

The numeral system of Proto-Niger-Congo

A step-by-step reconstruction

Konstantin Pozdniakov

Niger-Congo Comparative Studies 2



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Konstantin Pozdniakov. 2018. *The numeral system of Proto-Niger-Congo: A step-by-step reconstruction* (Niger-Congo Comparative Studies 2). Berlin: Language Science Press.

This title can be downloaded at:

<http://langsci-press.org/catalog/book/191>

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ISBN: **no digital ISBN**

no print ISBNs!

no DOI

Source code available from www.github.com/langsci/191

Collaborative reading: paperhive.org/documents/remote?type=langsci&id=191

Cover and concept of design: Ulrike Harbort

Fonts: Linux Libertine, Arimo, DejaVu Sans Mono

Typesetting software: Xe_{La}TeX

Language Science Press

Unter den Linden 6

10099 Berlin, Germany

langsci-press.org

Storage and cataloguing done by FU Berlin

no logo

Ирине Поздняковой

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4.2 Kwa

More than eighty Kwa sources were used for the reconstruction. They are representative of the major groups and sub-groups of this family, which consists of about seventy languages. A plausible internal classification of the Kwa languages does not exist. A step-by-step reconstruction of numerals may well be viewed as another important step in this direction. Our preliminary survey of the pertinent evidence is based on the traditional classification that distinguishes five major Kwa branches. We will start with the study of the numerical terms by branch. Then, individual reconstructions will be evaluated with regard to their potential for the general reconstruction of the Proto-Kwa numeral system.

4.2.1 Ga-Dangme

Table 4.66: Ga-Dangme numerals

	Dangme	Ga	Dangme	Ga
1	kákē	é-kòmé	7 kpà-à-gō (6+1)?	kpà-wo (6+1?)
2	é-ṣṣ	é-ṣṣ	8 kpà-a-ṣṣ (6+2)	kpà-a-ṣṣ (6+2?)
3	é-tē	é-tē	9 nēē	nēēhú
4	é-ywè/é-wìè	é-ṣwè	10 ṣṣmá (PL: ṣṣmí)	ṣṣmá
5	é-nūṣ	é-nùmṣ	20 ṣṣmí éṣṣ (10*2)	ṣṣmá -í éṣṣ (10*2)
6	é-kpà	é-kṣaa	100 làfá	ò-há, pl. -ì
			1000 à-kpé	à-kpé, pl. -ì

These two languages exhibit isolated forms of the term for ‘one’. Both terms will be preserved for further comparison (note that the first syllable of the Dangme term probably represents a noun class prefix). The term for ‘eight’ is undoubtedly constructed as ‘6+2’. The term for ‘six’ is primary, hence the term for ‘seven’ must be formed of ‘6+1’. This would suggest the existence of an additional term for ‘one’ (*-gō/-wo). Two separate forms are attested for ‘hundred’. Apart from that, the Dangme and Ga numeral systems are quite homogeneous.

The Adampe system is in many respects different, so there may be doubts as to whether it indeed belongs together with Dangme. The Adampe evidence will be treated later in this chapter.

4.2.2 Gbe

The reconstruction of the Proto-Gbe numeral system is straightforward, since alternative forms are few (Table 4.67). It is based on the available evidence from twelve of the Gbe dialects.

Table 4.67: Proto-Gbe numerals and patterns (*)

1	è-dɛ/dɛ-kpo	7	'hand'+2, 5+2
2	è-ve/e-wè	8	e-ní, 'hand'+3
3	è-tṣ	9	8+1, 5+4
4	è-nɛ	10	e-wó, *bula
5	à-tṣṣ	20	10*2, ko
6	à-dṣ/zṣ	40	e-kà
100	40*2+20	1000	à-kpé, kotokũ

The Gbe term for 'six' is primary. Its form, however, differs significantly from the (also primary) one attested in the languages of the Ga-Dangme group.

The term for 'eight' seems to be derived from 'four', whereas the term for 'nine' follows the pattern '8+1'.

The forms for 'twenty' follow the pattern 'X*2' in Aja (*bulaa-ve*), Waci-Gbe (*blá-ve*) and Ewe (*blá-vè*), which suggests an alternative form for 'ten' (**bula*).

The etymological relationship between the term for 'fifteen' and a lexical root with the meaning 'foot' attested in two of the dialects is an apparent innovation: Maxi-Gbe *à-fṣ-tṣ* ('foot', '3') and Kotafon-Gbe *fṣ-tṣ* ('foot','3'). This pattern is attested in a number of the NC languages (including Atlantic).

A primary term for 'forty' is distinguishable (hence '50=40+10', '60=40+20', '70=40+30', '80=40*2', '90=40*2+10').

4.2.3 Ka-Togo

Ka-Togo is a quite diverse group of the Left Bank languages. The reconstructions for each of its three branches are provided in the table below (Table 4.68). Its rightmost column lists forms and patterns that are the most likely candidates for the Proto-Ka-Togo reconstruction.

Table 4.68: Proto-Ka-Togo numeral system (**)

	*Avatime-Nyangbo	*Kebu-Animere	*Ikposo-Ahlo-Bowili	**Proto-Ka-Togo
1	o-le	tɛ̀-ì, bɛ̀-ɪ	è-dɪ/è-dɪ-gbo	di
2	ɛ-bha	din/ji	è-va/è-fwa	bha, din
3	ɛ-ta	tha	è-ta/è-la	ta
4	ɛ-né	nie	è-na	na/nɛ
5	ɛ-tí, ɛ-cu	thu(ɲ)	è-tɔ	tu(N)
6	golo/holo	kòrɔ̀ɲ	è-gɔlu/è-wɔlu	golo/ koro
7	6+1	10-3	6+1, kɔ̀nɔ̀, ù-zòni	6+1
8	10-2? a-nse	4*2	è-lɛ?, <4	4*2, nse/lɛ?
9	10-1? zi+3?	5+4?	8+1, 10-1?	8+1? 10-1
10	kɛ-fɔ	the	wa/wu, i-jo, *bula	fo/wo, te, bula
20	10*2	10*2?	bula-2, lye-2, ɲué-2, tɛ́ɛ́yá?	10*2
100	a-lafa (< Ewe)	tùùrù, sala	gbɔwa	lafa?
1000	a-kpe (< Ewe?)	lààfā	a-kpe	a-kpe

It needs to be stressed that the forms marked with /**/are only suggestive and should not be taken at face value. They are not reconstructions in the strict sense and only serve for comparative purposes, so the absence of a tonal marker in a reconstructed form should not be considered meaningful. It only shows that at this point the available evidence does not allow reconstructing a tone in the pertinent case.

4.2.4 Na-Togo

An overview of numerical terms as attested in the branches of Na-Togo and some isolated languages is provided below (Table 4.69). A tentative reconstruction of the Na-Togo numeral system can be found in the rightmost column.

The Lelemi term for ‘fifty’ (*li-ti*) is peculiar because it is a likely source of ‘hundred’: *è-ti á-pɔ́* (‘50*2’).

Table 4.69: Proto-Na-Togo numeral system (**)

	Adele	Anii	*Lelemi	*Likpe-Santrokofɔ	Logba	**Proto-Na-Togo
1	è-kí	ḍĩŋ, *mi	ù-nwi/ɔ-wẽ	nòé/nwû (lèwé)	i-kpɛ	i-wɛ/kpɛ? , di(N)?
2	è-nyɔ̀n	i-nĩō	í-pɔ́	pɔ́/núà	i-nyɔ	i-nyɔ
3	à-sì	i-rĩũ	è-tɛ	tié	i-ta	i-ta
4	è-nàà	i-nāŋ	í-na	na	i-na	i-na
5	tòn	i-nōŋ	è-lɔ	nó	i-nú	i-no(N)
6	kòòròn	i-kòlōŋ	è-ku	kua	i-gló	golo/kolo, ku
7	6 + 1	kūlūmī (6+1?)	4+3?	6+1?	6+1	6+1
8	nìyè	4PL	4PL?	4PL?	4PL	4PL
9	yè-1	tʃĩĩnĩ	10-1	nase	X-1	10-1
10	fò	təb	vu/we	fo/wo?	u-ɖú	fo, ɖu, təb
20			10*2	10*2		10*2, ɔ-ɖɔ(n), ā-kōō, dikpilin
50	20*2+10	20-PL+10	ti	10*5	10*5	20*2+10
100	20*5	20*5, gā-sɔwā	50*2, lafa	kò-lòfá	u-ga	20*5, lofa, u-ga
1000	200*5	ũ-fɛlɛ, kòtòkũ	pim, ka-kpi	kò-kpí	a-kpi	a-kpi, pim?

4.2.5 Nyo

The Nyo group, which is comprised of dozens of languages, is the most representative within the family. For this reason (even though the Nyo numeral systems are closely related to each other) they will be studied separately (by sub-group) and then compared to each other.

4.2.5.1 Agneby (Abbey, Abiji, Adiokru)

Alternative sources representative of these three languages are quoted below (Table 4.70). Significant variation of forms is sporadically attested.

Table 4.70: Proto-Agneby numeral system (*)

	Abbey1	Abbey2	Abiji1	Abiji2	Adiokru1	Adiokru2	*Proto-Agneby
1	ḡkpɔ̃	ḡkpɔ̃	ń 'nó	ḡnɔ̃	nâm	nâm	N-kpɔ̃, n-âm, *a-ri
2	āpɔ̃	āpɔ̃	áá 'nó	áānɔ̃	yón	nón	a-pɔ̃/nɔ̃
3	ārí	ārí	ḡḡ 'tí	ḡḡtí	nâhñ	nâhñ	a-ti(N)/ ri
4	alé	alé	ḡḡ 'lá	áālá	yâr	jâr	a-ní/la, jar
5	ōní	ōní	éé 'né	éēnē	yên	jên	o-ne,lôhñ, jên
6	lôhñ	lôhñ	nâhñ	nâhñ	nôhñ	nôhñ	hu(n)
7	lôhñ-ārí	lôhñ-ārí	nôbñ	nômbñ	lôbñ	lôbñ	6+1, bu(n)
8	èpyè	èp'è	nówò	nówò	níwn	níwn	è-pyè, wo(n)
9	nâkó	nââkó	nḡ 'brḡ	nḡmbḡ	libárm	libárm	bare(-n)
10	ènḡ	nnè	ndíḡ	ndíḡ	lêw	lêw	nḡ(n) (< 5PL?), diw/ liw
20	ēbrá-pɔ̃	òbrāpɔ̃	àbrúáí	àbrúáí	líkj	líkj	<'hand' *2?,li-kj
100	yā	jā	yā	jā	ékj-yén	ékj jên (20*5)	ja, 20*5
1000	àkpī	àkpī		àkpī		fándí (Engl.?)	a-kpi

The presence of the primary terms for 'seven', 'eight' and 'nine' is an important characteristic of this sub-group.

4.2.5.2 Attié

Internal reconstruction of the Attié numeral system yielded the following results (Table 4.71).

Table 4.71: Attié numeral system (*)

1	kə(n)	7	nson
2	mwə(n)	8	ma-4? 2 de 10?
3	ha(n)	9	ɲgwan
4	dʒí(n) < *kɥe?	10	kɛɲ
5	bə(n)	20	‘hand’ (bwa?)*2?
6	mu(n)	100	ja
		1000	a-kpi

4.2.5.3 Awikam-Alladian

No numerical terms (except for ‘one’ and ‘nine’) are reconstructable on the subgroup level. This raises doubts as to whether these languages should indeed be grouped together. A representation of the pertinent forms is presented in the table below (Table 4.72) and may serve as a starting point for further discussion.

Table 4.72: Avikam-Alladian numerals

	Awikam	Alladian	Awikam- Alladian		Awikam	Alladian	Awikam- Alladian
1	étɔ̃	ētò	ɛ-to	7	ébyɔ̃	ɛbwè	é-byɔ̃, ɛ-bwè
2	ápɔ̃	āyrè	á-ɲɔ̃, ā-yrɛ	8	ètyé	ēqri	è-tyé, ē-qri
3	ázá	āò	á-zá, ā-ò	9	émrɔ̃	ɛmwrɔ̃	é-mrɔ̃
4	àná	āzɔ̃	à-ná, ā-zɔ̃	10	èjú	ɛvà	è-jú, ɛ-và
5	ànú	ēnrì	à-ɲú, ē-nrì	20	èvé	ɛqá, *ɛkòqì	è-vé, ɛ-qá
6	áwá	ēwrè	á-wá, ē-wrè	100	àkpá 'ɲú	20*5	20*5, àkpá 'ɲú

4.2.5.4 Potou-Tano

4.2.5.4.1 Potou

The following forms are distinguishable in the Potou sub-group (Table 4.73).

