm(-ɛ̀) / -V(V)(n)Ri/e(-kì)	7
kù/ṭù	-kù / -ṭù		4
mɛ̀/–	-mɛ̀ / –		4
sɔ̀/mè ?	-sɔ̀ / -mè (?)	?/-m	2
–/mè ?	– / mè (?)	/-m	1
kí/mò	-kí / -mò	?/-m	1
kɛ̀/mò	-kɛ̀ / -mò	?/-m	1
unknown			253
total			1218

Table 7. Kulaal noun classes and agreement determiners in nouns

As can be seen, the most frequent types are represented by genders *kù/kì*, *kɛ̀/kì*, and *lɛ̀/ṭù*, followed by the singleton classes *kɛ̀/–*, *kù/–*, and *–/kì*, the latter being associated with nouns that are, in most cases, annotated as ‘pl.’, ‘invariable pl.’, ‘without sg.’, etc. by C. Pairault himself.

[29] The Kulaal lexical corpus used in this section combines published data (Pairault 1966, 1969) and unpublished documentation of C. Pairault. The corpus also contains 214 proper names and 93 adjectives that are always presented without any determiner (concerning personal names however, see *sɔ̀* in ex. [21] below).

Let us consider the members of the less important types in more detail. Gender *lɛ̀/kì* contains nouns that display *-l/-Ø* or *-l/-n* contrasts in final segment and often refer to body parts:

(15)	kɔ̀rɔ̀’ɔ̀l (lɛ̀)	/pl.	kòrè’ím (kì)	‘*Detarium microcarpum* (tree)’
	máál ([l]ɛ̀)	/pl.	móó (kì)	‘corner; breast’
	nál (lɛ̀)	/pl.	nó (kì)	‘leg, foot’
	nèèl ([l]ɛ̀)	/pl.	nèè (kì)	‘tooth’
	tɛ̀ɛ̀pìl (lɛ̀)	/pl.	tɛ̀ɛ̀pùn (kì)	‘*Malapterurus electricus* (fish)’
	tél (lɛ̀)	/pl.	tén (kì)	‘vulva’
	ùl (lɛ̀)	/pl.	ùṭè (kì)	‘way, road’

Gender *mɛ̀/kì* contains exclusively nouns referring to masses or liquids:

(16)	fo̱m (mɛ̀)	/pl.	fo̱rè (kì)	‘flour’
	fa̱m (mɛ̀)	/pl.	fo̱ṭì (kì)	‘milk’
	ha̱m (mɛ̀)	/pl.	hóṭí (kì)	‘alcohol, beer’
	ím (mɛ̀)	/pl.	íṭè (kì)	‘water’
	lòm (mɛ̀)	/pl.	lòṭè (kì)	‘salt (vegetable)’
	nóm (mɛ̀)	/pl.	nóṭè (kì)	‘oil, butter, fat’
	hɛ́ɛ́m ([m]ɛ̀)	/pl.	hɛ́ɛ́nṭé (kì)	‘smoke’

Five single plurals of class *–/kì* show similar suffixes and obviously belong to the same semantic domain:

(17)	ɛ̀ɛ̀ṭé (kì)	‘tears’
	hà̱rè (kì)	‘cuvée (= must + marc)’
	hɛ́ṭè (kì)	‘blood’
	hɛ́ɛ̀ṭè (kì)	‘urine’
	tínṭè (kì)	‘dregs of must (malt drink)’

Gender *kù/ṭù* contains four terms, the behaviour of which looks more or less irregular:

(18)	fòròòm (kù)	/pl.	fòrèèn (ṭù)	‘*Pseudocedrela kotschyi* (tree)’
	fù (kù)	/pl.	fùmón (ṭù)	‘mouth’
	hùíl (kù)	/pl.	hùún (ṭù)	‘millet (*Pennisetum sp.*)’
	téé (kù)	/pl.	téún (ṭù)	‘village, urban area’

Single class *mɛ̀/–* concerns four nouns without plural that are, for three of them at least, derived from verbs (cp. determiners of verbal nouns below):

(19)	kɛ́m (mɛ̀)	‘anger’	cp.	kɛ́mó	‘be angry’
	lòòm ([m]ɛ̀)	‘sleep’		lóèè	‘to sleep’
	màréém ([m]ɛ̀)	‘judgement’		máárì	‘to judge’
	rùm (mɛ̀)	‘dermatosis’			

The last four classes/genders involve, in most cases, exceptional determiners:

(20)	sɔ̀?/mè	wɔ̀sà, wɔ̀sɔ̀	/pl. pìsè(m) (mè)	‘somebody, person’

sɔ̀?/mè	wɔ̀sɔ̀-wáá (sɔ̀)	/pl.	pìsè(m)-'(á)ám (mè)	'woman'
–/mè	–	/pl.	nàm ([mè] ?)	'siblings, friends'
kí/mò	ì (kí)	/pl.	òm (mò)	'thing'
kè/mò	én (kè)	/pl.	óñóm (mò)	'place'

The status of the element *sɔ̀* is rather uncertain: although it looks like a determiner in ***wɔ̀sɔ̀-wáá (sɔ̀)***, it is not identified as such in the first example (***wɔ̀sà, wɔ̀sɔ̀***).[30] A similar and most probably equivalent form appears elsewhere in several terms (21),

(21) éné(é)-sɔ̀ /pl. énéé-kè (noun?) 'each person (*chacun*)'
ñsɔ̀ (~ ñsɔ̀mòsɔ̀), mòsɔ̀ (= mò + sɔ̀), ńsɔ́ (~ ńsɔ́mòsɔ̀) 'it's me / you / (s)he who' [focalized pronouns, paradigm incomplete]
páñsɔ̀ / kènòn (ṭù) 'child' (cp. páŋ, pámpáŋ 'small, young [not for things]')
sɔ̀ (personal determiner) 'self; this (demonstrative of personal names, e.g. Pèèsè sɔ̀ [*not* *Pèèsè-kè] 'this [person named] Pèjè')

where it often involves the semantic features [+human] and [+definite] (but what about ***páñsɔ̀*** /pl. ***kènòn (ṭù)*** 'child'?). Note also that it seems to alternate with pl. ***sè*** (***sèm***?) in ***wɔ̀sà, wɔ̀sɔ̀*** /pl. ***pìsè(m) (mè)*** 'somebody, person'.

These instances have to be distinguished from the morpheme *-sɔ ~ -so* that is found with a small number of derived abstract nouns (exclusively?) in class ***kù*** and derives (i) the abstract quality/function/office of function owners within the society, and (ii) the abstract quality of adjectives (or adjective-like words):

(22) ŋàñsɔ̀ (kù)	'chiefdom'	< ŋàñ (kè) / ŋòñ (kì)	'chief'
kùààsɔ̀ (kù)	'hunt(ing), fishing'	cp. kùrò, kùì	'to hunt, fish, collect (honey)'
		cp. kùàl (lè) / kùèn (ṭù)	'hunter'
kàlàsɔ̀ [kù?]	'priesthood (of Póón)'	< kálú (kù) / kólí (kì)	'priest (of Póón)'
hípààsɔ́ (kù)	'wickedness'	< hípàà	'wicked, ugly'
èrèèsò (kù)	'kindness'	< èrè	'good, well'

Lastly pl. ***mè***, sg. ***kí*** (the only determiner with a high tone), and pl. ***mò*** are marginal and limited to the examples in (20).

Not surprisingly some of the markers exposed in the preceding paragraphs also appear in Kulaal verbal nouns (cp. [13] above), e.g.:

(23) Verb	>	Verbal noun	
hèè		hɛ̀ɛ̀má (kɛ̀)	'to go'
lóñò		lúñél (lɛ̀)	'to leave'
lóèè		lòòm ([m]ɛ̀) ~ lòú (kù)	'to sleep'

As shown in the last example some verbs may have variable verbal nouns, belonging to distinct classes.

[30] Pairault (1969: 277) contrasts ***wɔ̀sà*** 'somebody, anybody' and ***wɔ̀sɔ̀*** 'somebody (plus modifier)'. Consider that in ***wɔ̀sɔ̀-wáá (sɔ̀)*** 'woman' the determiner *sɔ̀* is in agreement with the *head noun* ***wɔ̀sɔ̀*** (see paragraph introducing ex. [14] above).

Table 8 gives an account of the identity and relative importance of the classes involved in verbal nouns. Except for one case that displays the plural form ***kì*** (***kéé*** > ***kèèné (kì)*** 'to cry, say'), the determiners are identical with *singular* determiners in nouns:

Class symbols	Determiners	Main final segments in verbal nouns and realisation of determiner	Lexical tokens
kʊ̀	-kʊ̀	-a, -ɔ, -ɔ, -ʊ, -u	245
kɛ̀	-kɛ̀	-a	92
lɛ̀	-lɛ̀ ~ -ɛ̀	-Vl(-lɛ̀) -VVl(-ɛ̀)	23
mɛ̀	-mɛ̀ ~ -ɛ̀	-em(-mɛ̀), -om(-mɛ̀) -eem(-ɛ̀), -oom(-ɛ̀)	7
ṭʊ̀	-ṭʊ̀	-un	3
kì	-kì	-e	1
unknown			198
total			569

Table 8. Kulaal classes and agreement determiners in verbal nouns

4.7. Concords in other Bua languages?

The double system of suffixes and concords of Kulaal is clearly reminiscent of class/gender systems that can be observed in some Adamawa languages such as Longuda (Jungraithmayr 1968/69) or the languages of the Ɓəna-Mboi group (Kleinewillinghöfer 1991b, 1993; Van de Velde & Idiatov 2015). Now, if it is not a Kulaal innovation, the question arises as to whether similar concord systems may characterise other Bua languages. The answer seems to be negative: there is currently no sign that any other language than Kulaal has a set of free, separable agreement markers justifying the status of a noun class language. On the other hand it is not excluded that traces of such concord morphemes can still be detected in some cases: as first observed by Raimund Kastenholz, one wonders whether, for some languages, a number of forms might not have been transcribed together with elements that (diachronically or synchronically) probably correspond to Kulaal determiners. The Bon Gula noun meaning 'fire' is a first example (Kulaal nouns are transcribed here exactly as in Pairault's data in order to underline the formal parallelism with other languages):[31]

(24) 'fire'

Lua	lɑ̃ː /pl. lɔ̃ː	*Kulaal*	*lá(kʊ̀) /pl. ló(kì)*
Tun	lāā	Bon Gula (P)	ɟāko
Ɓa	lɑ̃ː /pl. lɛ̃ː, ɲiː	Bon Gula (JR)	yákʊ̀
Fanya (R)	la		
Zan Gula	láː		
Bolgo (RK)	lá		

A second case is the comparative series for 'urine', where cognates display three types, ***Cid/ri*** (presumably frozen plurals), ***CibE*** (unexplained), and ***Cirk/gi***, the latter resembling the plural only form of Kulaal with its determiner:[32]

(25) 'urine'

[31] Bon Gula *y-* is, together with *l-*, a reflex of proto-Bua **l-* although the conditioning of the two is unclear.

[32] The interpretation of this series is complicated by the fact that there exists otherwise a plural suffix **-gI* (see 5.6.11 below) that might step in here.

Tun	ɲíírī	Fanya (J)	nibé	*Kulaal*	*hḛ́ḛ̀ṭè(kì)*
Bolgo (B)	nìɾí	Fanya (R)	ʃibɛ	Lua	ɲírgī
Zan Gula (F)	sidèì	Fanya (JS)	sibɛ	Bon Gula (F)	híɾkéɛ̀
Zan Gula (S)	sí꞉déy	Fanya (AK)	hḭnbè	Bon Gula (JR)	hirke
		Kulaale	hɪ̰̄꞉bè	Bolgo (D)	nìɾgí
				Bolgo (RK)	ɲírgɪ
				Koke (F)	nirgi

Last but not least, all the twenty-odd nouns reflecting gender **-lE/*-rU* – exclusively limited to Zan Gula, Fanya, and Kulaale, see 5.6.7 below – look as if they resulted from the integration of elements similar to the determiners of Kulaal gender *lè/ṭù* (see further examples in Tables 26 and 28):[33]

(26)

	‘tongue’	‘head’	‘roan antelope’
Kulaal	*lìl(lè) /pl. lìn(ṭù)*	*húl(lè) /pl. hún(ṭù)*	*hèèl(è) /pl. hèèn(ṭù)*
Zan Gula (S)	līllɛ́ /pl. līnnú	súlé /pl. súrú	sè꞉lɛ /pl. sè꞉rù ‘hartebeest’
Fanya (AK)	līllè /pl. līllù	hīlè /pl. sīlù	
Kulaale	líllɛ́ / pl. línɖú	hílè /pl. hílù	hyè꞉lè /pl. hyè꞉rɔ̀ ‘waterbuck’

If the two former examples (‘fire’ and ‘urine’) are too limited to be really significant, the systematic character of the latter is doubtlessly relevant, although its implications are currently unclear: if these nouns indeed incorporated former concord markers similar to the ones we still see in Kulaal, why did this target all and only the reflexes of gender **-lE/*-rU*? The question, which involves the complementary distribution of this gender with **-l/*-n*, will be addressed again in Section 5.6.7.