Table 4.73: Potou numerals

	Ebrie	Mbato	*Potou		Ebrie	Mbato	*Potou
1	b̃è/br̃è	lóḃō	b̃è /br̃è, ló-f̃ō; ce/se	7	ák ^h wác ^h è	óḃīs̃é	6+1
2	m̃ò	ónoó	noó	8	áḃyá	ógḃī	ḃyá/ gḃī
3	ḃwàḃyá	néj̃ē/nój̃ē	ḃyá/je	9	áḃrò	ótrū	ḃrò, trū
4	ḃwèḃí	ñéní/ñóní	ḃí/ni	10	áwó	ówā	wɔ
5	mwàná	ñénā	na	20	áp ^h ̃̃	óp̃̃	p̃̃
6	ák ^h wá	ókoā	kwa	100	àyà	yǎ	ya

4.2.5.4.2 Tano

The Tano branch consists of nearly thirty languages. It seems reasonable to treat them by sub-groups.

Western Tano

Table 4.74: Western Tano numerals

	Abure1	Abure2	Eotile	Western Tano
1	okuè	ókúè	ìkò	o-kue
2	apù	ápû	àpɔ́	a-pu(n)
3	nɲà	ńɲâ	àhâ	n-ha(n)
4	nnàn	ńnâ	ànè	n-na(n)
5	nnú	ńnú	ànù	n-nu(n)
6	nciè	ńciè	àhíè	n-cíè/híè
7	ncùn	ńcɔ̃	àfà	n-cùn, à-fà
8	mòkùé	mòkúé	ànèmrɔ̃	mò-kùé, à-nèmrɔ̃
9	puáléhùn	pòàlɔ̃hɔ̃	brúkú	puáléhùn, brúkú
10	óblún	òbùlú	èdí	ò-bùlú, è-dí
20	éfm̃	éfm̃	èfè	é-fi(n)
100	èvá okuè	èyǎ kúè	átá	è-vá /è-yǎ, áta
1000	akpí okuè			a-kpi

Central Tano Akanic (Table 4.75):

Table 4.75: Akanic numerals

	Akan1 (Twi dial.)	Akan2	Abron1	Abron2	*Akanic
1	baakó~	baakɔ̃	bakũ	biàkɔ̃?	ba-kó(n)
2	àbié-ń	mmie-nú	mie-nu	mìènú?	mie-nú
3	àbiè-sá~	mmɛɛ-nsá	mie-nsá	mìènzá?	mie-nsá(n)
4	à-nán	(ɛ)nán	nain	ńnáí	náin
5	à-núm	(e)núm	num	ńnúm	núm
6	à-siá~	(e)nsiá	nsiã	ńziá	siá(n)
7	à-són	(ɛ)nsón	nsɔ	ńzɔɔ	só(n)
8	à-wòtɔ̃wé/tw/	nwɔtwé	ɲɔtʃwie	wɔcɔɪ	twé/cué
9	à-krón	(ɛ)nkrón	ɲkrɔŋ	ɲgɔ́nɔ̃	n-krón
10	dú	(e)dú	du	dú?	dú
20	àdùònú	aduonú	edu enu	àdùònú	10*2
100	àhà	ɔha	ɔha	hà	ɔ-ha
1000	àpím	apém	apim		a-pím

Bia The numeral systems in these languages (Agni, Baoule, Sefwi, Nzema, Ahanta, and Jwira-Pepesa) are virtually identical and can be described as follows (Table 4.76).

Table 4.76: Proto-Bia numeral system (*)

1	ko(n)	7	su(n)
2	nu, ɲɔ̃(n)	8	cɔ̃ɛ/twɛ
3	sa(n)	9	ɲgɔ̃lã, nkrón
4	na(n)	10	bulu
5	nu(n)/nu(m)	20	10*2
6	sia(n)	100	ya
		1000	akpi

Guang This sub-group has two branches, Southern and Northern Guang which consist of four and eleven languages, respectively). Despite, the Guang nu-

meral systems do not differ significantly, hence quoting individual forms seems unreasonable. Our reconstructions for both branches, as well as the general Guang reconstruction, are given below (Table 4.77).

Table 4.77: Guang numerals

	*Northern Guang	*Southern Guang	**Guang
1	kó	kɔ	kɔ
2	ɲó	ɲó	ɲó
3	sá	sa(n)	sa(n)
4	ná	nɛ(n)/na	na(n)
5	nú(n)	nu/ni	nu(n)
6	síyé	siɛ(n)	siɛ(n)
7	súnɔ	súnɔ	súnɔ(n)
8	bùrùwá, kwé	twi/cwi	bùrùwá, kwé/cwi
9	kɔnɔ, sàngɔɔ?	kɔnɔ	kɔnɔ, sàngɔɔ?
10	dú	du	du
20	o-ko, 10*2	10*2	10*2, ko?
100	lafa (< Akan?)	ɔ̀lɔ̀fɛ/lafa	lafa
1000	kɔ́ɲ, pim	a-kpe	kpi(N), pim

Krobu; Basilia-Adele; Ega To make our presentation complete, the evidence of these three isolated Tano languages is presented in the table below (Table 4.78).

4.2.6 Proto-Kwa

Intermediate reconstructions suggested above should be compared in order to reconstruct the forms of the Proto-Kwa numerals. It seems reasonable to group potentially related forms (or patterns) together. The rightmost column contains isolated forms attested in one particular group only.

4.2.6.1 ‘One’

The Awikam-Alladian term for ‘one’ is definitely an innovation.

The root **di* is attested in four branches out of five and thus is likely reconstructable at the Proto-Kwa level.

Table 4.78: Numerals in Tano isolated languages

	Krobu	Basila-Adele	Ega
1	kɔ́	kɔ́, li/diŋ	ì-lō-gbó
2	ɲ́-ɲɔ́	ɲúà	ì-ɲò
3	ń-sá	sa	ì-tà
4	ń-ná	na	ì-lè
5	ń-nù	ton, nun	ì-ɲwè
6	ń-sỹē	koron	5+1
7	ń-sô	6+1?	5+2
8	mò-kwé	4-4, cǔé	5+3
9	ɲ-grǎ	-1, gwalan	5+4
10	brú	fo, teb, bulu	ì-zù
20	à-brūā́ (10*2?)	dikpilin, koo, bulV	ú-glū
100	yǎ	20*5	20*5
1000		kpen?	

Table 4.79: Kwa stems for '1'

	1	1	1	1
*Ga-Dangme	ká-kē, *go/wo			é-kómé
*Gbe	ɖe-kpo	è-ɖe		
*Ka-Togo		di		
*Na-Togo	i-wɛ/kpɛ?	di(N)?		
*Nyo:				
*Agneby	N-kpɔ	*a-ri		ɲ-âm
Attié	kə(n)			
Awikam			é-tɔ́	
Alladian			ē-tò	
<i>Potou-Tano</i>				
Potou	*ce/se			bɛ̃/brɛ̃, ló-fō
<i>Tano</i>				
Western	o-kue			
<i>Central</i>				
Akanic	ba-kó(n)			
Bia	ko(n)			
Guang	kɔ			
Krobu	kɔ́			
Ega	ì-lō-gbó	ì-lō-gbó (< *li-kpo?)		

The forms given in the left column are more problematic. Each of them contains a velar consonant (the Potu form **ce* may have resulted from the palatalization of a velar before a front vowel, *ce* < **kue* – cf. Western Tano).

Regular phonetic correspondences between these languages have not been established and therefore cannot be used for purposes of reconstruction. In any case, the following considerations might prove useful for the NC reconstruction. The inventory of forms attested in the eighty Kwa idioms may seem rather diverse. However, only two of them may be considered for the Proto-Kwa reconstruction, namely **di* and **k(p)o* (or the compound form **di-kpo* suggested by the Gbe (*ḑe-kpo*) and Ega (**li-gbó?*) forms).

4.2.6.2 ‘Two’

Table 4.80: Kwa stems for ‘2’

	‘2’	‘2’	‘2’	‘2’
*Ga-Dangme	é-ɲɔ̃(n)			
*Gbe			è-ve/e-wè	
*Ka-Togo		din		bha
*Na-Togo	i-nyɔ			
*Nyo				
*Agneby	a-ɲɔ̃/nɔ̃			
Attié			mwə(n)	
Awikam	áɲɔ̃			
Alladian		āyɾè		
<i>Potou-Tano</i>				
Potou	nõɔ̃			
<i>Tano</i>				
Western	a-ɲu(n)			
<i>Central</i>				
Akanic	mie-nú			
Bia	nu, ɲɔ̃(n)			
Guang	ɲɔ̃			
Krobu	ɲi-ɲɔ̃			
Ega	ì-ɲɔ̃			

The only form reconstructable at the Proto-Kwa level is evidently **ɲɔ̃*.

4.2.6.3 ‘Three’ and ‘Four’

Table 4.81: Kwa stems for ‘3’ and ‘4’

	‘3’	‘4’	‘4’
*Ga-Dangme	é-tě		é-ɟwě
*Gbe	è-tǝ	è-ně	
*Ka-Togo	ta	na/nɛ	
*Na-Togo	i-ta	i-na	
*Nyo			
*Agneby	a-ti(N)/ri	a-ní/la	jar
Attie	ha(n)		dʒí(n) < *kɛ?
Awikam	ázá	àná	
Alladian	āò		āzò
<i>Potou-Tano</i>			
Potou	ɖyá/je	ɖi/ni	
<i>Tano</i>			
Western	n-ha(n)	n-na(n)	
<i>Central</i>			
Akanic	mie-nsá(n)	náín	
Bia	sa(n)	na(n)	
Guang	sa(n)	na(n)	
Krobu	ń-sá	ń-ná	
Ega	ì-tà	ì-lě	

Just as in the majority of the NC branches, the roots for ‘three’ and ‘four’ are the most persistent. Suggested Proto-Kwa reconstructions are **ta* and **na* respectively.

4.2.6.4 'Five'

Table 4.82: Kwa stems for '5'

	'5'	'5'	'5'
*Ga-Dangme		é-nùṣ	
*Gbe	à-tṣṣ		
*Ka-Togo	tu(N)		
*Na-Togo		i-no(N)	
*Nyo			
*Agneby		o-ne	lòhṣ, jèn
Attié			bə(n)
Awikam		ànú	
Alladian			ēnrì
<i>Potou-Tano</i>			
Potou		na	
<i>Tano</i>			
Western		n-nu(n)	
<i>Central</i>			
Akanic		núm	
Bia		nu(n)/nu(m)	
Guang		nu(n)	
Krobu		ń-nù	
Ega		ì-ɲwè	

The root **tan* ('five') is only traceable in the Left Bank languages. Another root, commonly attested in other languages (**nun*), is found in these languages as well. Both roots should be considered for the reconstruction (note that the former is comparable to the pertinent form reconstructed for Proto-Bantu).

4.2.6.5 ‘Six’

Table 4.83: Kwa stems for ‘6’

	‘6’	‘6’	‘6’	‘6’
*Ga-Dangme		é-kpà		
*Gbe			à-dě/zě	
*Ka-Togo	golo/koro			
*Na-Togo	golo/kolo	ku		
*Nyo				
*Agneby		hu(n)		
Attié				mu(n)
Awikam				áwá
Alladian	ě-wrè			
<i>Potou-Tano</i>				
Potou		kwa		
<i>Tano</i>				
Western			n-cíě/híě	
<i>Central</i>				
Akanic			síá(n)	
Bia			sia(n)	
Guang			siε(n)	
Krobu			ń-sỹě	
Ega				5+1

The evidence presented in Table 4.83 is inconclusive. At this stage our task is to process the complex Kwa data so that it can be compared to the evidence of other NC languages. In this respect, three provisional Kwa forms are noteworthy: **golo/kolo*, **kua*, and **ciε*. In any case, as the forms for ‘seven’ suggest, the Proto-Kwa term for ‘six’ was probably primary.