4.8. Verb morphology

Example (11) above already showed the role of tone alternations in the definition of Lua verb classes. This situation is in fact shared by Lua, Tun, and Ɓa: the three languages contrast two verbal moods/aspects – respectively labelled as Indicative/Injunctive (*indicatif/injonctif*: Lua, Ɓa) and Perfective/Intentional (*accompli/intentionnel*: Tun) – by means of a simple change of the verb tone pattern.[34] Verb class assignment is defined by the association of the two alternating tone patterns. Note that similar segmental combinations may appear in different verbs/verb classes, which means that the tone of the verb is not only morphological but also lexical. Examples in Tun and Ɓa (27):

(27)

	Class	Tones	Perfective ~ Indicative	/	Intentional ~ Injunctive	
Tun	1	L/H͡M	sìì		síī	‘to join’
	2bis	M/M	sīī		sīī	‘to go back home’
	1	LLL/HMM	tùgərù		túgərū	‘to roll out’
	2	MMM/LLL	tūgərū		tùgərù	‘to carry’
Ɓa	4	M/H	ʔiēr		ʔiér	‘to climb’
	5	H/M	ʔiér		ʔiēr	‘to grill, fry; to sew’
	2	LM/HL	yèngī		yéngì	‘to boil beer’

[33] To some extent this holds also for reflexes of gender **-lE/*-I*, see 5.6.8 below.
[34] In some rare cases the change is nil (see Tun in [27] below).

3	MM/HL	yēngī	yéngì	‘to make pregnant’

Those verbal noun formation processes that belong to nominal morphology have already been presented above. The remaining way of deriving a verbal noun is by tonal alternation. This is, in its principle, similar to the way mood/aspect contrasts are conveyed. Verbal nouns derived by tonal alternation could thus constitute a third term in the identitification of verb classes. Although there is an obvious tendency in the three languages Lua, Tun, and Ɓa for verb classes to be correlated with certain tone patterns in the verbal noun, these correlations are so irregular that the two systems must be considered independent. The same holds for the existence of suffixed verbal nouns: at the very most, one can observe that they are chiefly correlated with verb classes that are both limited in number and presumed to constitute conservative classes that preserved older morphological processes (e.g. classes 3 and 5 in Lua, see Table 9 below).

Tables 9-11 below display the identity and lexical extent of the different verb classes in Lua, Tun, and Ɓa repectively.

Class	Ind.	Inj.	Verbal noun (main processes)	Lexical tokens
1	L	ML	M, LM; 2 suffixes	329
1bis	LH	L͡MH	LH	15
2	L	H	M; 1 suffix	3
3	M	ML	LM = L͡MM; mostly suffixes	34
3bis	MH	M͡LH	MH	1
4	M	H	M, HM, LM; some suffixes	182
4bis	MH	H	MH	6
5	H	M	HM; mostly suffixes	23
invariable	...	...	...	16
irregular	...	...	...	3
Total				612

Table 9. Verb classes and verbal nouns in Lua (Boyeldieu 1985: 362, 377)

Class	Perf.	Int.	Verbal noun (main processes)	Lexical tokens
1	L	HM	HM	212
1bis	L	MH	HM	6
2	M	L	L͡H (monosyll.) = ML (disyll.)	214
2bis	M	M	various tone patterns; 4 suffixes	7
3	MH	MH	HM; 2 suffixes	8
3bis	MH	M	2 L, 1 MH ; 3 suffixes	3
3ter	MH	L	LH	1
invariable	...	...	...	8
Total				459

Table 10. Verb classes and verbal nouns in Tun (Palayer, s.d.)

Class	Ind.	Inj.	Verbal noun (main processes)	Lexical tokens
1	L	HL	LH; some suffixes	68
2	LM	HL	LH; some suffixes	30
1 ~ 2				8
3	M	HL	various tone patterns; some suffixes	135
3 ~ 4				1
4	M	H	HM; some suffixes	15

5	H	M	HM; mostly suffixes	22
6	H	HL	1 suffix	4
uncertain	...	...	...	16
Total				299

Table 11. Verb classes and verbal nouns in Ɓa (Boyeldieu: pers. doc.)

The verb morphology of Kulaal has never been described as such. One would have to pick up and gather scattered information, an endeavour which has not yet been undertaken systematically. However, a few generalizations may be drawn from the available data: Kulaal has no tone alternation; beside its simple form and the already mentioned verbal noun, the verb may further appear in the Jussive (*jussif*) (suffixed by *-a*) and Preterite (*prétérit*) forms (suffixed by *-(V)n*), the precise values and uses of which are not clear yet. Some illustrations are given in (28):

Kulaal

(28)	Simple form	Jussive	Preterite	Verbal noun	
	néé	ná(á)	néèòn	nèál (lɛ̀)	‘to give’
	hùrò	hùìá	hùrùn	hùùpà (kɛ̀)	‘to rub, wipe’
	kɔ́l, kɔ́lɔ̀	kɔ́llà	kɔ́lùn	kɔ̀lɔ̀ɔ̀ (kù)	‘to come back’
	kɔ̀ɔ̀lì	kɔ̀ɔ̀lá(á)	kɔ̀ɔ̀lùn	kɔ̀ɔ̀lʊ́ (kù)	‘to look at’

In Bolgo (Kastenholz 2017: 20-22) the verb itself does not undergo any segmental or tonal modification, except for the tonal changes that may occur in the reduplicated, imperfective form (see below). The bare verb form is neutral as regards tense or aspect (29):

Bolgo

(29) jō tɛ́r ŋā́
3SG buy ox.SG
‘(S)he buys/bought an ox.’

It may be followed by a Perfective (*accompli* or *parfait*) marker *=ra* (~ *=na*) (30), which comes after the object pronoun (31):

Bolgo

(30) ɲī tòb=rà
1SG fall=PF
‘I have fallen.’

(31) jō ól=iy=rà
3SG see=2PL=PF
‘(S)he has seen you.’

The reduplication of the verb expresses an Imperfective value (32); note that the second element (or maybe the whole) may undergo tonal change (33); as for the animate personal object – which is obligatory in the presence of a lexical animate object – it appears after the first verb base (34):

Bolgo

(32) ɲī yá lī lī sàː-l
1SG mother eat eat polenta-SG

'My mother is eating polenta.'

(33) jō yé yē
3SG arrive arrive
'(S)he is arriving, he is about to arrive.'

(34) yǐ gɛ̄n ɛ́l=ɪɓ ɛ́l bìì
man DEM.SG wait=3PL wait people
'This man is waiting for people.'

Lastly the verb may be directly preceded by a Future marker (auxiliary?):

Bolgo
(35) ɲī yá kà lī sàːl
1SG mother FUT eat polenta
'My mother will eat polenta.'

The verbal noun apparently does not play any role in the Bolgo verb system as a set of structured tense, mood and/or aspect values. In Lua and Ɓa on the other hand – nothing is known for Tun or Kulaal in this respect –, the verbal noun may be combined with several preposed markers (auxiliaries?) to express further values of the verb process. Illustrations are Lua Obligative *ká* (note that the object precedes the verbal noun in [36b]) and Ɓa Progressive *yì* (note that the two complements precede the verbal noun in [37b]):

Lua
(36a) ŕ tón ʔáːˑ
3SG IND.send woman.PL
'(S)he sends/sent women.'

(36b) ŕ ká ʔáːˑ tómnī
3SG OBLIG woman.PL send.VN
'(S)he has to/must send women.'

Ɓa
(37a) ā hą̰ ʔíːˑ hūrgà
3SG IND.give woman pagne
'(S)he gives/gave the pagne to the woman.'

(37b) ā yì ʔíːˑ hūrgà hą̰
3SG PRGR woman pagne give.VN
'(S)he is giving the pagne to the woman.'

5. Comparison and reconstruction: what we know and what we would like to know

In the recent years both Pascal Boyeldieu and Raimund Kastenholz developed, independently of each other, comparative databases for the Bua languages. These databases, that are now being merged, involve lexical comparative series, regular sound correspondences (consonants, vowels, and tones), and tentative correspondences for both the noun and the verb classes. This section will expose the most outstanding findings and underline the remaining doubts and questions.

5.1. Lexical comparative series

Up to now more than 400 comparative series have been established by compiling the forty – or so – sources that are available for the different Bua languages (see Section 2 above). The series are established on the principle of bringing together only cognates that represent (presumed) regular reflexes of a historically common lexical unit. This explains why they sometimes contain gaps, not only because some sources are rather limited but also because, over time, languages may have replaced part of their original lexicon.

The database is developed and exploited using the *Toolbox*® software, freely provided by *SIL international* (http://www-01.sil.org/computing/toolbox/). Table 12 presents the forty-one fields currently defined for the Bua languages and their corresponding sources. Additional fields are provided for future research, with data from Laal (an isolate spoken in close neighbourhood with Lua and Ɓa), Day (probably the Adamawa language that is the closest to the Bua group, both geographically and genetically), Gur reconstructions, Adamawa-6 reconstructions, and Central Adamawa evidence.

<insert Table 12 about here>

Table 13 displays a sample of comparative series (of a good quality in the present case) for 11 Bua languages. As far as possible each series of the database is provided with formulas referring to the correspondence tables for segments, tones and historical classes/genders that are also present in the *Toolbox*® project.

<insert Table 13 about here>

5.2. Canonical patterns

Considering the comparative series, three types of canonical patterns with a vowel length contrast have to be reconstructed for both nouns and verbs, namely CV(ː), CV(ː)C, and CV(ː)CV. Relying on the status of the nasal vowels in Lua, Ɓa, Tun, Kulaal and Kulaale (see Section 4 above), these patterns may be detailed as follows:

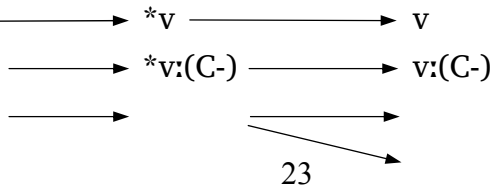
(38)

*Cv(ː)	*Cv(ː)C(-)
*Cṽ(ː)	*Cṽ(ː)r(-)
	*Cṽ(ː)l(-)
	*Cṽ(ː)d(-)
	*Cṽ(ː)g(-)
	*Cṽ(ː)b(-)
	*Cṽ(ː)z(-)

Although we assume that these formulas may account for Bolgo, which has no nasal and apparently no phonologically long vowels, it remains to be confirmed that these features were lost in Bolgo and that the existence and specific environment of the nasal vowels have to be considered as a Bua common heritage.

On the basis of internal data, Boyeldieu (1985: 158-165) argued for Lua that length and nasality are correlated (nasal long vowels are statistically more frequent than oral ones) and that both long and nasal vowels derived, at a pre-Lua stage, from the elision of a coda consonant (final or not), according to the following diagram:

(39)



c.	*VN(r-)	*ỹː(r-)	ỹ(r-)
			ỹː(r-)

If we postulate that consonant clusters appearing in situations b-c above result from the fusion of former class suffixes with roots, one has to consider that this kind of scenario could predate not only Lua but even the historical system common to all Bua languages that was, in that case, already characterised by long and nasal vowels before its splitting into the current languages.

5.3. Consonants

In accordance with what can be observed in current systems, the correspondence series led us to reconstruct two complementary sets of proto-consonants, i.e. one for the initial position (symbolized as *C-) and one for the 'second' (or coda) position (*-C). These two proto-Bua subsystems are displayed in (40):

(40) Initial consonants

	*ɓ-	*ɗ-				*ʔ-
	*p-	*t-	*s-	*c-	*k-	*h-
	*b-	*d-	*z-	*j-	*g-	
	*m-	*n-		*ɲ-	*ŋ-	
	*w-			*y-		
		*l-		*ʎ-		
		*r-				

Second consonants

	*-b	*-d ?	*-z	*-g
*-m / *-w̃	*-n		*-ɲ	*-ŋ
*-w			*-y	
	*-l			
	*-r			

Let us briefly comment on some of these reconstructions (the abbreviation CS will stand for *lexical Comparative Series*).

Reflexes of initial **d-* are *d-* in the best documented languages (except Kulaal *t-*) but the formula is under-represented (only 4 CS against **b-* [13], **z-* [13], **j-* [7], and **g-* [16]). Conversely voiceless formulas are attested in much more numerous CS: **p-* (47), **t-* (40), **s-* (27), **c-* (29), **k-* (41) (but not **h-* [7]).

**ʎ-* (5 CS only) accounts for a specific distribution of reflexes that are partly similar to those of **l-* (22 CS) and partly to those of **y-* (5 CS).

The phonic characterisation of the formulas **s-*, **c-*, **h-*, **z-*, **j-*, and **g-* deserves a short explanation. The reflexes in the same eleven languages as in Table 13 are summarised in Table 14 (note that the less frequent formulas are not completely documented).

(Nbr of CS:)	*s- (27)	*c- (29)	*h- (7)	*z- (13)	*j- (7)	*g- (16)
Lua	h-	s-	h-	j-	j- ?	g-
Cini	h-	s-	h-		j-	
Tun	s-	s-	h-	j-	j-	g-
Lɔɔ	s-	s-				
Kulaal	h-	h-	w-	s- (= [s, z, š, ž])	k-	k-
Bon Gula (JR)	h-	h-	w-, Øu- ?		c(i)- ?	g- ?
Zan Gula (S)	s-	s-	w-	j-	j(i)- ?	
Ɓa	h-	s-	w-, (h(u)- ?)	d-	j-	g-
Fanya (S)	s-, (h- ?)	s-				
Bolgo (RK)	s-	s-	h ?		g(i)- ?	
Koke (F)	s- ?	s-				

Table 14. Reflexes of correspondence formulas *s-, *c-, *h-, *z-, *j-, and *g-

*s- and *c- share the same type of reflexes but with a different distribution (practically only Lua, Cini, and Ɓa reflexes constitute evidence for this contrast).[35] Neither can be identified as *h*, which is logically used for *h-, the reflexes of which are always either *h-* or *w-*. It is then necessary to find not only a label but also a plausible phonic symbol that may account for the different sets of reflexes. Such a dilemma can be sometimes hard to resolve. In this particular case however, several further sources – Gaudefroy-Demombynes (1907) for Tun, Lukas (1937) for Ɓa, Joly (1935) and Faris & Meundeung (1993) for Fanya (J)/(R), and Lionnet (field notes) for Kulaale – suggest that reflexes of *c- may sometimes display (preserve?) a palatal feature that shows up in such transcriptions as *sh*, *š*, *y*, *ʃ*, or *hy* (see Table 15).

<insert Table 15 about here>

Reflexes of *s-, *c-, and *h- call for a further comment regarding their combinatory abilities with the following vowels. Table 16 shows that

<insert Table 16 about here>

i. in an oral vocalic context – *CV(:)* and *CV(:)C(-)* – the occurrences of *s- are limited to 2 CS while *c- (20) and *h- (5) are well represented,

ii. in a nasal vocalic context – *CṼ(:)* and *CṼ(:)L(-)* –[36] the occurrences of *c- and *h- are limited to 1 for the former and are nil for the latter,

iii. the context of a phonologically neutralised vowel followed by a nasal consonant – *CV(:)N(-)* – is the only one where the three formulas contrast in a balanced way.

If the complementary distribution is not absolute, the imbalance is marked enough to require an explanation. Is it related to the nature of the proto-consonants? Or could the vocalic context have exerted an influence on the phonetic nature of the preceding consonant and maybe caused a split in the reflexes of a former single phoneme? This is not at all clear at this time.

Second-consonant formulas also call for some comments. First it is not certain yet whether *-d should be distinguished from *-r. Both formulas apparently share more or less the same reflexes and the most recent documentation (Bolgo, Bon Gula, Zan Gula, Fanya, Kulaale) must be checked closely in this respect.

Additionally, two distinct formulas – *-r and *-z – have to be distinguished, the reflexes of which differ in some languages (see Table 17):

(Nbr of CS:)	*-r (116)	*-z (12)
Lua	-r	-r
Cini	-r	-r
Tun	-r, (-(ii)Ø ?)	-r
Lɔɔ	-r	
Kulaal	-r = -ṭ	-s (= [s, z, ž])

[35] This means that when cognates of a specific CS are, for any reason, absent in these three languages, the reconstructed form must be provided with an undecided *s-~*c-?.

[36] *-L- stands here for the proto-consonants (*-r, *-l, *-d, *-g, *-b, and *-z that allowed (preserved?) an oral/nasal contrast in the preceding vowel (see 5.2 above).

Bon Gula (JR)	r, ɽ?	-r
Zan Gula (S)	-d, -r	-s
Ɓa	-r, (-(ii)Ø ?)	-r
Kulaale	-r	-j?
Bolgo (RK)	-r, -d	-r, -s, (-d)
Koke (F)	-r	-r?

Table 17. Reflexes of correspondence formulas *-*r* and *-*z*

The reflex of *-*z* is clearly -*s* in Kulaal[37] and Zan Gula. Bolgo may show – regular? – instances of the same reflex. Finally a unique case suggests a reflex -*j* in Kulaale. Some lexical illustrations are presented in Table 18.

<insert Table 18 about here>

Most probably all languages except Kulaal and Zan Gula underwent rhotacism (*s* ~ *z* > *r*), which would explain the resemblance between the two formulas *-*r* and *-*z* (rhotacism was apparently not systematic in Bolgo and the situation of Kulaale is uncertain). This relationship is probably confirmed by the fact that Kulaal contrasts oral/nasal vowels, among others, before both *-r(-)* and -*s*- (see 4.2 above).

A third comment concerns the difficulty of establishing regular reflexes for several second consonants, namely *-*w*-, *-*y*, *-*l*, and *-*r*. Uncertainties remain, within both the noun and verb categories, regarding:

i. the complexity and exact phonic identity of the reflexes of each formula, a situation that is illustrated in Table 19,

(Nbr of CS:)	*-w (25)	*-y (39)	*-l (105)	*-r (116)
Lua	-Ø, -w [cond.?], -(a)w	-y	-l / -[*Vnas*]n	-r
Cini		-Ø	-l / -[*Vnas*]n?	-r
Tun	-Ø, (-(a)w ?)	-Ø, -y- [cond.?]	-y, -l, -Ø / -[*Vnas*]ɲ, -l, -Ø [cond.?]	-r, (-(ii)Ø ?)
Lɔɔ				-r
Kulaal	-Ø, -(a)ʊ	-Ø, -y, -ɪ/e [unclear]	-l	-r = -ṭ
Bon Gula (JR)	-w, -(U/O)Ø	-Ø	-l	r, ɽ ?
Zan Gula (S)	-w, -(U/O)Ø	-Ø, -y	-l	-d, -r
Ɓa	-w, -(e/a)Ø	-Ø, -(a/e)y	-l	-r, (-(ii)Ø ?)
Fanya (S)	-u ?	-Ø ?	-l	-r
Bolgo (RK)	-ʊ, -o, -(U/O)Ø	-Ø, -i	-l	-r, -d
Koke (F)	-w		-l	-r

([cond.?]: conditioning unclear; [*Vnas*]: nasal vowel)

Table 19. Reflexes of correspondence formulas *-*w*, *-*y*, *-*l*, and *-*r*

ii. the diversity of second consonant formulas that sometimes have to be reconstructed for one and the same CS, e.g.:

[37] According to Pairault (1969: 20-21), non initial *-s(-)* is realised as *[s]* when final after long vowel (e.g. *tòòs [tòːs]* 'three'), and *[z]* or *[ž]* (but under which conditions?) when intervocalic (e.g. *fésù [fézù]* 'African Mahogany').

(41)

*n-n; *n-m; *n-w	‘to bite’
*b-y; *b-r; *b-l	‘to be white’
*y-r; *y-g; *y-y	‘to change’
*k-r; *k-l; *k-y?	‘giraffe’
*c-l; *c-y or *c-w?	‘last year, once, yesterday’
*r-r; *r-l; *r-y?	‘seed’

iii. the question whether these second consonant formulas have to be analyzed as part of the lexical root or part of an ancient grammatical unit, namely frozen noun class marker or verbal extension. Table 20 displays some CS where frozen grammatical units (in bold italic) have been identified. Similar cases may be more frequent but not (yet) recognized.

	‘tree, wood’	‘spirit’	‘to cultivate’	‘field’
*consonants	*t-***_l_** */pl.* *t-***_r_**; *t-g; *t-***_w_** */pl.* *t-***_y_**	*ʔ-r ; *ʔ-***_l_** */pl.* *ʔ-***_n_**	*w-y */n.v.* *w-***_l_**	*w-***_l_**
*vowels	*e ?	*u(ː)	*aː? */n.v.* *aː?	*aː
*tones	*HM (Tun HM)	*HM	*{M3} */n.v.* *?	*H (Kul B)
*class/gender	*-***_l_** */pl.* *-***_r_**I; *-***_U_** */pl.* *-***_I_**	*-***_l_** */pl.* *-***_n_**	*n.v.* *-***_l_**	*-***_l_** */pl.* *?
Lua	tɬlā */pl.* térī	ʔúrī	wāy (4) */n.v.* wày	wáːl */pl.* wórgɨ́
Cini	tɬla			
Tun	təgā */pl.* tígī	ūy */pl.* ūn	wāā (2) */n.v.* wàá	wāy */pl.* wāā
Lɔɔ				way
Kulaal	téú (kù) */pl.* tí (kì)	úúl ([l]è) */pl.* úún (ṭù)	wáy */n.v.* wààl ([l]è)	wààl ([l]è)
Bon Gula (JR)	tóú */pl.* tii			
Zan Gula (S)	tū */pl.* tí		way */n.v.* ?	
Ɓa	tílā */pl.* tɛ̄r	ʔúːr	wāy (4) */n.v.* wáːl	
Fanya (S)	tɛu		[? =] wʌnton	wallɛ
Kulaale	tíù/tíì			wáːlɛ́/wáːɽɔ́
Bolgo (RK)	téú */pl.* téí		woi */n.v.* woi-el	
Koke (F)	tɛw ‘tree’; tɛ ‘wood’			wɛl

Table 20. An illustration of frozen grammatical units as second consonants

These three orders of facts – identification of formula reflexes, multiplicity of needed reconstructions and possible grammatical origin of some of them – are obviously correlated. They will need a thorough analysis of all CS involving problems of this type, which means probably the majority of them.

5.4. Vowels

Up to now, and on the basis of Lua, Tun, Kulaal, and Ɓa, the historical common system of vowels had been very tentatively reconstructed as in (42) (Boyeldieu 2014):

(42)

*i *u *e *o *ɛ *ɔ *a	*e̯(ː) *ɔ̯ *a̯
*iː *uː *eː *oː *ɛː *ɔː *aː	*i̯ː ? *u̯ː *ɛ̯ː *ɔ̯ː *a̯ː

In fact reflexes of these formulas are far from regular, especially regarding length. But above all, since ±ATR systems have been recently identified at least in Bolgo and in Bon Gula (see 4.3 above), a reconstructed system should be able to justify the situation of these latter languages, either by the former presence of such a contrastive feature or by a plausible scenario justifying its acquisition by some languages at a later stage.

5.5. Tones

Due to the nature of the available documentation, the comparative study of tones is practically limited to Lua, Tun, Ɓa, and Kulaal. Bon Gula (Roberts 2004), Zan Gula (Sauer & Sauer, unpublished), and Bolgo (Kastenholz 2017) have been recently added to the comparative data and introduced into Tables 21-22 below but, as these will show, it is still difficult to derive clear information from sources that are relatively limited and not systematically marked for tones, so that we will in fact not comment on them here.

Lua, Tun, and Ɓa have three contrastive tones while Kulaal has only two. Despite all gaps and irregularities that may characterise the data, it is relatively easy to identify significant cases of regular correspondences for the first three languages. Correlations with Kulaal, which shows more variation, are not as conclusive.

<insert Table 21 about here>

Table 21 displays eight distinct series of tone correspondences for nouns, out of which two – *ML? and *LM? – are tentative. *L1 and *L2 contrast only in Ɓa, the reflexes of which are L and LM respectively. But these two patterns seem, to some extent, to represent variants in this language, so that *L1 and *L2 are probably characterised by some degree of complementarity. The most represented formula is the complex pattern *HM that has often falling contour reflexes in the present-day languages. In this respect one should note that Tun does not reveal any flat H or HH pattern among its reflexes in this table (in particular the Tun reflex of *H is M). Indeed Palayer (1975: 183) underlines that both CV́V́ and CV́(V́)CV́ are infrequent in lexical units, except ideophones. We will come back to this peculiar feature below.

<insert Table 22 about here>

Table 22 identifies tone correspondences for verbs. In Lua, Tun, and Ɓa the cognation relies on the two tone patterns – identified either as Indicative/Injunctive or Perfective/Intentional – alternating in one and the same morphological class (see 4.8 above). However the first of these two patterns – presented to the left of the slash – is the one that makes the most sense in comparison with the other languages and therefore the only one that is currently retained as the reconstruction symbol. Under these conditions five formulas are identified, namely *{L}, *{M1}, *{M2}, *{M3}, and *{H}. For now, some representatives of marginal verb classes have been integrated – as 'irregular' and unexplained members – among the Tun reflexes of *{L} (classes [1bis] and [3]) and *{H} (classes [3bis] and [2bis]); note that these marginal classes do not appear elsewhere. In a similar way Ɓa reflexes of *{L} also contain, besides class (1) (L/HL) verbs, some class (2) (LM/HL) verbs – concerning the partial variation of L and LM patterns, see noun tone patterns above. As for the three 'type *{M}' series – i.e. *{M1}, *{M2}, and *{M3} –, their reflexes associate, in different configurations, classes that all have a first M pattern in Lua, Tun, and Ɓa. Although there is currently no reason to consider them as complementary, they could ultimately prove to be so. Finally *{M1/2?} and *{M1/3?} represent undecided formulas for series that lack a Lua or Ɓa crucial cognate.

For nouns as well as for verbs the above analysis holds essentially for the three languages Lua, Tun, and Ɓa. Kulaal, which only has two contrastive tones, tends to have L reflexes for the 'L-type' formulas and H or HL reflexes for the 'H-type' ones, but this principle is not absolute and the reflexes of the 'M-type' series are less clear.