4.2.6.6 ‘Seven’

Table 4.84: Kwa stems and patterns for ‘7’

	‘7’	‘7’	‘7’	‘7’
*Ga-Dangme	6+1			
*Gbe				5+2, ‘hand’+2
*Ka-Togo	6+1			
*Na-Togo	6+1			
*Nyo				
*Agneby	6+1		bu(n)	
Attié		nson		
Awikam			ébyɔ̃	
Alladian			ēbwè	
<i>Potou-Tano</i>				
Potou	6+1			
<i>Tano</i>				
Western		n-cùn		
<i>Central</i>				
Akanic		só(n)		
Bia		su(n)		
Guang		súnɔ̃(n)		
Krobu		ń-sô		
Ega				5+2

The forms presented in the table above point toward the pattern ‘6+1’ being used for the Proto-Kwa term for ‘seven’, whereas Proto-Nyo developed the primary term **sun*.

4.2.6.7 ‘Eight’

Table 4.85: Kwa stems and patterns for ‘8’.

	‘8’	‘8’	‘8’	‘8’	‘8’
*Ga-Dangme					6+2
*Gbe		e-ɲí	‘hand’+3		
*Ka-Togo	4*2	nse/ɛ?			
*Na-Togo	4PL				
*Nyo					
*Agneby				è-pyè	wo(n)
Attié	ma-4?				10–2?
Awikam		ètyé			
Alladian		ēɸrì			
<i>Potou-Tano</i>					
Potou				ɓyá/gbī	
<i>Tano</i>					
Western		mò-kùé			à-nèmrɔ̀
<i>Central</i>					
Akanic		twé/cué			
Bia		cɔɛ/twɛ			
Guang		kwé/cwi			
Krobu		mò-kwé			
Ega			5+3		

Based on the evidence attested in the table above, the Proto-Kwa term for ‘eight’ may be reconstructed as either primary (**kwe/ kye*) or derivative, in which case it must have been based on ‘four’ (**‘4PL’*).

4.2.6.8 ‘Nine’

Table 4.86: Kwa stems and patterns for ‘9’

	‘9’	‘9’	‘9’	‘9’	‘9’	‘9’
*Ga-Dangme						ně́ě́(hú)
*Gbe	8+1		5+4			
*Ka-Togo	8+1?		10-1			
*Na-Togo			10-1			
*Nyo						
*Agneby		bare(-n)				
Attié					ɲgwan	
Awikam		émrɔ́				
Alladian		ēmwrò				
<i>Potou-Tano</i>						
Potou		brò				trū
<i>Tano</i>						
Western		brúkú				puáléhùn
<i>Central</i>						
Akanic				n-krón		
Bia				nkrón	ngòlǎ	
Guang						kpuno, sàngóó?
Krobu					ɲ-gròā	
Ega			5+4			

This is the hardest form to interpret. A rare pattern ‘8+1’ is attested in the Left Bank languages. In contrast to this, the Togo pattern is ‘10-1’, while the Nyo term (**brɔ́/mrɔ́*) is ‘primary’. The latter is probably connected to the term for ‘ten’, although this connection does not necessarily imply a derivation (‘10-1’) and could be explained by analogy. All three forms/patterns are considered for reconstruction.

4.2.6.9 ‘Ten’

Table 4.87: Kwa stems for ‘10’

	‘10’	‘10’	‘10’	‘10’	‘10’	‘10’
*Ga-Dangme						ɲòŋmá
*Gbe	e-wó	*bula				
*Ka-Togo	fo/wo	bula			te	
*Na-Togo	fo		ɖu		təb	
*Nyo						
*Agneby				diw/liw		nɛ(n)<5PL?
Attié						kɛŋ
Awikam			ɛ́jú			
Alladian	ɛ̃-và					
<i>Potou-Tano</i>						
Potou	wɔ					
<i>Tano</i>						
Western		ò-bùlú		è-dí		
<i>Central</i>						
Akanic			dú			
Bia		bulu				
Guang			du			
Krobu		brú				
Ega			ì-zù			

Isolated forms are attested in Ga-Dangme and Attié. The root *tə(b)* is traceable in the Ghana–Togo Mountain languages (Togo-remnant) and is not found elsewhere. Thus we are dealing with another isogloss suggesting that these languages belong to the same branch. The stem **du* supported by R. Blench could be proposed for Proto-Kwa. This stem is indeed attested in the majority of the groups that do not belong to the Left Bank languages (including Na-Togo).

The stem **bula* (Left Bank)/**bulu* (Tano) is distributed fairly evenly.

Finally, a Niger-Congo root reflected in Kwa as **fo/wo* can be reconstructed in a number of languages.

4.2.6.10 ‘Twenty’

Table 4.88: Kwa stems and patterns for ‘20’

	‘20’	‘20’	‘20’	‘20’	‘20’	‘20’
*Ga-Dangme	10*2					
*Gbe	10*2	ko				
*Ka-Togo	10*2					
*Na-Togo	10*2	ā-kōō	dikpìlìn			ɔ-dɔ(n) (<10?)
*Nyo						
*Agneby	‘hand’ (bra)*2?		li-kɲ			
Attié	‘hand’ (bwa?)*2?					
Awikam				ɛ̃-vɛ́		
Alladian		*ɛ̀kòɥì		ɛ̃-ɥá		
<i>Potou-Tano</i>						
Potou					pɛ	
<i>Tano</i>						
Western					ɛ̃-fi(n)	
<i>Central</i>						
Akanic	10*2					
Bia	10*2					
Guang	10*2	ko?				
Krobu	à-brūā́ɛ̃ (10*2?)					
Ega						ú-glū

The pattern ‘10*2’ attested in the majority of the branches. The root **ko* is also to be taken.

4.2.6.11 ‘Hundred’ and ‘thousand’

In addition to the pattern ‘20*5’, the roots *lafa/lofa* and **ya/ja* (Nyo) are reconstructable for ‘hundred’. The latter may be etymologically related to **ga/ha*.

The term for ‘thousand’ is commonly attested as **a-kpi*. Its less common by-form is **pim*.

Table 4.89: Kwa stems and patterns for ‘100’ and ‘1000’

	‘100’	‘100’	‘100’	‘100’	‘1000’	‘1000’
*Ga-Dangme	lǎfá		ò-há		à-kpé	
*Gbe				40*2+20	à-kpé	
*Ka-Togo	lafa?				a-kpe	
*Na-Togo	lofa	20*5	u-ga		a-kpi	pim?
*Nyo						
*Agneby		20*5	ja		a-kpi	
Attié			ja		a-kpi	
Awikam				àkpá ‘-2		
Alladian		20*5				
<i>Potou-Tano</i>						
Potou			ya			
<i>Tano</i>						
Western			è-vá/è-yǎ	átá	a-kpi	
<i>Central</i>						
Akanic			ɔ-ha			a-pím
Bia			ya		a-kpi	
Guang	lafa				kpi(N)	pim
Krobu			yǎ			
Ega		20*5				

Table 4.90 lists provisional Proto-Kwa reconstructions based on the evidence discussed above.

Table 4.90: Proto-Kwa numeral system (*)

1	di-kpo	7	6+1
2	ɲɔ, **di?	8	4PL, kwe/kye
3	ta	9	10-1?
4	na	10	fo/wo, bula, du
5	nu(n), ton	20	10*2, ko
6	golo/kolo, kua, cie	100	20*5, lofa, ja/gya?
		1000	kpi, pim

The remaining roots and patterns are probably innovations that developed separately within a branch/language. They may help to adjust the internal classification of the Kwa languages.

4.3 Ijo

According to traditional classification, the Ijo family is comprised of the Ijaw languages and the Defaka language. Some scholars express doubts as to whether the latter indeed belongs to this family. According to Roger Blench, “The Ijo languages constitute a well-founded group, but the membership of Defaka (constituting Ijoid) remains problematic. Defaka has numerous external cognates and might be an isolate or independent branch of Niger-Congo which has come under Ijo influence” (Blench 2013).

Ijaw languages consist of the Eastern and the Western groups (the latter is sometimes called Central).

The following reconstruction is based on the evidence of all three Ijo branches (Table 4.91).

Table 4.91: Proto-Ijo numeral system

	Defaka	*East	*West	**Ijo
1 (qualifying)	gbéri	gbéri	?	?
1 (counting)	?	ḡgèi	kènɪ	*n-kèni
1 in 6 (5+1)	–	die/ie	die/zie	*die
2	mààmà	màmi	maamʊ	*mamV
3	táátó	tárú	tǎɾʊ	*tató
4	nèi	i-neĩ	néin/nóin	*néin
5	túúnò	sónó	sǝnǝ-rǝ	*túnó
6	mààngò	5+1	5+1	*5+1
7	5+2	5+2	5+2	*5+2
8	5+3	4+4	4+4	*4+4
9	5+4	5+4	5+4?	*5+4
10	wói	ójí/àtié	ójí	*(w)ójí
15	10+5	jìé	dié	*dié
20	sii	sí	síi	*síi

Both qualifying and counting terms for ‘one’ are attested in the Eastern Ijo languages (e.g. in Ibani). The Defaka form may be a borrowing. An unexplained allomorph for ‘one’ is attested as a part of the term for ‘six’ in Ijaw (?).

The root for ‘two’ (**mam*) is an Ijo innovation. It has no parallels outside this language family. Its phonetic similarity to several other forms is a mere coincidence, e.g. *ma-* in the Jaad (Atlantic) *maae* does not belong to the root and can be

explained as a class prefix. The lexical meaning ‘twin, pair’ (as attested in Nembe (East) according to (Kaliai 1964)) may underlie the Ijo term. However, no reliable parallels for this term with the meaning ‘twin, pair’ are establishable in NC.

The root for ‘three’ is apparently of NC origin, with its most archaic form attested in Defaka.

The term for ‘four’ is undoubtedly a reflex of the NC root.

The term for ‘five’ probably goes back to the NC root **tan(o)*. As in the case of ‘three’, its most archaic form is found in Defaka.

The terms for ‘six’, ‘seven’, and ‘nine’ follow the common patterns (‘5+1’, ‘5+2’, and ‘5+4’ respectively).

The Ijaw term for ‘eight’ must have derived from ‘four’ by means of partial reduplication (**ni-néín*). This pattern is reconstructable on the Proto-NC level and will be discussed at length in the next chapter.

A specific counting term for ‘ten’ is reconstructable in the Eastern Ijo languages (**àtié*). The Defaka form is comparable to those found in the Ijaw languages.

A special form for ‘fifteen’ is reconstructable in Ijaw (**dié*), cf. e.g. the Nembe evidence: *dié-èsi* ‘300’ (=‘15*20’). This form may go back to Ijaw **dîè* ‘divide; separate into parts; split or break up into parts; share’, ‘distribute, donate’, cf. Nembe *dîè*, Ibani (Koelle 1963[1854]) *dîè-*, *dié*.

As in a number of other languages that belong to different families within NC, a special form is attested for the term for ‘twenty’ (**síí*). The term itself has several functions. It serves as a basis for a number of other terms for tens (also in Defaka), e.g. ‘40=20*2’, ... ‘100=20*5’. The Ijaw terms for 16–19 are based on it as well, e.g. ‘16=20–4’, etc.

4.4 Kru

Our analysis of the Kru numerals is based on nearly forty sources representative of five major groups and eleven major subgroups of the family. Preliminary reconstructions of the pertinent numerical terms (by sub-group) are represented in commented tables below.

4.4.1 ‘One’, ‘Two’ and ‘Three’

As in the majority of the NC languages the term for ‘three’ is the most persistent: the root **taa(n)* can be reliably reconstructed for Proto-Kru.

Table 4.92: Kru stems for ‘1’-‘3’

	‘1’	‘1’	‘1’	‘2’	‘2’	‘3’
Aizi		mumɔ	yre	i-ɸt		i-ta
<i>Eastern</i>						
Bakwe/Wané	dô			sô		ta
Bete/Godié		ɓlo/gbolo		sɔ		ta
Dida/Neyo		bolo		só		ta
Kodia		gbɤɤ/ɓɤɤ		sɔ:		ta:
Kuwa	dee			sɔr		tãã
Seme	dyuɔ		byéé		nĩ	tyáār
<i>Western</i>						
Bassa ¹⁴	doo	(g)boo?		sɔ̃		tã
Grebo ¹⁵	do(o)			sɔ̃	hwɔ̃/hɔ̃	taa(n)
Klao/Tajuasohn	do			son		tan
Wee ¹⁶	due/too			sɔn		taan

The same is applicable to the root for ‘two’ reconstructed as **so(n)* in Proto-Kru (isolated forms are attested in the Seme and Grebo sub-groups only). It should be noted that in general the Seme numeral system is peculiar in many respects. These peculiarities (e.g. Seme being the only language with a full set of primary terms covering the sequence from ‘one’ to ‘ten’) may be due to the isolated status of the language. In his recent article entitled “Le sèmè/siamou n’est pas kru” Vogler argues that Seme is not a Kru language (see [Vogler 2015](#)). On the basis of a comparison between Kru, Gur and Mande (Samogo) morphology and lexicon he concludes that Seme is either remotely related to the Mande languages or represents a separate branch of Niger-Congo. As we hope to demonstrate below, Seme shows systematic correspondences with neither Kru nor Mande (including the contact Mande languages – Samogo and Jowulu).