The system of Kulaal leads to another question, namely what type of tone system should be reconstructed for proto-Bua. It is clearly too early to try to answer such a question and we have so far concentrated on – and are happy with – establishing relatively regular correspondences for the few languages for which it is possible. However, we just mentioned the restricted status of the Tun H tone, which rarely appears as a plain word pattern (CV́V́ or CV́(V́)CV́). Although less marked, Lua reveals a similar tendency (Boyeldieu 1985:214): as shown in Table 23, the lexical frequency of H patterns is markedly lower on disyllables than on monosyllables (the frequency is evaluated in absolute number and percentage within the same type of canonical pattern). As in Tun, ideophones (*impressifs*) are an exception:

Monosyllables				Disyllables			
V	v́	4 =	40,0%	CVCV	cv́cv́	64 =	10,6%
C	ć	4 =	57,0%	CV:CV	cv́:cv́	34 =	9,8%
CV	cv́	23 =	16,7%	CVCVC	cv́cv́c	13 =	4,7%
CV:	cv́:	14 =	15,8%	CV:CVC	cv́:cv́c	1 =	1,4%
CVC	cv́c	134 =	15,5%	CVCCV	cv́ccv́	37 =	5,8%
CV:C	cv́:c	56 =	14,8%	CVCCVC	–	–	–
				CVCVCV	cv́cv́cv́ (ideophones)	7 =	50,0%

Table 23. Lexical frequencies of H tone patterns in Lua

Looking at the tone correspondences for verbs in Table 22, it is striking that, again, Tun mostly has class (2) verbs – i.e. verbs with M as the first alternative tone pattern – as reflexes of the three 'type *{M}' formulas as well as of *{H}. Without anticipating an analysis that will require much more data, one can't help thinking that the not fully integrated H tone of Tun could be indicative of a recently expanded tone system and therefore suggest only two contrastive tones at the proto-Bua level.

5.6. Number marking and archaic noun 'classes'/'genders'

Most grammatical means used to mark nominal number in the Bua languages show enough connections with Adamawa and Gur class systems to reasonably postulate that they commonly derive from suffixed class markers of a similar type.[38] If so, however, this historical system underwent such changes in the present-day languages that it makes its identification a thorny matter. Difficulties may arise from different facts:

i. As has already been said (Section 5.3), the reconstruction of the second consonants, which may belong to a former suffix, is sometimes problematic.

ii. The postulated suffixed markers may have suffered a severe reduction in the present-day languages. For instance out of a lexicon of about 400 nouns, Tun has only 60 cases of specific noun plural formations.

iii. Some classes/genders may be represented by a very limited number of items (see the extreme case of 'thing' and 'place' in 5.6.10 below).

[38] Ulrich Kleinewillinghöfer, *Correspondences between the nominal classification in Kulaal, Bua languages and Central Adamawa-Gur (= Benue-Volta)* (Ms.).

iv. Noun assignment to genders has not always been stable through history: several CS display various proto-genders attached to one and the same nominal root (see illustrations in Table 24).

<insert Table 24 about here>

v. Analogical changes may have played a role, the importance of which is still difficult to evaluate. Let us consider the following variants in Lua and Ɓa noun plural forms (note that *{ˆ}* systematically symbolizes the raising of the root internal vowel):

(43a)	Lua	táwlī	/pl.	tə́wrī ~ tə́wlī	'kind of fish'	< *-*l* / *-*{ˆ}-rI*
		guàglì		gògrì ~ gòglì	'kind of fish'	…
(43b)	Lua	ɓuǎ:l		ɓòrgɨ́ ~ ɓǒ:l	'type of gourd'	…
		kuà:l		kòrgɨ̀ ~ kò:l	'axe'	…
(43c)	Ɓa	gwā:l		gwɨ̄:n ~ gwɨ̄:l	'male (of some animals)'	< *-*l* / *-*n*
		hwā:l		hwī:n ~ hwī:l	'kind of shrub'	…

In all cases the plural variant on the left may be considered as the older one:[39] the fact that root vowels also undergo raising (*Umlaut*) in the plural explains that the second consonant *-r(-)* or *-n(-)* can be replaced with singular *-l(-)* without damage to the number contrast.[40] In (43b) the presence of a secondary plural suffix *-gɨ* (see 5.6.11 below) probably stabilised the former *-l / -r-* alternation.

More complex Lua examples result from the combination of sound change and analogy as in (44):

(44)	Lua	jì:nà	/pl.	jḭ̀:rì ~ jì:nì	'hyena'	< *-*l* / *-*{ˆ}-rI*
		tí:ná		tḭ́:rí ~ tí:ní	'termite mound'	…

In the singular, Lua *-n(-)* is a regular reflex of *-*l* after a formerly nasal vowel that has now become neutralised. In the older plural form the reflex of *-*r* is *-r(-)* and the preceding vowel keeps its nasal feature. But in these particular cases analogy may replace *-r-* with *-n-*, which neutralises the preceding nasal feature. In other words *-*l(?)/*-rI* becomes *-na/-ni*. Compare the two paths:

(45)			sound change	analogy
	sg.	*Cı̰:-l(?)	> Ci:na	
	pl.	*Cı̰:-ri	= Cı̰:ri	> Ci:ni

Similar cases probably played a much more important role in the history of classes/genders than we can detect right now.

Under all the conditions mentioned above, we tentatively reconstruct a system of proto-'classes' and proto-'genders' as in Table 25. The concepts 'classes' and 'genders' – that from now on will be written without quotation marks – are used for convenience: it should be emphasised that they refer to morphological elements/patterns only, not to actual functional classes/genders.

[39] This view was clearly expressed by a Ɓa native speaker in the case of *gwɨ̄:n* 'male (pl.)'.

[40] If the proto-gender identification is right in (43a), we currently cannot explain why the Lua reflex of sg. *-*l* is *-li* and not *-l* as in (43b): should we recognise here an analogy with the plural form?

sg. (~ mass) /	pl.	*Comments:*
*-A	*{↑}-I	
*-U	*{↑}-I	
*-l	*-n	complementary to **-lE/*-rU*
*-l	*{↑}-rI	
*-m_1	*{↑}-rI (*{↑}-m_1-rI?)	exclusively masses and liquids
*-wɛ	*{↑}-I	includes animals
*-lE	*-rU	complementary to **-l/*n*; includes body parts
*-lE	*{↑}-I	'tooth', 'eye', 'breast', 'foot/leg', 'back', 'belly'
*?	*-B(V) (b/ɓ/w/u)	vestigial – human beings, kinship terms
*?	*-m_2	vestigial – kinship/relational terms
*?	*-m_3	vestigial – 'thing', 'place'

[{↑} = raising of the root internal vowel]
Table 25. Classes and genders of proto-Bua

5.6.1. Gender **-A/*{↑}-I*

Gender **-A/*{↑}-I* accounts for *-a~ɛ/-i~e~ɛ~ey* number marking patterns that appear in most languages (Kulaal concord markers are *kɛ̀/kì*), e.g.:

(46)	Lua	ʔūmā	/pl.	ʔūmī	'thorn'
		sù꞉rà		sù꞉rì	'scorpion'
	Tun	sɛ̀ɛ́		sìí	'fish'
		tə́gā		tígī	'tree'
	Ɓa	wūrā		wūrī	'spear'
		kwa̰꞉		kwḭ꞉	'dugout, pirogue'
	Kulaal	kìsà (kɛ̀)		kìsè (kì)	'porcupine'
		kéñà (kɛ̀)		kéñè (kì)	'baboon'
	Bolgo	ŋā		ŋíī	'ox'
	Bon Gula	kùlà (kʊ̀là?)		kùlè	'old person'
		hûŋá		hûŋé	'hair'
	Zan Gula	kula		kuley	'old person'
		kurɛ		kuri	'tortoise'
	Kulaale	kḭ̀bá		kḭ̀bɛ́	'nail, claw'

These alternations usually go together with a raising of the non-high root vowel (*a, ɛ, ɔ*, possibly even *e, o, ɪ, ʊ*) that we explain by the influence of the plural suffix (47).[41] This *Umlaut* that may be observed in most if not all Bua languages was most probably already a feature of proto-Bua, and it seems to be more accurate to characterise the plural proto-class as **{↑}-I*, rather than simply **-I*. Further illustrations will appear in the case of other genders with the same plural class (see below).

(47)	Kulaal	mànà (-kɛ̀)	/pl.	mònè (-kì)	'farmland in the village'
		kʊ̀là (kɛ̀)		kʊ̀lè (kì)	'*Ficus thonningii*'
		húúṭà (kɛ̀)		húúṭè (kì)	'scorpion (red)'

[41] Ulrich Kleinewillinghöfer holds that **{↑}* represents a vowel raising linked with an underlying [+ATR] feature which spreads to the stem vowels to the left.

Bolgo[42]	gârsá	gêrsi	‘louse’
Bon Gula	hoora	huure	‘river’
	hálá	hele	‘hen, chicken’
Zan Gula	fara	forey	‘millet sp.’
	sela	siley	‘hen, chicken’
Kulaale	hỹ̰ɔ̰ːbà	hỹ̰ɔ̰ːbè	‘fish’
	káyà	kóyè	‘ground squirrel’

Rare examples of Bolgo *-Ø/-i* could represent further reflexes of **-A/*{ˆ}-I* (with or without *Umlaut*):

(48)	Bolgo	ɲăm	/pl.	ɲèmí	‘meat, animal’
		dʌl		dʌlɪ	‘pot, jar’

Furthermore we consider that **-A/*{ˆ}-I* accounts for the cases of bare *Umlaut* that are extremely frequent in Lua and Ɓa, and may also occur in Tun (one instance only), in Kulaal or in Bon Gula (49):[43]

(49)	Lua	piáːr	/pl.	pɛ̄ːr	‘shinbone’
		ɗăːr		ɗə̄ːr	‘small basket sp.’
		suə̆lī		sɔ̄lī	‘soothsayer’
	Tun	sèngí		sìngí	‘piece of broken calabash’
	Ɓa	kwə̰̀l		kwɛ̰̀l	‘penis’
		sàːb		sìːb	‘fish’
		hɔ̀ːn		hwɨ̀ːn	‘beehive’
	Kulaal	ŋàñ (kɛ̀)		ŋɔ̀ñ (kì)	‘chief’
		kə́lè (kɛ̀)		kɔ́lì (kì)	‘mouse’
		kɔ̀kɔ̀m (kɛ̀)		kòkèm (kì)	‘toad’
	Bon Gula	ɲām		ɲum	‘meat, animal’
		má(ː)l		mú(ː)n	‘breast’

5.6.2. Gender **-U/*{ˆ}-I*

Reflexes of gender **-U/*{ˆ}-I* may be observed in Kulaal (with concord markers *kù/kì*), Ɓa, Bolgo, Bon Gula, Zan Gula, and Kulaale where they appear as *-u~ʊ~o~ɔ~w/-i~ɪ~e~y* contrasts, possibly combined with *Umlaut* (50):

(50)	Kulaal	wɛ́lɔ́ (kù)	/pl.	wélé (kì)	‘jackal’
		kàlú (kù)		kòlí (kì)	‘handle of calabash’
	Ɓa	ɓúrú		ɓírí	‘man (*vir*)’
		gōw		gōy	‘sorting basket’
	Bolgo	téú		téí	‘tree, wood’
		ʔóː		ʔóí	‘leaf’
	Bon Gula	tóú		tii	‘tree, wood’

[42] Examples of *-a/-i* number contrasts are extremely limited in Bolgo (see another instance in [46] above). The example of ‘louse’, although relevant here, obviously represents a borrowing from an SBB language, probably Bagirmi, where it appears as *ngírsā* (see Boyeldieu, Nougayrol & Palayer 2006; Keegan & Djibrine 2016).

[43] In Lua, these instances probably represent reflexes of both **-A/*{ˆ}-I* and **-U/*{ˆ}-I* that have apparently merged.

	tùkɔ́	tùkí	‘arm’
Zan Gula	aaw	aay	‘grass’
	ŋaaru	ŋoori	‘leaf’
Kulaale	tíù	tíì	‘tree’
	tóɽù	tóɽì	‘chin’

While instances of *-U/-I* contrasts are relatively limited in Bolgo, cases of *-U/-Iɲ* (e.g. *gʌ̀rʊ́* /pl. *gerɪɲ* ‘spear’, *ìsʊ́* /pl. *ìsɪ́ɲ* ‘porcupine’) are so numerous that one may wonder whether the latter do not represent the most common reflex of **-U/*{ˆ}-I*. In fact the plural suffix *-Iɲ*, which Kastenholz (2017: 12-13) considers to be recent, may also alternate with *-a* or *-ɛ* (e.g. *fana* /pl. *fenɪɲ* ‘axe’, *sɛmɛ* /pl. *semɪɲ* ‘monitor lizard’), or be simply added, possibly combined with *Umlaut* (e.g. *dɔ̀m* /pl. *dɔmɪɲ* ‘chin’, *sɛw* /pl. *sewɪɲ* ‘buffalo’). In two cases *-Iɲ* is even stacked onto another recent plural suffix *-gI* (see 5.6.11 below): *horu* ~ *hoːru* /pl. *horgɪɲ* ‘knife, machete’, *wōːrū* /pl. *wɔrɪɲ* ~ *wɔrgɪɲ* ‘skin’.

5.6.3. Gender **-l/*-n*

Gender **-l/*-n* is reflected by an *-l/-n* contrast in Lua (one example only), *-y~ɲ~Ø/-n* in Tun, and *-l/-n* in Ɓa, Kulaal (with *lɛ̀/ṭʊ̀* concord markers), and Bon Gula (51):

(51)			/pl.		
	Lua	bə̀ːl		bə̀ːn	‘beam(s) of granary’
	Tun	hɔ̄y		hɔ̄n	‘mortar’
		māɲ		mān	‘Tamarindus indica’
		hɔ̰̄ɔ̰̄ [hɔ̰̄ɔ̰̄?]		hɔ̀n	‘egg’
	Ɓa	hóːl		hwéːn	‘mortar’
		jə̰̀ːl		jìːn	‘mouse, rat’
	Kulaal	pààl ([l]ɛ̀)		pààn (ṭʊ̀)	‘door post’
		hɔ́ɔ́l ([l]ɛ̀)		hóón (ṭʊ̀)	‘rope’
	Bon Gula	kɛl		kɛn	‘hip’
		má(ː)l		mú(ː)n	‘breast’

As already mentioned, although the Lua *-l/-n* example in (51) is a unique instance, the language displays several examples of *-l/-ni* (e.g. *ɓōl* /pl. *ɓōnī* ‘kind of fish’) or *-la/-ni* (e.g. *bɪ̀là* /pl. *bènì* ‘shield’) contrasts that might result from analogical changes under the influence of **-A/*{ˆ}-I* reflexes.

Beside *-l/-n*, Kulaal and Bon Gula also show significant instances of complementary *-Il/-Un* pairings that appear in the context of a CVC- stem (52).

(52)			/pl.		
	Kulaal	ɛ̰̀kíl (lɛ̀)		ɛ̰̀kún (ṭʊ̀)	‘hearthstone’
		fɔ̰sɪ̀l (-lɛ̀)		fɔ̰sʊ̀n (-ṭʊ̀)	‘scale (of fish)’
		ɑ́ɑ́ṭ̰ɪl (-lɛ̀)		ɑ́ɑ́ṭ̰ʊn (-ṭʊ̀)	‘fishing basket, filter’
		fɔ́ñél (-lɛ̀)		fɔ́ŋón (-ṭʊ̀)	‘barrier’
	Bon Gula	ɛ̀kíl		ɛ̀kʊ̄n	‘hearthstone’
		kɔmɪl		kɔmʊn	‘beard’
		kɛɲɪl		kɛɲʊn	‘buttocks’
		híjîl		híjûn	‘belly’

Zan Gula and Fanya/Kulaale seem to have reflexes of the **-l/*-n* gender only in cases where the former determiner **lE/*ṭU* has been integrated into the noun, following the class

suffix. Compare with Kulaal (Table 26), where the determiners are still separate from the nouns:

	'knee'	'tongue'	'tamarind'
Kulaal	yúl [lè] / yún [ṭù][44]	lìl (lè) / lìn (ṭù)	mál (lè) / món (ṭù)
Zan Gula (S)	rūllé / runnu	līllɛ́ / līnnú	mallɛ / mannʊ
Fanya (AK)	rūllè / rūndù	līllè / līllù	
Kulaale	rúllè / rúnɖù	líllɛ́ / línɖʊ́	míllɛ̀ / mánɖʊ̀

Table 26. Reflexes of plural **-n* in Zan Gula and Fanya/Kulaale, compared to Kulaal

Bolgo seems to have no direct reflex of **-l/*-n*. It usually shows an *-l/-di* contrast in series where other languages have reflexes of **-l/*-n*, which suggests that the latter gender has merged with **-l/*{↑}-rI* in this language. In the same CS, Zan Gula, Fanya, and Kulaale usually have reflexes of gender **-lE/*-rU*, which might result from the integration of concord markers similar to those observed in Kulaal (see Section 4.7 above).

As shown in (51), regular reflexes of **-l/*-n* are sometimes combined with an *Umlaut*. This fact can be explained in two ways: a) the plural suffix should integrate a vowel similar to that of **-A/*{↑}-I*, i.e. the gender should be characterised as **-l/*{↑}-nI*, or b) instances of vowel quality change result from an analogical influence of the *Umlaut* observed in the case of genders **-A/*-I* and **-U/*-I*. Since the vowel quality changes are not systematic in the case of **-l/*-n* reflexes, we currently give priority to the latter hypothesis.

5.6.4. Gender **-l/*{↑}-rI*

Reflexes of **-l/*{↑}-rI* are limited in most languages. They appear as Lua *-l/-ri*, Tun *-ɲ~Ø/-ri*, Kulaal *-l/-ṭe* (one example only, in gender *lɛ̀/kì*), Kulaale (?)/*-re*, and, with a markedly higher frequency, Bolgo *-l/-d~ri* (53). Vowel raising may appear, although not systematically.

(53)	Lua	súl	/pl.	súrí	'head'
		ngiâːl		ngíːrī	'gravel, sand'
	Tun	īī		íírī	'eye'
		māɲ		máárī	'breast'
	Kulaal	ùl (lè)		ùṭè (kì)	'path, way'
	Kulaale	–		ɓírè	'excrement'
	Bolgo	súːl, súl		súdí	'head'
		sàːl		sedi	'paste, polenta'
		béːl		bédí	'stone, hill'
		ɓìl, ɓìːl		ɓìːrì	'excrement'

It is not clear to what extent **-l/*{↑}-rI* could also account for several cases of *CVCVl* /pl. *CVCri/ʊ* contrasts in Bolgo (54):

(54)	Bolgo	gabal	/pl.	gʌbrɪ	'wing'
		ógol		ɔ́grɪ	'bone'
		ɗʌ̄búl		ɗʌ̄brí	'tail'
		ɛ̀múl		ɛ̀mrʊ́	'co-wife'

[44] Although the Kulaal class markers are missing in Pairault's data, they may be confidently restored as *lɛ̀/ṭʊ̀*.

There seems to be no direct reflex of this gender in Bon Gula or in Zan Gula where the corresponding lexical roots are assigned to other classes.

5.6.5. Gender **-m$_1$/*{↑}-rI (/*{↑}-m$_1$-rI?)*

Reflexes of this specific gender that contains exclusively nouns referring to masses and liquids are best represented in Kulaal, where they appear in seven sg./pl. pairs (in gender *mɛ/ki*) and five additional frozen plurals (in class *–/ki*); see full illustrations in 4.6 above. The number contrast is limited in other languages, where the noun usually appears as a singular, more rarely as a plural form. Some illustrations are displayed in Table 27:

	'oil'	'water'	'beer'	'blood'
*consonants	*n-m	*ɲ-m; *r-m	*s-m	*s-m
*vowels	*u (Kul o = Tun ɔ)	*i (Tun u)	*a	*i (Kul e)
*tones	*HM	*H or *M ?	*H	
*class/gender	*-m$_1$/*{↑}-rI	*-m$_1$/*{↑}-rI	*-m$_1$/*{↑}-rI	*-m$_1$/*{↑}-rI
Lua	n̄ɨ̄m		hám / (hə́mngɨ́)	hímá
Cini		nyímə̄		
Tun	nɔ̄m	ɲūm	sām	sīrì
Lɔɔ	lum	rīm	sʉ̀mā, sə̀mə̄	
Kulaal	nóm (mɛ̀) / nóṭɛ̀ (kì)	ím (mɛ̀) / íṭɛ̀ (kì)	hą́m (mɛ̀) / hóṭí (kí)	hɛ́ṭɛ̀ (kì)
Bon Gula (JR)	(lʊwa / luwe ?)	ɽim	hám	hɪrɛ
Zan Gula (S)	nume	rím, (rídá) / rídéy	sámi	sídéy
Ɓa	númū, (ɲúmū, hyúmū)			(hùmā 'blood; milk' ?)
Fanya (S)	nummɛ	hrimɛ		simɛ
Kulaale	nómí	rímì	hỹ́ą́mì	hį́mì
Bolgo (RK)	núm	rím	sam / (semei)	sè:rì
Koke (F)	nom	rim		(sira ?)

Table 27. Reflexes of gender **-m$_1$/*{↑}-rI (/*{↑}-m$_1$-rI?)*

In CS 'water' Zan Gula sg. *rím* /pl. *rídéy* are regular reflexes of the original gender while sg. *rídá* might represent a back formation from the regular plural, based on reflexes of **-A/*{↑}-I*. In CS 'beer', Lua *hə́mngɨ́* and Bolgo *semei* plural forms are not reflexes of the original pl. class **{↑}-rI*. Numerous regular yet isolated plural forms may be observed in the CS 'blood' (Koke pl. *sira* is problematic).

The reflex of sg. **-m$_1$* is usually *-m*, sometimes followed by a vowel (*-mV*) of unknown origin. Reflexes of pl. **{↑}-rI* are similar to those that have been described for gender **-l/*{↑}-rI* above. However, it is remarkable that some Kulaal plural forms contain (retain?) a nasal feature that in many cases affects the vowel preceding the suffix (e.g. *fǫ̃m (mɛ̀)* /pl. *fǫ̃rè (kì)* 'flour', isolated pl. *hɛ́ɛ̃ṭɛ̀ (kì)* 'urine') or even shows up as a nasal consonant preceding this suffix (*hɛ́ɛ̃́m ([m]ɛ̀)* /pl. *hɛ́ɛ̃́nṭé (kì)* 'smoke', isolated plural *tínṭɛ̀ (kì)* 'dregs of must'). This particular situation strongly suggests that, in many if not all cases, the plural suffix **{↑}-rI* is not substituted for but added to the singular suffix **-m$_1$* so that the accurate characterisation of the gender is probably **-m$_1$/*{↑}-m$_1$-rI*.

5.6.6. Gender **-wɛ/*{↑}-I*

The reconstruction of a singular class **-wɛ* is supported mainly by evidence from Kulaale, Bolgo, Kulaal, and, to a lesser extent, Zan Gula and Fanya, as shown in (55-58).

(55)	Zan Gula	sɔ̄wɛ̀	/pl.	sōwì	'dog'
		suwɛ		suwi	'warthog'

Fanya (AK)	sʌwɛ	?	‘dog’
	buwɛ	?	‘goat’
Fanya (R)	(niwo?)	?	‘bird’
Fanya (S)	niwɛ	?	‘bird’
Kulaale	ɲo̱wɛ̀	ɲú̱wì	‘bird’
	ɓówɛ̀	ɓúyì	‘goat’
	hỹó̱ːlwɛ̀	hyú̱ːlì	‘guinea fowl’

In Bolgo, the singular suffix of a significant number of animals names, but also some nouns of different semantic categories appears to be *-ʊ∼o∼w* alternating with a plural suffix *-i* combined with a modification of the stems vowels (in many cases the original plural *-i* has been replaced by a new suffix *-iɲ*) (56).

(56)	Bolgo	ɓō ([ɓᵘ̯o] ∼ [ɓo])	/pl.	ɓīī	‘goat’
		hùː		hùì	‘kind of red antelope’
		kǒ		koi	‘leopard’
		sɛw		(sewiɲ)	‘buffalo’
		sʌmʊ		(sʌmʊɲ)	‘ovine, sheep’

Most Kulaal nouns ending in *-u∼ʊ∼ɔ* that ‘oddly’ fall within the *kɛ̀/kì* gender – instead of *kʊ̀/kì* – refer to animals (57). The final back vowel may be the trace of a former **-wɛ* suffix, which – by virtue of the now eroded suffix vowel – ended up in the *kɛ* class.

(57)	Kulaal	hàʊ̀ (kɛ̀)	/pl.	hòì (kì)	‘dog’
		àntáú (kɛ̀)		òntóí (kì)	‘cat’
		púʊ̀ (kɛ̀)		púù (kì)	‘caprine, goat’
		kɔ́ɔ̀ (kɛ̀)		kóò (kì)	‘snake’
		sù (kɛ̀)		sù (kì)	‘wild dog’

Finally, there is a distinct group of nouns in Kulaale – apparently exclusively animal names – which appear to have a reflex of the singular suffix **-wɛ* in both the singular and the plural, amalgamated with hypothetical former determiners similar to Kulaal *kɛ̀/kì* (cf. [57] above).

(58)	Kulaale	hyàwwɛ̀	/pl.	hyòwwì	‘dog’
		káwwɛ̀		kówwì	‘baboon’
		híwwɛ̀		híwwì	‘warthog’
		kámm̀mɛ̀		kóm̀mmì	‘kind of antelope (duiker?)’

It is not clear for the moment what this gender has become in the other languages, whether it has merged with (an)other(s) gender(s) and which one(s).

5.6.7. Gender **-lE/*-rU*

The identification of a **-lE/*-rU* gender is based on the existence of numerous and clear suffix pairings of the *-l∼de∼ɛ /-r∼n∼-ɲ∼ndu∼o∼ɔ* type, which, however, appear exclusively in Zan Gula, Fanya, and Kulaale. Table 28 displays a selection of CS where these three languages are contrasted with Lua, Tun, Ɓa, Kulaal, Bon Gula, Bolgo, and Koke, which all use other number marking processes (further CS were already presented in Table 21 above).

<insert Table 28 about here>

Yet the recognition of **-lE/*-rU* as a gender that was functional in a former system common to all present-day Bua languages raises some tricky questions.

As was already mentioned above (5.6.3), there is an obvious complementarity between languages that have reflexes of **-lE/*-rU* but no reflexes of **-l/*-n* (Zan Gula, Fanya, and Kulaale), and languages that have reflexes of **-l/*-n* but no reflexes of **-lE/*-rU*, i.e. virtually all other languages except Bolgo, which has neither. If we posit these two genders as distinct in the proto-system, we have to explain how one of them could disappear in one subgroup of languages while the other gender got lost in the second subgroup, a scenario that seems hardly plausible. Conversely if we imagine that both of them derive from one single historical gender – a hypothesis in principle more compatible with a situation of complementarity –, then we still have to explain how this unique gender could formally develop into the two pairings we are facing now.