‘One’. It is likely that the root **do* should be reconstructed on the Proto-Kru level. However, there is enough evidence for reconstructing the alternative root **(g)bolo*.

¹⁴Bassa, Dewoin, Gbii.

¹⁵Grebo, Krumen, Glio-Oubi.

¹⁶Wee is a Western Kru group which includes (among other languages) Sapo, Krahn, Nyabwa, Wobe.

4.4.2 ‘Four’ and ‘Five’

Table 4.93: Kru stems for ‘4’ and ‘5’

	‘4’	‘4’	‘4’	‘5’	‘5’	‘5’
Aizi			yebi	yu-gbo		
<i>Eastern</i>						
Bakwe/Wané		hiɛ ⁴	mrɔ:	ɡb̩ə̀ə̀, ɲ ^w ũ		
Bete/Godié			mɔ̃-wana	ɡbu/ɡbi		
Dida/Neyo	na			ɡbí		
Kodia	na			ⁿ gbɿ		
Kuwa	ɲijɛhɛ					wáyòò
Seme			yur			kwɛ̃l
<i>Western</i>						
Bassa	hì-nyɛ(n)				h-mm	
Grebo		hɛn		gbə	mm	hun
Klao/Tajuasohn	nyìè	hɛn			mù, hoom? (< m?)	
Wee	nyìè				mm	

The forms for ‘four’ in the left column apparently are the reflexes of the NC root that is preserved in its archaic form **na* in Eastern Kru, whereas in Western Kru it changes into *nyìè*.

Two major forms are observable for ‘five’, namely **gbə/ gbo* and **mm* (Western).

4.4.3 ‘Six’ to ‘Nine’

It is immediately apparent that these numerals already followed the pattern ‘5+X’ in Proto-Kru. As noted above, the Seme forms are innovations.

Table 4.94: Kru stems and patterns for ‘6’-‘9’

	‘6’	‘6’	‘7’	‘7’	‘8’	‘8’	‘8’	‘9’	‘9’	‘9’
Aizi		fɔ	fri+2				patɛ			fi
<i>Eastern</i>										
Bakwe/Wané	5+1		5+2		5+3			5+4		
Bete/Godié	5+1		5+2		5+3			5+4		
Dida/Neyo	5+1		5+2		5+3			5+4		
Kodia	5+1		5+2		5+3			5+4		
Kuwa	5+1		5+2		5+3			5+4		
Seme		kpāā		kĩĩ			kprɛ̃n			kɛ̃l/kal
<i>Western</i>										
Bassa	5+1		5+2		5+3			5+4		
Grebo	5+1		5+2		5+3			5+4		
Klao/Tajuasohn	5+1		5+2			4PL			10–1	
Wee	5+1		5+2		5+3			5+4		

4.4.4 ‘Ten’ and ‘Twenty’

The root *kʊgba* is attested beside the common NC root for ‘ten’ (**pu/fu*) in Eastern and Kuwa. The root for ‘twenty’ is attested as *golo* in both Eastern and Western.

4.4.5 ‘Hundred’ and ‘Thousand’

All Kru sub-groups are characterized by the lack of a primary term for ‘hundred’.

The form for ‘thousand’ in Western Kru was borrowed from the Mande languages. A primary term for ‘400’ (**dwi*) that developed in Eastern Kru served as the basis for a rare pattern for ‘thousand’ attested in these languages (‘400*2+200’).

The reconstruction of the Proto-Kru numeral system is given in Table 4.95.

Table 4.95: Proto-Kru numeral system (*)

1	do, (g)bolo	7	5+2
2	so(n)	8	5+3
3	taa(n)	9	5+4
4	na	10	pu, kʊgba?
5	gbə/gbo, mm	20	golo
6	5+1	100	20*5
		1000	400*2+200

Table 4.96: Kru stems for ‘10’ and ‘20’

	‘10’	‘10’	‘20’	‘20’	‘20’
Aizi	bɔ		gu		
<i>Eastern</i>					
Bakwe/Wané	pò, bu?		grò, g’lɔ		
Bete/Godié		kógba	gwɛ́/gɔ́lɔ		
Dida/Neyo		kógba	gló/góló		
Kodia		kɔ́gba	ǵalo		
Kuwa		kowaa		10*2	
Seme	fu				kār
<i>Western</i>					
Bassa	baɖa-bùè, puue, vu			<10	
Grebo	pu		gōrō/wlò		
Klao/Tajuasohn	pue/punn		wlòh-2		quilar-2
Wee	pue/bue		gwɛ́-2		kwela 2

Table 4.97: Kru stems and patterns for ‘100’ and ‘1000’

	‘100’	‘100’	‘1000’	‘1000’	‘1000’
Aizi		juyugbo			
<i>Eastern</i>					
Bakwe/Wané	20*5		400*2+20*10		
Bete/Godié	20*5		400*2+200		
Dida/Neyo	20*5		400*2+200		
Kodia					
Kuwa		kòlɛh?		100*10	
Seme	20*5				lit: ‘goat one’
<i>Western</i>					
Bassa	20*5				borrowed
Grebo	20*5				borrowed
Klao/Tajuasohn	20*5				borrowed
Wee	20*5				?

4.5 Kordofanian

The evidence of about twenty Kordofanian languages does not permit reconstructing the Proto-Kordofanian numeral system (assuming that Proto-Kordofanian existed). Comprehensive data for each of the four major groups is represented below (Table 4.98). Forms and patterns traceable in at least two groups are in bold. The forms are grouped within the lines in a more or less ad hoc manner, e.g. there is no special reason to believe that Talodi **lu(k)/ li(k)* ‘one’ corresponds to the forms with initial *t-/t̥-* attested in other groups.

The systematic presence of the final velar *-k* in some of the terms can also be found in the Atlantic languages (especially in North Atlantic).

The term for ‘ten’ appears in numerous forms in the Kordofanian languages, which is rare. At the same time, no root for ‘ten’ is represented in at least two

Table 4.98: Kordofanian numerals 1–5

	*Heiban	*Katla	*Rashad	*Talodi	*Kordofanian
1	kwe-(t)tɛ(k)	t̥i-tʌk	-tta	lu(k)/li(k)	tɛ(k)/ lu(k)
1	ɲɔ-(t)tɔ	ʌ-t̥een/t̥im			tɔ(n)
1	*-lel?			tleidi	lel/ led?
2		cik/heek	(k)ko(k)		kok/kek/ cik
2	-can /-ɾan, rɔm			we-tʌk/-tta	(can/ɾan, rak, rɔm)
3	tɔɾɔl/tɛɾel	tʌt	tta	wa-ttak	tat/t̥ɔɾ/ tak
3	-ɾicm/-gɾɪfɪm	i-hwʌy			(ɾitin/ɾicin, hwʌy)
4	k(w)ɔ- ɾɔɲɔ/ma- ɾɲan/-rlon/- ɬɾɔ		ya-rem/wa- rɔm	-ɾando	-ɾɔɲ/-ɾando/- ranto/-rɔm?
4		ʌ-gʌlʌm/i- hʌlʌm		kekka	(-gʌlʌm, kekka)
5	tɔ-diní/-ðene	i-duliin			dinin/ dulin?
5	ɲer-/ɲer-		*ɲer-		ɲer-/ ɲer-
5		ɔ-gbəlɪm	wɔ-ram, ma	‘hand’-‘1’, ki-liægum	(‘hand’, ...)

Table 4.99: Kordofanian numerals >5

	*Heiban	*Katla	*Rashad	*Talodi	*Kordofanian
6	5+1	<5	nere(-r/-l/-y) (< *5+1?)	5+1	5+1
6	3+3? 3PL				(3+3)
7	5+2	5+2	5+2	5+2	< A5+2
7	4+3	3PL+1			(4+3, 3PL+1)
8	duuba(η)		dubba/tuppa		dubba
8	5+3, 4 redupl.?			5+3, 4 redupl.	5+3, 4 redupl.
8	bɔ	tɔŋgɪl/tɪŋɛɾɛy			(bɔ, tɛŋi-)
9	10-1	10-1	10-1		10-1
9	5+4	ʃɔlbɔtɪn (<5?)		5+4	5+4
10	di/di/ri	*tɔɔ, ɔ-rɔ	kɔ-mən (5PL)	ma-tu(l)	?
10		rakpac, i-hedɔkun	fəŋən (fə-ŋən?)	tiəɾum, ɲipɾa, gurrɪŋ)	?
20	10*2	10*2	10+10	10*2	10*2
20	tuɾi (‘grain’), ‘big figure’			‘body’, (a-riəl, a-(na)ttu)	(‘body’, ...?)
100	20*5, < Arabic	10*10	10*10	10*10, 20*5	10*10, 20*5
1000	rabic, 20*2*10	absent	10*10*10	ɑ-ðar	?

languages simultaneously. Moreover, nearly every language in a group has its own term for ‘ten’.

A primary term for ‘eight’ is distinguishable¹⁷ in the Heiban and Rashad languages.

¹⁷I used data from the following Kordofanian languages and dialects: Acheron, Dagik, Heiban, Jomang, Katla, Koalib, Lafofa, Laro, Logol, Lumun, Moro, Nding, Orig, Rere, Shirumba, Tagoi, Talodi, Tegali, Tegem, Tima, Tira, Tocho, Utoro, Warnang.

4.6 Adamawa

Adamawa is the most divergent of the NC families. The variety of numeral systems attested in the Adamawa languages confirms this statement. This can be observed not only in cases of forms that belong to different groups, but often within groups and sub-groups as well, which makes the reconstruction of its numeral system quite problematic. In other words, it is not a rare case that small Adamawa branches consisting of only a pair of languages show incomparable forms. Some examples are in order here.

Let us compare the terms from ‘one’ to ‘ten’ in the Kim branch that is commonly attributed to the Mbum-(Day) group (Greenberg 14) (Table 4.100).

Table 4.100: Numerals in the Kim branch

	Besme	Kim
1	mōndā/mbírāŋ	đú
2	tǰírí	zí
3	hāsī (hā-sī?)	tā
4	ndày	ndà
5	ndiyārá	nūwēy
6	māngùl	mènèngāl
7	điyārā	ḃēálā/ḃēálār
8	ndā-sì (4+3?)	tīmāl/wá-zì-zí(10–2)
9	nòmīnā	lāmāđō/wá-zì-đú (10–1)
10	wàl	wòl

Only the terms for ‘four’, ‘six’, and ‘ten’ are comparable in these systems.

The Longuda language constitutes a separate branch of Waja-Jen (Greenberg 10). The table below gives an overview of the first ten numerical terms as attested in two dialects of Longuda (Table 4.101). The evidence for both dialects was collected by the same scholar (Ulrich Kleinewillinghöfer¹⁸). Morphological analysis of the forms is given according to Longurama of Koola (Longuda1) and Wala Lunguda (Longuda2).

Although we are dealing with two dialects of the same language, the roots for ‘one’, ‘two’, ‘three’, ‘six’, and ‘ten’ attested in them are different. At the same time, the terms covering the sequence from ‘six’ to ‘nine’ follow patterns com-

¹⁸<https://mpi-lingweb.shh.mpg.de/numeral/Niger-Congo-Adamawa.htm>

Table 4.101: Longuda numerals

	Longuda1	Longuda2
1	laa-twè	naa-khal
2	nàà-kwé	naaa-shir
3	nàà-tsór	naa-kwái
4	nèé-nnyìr	naa-nyìr
5	nàà-nyó	nàà-nyó
6	tsààtèn	na-khí-nà-kwái (2*3)
7	í-néé-nyìr i-nàà-tsór(4+3)	nyi-na-kwái (4+3)
8	nyíi-tìn (<4?)	nyí-thìn (<4?)
9	é-nàà-nyó í-néé-nyìr(5+4?)	nyi-na-nnyó (4+5)
10	koo	nôm

monly attested elsewhere. Thus the differences between these dialects appear to be greater than those between the languages within Mande or Bantu families. This raises the question as to whether a Proto-Kim or Proto-Longuda reconstruction is indeed relevant.

Moreover, the reconstruction is additionally hindered by the fact that numerical terms in the majority of the Adamawa languages are subject to the alignment by analogy more frequently than in other NC languages. General considerations regarding this problem can be found in Chapter 2. This is of special significance for the Adamawa languages since it affects etymological interpretations. The evidence from a number of languages belonging to the Duru sub-group of Leko-Nimbari (Greenberg 4) may serve as a case study (Table 4.102).

Table 4.102: Duru numerals

	Peere	Doyayo	Gimme	Gəunəm	Vəmnəm	Momi	Longto
1	dəə	gbúnú	wəɔna	mani	màn	muzoz	wəŋŋá
2	iro	ééré	idtigè	tək	ètèn	ittáz	sittó
3	tāāro	taare	taagè	taarək	tāán	tàáz	tāābó
4	naro	náɔ	nàagè	náárək	nānnò	náz	nabbó
5	núuno	nooné	nəɔnigè	nəɔnək	gbà náárò	gbanáá	nǝmó
6	nón-dəə	nəɔn-gbúnú	nəngè	nəɔ-waŋgə	gbāa-sə māl	bámbéz	sááme

Matching final segments of the first few numerical terms in each of these languages are highlighted in red. I agree with Larry Hyman that “it might not be analogy, rather the use of a marker” (p.c.) but it should be noted that though these segments are different in each case (i.e. they do not match even within a pair of languages), they are present in each language under discussion.

In Mumuye-Yandang, which is another branch of Leko-Nimbari (Greenberg 5), an additional sub-morpheme (-t) is attested that is not present in Duru (Table 4.103).

Table 4.103: Analogical alignments in Mumuye-Yandang

	Mumuye	Bali	Yendang (dial.)
2	ziti	i-ye	í-nī
3	ta:ti	taat	tâ:t
4	dě:tì	naat	nâ:t

The following conclusions with regard to the Proto-Duru numeral system can be reached upon the basis of this evidence. First, the final segments (whatever their phonetic difference) should not be viewed as a hinderance to the comparison of numerical terms. This means that Momi *tâáz* ‘three’ can (and should be) compared to Longto *tāábó*. The question of whether their final segments should be analysed as morphemes or sub-morphemes is of secondary importance for our purposes. At the same time, the quality of the second consonant in Proto-Leko-Nimbari is obscure, so we have to reconstruct the form as **taaX*, where X is an unknown consonant.

As demonstrated above, numerical terms are exceptionally divergent within the family. In addition to this, systematic (diversified) alignment by analogy is often employed in the languages under study. Both factors make the reconstruction a challenging task, even though an attempt at reconstruction of the Adamawa numerals by a highly competent scholar is available (see R. Boyd 1989). His results, however, are of limited relevance for our comparative purposes, as the following example shows. According to Boyd, the Proto-Adamawa term for ‘one’ is to be reconstructed as **ku-di-n* (the root **di*) with **kwin* being its later development. His ideas on how this proto-form is reflected in particular branches of the Adamawa family are summarized in the table below (Table 4.104). Notations in the first column refer to Grinberg’s grouping of the Adamawa languages.

Even if Boyd’s reconstruction of the Proto-Adamawa form is correct, a diachronic interpretation that implies an etymological relationship between *bim-*

Table 4.104: **kwin*- reflexes in Adamawa according to Boyd

	*Proto	Reflexes
G1	kwin	kun
G1	kwin	kwaan
G2	kwin	gu-(a)s(a)
G4	kwin	gun, gbun, bin, wun-ga, guu
G5	kwi(t)	gbet, gorV
G5	kwin	in(d)i
G6	kwin-k	soŋ
G7	kwin	indi > fa-ndi
G8	kwin-kwin	bimbimi
G8	kwi(n)	gwi > ju
G9	kwin	tsuŋ/tsiŋ, cɔŋ
G10	kwi-t	> kwat > kal
G13	kwit	ɓuru, gulu
G13	kwit	> kwat > bara(k)
G13	kwin	ɬoŋ
G14	kwin	du
Day	kwin-k	ngoŋ
Day	kwin	(k)wan > mɔn

bimi, *cɔŋ*, *du* and *gbet* does not fit the purpose of our integral comparative study of NC numerical terms because it can be used to justify nearly any etymological connection. In view of this, the Adamawa numerical terms will be treated in the same way as those from the preceding language families. First, the main forms of the numerical terms will be established, with no attempt at tracing them down to a provisional proto-form. Then the numeral systems of each of the Adamawa branches will be studied separately. Finally, an integral analysis of the available evidence pertaining to each of the terms will be offered. This approach will enable us to treat the Fali languages and even Laal together with the Adamawa languages, although their relationship to the latter is often questioned (in the case of Laal, doubts are raised as to whether it belongs to NC at all).

Table 4.105: Fali-Yingilum numerals

1	kpolo/balo (< *lo?)	7	jɔrɔs
2	cuk, gbara	8	4 redupl.
3	taan (< taaX)	9	10-1/ɲɔʌs kàm(kàn) kɔ̀pòlò ‘rest hand one’
4	naan	10	ra
5	kẽrew	20	10*2
6	yira/yilo	100	< Fula
		1000	< Fula

4.6.1 Fali-Yingilum (G11)

It should be noted that after a nasal, *-r-* in the Fali forms regularly corresponds to *-N-* in those of Yingilum, cf. ‘5’ Fali *kẽrew* ~ Yingilum *kénàù*, ‘7’ *jɔrɔs* ~ Yingilum *jónàs*. An alignment by analogy is probably attested in the terms for ‘three’ and ‘four’ (**taaX* > *taan* may have changed by analogy with **naan*).

4.6.2 Kam (Nyimwom, G8)

Table 4.106: Kam numerals

1	bii (Meek: bimbini) (< *b-ii?)	7	jùp yi-raak (6,2 - ‘second six’?)
2	yi-raak (i-ra)	8	sâl
3	càr	9	níízaa
4	nár (< *naX)	10	bòò
5	ɲwún	20	kpáímí, *̀̀̀kpó
6	jù:p	100	20*5
		1000	?

Within the NC context, a reversion alignment by analogy may be considered: **naX* ‘4’ > *nar* by analogy with **car* ‘3’. As Boyd rightfully observes, in the case of ‘one’ it is often unclear whether the initial consonant is a part of the root, or a reflex of the noun class prefix.

The term for ‘seven’ simulates the pattern ‘7=6+2’ (this phenomenon is not infrequent in NC). Sometimes (e.g. in some of the Mande languages) this impression is due to the fact that the term for ‘six’ originally derived from ‘5+’. Over

time, an innovation replaced the original term for ‘five’, which was only preserved in the derived term for ‘six’. Alternatively, the term for ‘seven’ could be explained as ‘the other six’ (or ‘a big six’ in some languages), as perhaps in Kam, assuming that *jù:p* does not go back to the term for ‘five’.

4.6.3 Leko-Duru-Mumuye (G4, G2, G5)

This group is often labeled Leko-Nimbari. Here we follow Raimund Kastenholtz and Ulrich Kleinewillinghöfer, who note that “The term ‘Nimbari’ should not to be used as a classificatory term, nor should the scarce and surely in large parts erroneous data be given central significance in any comparative approach to Adamawa languages” (Kastenholtz & Kleinewillinghöfer 2012).

4.6.3.1 Duru (G4)

Table 4.107: Duru numerals

1	dáə, gbúnú, wó-ŋjá/wɔɔna/dá(ŋ)gá/*nge, man(i)/*mal	7	5+2, (gútambe, 6+’odd’, dámsàrà, 4+3)
2	du/ru/to, te/re	8	4PL/4+4, 5+3, (< Hausa)
3	tãátó/tããro	9	‘one finger is left’, níŋsínè, 5+4, 10–1
4	nató/naró (< *naX)	10	bōʔ, kob/kop/fób
5	núno/nɔɔnì, gbà náárò/gbanáá, sáá	20	gbeg/gbàhsí (=’staff’), *wóóg (‘head’), zul/zur (‘head’), (10*2, ráárò, jùgúyɔ),
6	gúú, 5+1	100	temere < Fula, 20*5
		1000	uzinere < Fula, (dukə)

This table provides an overview of forms and patterns attested in eleven sources for this sub-group. This degree of variety is not normally attested within a single sub-group, which raises doubts as to whether these languages should be grouped together.

Table 4.108: Leko numerals

1	níŋa/níiá (<ŋa?)	7	5+2
2	nnú, ra?, *-i?	8	5+3, < Hausa
3	toorà/toonú	9	5+4, 'one is left'
4	naarà/nεεr-əb	10	kób/kóp
5	núúnà/núnn-ub	20	nəd níi gbəd, laa-1
6	nôŋgôs/núŋgôs	100	20*5, < Fula
		1000	20*10?, < Fula

4.6.3.2 Leko (G2)

Our study of this sub-group is based on the evidence of two languages. The summary table above is not descriptive of the language-specific mechanisms of the alignment by analogy. An overview of the numerical terms covering the sequence from 'two' to 'five' by language is provided below (Table 4.4. 107).

Table 4.109: Analogical alignments in two Leko languages

	Kolbila (Zurá)	Samba Leko
2	innú	iirà
3	toonú	toorà
4	nεεrəb	naarà
5	núnnub	núúnà

Apparently, the terms from 'three' to 'five' in these two languages are related to each other. At the same time, two groups of terms ('2–3' and '3–4') with an alignment by the ultima are observable in Kolbila. This is applicable to a group of Samba Leko terms as well, namely '2–4' (possibly also '5'; the fact that the Samba Leko terms are adjusted by both the vowel quality and the tone is noteworthy). This means that the seemingly unrelated roots for 'two' may have derived from a common etymon (still unknown to us) by means of alignment by analogy. The source form of 'two' remains obscure. Assuming that it was similar to the one reconstructed for the Duru sub-group (e.g. **ru*), it is likely that the same form is to be reconstructed for Leko as well: **ru* > Kolbila *nu* by analogy with *toonú* '3'; **ru* > Samba Leko *rà* by analogy with *toorà* '3'. However, the evidence in favor of this reconstruction is inconclusive. Alternatively, the initial vowel of the term for

‘two’ (*ii-/in-) may reflect the source root, while the final segment is potentially explained via an alignment by analogy with ‘3’.

4.6.3.3 Mumuye-Yandang (G5)

Table 4.110: Numerals in Mumuye-Yandang

1	ḡinti/ḡini (* < nti/ni?) , gbétè	7	5+2
2	ziti, ye, nī	8	5+3
3	taat	9	5+4
4	naat	10	kop/kob
5	mă:ni, nɔŋ/ghinān	20	mba-1, kar-1, mim-1
6	5+1	100	20*5
		1000	derived

This sub-group is represented by three languages that show different forms of ‘two’. The terms for ‘three’ and ‘four’ are adjusted by analogy. Studying them in a wider NC context reveals that the final consonant in ‘four’ was adjusted by analogy with ‘three’. The alignment itself must have occurred already at the Proto-Mumue-Yandang level, which explains our provisional reconstructions suggested for this proto-language in the table above.

No evidence pertaining to the Nimbari numerals is available to us. The forms of ‘one’ given by Boyd (R. Boyd 1989) are noteworthy (Nimbari (*n*)yeme/ geme/ (zeme?)).

4.6.4 Mbum-Day (G13, G14, G6, Day)

4.6.4.1 Bua (G13)

This is very divergent branch that has been poorly documented. I’d like to thank Pascal Boyeldieu who has provided me with his personal data on Ba (Bua) and Lua (Niellim), as well as some other rare sources. The main forms and patterns are shown in Table 4.111.