There is another fact that is obviously related to this question although for the moment we do not understand exactly how: the **-lE/*-rU* reflexes are indeed formally close to the determiners *lè/tù* that appear in the Kulaal cognates, as if similar markers had lost their independence and become a synchronically indivisible part of the word in Zan Gula, Fanya or Kulaale: compare for instance Kulaal – as transcribed by C. Pairault – *ɑ́ɑ́l(è) / ɑ́ɑ́n(tʊ)*, Fanya *ɑ̄ːlè / ɑ̄ːrū* ‘neck, throat’, and Kulaale *ɑ́ːlɛ̀ / ɑ́ːr̃ɔ̃̀* ‘nape’, Kulaal *yúl[lè] / yún[tù]*, Zan Gula *rūllé / runnu*, Fanya *rūllè / rūndù*, and Kulaale *rúllè / rúndù* ‘knee’ (see Tables 26 and 28). The process is not surprising in itself but how can we explain that such a fixation is restricted to the reflexes of genders **-lE/*-rU* and, as is shown in the coming Section (5.6.8), **-lE/*{ˆ}-I*?

5.6.8. Gender **-lE/*{ˆ}-I*

Gender **-lE/*{ˆ}-I* is reflected by *-l/-i* in Bolgo, *-li/-Ø* in Ɓa (one case only), *-le/-Ø* in Kawãwãy, *-l/-Ø* in Kulaal (agreement gender *lè/kì*), *-lɛ/-y* in Zan Gula, *-le/ye~i* in Fanya (AK), and *-le/ɛ~e~y~Ø* in Kulaale, some languages possibly showing cases of additional *Umlaut*:

(59)	Bolgo	gīl ~ gīːl	/pl.	gīī	‘eye’
		naːl		nʌɪ	‘foot, leg’
		nìl		nìì	‘tooth’
	Ɓa	jílí		jí	‘eye’
	Kawãwãy	jílé		jé	‘eye’
		hwīīlē		hwīī	‘belly, inside’
		ɓììlè		ɓìì	‘back, rear’
	Kulaal	nál (lè)		nó (kì)	‘foot, leg’
		nèèl ([l]è)		nèè (kì)	‘tooth’
		máál ([l]è)		móó (kì)	‘breast, corner’
	Zan Gula	nɛ̀lɛ̀		ney	‘foot’
		máálɛ́		máay	‘breast’
	Fanya (AK)	īːlè		īyē	‘eye’
		nīːlè		nīyè	‘tooth’
		nālè		náì	‘leg’
	Kulaale	nɪ́ːlɛ̀		nɪ́ːɛ̀	‘tooth’
		nɑ́lɛ̀		nɑ̂y	‘foot, leg’

This gender is clearly residual and concerns at most six nouns referring to body parts ('tooth', 'eye', 'breast', 'foot/leg', 'back', and 'belly'). It is not clear as of now whether it is also attested in the following three Tun nouns:

(60)	Tun	wāy	/pl.	wāā	'field'
		sáȳ		sáā	'house'
		sàɲ		sa̰à̰	'food'

Otherwise it has no direct reflex in other languages, in which the corresponding lexical roots have shifted to other genders.

Considering the form of **-lE/*{↑}-I* reflexes in Zan Gula, Fanya, and Kulaale, one observes again that these languages look, to some extent, as if they had incorporated a former element similar to the current Kulaal determiner (assuming the reduction of plural *ki* to *i/ye*): compare for instance Kulaal ***máál(è) / móó(kì)*** and Zan Gula ***máálɛ́ / mááy*** 'breast', Kulaal ***nèèl(lè) / nèè(kì)*** and Fanyan ***nīːlè / nīyè*** 'tooth', etc. (see [59] above). In fact, the situation is clearly reminiscent of that of **-lE/*-rU* (see 5.6.7 above), and suggests that the latter is indeed complementary to **-l/*-n* (see 5.6.3).

5.6.9. Vestigial genders **?/*-B(V)* and **?/*-m_2*

Genders **?/*-B(V)* and **?/*-m_2* account for limited and varied instances of plural nouns, the singular marking of which is unclear. More than reflexes in the strict sense, they represent traces of grammatical pairings that were most probably already marginal and irregular at the proto-Bua level.

These two genders are semantically specialised: **?/*-B(V)* contain exclusively nouns referring to 'human beings' (including possible kinship terms), and **?/*-m_2* only kinship terms and relational terms such as 'chief' or 'friend'. Some vestiges of **?/*-B(V)* are displayed in (61):

(61)	Lua	mwà: kwá:	/pl. -(i)bɨ	mɔ̀ybɪ̄ kóybɪ̄	'parent-in-law' 'maternal uncle'
	Zan Gula	iya biney	/pl. -w	iyɔw binow	'mother' 'sibling (of same sex)'
	Kulaale	ʔá ɓa̰á̰ kà:ká	/pl. -wɛ̀	ʔá-wɛ̀ ɓa̰á̰-wɛ̀ kà:kú-wɛ̀	'woman' 'child' 'grand-parent'
	Ɓa	nă: mă:	/pl. -ɓé[45]	nă:-ɓé (mĭ:m ~) mĭ:m-ɓé ~ mă:-ɓé	'mother' 'grandparent, ancestor'
	Bolgo	bí:n yă tɛm	/pl. -(o)w/u/ʊ	bínow yʌ̀ú timu	'brother' 'maternal uncle' 'healer'

Traces of **?/*-m_2* are displayed in (62) (note that Kulaal plurals fall into a specific class *mè*):

(62)	Lua	w̃àɲ	/pl.	w̃òm	'chief'

[45] Note that Ɓa pl. *-ɓé* is identical with the 3[d] plural personal pronoun (subject, object, and possessive).

	ɓa̰ː	ɓíːm	‘child’
Tun	wànī	wànùm	‘chief’
Ɓa	ɓa̰ː	ɓíːm	‘child’
	măː	mǐːm ~ mǐːm-ɓé (~ măː-ɓé)	‘grandparent, ancestor’
Kulaal	wɔ̀sà, wɔ̀sɔ̀	pìsè(m) (mè)	‘somebody, person’
	(kúé)	nàm [(mè)?]	‘siblings, friends’
	-wáá	-’(á)ám	‘female’
Zan Gula	nɛ́ɛ́	nɛ́m	‘friend’

5.6.10. Vestigial gender **?/*-m_3*

The identification of a gender **?/*-m_3* is essentially based on two Kulaal nouns that display specific concord markers, namely sg. *kí* (in the case of ‘thing’ only; note that this is the sole Kulaal determiner that bears a high tone), and pl. *mò* (63):

(63)	Kulaal	ì (kí)	/pl.	òm (mò)	‘thing’
		ɛ́n (kɛ̀)		óñóm (mò)	‘place’

A trace of plural suffix *-m_3* is also present in Lua *w̃āŋ / mūm* ‘thing’.

5.6.11. Plural **-gI?*

Many Bua languages[46] show instances of a plural suffix marker of the *-gI* type. Some illustrations are shown in (64):

(64)	Lua	kwàːl	/pl.	kòːl ~ kòrgɨ̀	‘axe’
		piāní		pēnngɨ́	‘spear’
	Tun	ɗāŋ		ɗíngī	‘foot’
		hṵ̄ṵ́		hūŋgú	‘flower’
	Ɓa	kwḭːlī		kwḭːlgī	‘hippo’
		kɔ̄		kɔ̄ygɪ̄	‘snake’
	Kulaal	tòŋ (kù)		tòŋkì (kì)	‘house’
		yàà (-kɛ̀)		yòòkì (kì)	‘water hole’
	Bolgo	ŋàn		ŋɛ̀ŋgí	‘behind, buttocks’
		téú		téí	‘tree, wood’
				teigi	‘medicine’
	Kulaale	tɔ̂		tóỳkè	‘house’
		tàbà		tèbkè	‘shelter’

The inclusion of Kulaal suffix *-ki [-gi]* as a reflex of **-gI* seems reliable because of its phonetic realisation, but the identification of Kulaale *-kè* remains tentative.

Several facts suggest that reflexes of **-gI*, which are rather added than substituted to a zero singular marker, represent a relatively recent morpheme that does not participate in the gender system (Boyeldieu 1986b: 242, 246; Kastenholz 2017: 12). First it is frequently stacked onto a former marking process as in Lua *kwàːl* /pl. *kòrgɨ̀* ‘axe’, Ɓa *kɔ̄* /pl. *kɔ̄ygɪ̄* ‘snake’, or Bolgo *téú* ‘tree’ /pl. *teigi* ‘medicine’. Its secondary character is also shown by a comparison of cognates in close languages/varieties such as Lua, Tun, and Ɓa:

[46] Bon Gula, Zan Gula, and Fanya seem to be an exception. Note however that in most languages, except Lua, the instances of **-gI* are extremely limited.

(65)	Lua	Tun	Ɓa	
	suāːl / sōrgɨ̄	sɔ̄ɔ̄ / sōm	hwāːl / hwīːn	‘rope’
	húː / húːgɨ	hɔ̰̄ɔ̰̄ / hɔ́n̄	hṓw / hṓy	‘horn’

or Kulaale and Fanya (AK):

(66)	Kulaale	Fanya (AK)	
	mṵ̀ / mṵ̀ykè	mū / mwi	‘mouth’
	tɛ̰̀w̃ / tɛ̰̀ykè	tɛ̃w / téỹi	‘arm’

The suffix **-gI* might have been borrowed from a neighbouring SBB language, in particular from the Bagirmi noun plural marker *gē* (Keegan & Djibrine 2016) but this remains to be demonstrated. Also, it is uncertain whether **-gI* may be ascribed to a system that was common to all Bua languages or whether its apparent reflexes were in fact independently borrowed by languages after they split.

5.6.12. Suppletive plural of ‘person’

In several Bua languages, there is a striking similarity in noun pairs referring to ‘person /pl. people’ (67):

(67)	Lua	wò	/pl.	bì	‘person/people’
	Tun	ùù		(ɓa̰ā̰?)	*id.*
	Ɓa	wù		bì	*id.*
	Kulaal	wɔ̀sɔ̀, wɔ̀sa		pìsè(m) (mè)	*id.*
	Bon Gula (JR)	wa		be	*id.*
		wà.jìl		pè.jùn	‘old person’
	Zan Gula (S)	(isɔ?)		biye	‘person/people’
		ōbríː (ō-bríː?)		(obru)	‘man (*vir*)’
	Fanya (J)	?		biè	‘people’
	Kulaale	ʔùyò		ɓìyè	‘person/people’
	Bolgo (RK)	wìː		bìò	‘person/people’
				bìː	‘people’

As a historical explanation of these suppletive forms, Ulrich Kleinewillinghöfer argues that initial consonants *w(V)-* (sg.) and *b(V)-* [or *ɓ(V)-, p(V)-*] (pl.) are most probably reflexes of the common Volta-Congo class morphemes of the human gender, which are reconstructed for Gur as **ʊ* (class 1) and **ba* (class 2) (Miehe et al. 2012), and for Benue-Congo as **u* and **ba* (De Wolf 1971).

5.6.13. Noun formative *-m(V)* in tree names

<insert Table 29 about here>

It is remarkable that in Bua languages, several common tree names contain a final element of the *-m(V)* type (see Table 29). As exemplified in (68), Kulaal, for which C. Pairault recorded about one hundred and fifty names of plant species, contains some sixteen nouns displaying the same feature:

(68)	Kulaal	kn̰ààm (kù)	/pl.	kn̰èèm (kì)	'*Ziziphus mauritiaca*'
		lúúṭàm (kɛ̀)		lúúṭèm (kì)	'*Hyptis spicigera*'
		fààm (kù)		fòòm (kì)	'*Sterculia setigera*'
		kǹkn̰mà (kɛ̀)		kǹkn̰mè (kì)	'wild vine, *Cissus sp.*'
		tn̰mà (kɛ̀)		tn̰mè (kì)	'*Bauhinia sp.*'

It is unlikely that this formative represents a class marker/suffix: *-m(V)* is usually preserved in the plural form, the Kulaal nouns that contain it fall into the most common genders *kù/kì* or *kɛ̀/kì*, and it appears in many cases as a third consonant. These facts rather point to the status of a nominal extension, the nature of which is still unclear.

6. Future prospects: the Bua languages comparative project

Quite recently, the four authors of this article started to share their data and knowledge of either Bua or, more widely, Adamawa-Gur in order to jointly pursue and improve the comparative study of the Bua Group languages. The more precise aims of the project are as follows:

– to put together and publish a comparative database including information about lexical series, phonological and morphological correspondences, as well as comments on the historical diversification of a former common linguistic system into the present-day languages,

– to promote individual publications on languages documented so far in order to make currently restricted data collected by the authors or by previous researchers public and accessible,

– as far as possible, to foster further research on the lesser known languages of the Bua group with the help of new people.

The present paper constitutes the first result of this collective project. As a complement to this 'internal' point of view, it will be followed by a study considering the relations of the Bua group with the other languages of the Adamawa and Gur branches.