Numerals in the Bua group can be presented as follows (Table 4.112)

Table 4.111: Bua numerals

Fanya Niellim	Tunya Bua	Zan Gula	Kulaal (Gula)	Bolgo	Koke		
1 do/lo	búdū/búrū sèli	gúlu	sammā, saado	ṭón	ba(k)ra, silla	barak	
2 i-ru/li-ndidí/ndirí ru	à-rī	i-li/í-rī:	ris:i/lissi	ròk	lēti, retè	lēdi	
3 taro	tērī	à-tā	í-tēr	to:ri	tòòs	teri	tēri
4 nagi/nani	nēni	à-nā	í- pāw/paō	na:sɪ	nòrò	har	hār
5 lugni	lùní	à-lōnī	í-lwār	te(r)	lún	tisso	tisó
6 kaba	tár	nānò	tār	5+1	lú-én-ṭón	tipsi	dípsil
7 5+2	longa	lúlú	lūr	5+2	lú-é-ròk	5+2	tiglén
8 <4	3+4', < Bagirmi	kòntā	<* 4 PL?	5+3		orhor (4 redupl.), 5+3	4 redupl.
9 10-X	< Bagirmi	à-tī	lór-lor	5+4	sàkólínnòrò	diar, 6+3	jār
10 teba	< Bagirmi, hulóa	kùtù	húlil/lorfilo:le/filori poo		yíppà	do(k)	dog
20 10*2	doksap	10*2	<10PL	ʊ-fa:le		a-rep, a-hun, tehu	
100	ro/ru	à-rū	a-ru	< Arabic	míà/mié		ae léd
1000	dubu	dūbú	dubu	< Arabic	hálif		ae har

Table 4.112: Bua numerals (summarized)

1	*do, *de?, bara(k), (ṭón)	7	5+2, 3+4, lúlú/lòng5/lur, (tiglen)
2	*di, *ri?, *ru?, (ròk), (rete)	8	4 redupl., 5+3
3	tar/tori/teri	9	ti, jar, 5+4, 10-X
4	na/nagi/niani, har	10	do(k), (kùtù), (filo:le), (yíppà), (teba)
5	luni/loni/*lu,te(r), *kən?, (tiso)	20	10*2, do-ksap, fa:le, (a-rep), (a-hun)
6	5+1, tá:r, (nānò), (kaba), tipsi	100	ro/ru
		1000	< Bagirmi

4.6.4.2 Kim (G14)

The first ten terms of Besme and Kim are given in the table above (Table 4.100). The term for ‘twenty’ in these languages follows the pattern ‘10*2’, whereas the Kim term for ‘hundred’ is borrowed from Arabic. The Besme term for ‘hundred’ is borrowed from the French *sac* ‘sack’, whereas the term for ‘thousand’ is borrowed from Bagirmi.

4.6.4.3 Mbum (G6)

Table 4.113: Mbum numerals

1	mbew/mbiew, bǝǝŋ/búónó/bóm/vaŋno	7	10–3, rɪŋ, (rěñām, tàrnágà)
2	seǝe/sere, gwa/ǝ̀-ǝ̀, ǝ̀-ǝ̀-tì	8	10–2, nama/namma/nènmaʔä
3	say	9	10–1, doraŋ
4	nìŋ, nai	10	boo, dʒama/dʒémà, (dùc, hù-wàlè)
5	ndiǝi/ndēǝē/dūwēe/dápì	20	10*2, ‘2 hands’, 10+10
6	ze(y)/ye(a), (tótókló, bì-gírò)	100	sód/sot, < Fula, < Arabic
		1000	‘sac’, bag’, < Fula, < Bagirmi

This sub-group is represented by a dozen languages. Unlike Leko-Duru-Mumue no alignment by analogy is attested. Some forms of ‘two’ are of unclear morphological structure.

4.6.4.4 Day

Table 4.114: Day numerals

1	ngǝ́ŋ, *mon	7	4+3
2	díí	8	4 redupl.?
3	tà	9	‘lacking one’
4	ndà, *bī-yām	10	mò
5	sēri	20	10*2
6	5+1	100	tù
		1000	< Bagirmi

This branch is comprised of an isolated language. Its attribution to Mbum-Day has been a subject of scholarly debate. The form **mon* ‘1’ is postulated on the basis of *sēri mōn* ‘six’, whereas the reconstruction of **bīyām* (**bī-yām?*) ‘4’ is based on *bīyām tà* ‘seven’.

4.6.5 Waja-Jen (G9, G10, G1, G7)

4.6.5.1 Jen (G9)

Table 4.115: Jen numerals

1	kwín/*fín/tsing	7	5+2
2	ráb/*re, bwə-ng, bwa-yung	8	4PL, 5+3
3	gbunuŋ, bwa-tə	9	5+4
4	net, bwa-nyə	10	fóób, bwa-hywə
5	nóob/*na, bwa-hmə/*hwĩ	20	fa-1, ngwu-1
6	5+1	100	20*5
		1000	fik-1, 20-fe

This branch is represented by two languages: Burak and Jenjo (Dza). The evidence from this group is among Boyd’s best arguments for the reconstruction of **kwin* (< **ku-di-n*) ‘one’. The primary term *li* (*bwa-li*) ‘fifteen’ is attested in Jenjo. Accordingly, the term for ‘sixteen’ follows the pattern ‘15+1’ (*bwali ji tsing*). Interestingly, in Burak the term for ‘hundred’ is *li* (*li kwín*).

The form **hwĩ* ‘five’ is traceable in Jenjo compound terms covering the sequence from ‘six’ to ‘nine’ (*hwĩ-tsing* ‘six’, *hwĩ-yung* ‘seven’, etc.) as is the corresponding Burak form **na* ‘five’ (*naa-fín* ‘six’, *náá-re* ‘seven’, *ná-tát* ‘eight’). The form **re* ‘two’ is observable in *náá-re* ‘seven’, whereas **fín* ‘one’ is traceable in *naa-fín* ‘six’.

4.6.5.2 Longuda (G10)

The evidence for the first ten numerals in two Longuda dialects can be found in the table above (Table 4.101). The term for ‘twenty’ in these languages follows the pattern ‘10*2’. The forms of ‘hundred’ are *pùlò(wé)/phulewe*.

Table 4.116: Waja numerals

1	w-in/d-in/kw-an/g-εen/*k-un?	7	ni-bir/ni-ber/ni-bil/ni-bi(y)
2	yó-rób/róɔp/yob/yo, (su)	8	na-rib/na-lib/na-rub (4*2)
3	taat, kunuŋ, (bwanbí)	9	10-1, teer/teet/tɔɔɔ
4	naat, (gwár)	10	kób/kub/kwab/kpop/kwu
5	nu(ŋ), (fwá:d)	20	10*2, '2 hands'
6	nu-kun (<5+1?)	100	<10?, wɔn, (bwa-tige)
		1000	kɔɔl, nèe/kú-néŋ, 100*10, bi-kate, tedu

4.6.5.3 Waja (G1)

Some languages in this sub-group are characterized by a sub-morphological alignment of the terms for 'three' and 'four' well-attested in Adamawa: Dadiya *tal* '3' ~ *nal* '4', Bangunji (dial.) 1 *táát* '3' ~ *náát* '4', Bangunji (dial.) 2 *taar* '3' ~ *naar* '4', Tula (Kitule) *jí-t:à* '3' ~ *jà:-nà* '4'. As a result, these terms are treated as minimal contrastive pairs in the paradigm. Within the NC context, forms with the final -t should be considered prototypical in the case of both terms. This means that **naaX* 'four' (final consonant unknown) may have evolved into **naat* by analogy with 'three' in Proto-Waja. Later, an innovative form for 'three' developed in Awak and Waja: Awak *kunúŋ*, Waja *kunuŋ*. The Dijim-Bwilim *bwanbí* is apparently an innovation.

Interestingly, the forms for 'six' attested throughout the sub-group resemble the Awak and Waja forms for 'three'. However, the forms for 'six' can be explained as '5+1' (assuming that they include an allomorph of **kun* 'one').

4.6.5.4 Yungur (G7)

The terms for 'twenty', 'hundred' and 'thousand' are attested in only one source (Kaan (Libo)) out of the eight sources available for this branch, hence they are quoted in brackets. Morphological analysis of the terms for 'one' and 'two' is unclear: **fV* may be a reflex of the original noun class prefix.

4.6.6 Laal

Finally, let us turn to the Laal numeral system. Laal's attribution to the Adamawa languages (as well as its attribution to NC) is debatable. Today it is assumed that

Table 4.117: Yungur numerals

1	fini/fandi/pándón (< *ndi?), wunú	7	nbutu
2	raap, fətə/fiici (< *tə/ci?)	8	4 redupl.
3	táákón/(taarón)	9	5+4
4	kurun	10	bú(u), (kutun)
5	wonon/wonun	20	(10*2)
6	mindike	100	(-ru)
		1000	(100*10)

it is an isolated case within Niger-Congo. Comparative study of its numerical terms may shed light on its genealogical relationship (Table 4.118).

Table 4.118: Numerals in Laal

1	b̀ìd̀ìl (b̀ì-d̀ìl?)	7	5+2
2	ʔìsì (ʔì-sì?)	8	4 redupl.
3	māā	9	yàṅjáj
4	b̀ìsān (b̀ì-sān?)	10	tūū
5	sāb, *swa-	20	10*2
6	cìcààn	100	10-'big'
		1000	< Baguirmi < Hausa

As in many other NC languages, the major problem with Laal numerals is the obscurity of their morphological structure. Pascal Boyeldieu established that traces of noun class suffixes are observable in Laal forms as their comparison to SG and PL forms show (see Boyeldieu 1982). However, as I tried to demonstrate elsewhere (Pozdniakov 2010), some traces of noun class prefixes had been preserved in this language as well. At this point, it seems reasonable to set the alternative variants aside for further comparison.

What follows is an attempt to synthesize the Adamawa evidence.

4.6.7 Proto-Adamawa

4.6.7.1 'One'

The main forms are given in Table 4.119.

Table 4.119: Adamawa stems for ‘1’

	‘1’	‘1’	‘1’	‘1’	‘1’	‘1’	‘1’	‘1’
Fali								
Kam	b-ü							
Leko								
Duru								
Leko		dáə		-(ŋ)gá/-na?/*nge	gbúnú	man(i)/*mal		
Mumuye		ḡi-nti/ḡi-ni		nina/níá (<ŋa?)				gbéè
		(* < nti/ni?)						
Mbum								
Bua		*de					bara(k)	tón, *si?
Kim			*do				mbirāŋ	
Mbum			dū			mōndā		mbew/mbiew
Day						*mon		
Waja				ngōŋ	bōōŋ/búónó			
Jen								
Longuda								
Waja	kw-ín/*f-ín/ts-ing (< *in)							
Yungur	w-in/d-in/g-εen/*k-un?							khal, twè
		fi-ni/fa-			wunú			
		ndi/pá-						
		ndón (<						
		*ndi?)						
		ḡidil						
Laal		(ḡi-dil?)						

In accordance with Boyd’s hypotheses discussed above, the forms in the first two columns may be related in view of the reconstruction of the root **di* (possibly also **-in*), the noun class prefix **ku-* and the suffix **-n* (**ku-di-n* ‘1’)

The last column lists forms that are attested in one of the branches only. The roots that can be tentatively reconstructed as **do*, **nga/ngɔ*; **(g)bunuand* and **mon* are noteworthy.

4.6.7.2 ‘Two’

The main forms of this root are quoted in Table 4.121. The grouping of forms is admittedly not substantiated enough. The variety of forms within this family is striking, even when unrestricted phonetic grouping is applied.

4.6.7.3 ‘Three’

Comparative evidence for this root points to its reconstruction as **taat* (with further alignment by analogy within each of the branches). As in the other NC families, the root is exceptionally stable, in contrast to the roots for ‘one’ and ‘two’ that demonstrate a wide variety of forms. A shared innovation in Jen and Waja (attested in Burak, Awak and Waja) is noteworthy.