Symbols and abbreviations

*{L}, *{M1}, etc.	reconstructed verb class formula
*L, *M, etc.	reconstructed tone formula
{↑}	root vowel raising
~	variant
1	1st person pronoun
2	2d person pronoun
3	3d person pronoun
A	stands for several non high vowels
ATR	advanced tongue root
C	consonant
-C	second consonant
C-	initial consonant
CAG	Central Adamawa-Gur ('Benue-Volta')
CS	lexical comparative series
DEM	demonstrative
E	stands for several non low front vowels
FUT	future
H	high tone
I	stands for several high front vowels
IND	indicative

L	low tone
M	mid tone
OBLIG	obligative
PF	perfective
pl., PL	plural
PRGR	progressive
sg., SG	singular
U	stands for several high back vowels
V	vowel
VN	verbal noun

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Maps

Carte de l'Afrique centrale au 1/200 000, République du Tchad. Paris: Institut Géographique National (Centre d'Afrique Équatoriale à Brazzaville):
– Sheet NC-34-XIX GUÉRA (1956)
– Sheet NC-33-XVIII MILTOU (1954)
– Sheet NC-34-XIII DAGÉLA (1960)
– Sheet NC-34-XIV LAC IRO (1960)

– Sheet NC-33-XII NIELLIM (1955)
– Sheet NC-34-VII FORT ARCHAMBAULT (1956)

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Khalil, Alio: *Fanya.*

Lionnet, Florian : *ʔBa (Magalya, Gawaya), Kawãwãy, Kulaale.*

Pairault, Claude: *Kulaal, Bon Gula, Zan Gula, ʔBa (Sombolo, Koy), Bolgo, Koke.*

Palayer, Pierre: *Tun.*

Sauer, Silke & Martin Sauer: *Zan Gula.*

\nlm_GD	niellim : Gaudefroy-Demombynes 1907 < Decorse (D), Bruel (B)
\nlm_L	nielim ; Lukas 1937 < AF zu Mecklenburg (AF), Nachtigal (N)
\nlm	nlm : Boyeldieu
\cin	cini : Boyeldieu
\tun_GD	tounia : Gaudefroy-Demombynes 1907 < Decorse
\tun	tun : Palayer
\per	perim : Boyeldieu
\noy	noy : Palayer
\kul	kulaal : Pairault BLG, DPI, man.
\glB_M	gula de Bon : Mouchet 1958
\glB_P	gula de Bon : Pairault man.
\glB_F	gula de Bon : Faris & Meundeung 1993
\glB_JR	gula dee Bon : Jim Roberts, pers. doc. (through RK)
\glZ_R	gula de Zan : De Rendinger 1949
\glZ_P	gula de Zan : Pairault man.
\glZ_F	gula de Zan : Faris & Meundeung 1993
\glZ_S	gula de Zan : Silke Sauer, pers. doc. (through RK)
\bua_L	bua : Lukas 1937 < Nachtigal (N), zu Mecklenburg (AF)
\bua_GD	bua : Gaudefroy-Demombynes 1907 < Decorse (D), Bruel (B)
\bua_G	bua : Gabe 1950
\bua_S	bua : Pairault man. (Sombolo)
\bua_K	bua : Pairault man. (Koy)
\bua_SB	bua : PB + Samil Bla
\bua_FM	bua (ɓà) de Magalya : Lionnet, pers. doc.
\bua_FG	bua (ɓà) de Gą̱waya : Lionnet, pers. doc.
\kaw_F	kawą̱wą̱y : Lionnet, pers. doc.
\fan_J	fanyan : Joly 1935
\fan_R	fania : Faris & Meundeung 1993 (Rim)
\fan_S	fania : Faris & Meundeung 1993 (Sissi)
\fan_AK	fanian : Alio Khalil (through RK)
NNN	kulaale : Lionnet, pers. doc.
\man	mana : Gaudefroy-Demombynes 1907 < Decorse
\blg_J	bolgo : Joly 1935
\blg_R	bolgo : De Rendinger 1949
\blg_P	bolgo : Pairault man.
\blg_B	bolgo Bormu : Faris & Meundeung 1993
\blg_D	bolgo Dugag : Faris & Meundeung 1993
\blg_RK	bolgo Bolgo : Kastenholz, pers. doc.
\kok_L	koke : Lukas 1937 (< Nachtigal ?)
\kok_P	koke : Pairault man.
\kok_F	koke : Faris & Meundeung 1993
\day	day : Nougayrol 1980
\laal	laal : Lionnet, pers. doc.
*Gur	Manessy 1969, 1975, 1979
*Ad_6	Boyd 1974
\Ctr_Ad	Kleinewillinghöfer, pers. doc.

Table 12. The comparative database: Toolbox® fields and source references

	‘head’	‘oil, fat’	‘tree’	‘to eat (sth soft)’	‘to die’	‘to tie’
*consonants	*c-l	*n-m	*t-l / *t-r ; *t-g ; *t-w / *t-y ? (*t- ?)	*l- // *l-m	*ʔ-y // ʔ-l	*ɓ-w (; *ɓ-b ?)
*vowels	*u/*i	*u (Kul o)	*e ?	*i (Tun ee)	*u(ː)	*o (Tun oo#)
*tones	*H (Ɓa LH)	*HM	*HM (Tun HM)	*(H) (Tun 3bis; Kul B) // *?	*{H} (Tun 3bis)	*{M?}? (Ɓa 1)
*class/gender		*-m/*-rI	*-l/*-r ; *-U/*-I	// *-m	// *-l ?	//
Lua	súl / súrí	n̄m̄	tɨ́lā / térī	lí (5) // lɨ̀mà	ʔúy (5) // ʔúːlū	ɓō̰w (3) // ɓɔ̰̀wlī
Cini	súlə́		tɨ́la			
Tun	sīī	nɔ̄m	təgā / tígī	lēé (3bis) // lèm	ūú (3bis) // ūlú	ɓōō (2) // ɓòó
Lɔɔ	súl	lum		le		
Kulaal	húl (lɛ̀) / hún (ṭù)	nóm (mɛ̀) / nóṭɛ̀ (kì)	téó (kù) / tí (kì)	lì // líúl ([l]ɛ̀)	úíí // ùààl ([l]ɛ̀)	pò, pòrò // pààpà (kɛ̀)
Bon Gula (JR)	hûl	lʊwa / luwe	tóú / tii	(dì [dí?]?)	ʔú // ul ‘death’	
Zan Gula (S)	sūlé / suru	nume	tō / tí	lí	ʔu	bōō
Ɓa	sìlí	númū	tílā / tɛ̄r	lí (5) // lĭ̈mī	ʔú (5) // ʔúːlū	ɓòw (1) // ɓùːlà
Fanya (S)	sillɛ	nummɛ	tɛu	li	ʔu	
Kulaale	hílè / hílù	nómí	tíù / tíì	lí // líwà	ʔú // ʔúwà	ɓó // ɓòwá
Bolgo (RK)	súːl, súl / súdí	núm	téú / téí	lī // lī-l	ú // ú-l	ɓó // ɓo-l
Koke (F)	sul	nom	tɛw ‘tree’ ; tɛ ‘wood’	lili	ʔu	

[Symbols: Sg. / Pl. noun ; Verb // Verbal noun]

Table 13. A sample of Bua lexical comparative series

	*c-	‘warthog’ *c-	‘fish’ *c-b	‘fight, war’ *c-l	‘wind’ *c-b	‘smoke’ *c-m	‘head’ *c-l	‘urine’ *ɲ-r; *c-r
Lua	s-	suâː / sùː		sàl	sàːb, sàːw	(lâː) síːm	súl / súrí	ɲírgī
Tun (GD)	s-, sh-		sè	soï ‘guerre (faire la)’	sã	lashem	si	
Tun	s-	síyū	sɛ̀ɛ́ / sìí	sày	sàà	lā-sēm	sīī	ɲíírī
Kulaal	h-	híù (kù) / hîì (kì)		[?=] sɔ̀l (lɛ̀) ‘lutte’	hààp (kù)	hɛ́é̱m ([m]ɛ̀) / hɛ́é̱nṭé (kì)	húl (lɛ̀) / hún (ṭù)	hɛ́è̱ṭɛ̀ (kì)
Ɓa (L)	s-, š-	šói (N)	šš̆ib (N); āb (AF)	sal ‘Krieg, Feind’, šal ‘Krieg’ (N)	kunasab (AF)		[m]sélē	
Ɓa	s-	swàː / swìː	sàːb / sìːb	sàl	kùnà, kùnàsàːb	síːm	sìlí	ɲĩrmī
Fanya (J)	Ø-, y-			yalè ‘guerre’	ɣabo	imèlè	ilè	nibé
Fanya (R)	s-, ʃ-				sabu	similɛ	ʃillɛ	ʃibɛ
Fanya (S)	s-				sabu	simɛlɛ	sillɛ	sibɛ
Fanya (AK)	h-						hīlè / sīlù	hínbè
Kulaale	h-, hy-	híwwɛ̀ / híwwì	hỹ̰ːbà / hỹ̰ːbè		(wáːlá / –)	hyéːmlè / hyéːmɽò	hílè / hílù	hỹ̰ːbè / –

[Ɓa (L) *[m]sélē* = ‘[your] head’]

Table 15. Palatal reflexes of *c- in Tun (GD), Ɓa (L), Fanya (J), Fanya (R), and Kulaale

	*s- (27)			*c- (29)			*h- (7)		
*CV(:)	(1)	*sa(:)	‘year’	(5)	*ci *ci: *cɔ:	‘to go, leave, walk’ ‘to steal’ ‘warthog’	(1)	hV ?	‘to come’
*CV(:)C(-)	(1)	*su(:)l / (*su(:)n)	‘hair, feather’	(15)	*cul *ci(:)r *ca:b(-)	‘head’ ‘to fill’ ‘fish’	(4)	*ho:w; (*ho:n) *hel; *her *ho:l / (*ho:n) (?)	‘to buy, sell’ ‘to survive’ ‘debt, credit’
*CV(:)N(-)	(13)	*sam *sum *sim	‘beer, alcohol’ ‘to wash’ ‘blood’	(6)	*ci:m *cám *(*cɔ:l) / *co:n	‘smoke’ ‘venom’ ‘rope’	(3)	(*ho:l) / *ho:n (?) *hun ; *hum *ho:n; (*ho:w)	‘debt, credit’ ‘to kill’ ‘to buy, sell’
*C̰V(:)	(1)	*sḛ(:)r	‘hearth’	–	–		–	–	
C̰V(:)L(-)	(6)	*sṵ:l(-) *sa̰:l *so̰l	‘be sweet, fresh’ ‘paste, polenta’ ‘star’	(1)	*cṵ:l; (*cu(:)l)	‘guinea fowl’	–	–	

Table 16. Relative complementarity of **s-*, **c-*, and **h-* regarding vocalic nasality (examples for each case limited to 3, total number in parentheses)

	‘African mahogany, *Khaya senegalensis*’	‘to tear’	‘to ask’	‘lungs’	‘to refuse’
*consonants *vowels *tones *class/gender	*p-z; *p-z-m *e? (Lua ɨ-a) *HM	*d-z *a̰ː (Ɓa ḛː) *{L}	*ɓ-z *iː *{M?}? (Kul HB; Ɓa [2])	*p-z; (*p-n?) *u (Lua i)	*k-z; *k-y *ɔ *{L}
Lua	pírmā / pírmī	dèːr ~ dà̰ːr (1)	ɓīːr (4)	pír	kuày (1) // kuày
Cini	pírámā	dàːr			
Tun	hērəm	ɗɛ̰̀r, ɗɛ̰̀ɛ̰̀rɛ̀	ɓīīrī (2)		
Lɔɔ					
Kulaal	fésù (kù) / fésí (kì)	tà̰à̰sì // tà̰à̰sú (kù)	píísè	fúsì (kì)	kòs, kòsí // kàsú (kù)
Bon Gula (JR)					
Zan Gula (S)			biisi		kɔsɪ
Ɓa	húrmā	dɛ̰̀ːr (1) (intrans.); dɛ̰̀ːrgī (2) (trans.)	ɓìrgī (2)	(hṵ̄n)	kwàr (1) // kwàrí
Kulaale	(hójó / hójé?)				
Bolgo (RK)	hísīl		ɓír ([ɾ])	hùːsí ([hʷʊːsɪ])	
Koke (F)					

Table 18. Reflexes of *-z in Kulaal, Zan Gula, Kulaale (?), and Bolgo (a selection)

(tokens:)	*L1 (33)	*L2 (15)	*M (19)	*H (23)	*HM (41)	*ML? (10)	*LM? (13)	*LH (6)
Lua	L	L	M	H	HM	ML	LM	LH
Tun	L, (LH, LM, MH)	L	M, (HM, MH, LH)	M	M, HM [cond.?], (MH)	ML	LH, M ?, MH?	LH?
Kulaal	L, (LH)	L	?	H, (L)	H/HL [1/2 syll.]	HL?	?	?
Bon Gula (JR)	?	?	H?	H	H, HL	?	?	LH?
Zan Gula (S)	ML?	?	M?	H?	H, (M?)	?	?	?
Ɓa	L	LM	M	H	HM	ML, M?	LM, M?	LH
Bolgo (RK)	L?	L?	?	H, (M)	H	?	?	LH?

([cond.?]: conditioning unclear)
Table 21. Tone correspondences: nouns

(tokens:)	*{L} (26)	*{M1} (25)	*{M2} (14)	*{M3} (7)	*{M1/2?} (7)	*{M1/3?} (4)	*{H} (16)
Lua	1=L/ML	4=M/H	3=M/ML	4=M/H	*no cognate*	4=M/H	5=H/M
Tun	1=L/HM, (1bis=L/MH, 3=MH/MH [cond.?])	2=M/L	2=M/L	2=M/L	2=M/L	2=M/L	2=M/L, (3bis=MH/M, 2bis=M/M [cond.?])
Kulaal	L	L, H(L)	L, H(L)	H(L), L	L, (HL)	H(L)	H(L), (L)
Bon Gula (JR)	?	?	?	?	?	?	?
Zan Gula (S)	?	?	H?	?	?	?	?
Ɓa	1=L/HL, (2=LM/HL)	3=M/HL	3=M/HL	4=M/H	3=M/HL	*no cognate*	5=H/M
Bolgo (RK)	?	H?	H?	H?	H?	?	H?