Table 4.120: Adamawa stems for ‘3’

Fali-Yingilum	taan (< taaX)		
Kam	cār		
<i>Leko-Duru-Mumuye</i>			
Duru	tāātó/tāāro		
Leko	toorà/toonú		
Mumuye	taat		
<i>Mbum-Day</i>			
Bua	tar/tori/teri		
Kim	tā		hāsī
Mbum	say		
Day	tà		
<i>Waja-Jen</i>			
Jen	bwa-tə	gbunuŋ	
Longuda	tsér		kwái
Waja	taat (bwanbí)	kunuŋ	
Yungur	táákón/(təərən)		
Laal			māā

Table 4.121: Adamawa stems for ‘2’

	‘2’	‘2’	‘2’	‘2’	‘2’	‘2’	‘2’	‘2’	‘2’
Fali-Yingilum									
Kam	yi-raak (i-ra)						gbara	cuk	
<i>Leko-Duru-Mumuye</i>									
Duru		du/ru, to			te/re				
Leko	ra?		ii-/in-?					nnú	
Mumuye			ye			ziti		nī	
<i>Mbum-Day</i>									
Bua		*ru, (ròk)	di/ri			(rete)			
Kim					zí	tʃiri			
Mbum					bà-tì	sede/sere			
Day			dii				gwa/bò-gě		
<i>Waja-Jen</i>									
Jen	ráb/*re,								bwə-ng, bwa-yung
Longuda									
Waja	yó-								
	rób/rəp/yob/yo								
Yungur	raap					shir	kwé	(su)	
					fətə/fici				
					(< *tə/ci?)				
Laal					ʔisi (ʔi-si?)				

4.6.7.4 ‘Four’

Table 4.122: Adamawa stems for ‘4’

Fali-Yingilum	naan			
Kam	nár			
	(< *naX)			
<i>Leko-Duru-Mumuye</i>				
Duru	nató/naró			
	(< *naX)			
Leko	naarà/nɛɛr-əb			
Mumuye	naat			
<i>Mbum-Day</i>				
Bua	na/nagi/niani		har	
Kim			ndà(y)	
Mbum	nai	nìŋ		
Day			ndà	*bī-yām
<i>Waja-Jen</i>				
Jen	net	bwa-nyə		
Longuda	nnyìr/nyìr			
Waja	naat		gwár	
Yungur				kurun
Laal				ḡīsān
				(ḡī-sān?)

The main NC form *naX is predominant here, its second consonant being subject to alignment by analogy. The same root is likely to be reconstructed at the Proto-Adamawa level as well.

4.6.7.5 ‘Five’

The main root (*nun*) may be the same as in the Gur languages and may be etymologically related to the term for ‘hand’. It is likely that the isolated forms quoted in the rightmost column go back to similar terms as well. The Jen root *hmə* could be a borrowing from Chadian Arabic: *xamsa* ‘5’. The Mbum forms *ndēbē/ dūwēe* may be influenced by Fula (*jowi* ‘five’).

Table 4.123: Adamawa stems for ‘5’

Fali-Yingilum		kēřew	
Kam	ŋwún		
<i>Leko-Duru-Mumuye</i>			
Duru	núno/nɔɔnɛ̀,		gbà náárò/gbanáá, sáá
Leko	núúnà/núnn- ub		
Mumuye	nɔng/ghinān		mă:ni
<i>Mbum-Day</i>			
Bua			luni/loni/*lu,tɛ(r), *kɔn?, (tiso)
Kim	nūwēy	ndiyārá	
Mbum		ndifi/dūwēe/dápì	
Day		sērì	
<i>Waja-Jen</i>			
Jen	nóob/*na	-hmə/*hwĩ	
Longuda	nyó		
Waja	nu(ŋ)		fwá:d
Yungur	wo- non/wo- nun		
Laal			sāb, *swa-

4.6.7.6 ‘Six’

Table 4.124: Adamawa stems and patterns for ‘6’

Fali-Yingilum			yira/yilo
Kam		jù:p	
<i>Leko-Duru-Mumuye</i>			
Duru	5+1	gúú	
Leko			nôŋgôŋ/núŋgôŋ
Mumuye	5+1		
<i>Mbum-Day</i>			
Bua	5+1		tá:r, (nānò), (kaba), tipsi
Kim			māngùl/mènèngāl
Mbum			ze(y)/ye(a), tótókló, bì-gíró
Day	5+1		
<i>Waja-Jen</i>			
Jen	5+1		
Longuda		tsààtòn	2*3?
Waja	nu-kun (<5+1?)		
Yungur			mindike
Laal		cicààn	

The most frequently attested pattern is ‘5+1’. However, there is a great variety of isolated forms (see the last column). The similarity between the Laal and Longuda forms is noteworthy; both may go back to Chadian Arabic *sit:e* ‘six’. The Kim (and also Yungur?) form could be a borrowing from Bagirmi (*miká* ‘6’).

4.6.7.7 ‘Seven’

Table 4.125: Adamawa stems and patterns for ‘7’

Fali-Yingilum				jɔɾɔs
Kam			‘second six’	
<i>Leko-Duru-Mumuye</i>				
Duru	5+2	4+3	6+‘odd’	gútambe, dómsàrà
Leko	5+2			
Mumuye	5+2			
<i>Mbum-Day</i>				
Bua	5+2	3+4		lúlú/lòngɔ̃/lur, (tiglen)
Kim			běálā/běálār	đīyārā
Mbum				10–3, rɪŋ, rěnām, tàrnǎgà
Day		4+3		
<i>Waja-Jen</i>				
Jen	5+2			
Longuda		4+3		
Waja			ni-bir/-bil/- bi(y)	
Yungur				nbutu
Laal	5+2			

As in the case of ‘six’, the predominant pattern (‘5+2’) for ‘seven’ is rather plain. It co-exists with a variety of isolated forms of uncertain etymology.

4.6.7.8 ‘Eight’

Table 4.126: Adamawa stems and patterns for ‘8’

Fali-Yingilum	4 redupl.			
Kam				sâl
<i>Leko-Duru-Mumuye</i>				
Duru	4PL/4+4	5+3		< Hausa
Leko		5+3		< Hausa
Mumuye		5+3		
<i>Mbum-Day</i>				
Bua	4 redupl.	5+3		
Kim	ndāsì (4PL?)		wázìzì (10–2)	tīmāl
Mbum			10–2	nam(m)a/nènmà?ä
Day	4 redupl.?			
<i>Waja-Jen</i>				
Jen	4PL	5+3		
Longuda				nyíthìn
Waja	4*2			
Yungur	4 redupl.			
Laal	4 redupl.			

The pattern ‘8=4 redupl.’ is to be reconstructed at the Proto-Adamawa level.

4.6.7.9 ‘Nine’

Table 4.127: Adamawa stems and patterns for ‘9’

Fali-Yingilum		10–1/ηgʌs kàm(kàn) kpòlò ‘rest hand one’	
Kam			níízaa
<i>Leko-Duru-Mumuye</i>			
Duru		‘one finger is left’, níḡsínè, 5+4, 10–1	
Leko	5+4	‘one is left’	
Mumuye-Yandang	5+4		
<i>Mbum-Day</i>			
Bua	5+4	10–X	ti, jar
Kim		10–1	nòmīnā
Mbum		10–1	doraŋ
Day		‘lacking one’	
<i>Waja-Jen</i>			
Jen	5+4		
Longuda	5+4		
Waja		10–1	teer/teet
Yungur	5+4		
Laal			yànjǎŋ

A primary term for ‘nine’ was apparently non-existent in Proto-Adamawa. A comparison between Bua *diar* and Kanuri *lɔ́yár* may be suggestive if a borrowing is considered. The same applies to the terms for ‘nine’ in Waja (*tɔɔrɔ*) and Hausa (*tara*).

4.6.7.10 ‘Ten’

Two alternative roots for ‘ten’ (Table 4.128) are distinguishable (**boo* and **kob* attested in four and two groups respectively). The root *d(u)o* is observable in two Mbum-Day sub-groups. Finally, the root *kutu(n)* is found in two languages, namely in Tunya (Bua) and Kaan (Yungur). Assuming that *ku-* is a class prefix, this root may prove to be related to *tūū* (Laal).

Table 4.128: Adamawa stems for ‘10’

Fali-Yingilum					ra
Kam	bòò				
<i>Leko-Duru-Mumuye</i>					
Duru	bōʔ,	kob/kop/fób			
Leko		kób/kóp			
Mumuye		kop/kob			
<i>Mbum-Day</i>					
Bua			do(k)	kùtù	(filo:le), (yíppà), (teba)
Kim					wàl/wòl/wàr/*wèy
Mbum	boo		dùɔ		hù- dzama/džémà wàlě
Day	mò				
<i>Waja-Jen</i>					
Jen		fóób			bwa- hywə nôm
Longuda		koo/kù			
Waja		kób/kub/kwab/kpop/kwu			
Yungur	bú(u)			kutun	
Laal				tūū	

4.6.7.11 ‘Twenty’

The term for ‘twenty’ (Table 4.129) in the Duru languages either follows the pattern ‘20=10*2’ or goes back to the lexical roots for ‘head’ and ‘staff’. The Niellim term *do-ksap* was likely borrowed from Bagirmi *dùg sap* ‘twenty’.

Table 4.129: Adamawa stems and patterns for ‘20’

Fali-Yingilum	10*2		
Kam			*̀̀̀kpó, kpáímí
<i>Leko-Duru-Mumuye</i>			
Duru	10*2		gbeg/gbàhsí ráárò, (‘staff’), jùgúyò *wóóg (‘head’), zul/zur (‘head’)
Leko		laa-1	nèd níi gbèd
Mumuye			mba-1, kar-1, mim-1
<i>Mbum-Day</i>			
Bua	10*2	fa:le	do-ksap, a-rep, a-hun
Kim	10*2		
Mbum	10*2	‘2 hands’, 10+10	
Day	10*2		
<i>Waja-Jen</i>			
Jen		fa-1	ngwu-1
Longuda	10*2		
Waja	10*2	2 hands’	
Yungur	10*2		
Laal	10*2		

4.6.7.12 ‘Hundred’

Table 4.130: Adamawa stems and patterns for ‘100’

Fali-Yingilum			< Fula
Kam	20*5		
Leko-Duru-Mumuye			
Duru	20*5		< Fula
Leko	20*5		< Fula
Mumuye	20*5		
Mbum-Day			
Bua		ro/ru	
Kim			< Arabic
Mbum		sód/sot	< Fula, < Arabic
Day		tù	
Waja-Jen			
Jen	20*5		
Longuda			pùlò(wé)/phulewé
Waja	<10?		wɔn, bwa-tigɛ
Yungur		(-ru)	
Laal	10-’big’		

The fact that this term was massively borrowed (most likely simultaneously) from Fula and Arabic suggests that it was lacking in Proto-Adamawa. It can be assumed that the root *ru* attested in Bua and Yungur is also a borrowing, this time from Bagirmi *àrú* ‘hundred’.

4.6.7.13 ‘Thousand’

The term for ‘thousand’ was massively borrowed from Fula, Bagirmi and Hausa, which points to its absence in the proto-language.

Table 4.131: Adamawa stems and patterns for ‘1000’

Fali-Yingilum		< Fula
Kam	?	
Leko-Duru-Mumuye		
Duru		< Fula, < Hausa
Leko	20*10?	< Fula
Mumuye	?	
Mbum-Day		
Bua		< Bagirmi
Kim		< Bagirmi
Mbum	‘sack’, bag’	< Fula, < Bagirmi
Day		< Bagirmi
Waja-Jen		
Jen	ʃik-1, 20-fe	
Longuda	?	
Waja	kɔɔl, nèe/kú-néɲ, 100*10, bi-kate, tedu	
Yungur	(100*10)	
Laal		< Baguirmi, < Hausa

4.7 Ubangi

What follows is a preliminary analysis of the evidence of five separate language groups including Ubangi-Banda, Gbaya-Manza-Ngbaka, Ngbandi, Sere-Ngbaka-Mba (A. Ngbaka-Mba, B.Sere), and Zande.

4.7.1 Banda

The form *gba* ‘ten’ is traceable in the Mbanza (Mabandja) terms for tens.

4.7.2 Gbaya-Manza-Ngbaka

Ives Moñino’s reconstructions (Moñino 1995) are quoted in the table under an asterisk. Selected noteworthy forms are also included.

In the diachronical perspective, the forms **lúitò* and **bùà* ‘two’ probably included noun class prefixes. They go back to **-too* and **-wa* respectively (cf. *vàχ* ‘2’ in Gbaya Mbodomo).

Table 4.132: Numerals in Banda

1	bàlē (bà-lē?)	7	5+2
2	bīfī (bi-fī?)	8	5+3, ngebedede
3	vɔ-ta	9	5+4, 8+1
4	và-nā	10	mó-rófō, bu-fu, ‘two hands’, ‘all the fingers’, *gba
5	mī-ndū	20	‘one person’, ‘the whole person’, ‘body-person-all’
6	5+1, gazala	100	ngàmbò/ngbàngbò, ‘five persons’, < Sango, < Lingala?
		1000	< French ‘sack’, < Lingala?