([cond.?]: conditioning unclear)
Table 22. Tone correspondences: verbs

	‘tree, wood’	‘roan antelope’	‘ear’
*consonants	*t-l / *t-r; *t-w / *t-y; *t-g	*c-l / *c-n	*t-l; *t-w / *t-y
*vowels	*e ?	*ɛː (Ɓa eː)	*o
*tones	*HM (Tun HM)	*L2	*HM
*class/gender	*-l / *-rI	*-l / *-n	*-l/*-rI
	*-U / *-I	*? / *-m	*-l/*-n
	*? / *-I?	*-lE/*-rU	*-U/*-I
Lua	tɬlā / térī	siàːl / sèːl, sìːl	túlā / tórī
Cini	tɬla		túlā
Tun	tə́gā / tígī	sɛ̀ɛ̀ / sèm	tōy / tōn
Lɔɔ			
Kulaal	téó (kù) / tí (kì)	hɛ̀ɛ̀l ([l]ɛ̀) / hèèn (ṭù)	tó (kù) / tú (kì)
Bon Gula (JR)	tóú / tii		tó ~ tó / tu
Zan Gula (F)	tō / tí	sɛ̀ːlɛ /pl. sɛ̀ːrù ‘hartebeest’	tū / tūy
Ɓa	tílā / tɛ́r	siɛ̀ːl / siɛ̀ːn	tṓw / tṓy
Fanya (S)	tɛu		to
Kulaale	tíù / tîì	hyɛ̀ːlɛ̀ / hyɛ̀ːɽɔ̀	tów / [ttykɛ̀]
Bolgo (RK)	téú / téí		tō / tōī
Koke (F)	tɛw ‘arbre’; tɛ ‘bois’		to

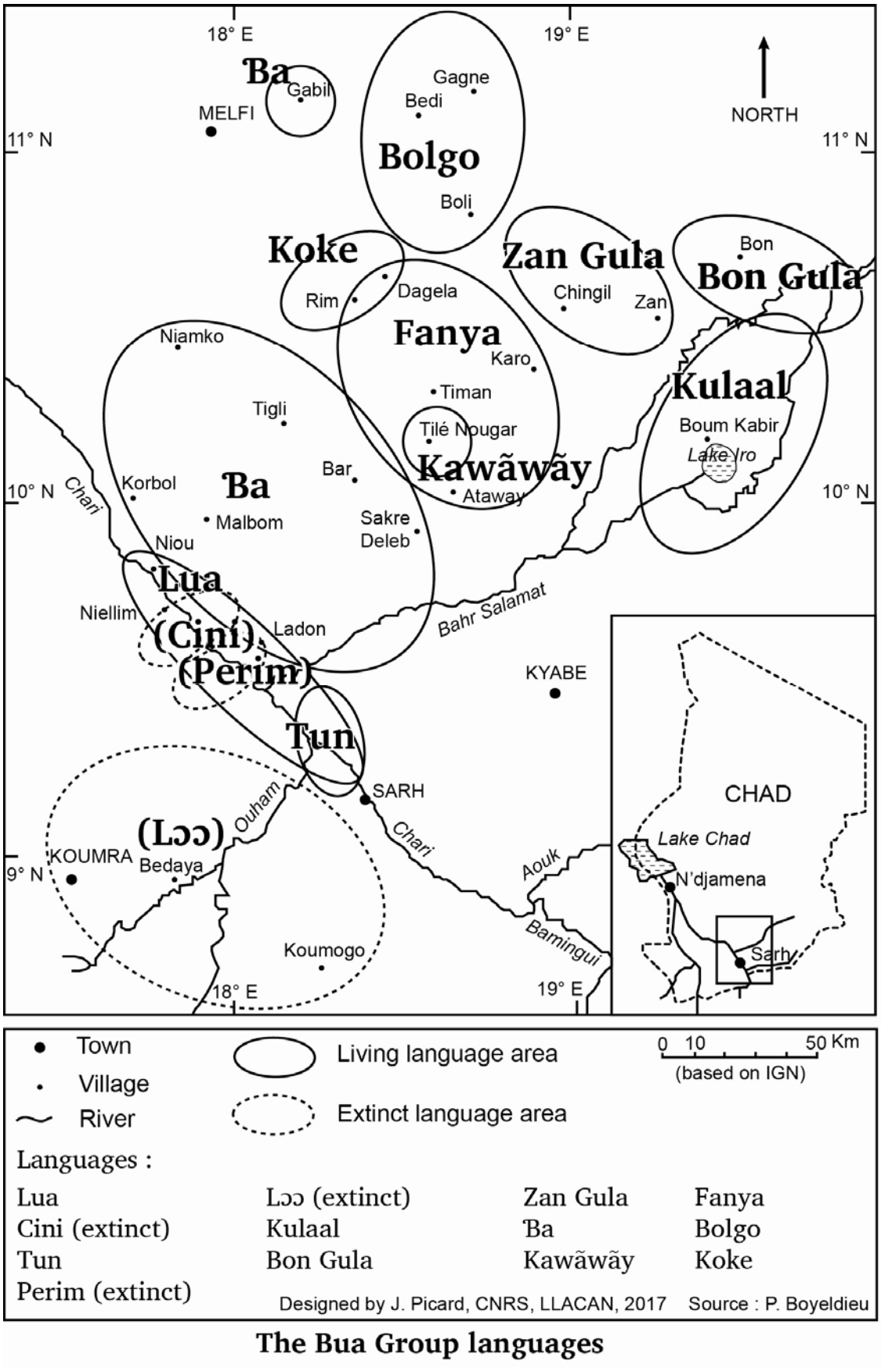
Table 24. Variable assignment of a nominal root to proto-genders

	‘head’	‘paste, polenta, food’	‘skin’	‘liver’	‘eye’	‘star’
*consonants *vowels *tones	*c-l *u/*i *H (Ɓa LH)	*s-Nl *a̰: *L?	*ʔ-l *u	*n-r ; *n-l ? *i(:) (Kul ee) *H	*j-(l) ; *ʔ-l *i(:) *H	*s-Nl *o̰ (Tun ɔ̰) *H or *M?
Lua	súl / súrí	hà:n / hənngɨ		nírí ‘heart’	jí	
Tun	sīī	sàŋ / sa̰a̰		nīī	īī / íírī	sɔ̄ŋ / sɔ̄n
Ɓa	sìlí				jílí / jí	
Kulaal	húl (lɛ̀) / hún (ṭʊ̀)	ha̰a̰l ([l]ɛ̀) / ha̰a̰n (ṭʊ̀)	úl (lɛ̀) / ún (ṭʊ̀)	néét̰ ([l]ɛ̀) / néén (ṭʊ̀)	ííl ([l]ɛ̀) / íí(n) (ṭʊ̀)	hó̰l (lɛ̀) / hó̰n (ṭʊ̀)
Bon Gula (JR)	hûl	hàl	ʊl / ʊn	nīr	iil / iiri	
Zan Gula (F)	sulɛ				ʔillé	soódɗè
Zan Gula (S)	súlé / súrú	sa:lɛ / so:ru	úllé / unnu	ɲi:de / ɲi:ru	í:lé / iɲɲu	sɔ́:dɛ́ / sɔ:ru
Fanya (J)	ilè	saalè	oulè			
Fanya (R)	ʃillɛ		(lurɛʔ)		ʔillɛ	sorɛ
Fanya (S)	sillɛ		(lurɛʔ)		ʔillɛ	sorɛ
Fanya (AK)	hīlè / sīlù		ūlè / ūrū	nī:rē / nī:rù	ī:lè / īyē	
Kulaale	hílè / hílù	hỹa̰:lɛ̀ / hỹa̰:r̃ɔ̰̀	ʔólɛ̀ / ʔóɽò	nḭ́:rè / –	ʔí:lè / ʔí:lù	hỹɔ̰́:rɛ̀ / hỹɔ̰́:r̃ɔ̰̀
Bolgo (RK)	sú:l, súl / súdí	sà:l / sedi		ned / nedi ‘heart, chest’	gīl / gii	
Koke (F)	sul				gil	

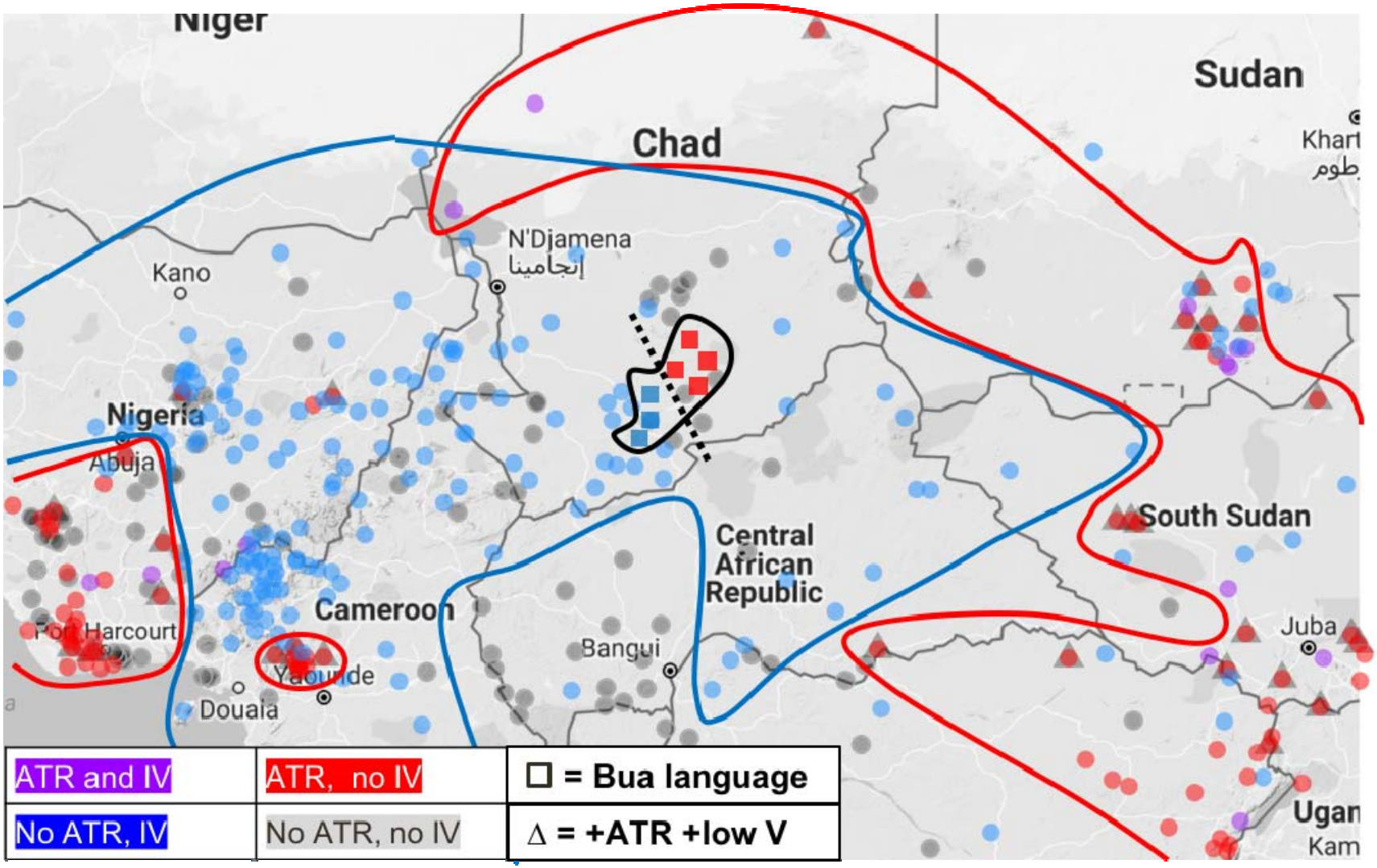
Table 28. Evidence for reflexes of gender *-*lE*/*-*rU* in Zan Gula, Fanya, and Kulaale (a selection)

	‘African mahogany, *Khaya senegalensis*’	‘*Ficus sp.* (*F. platyphylla*?)’	‘shea tree, *Vitellaria paradoxa’*	‘doum palm, *Hyphaene thebaïca*’	‘deleb palm, *Borassus aethiopum*’	‘néré, *Parkia biglobosa*’
Lua	pírmā / pírmī	hūmá	tə̀m / tə̀m		sî̀m	luá:l / ló:l
Tun	hērə̄m	hɔ́m̄	tēǹ	kùrì / kùrùm		lɔ̄y / lɔ̄n
Kul	fésù (kù) / fésí (kì)	fù̀m (kù) / fùm (kì)	tɔ́ó (kù) / tóí (kì)			lɔ̀ɔ̀m (kù) / lɔ̀ɔ̀m (kì)
Bon Gula (JR)						
Zan Gula (S)				kurma / kurmo		
Ɓa (L)	fúrma	hű́ma		kórma	símme	llma
Ɓa	húrmā	hūmà	tāmà / tə̀ːn	kòrùm	símī / sî̀ːm	lóːm, lómó
Kulaale	hójó / hójé		tàbɛ̀llɛ̀ / tèbèndè			
Bolgo (RK)	hísīl					

Table 29. Some common tree names in the Bua languages (instances of an *-m(V)* formative appear against a grey background)



Map 1. Distribution of the Bua languages in Southern Chad



Map 2. Geographical distribution of the ±ATR feature in Central Africa [to be redrawn]