Table 4.133: Numerals in Gbaya-Manza-Ngbaka

1	*kpók/kpóm ;ndán	7	*5+2
2	*bùà, *jíto; bùwá (bù-wá?)/vàχ, -too	8	*5+3; 4PL
3	*tār(à)	9	*5+4; kùsì
4	*nár(á)	10	*bú/bú-kɔ́
5	*mòòrɔ́/mòr-kɔ́	20	*10*2
6	*5+1, (gàzèlè)	100	*góm-màá ; < Lingala
		1000	< French ‘sack’, < Lingala

In his discussion of **mòòrɔ́* Moñino states that “La variante **mòòrɔ́* semble être une contraction de **mòr-kɔ́*, dans laquelle on peut reconnaître l’élément *kɔ́* ‘main’ ...” (Moñino 1995: 655). He also makes the following observation regarding the reconstruction of the term for ‘ten’: “**bú* ‘dix’ est en relation avec **bú* ‘façonner, faire un cercle, joindre les mains’; la série partielle *bú-kɔ́* est encore plus explicite, et décrit le geste qui accompagne l’énonciation du chiffre 10 chez tous les locuteurs” (Moñino 1995: 656).¹⁹ This is an important point, especially in view of the relatively frequent occurrence of *bu* in the NC languages and the possible etymological relationship between **bú* and phonetically similar forms attested in other branches. However, such a relationship would be doubtful within Moñino’s ety-

¹⁹However, in some Gbaya languages, these forms differ by tone: Gbaya (Roulon-Doko) bú ‘10’ ~ bú ‘to tap; to applaud, to roll’.

mological hypothesis.

The following etymology is suggested for ‘hundred’ by Thomas Elvis Guenekean: “The word *gǝm* means ‘cut’ or ‘gathered’ and *n̄mà:* means ‘things’.”²⁰ According to Moñino, the form literally means ‘frapper-l’une l’autre (les mains)’ (Moñino 1995: 657).

4.7.3 Ngbandi

The Ngbandi and Yakoma evidence points toward the reconstruction outlined in the table below (Table 4.134).

Table 4.134: Numerals in Ngbandi

1	kɔ(i)	7	mbara-mbara
2	sɛ	8	miambe/myòmbè
3	ta	9	gumbaya
4	siɔ/syɔ	10	sui, bàlé
5	kɔ̄/kū	20	10*2
6	mana, mɛ̀ɛ	100	ngbangbo
		1000	< Lingala, Arabic

4.7.4 Sere-Ngbaka-Mba

Since the languages within this group are extremely divergent, it seems reasonable to treat the evidence from its two major sub-groups separately.

Ngbaka-Mba (Table 4.135)

Sere (Table 4.136)

Sere-Ngbaka-Mba (Table 4.137)

4.7.5 Proto-Ubangi

The evidence pertaining to each of the numerical terms is summarized below.

4.7.5.1 ‘One’

Two competing roots (**le/ne* and **k(p)o(k)*) are distinguishable here.

²⁰<https://mpi-lingweb.shh.mpg.de/numeral/Gbaya-Bossangoa.htm>

Table 4.135: Numerals in Ngbaka-Mba

1	kpó-/kpàà-, 6a-wi, 6i-ni/bi-rì, ú-ma	7	5+2, (mā-nānikà, lè-rèzi, zyálá, sáḃá), sílānā/sélēnā/fīēnā (<4?)
2	bīf-i/6i-sī, 6i-né/bí-de, gbwò	8	sénā (2*4?), gba-dzena/mā-dzénā, (5+3, 10-2)
3	ba-ta/ba-la	9	5+4, 10-1, (me-newá)
4	ba-na/ba-dā/ba-la	10	nzò kpā('head-hand')/àngbà, a-busa
5	bu-ruwe/bu-luve/θuwe, ʔeve/ve/vue	20	10*2
6	fí-tà/si-ta (2*3), mā-dīà/ká-zyá, 5+1	100	< Sango, < Lingala, 20*5, (mya, kúló, kpode, ngündāngū)
		1000	gyu, kutu, < Arabic, < French ('sack'), 100*10

Table 4.136: Numerals in Sere

1	njēe	7	5+2
2	so	8	5+3
3	táʔò	9	5+4
4	nàʔò	10	ḃĩ-kürü , muʔḃi ('on hands')
5	vo	20	'kill-person-one'
6	5+1	100	'kill-persons-five', < Arabic
		1000	100*10

Table 4.137: Sere-Ngbaka-Mba numeral system (*)

1	kí-lī, sa	7	5+2
2	ī-jō/ī-yō/úé	8	5+3
3	bíá-tá/ā-tā	9	5+4
4	lu, bià-ngì ~ bià-mà	10	ngbḃ/bà-wē
5	ì-sibē/bī-sùè	20	'people one'
6	5+1	100	ndḵngbá, ngbàngbù< Sango
		1000	sáki/sākè (< Sango < French)

Table 4.138: Ubangi stems for ‘1’

Banda	bàlē (bà-lē?)		
Gbaya-Manza-Ngbaka		kpó(k)/(kpémd)ŋ	
Ngbandi		kɔ(i)	
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	ḡi-nì/bì- rì	kpó- /kpáà-	ḡa-wiú-ma
Sere			njēe
Zande	kí-lī		sa

4.7.5.2 ‘Two’

Table 4.139: Ubangi stems for ‘2’

Banda	bifi (bi-fi?)		
Gbaya-Manza-Ngbaka		bùwá (bù-wá?)/vàχ	-too
Ngbandi	sɛ		
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	bī-ḡi/ḡi-sī	gbwò	ḡi-né/bí-de
Sere			so
Zande			ī-jō/ī-yō/úé

The only root widely attested within this family is *si/fi.

4.7.5.3 ‘Three’ and ‘four’

The roots for ‘three’ and ‘four’ can be securely reconstructed as *taar and *naar respectively (with an alignment by analogy applied).

4.7.5.4 ‘Five’

The Proto-Ubangi form is unclear, since the term for ‘five’ is based on the lexical root meaning ‘hand’ (*kɔ) in two groups out of five. The only root whose attestations are not limited to a single group is *du(w)/lu(w).

Table 4.140: Ubangi stems for ‘3’ and ‘4’

	‘3’	‘4’	‘4’
Banda	vɔ-ta	và-nā	
Gbaya-Manza-Ngbaka	tààr	náár	
Ngbandi	ta		siɔ/syɔ
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	ba-ta/ba-la	ba-na/ba-ɗa/ba-la	
Sere	táʔò	nàʔò	
Zande	bíá-tá/ā-tā		lu, bīà-ngì ~ bīà-mà

Table 4.141: Ubangi stems for ‘5’

Banda	mī-ndū		
Gbaya-Manza-Ngbaka		mòr-(k)ɔ	
Ngbandi		kō/kū	
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	bu-ruwe/-luve/θuwe	ʔeve ~ ve/vue	
Sere		vo	
Zande			ì-sìbē/bī-sùè

4.7.5.5 ‘Six’

Table 4.142: Ubangi stems and patterns for ‘6’

Banda	5+1	ga-zala	
Gbaya-Manza-Ngbaka	5+1	gà-zèlè	
Ngbandi			ma-na, mè-rē
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	5+1	mā-ɗià/ká-zyá	ʃí-tà/si-ta (2*3)
Sere	5+1		
Zande	5+1		

In addition to forms that follow the common pattern ‘6=5+1’, a number of other forms of uncertain etymology are attested in the first two groups (and possibly in

Sere-Ngbaka-Mba as well, assuming that our morphological analysis of pertinent forms is correct).

4.7.5.6 ‘Seven’

Table 4.143: Ubangi stems and patterns for ‘7’

Banda	5+2	
Gbaya-Manza-Ngbaka	5+2	
Ngbandi		mbara-mbara
<i>Sere-Ngbaka-Mba</i>		
Ngbaka-Mba	5+2	mā-nānìkà, lè-rèzi, zyálá, sáábá, sílànā/sélènā/ǰiēnā (<4?)
Sere	5+2	
Zande	5+2	

The variety of forms attested in Ngbaka-Mba is noteworthy.

4.7.5.7 ‘Eight’

Table 4.144: Ubangi stems and patterns for ‘8’

Banda	5+3		ngebedede
Gbaya-Manza-Ngbaka	5+3	4PL	
Ngbandi			miambe/myòmbè
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba	5+3	sénā (2*4?)	ǰba-dzena/mā-dʒénà, 10–2
Sere	5+3		
Zande	5+3		

4.7.5.8 ‘Nine’

Apparently, at the family level the common pattern ‘5+’ should be assumed for the terms from ‘six’ to ‘nine’. Isolated forms attested in groups and sub-groups are quoted here (as well as in the cases of other families) in order to collect exhaustive evidence for further etymological analysis. Moreover, a small chance that the

Table 4.145: Ubangi stems and patterns for ‘9’

Banda	5+4	8+1
Gbaya-Manza-Ngbaka	5+4	kùsì
Ngbandi		gumbaya
<i>Sere-Ngbaka-Mba</i>		
Ngbaka-Mba	5+4	10–1, (me-newá)
Sere	5+4	
Zande	5+4	

Niger-Congo proto-form is traceable within only a single branch should not be ignored.

4.7.5.9 ‘Ten’

Table 4.146: Ubangi stems for ‘10’

Banda	bu-fu	*gba	mó-rófō, ‘two hands’, ‘all the fingers’
Gbaya-Manza-Ngbaka	‘personne’ (‘joindre les mains’)		
Ngbandi			sui, bàlé
<i>Sere-Ngbaka-Mba</i>			
Ngbaka-Mba		nzò-kpā ‘head’- ‘hand’)/à-ngbà	a-busa
Sere			ḡĩ-kürü, ‘on hands’
Zande		ngbḡ/bà-wē	

The reconstruction of the term for ‘ten’ is so problematic that it raises doubts as to whether it was present in Proto-Ubangi at all. In view of the convincing internal etymology suggested by Ives Moñino, the root **bu* alternating with **pu* and **fu* in some of the NC families is an unlikely candidate. The reconstruction of **gba/ kpa* is worth considering. However, the root may not be primary.

4.7.5.10 ‘Twenty’

Table 4.147: Ubangi stems and patterns for ‘20’

Banda	‘one person’, ‘the whole person’, ‘body-person-all’	
Gbaya-Manza-Ngbaka		10*2
Ngbandi		10*2
<i>Sere-Ngbaka-Mba</i>		
Ngbaka-Mba		10*2
Sere	‘kill-person-one’	
Zande	‘people one’	

Two reconstruction possibilities are available here, i.e. the pattern ‘20=10*2’ commonly attested in NC, and a derivation from the lexical term meaning ‘person’.

4.7.5.11 ‘Hundred’

Table 4.148: Ubangi stems and patterns for ‘100’

Banda	ngàmbò/ngbàngbò	‘five persons’ < Sango, < Bangala (< Lingala?)
Gbaya-Manza-Ngbaka		‘cut/gathered’- ‘things’? ‘clap hands’?, < Lingala
Ngbandi	ngbangbo	
<i>Sere-Ngbaka-Mba</i>		
Ngbaka-Mba		< Sango, < Lingala, 20*5, (mya, kúló, kpode, ngündāngū)
Sere		‘kill-persons-five’, < Arabic
Zande	ngbàngbù < Sango	‘ndṵṅḃá

Most of the forms are apparent borrowings which suggests that the term for ‘hundred’ was absent in Proto-Ubangi.

Table 4.149: Ubangi stems and patterns for ‘1000’

Banda	< French, < Lingala?	
Gbaya-Manza-Ngbaka	< French, < Lingala, tómay	
Ngbandi	< Lingala, < Arabic	
<i>Sere-Ngbaka-Mba</i>		
Ngbaka-Mba	< Lingala, < Arabic, < French, 100*10	gyu
Sere	1000*10	
Zande	< Sango < French	

4.7.5.12 ‘Thousand’

The absence of the term for ‘thousand’ in Proto-Ubangi is even more evident than the absence of the term for ‘hundred.’

4.8 Dogon and Bangime

A step-by-step reconstruction of Dogon numerals does not seem reasonable because the family is relatively homogeneous. In addition, the formal differences between the numerical terms do not seem to correlate with the internal genealogical classification of the Dogon languages. The table below offers an overview of the pertinent data (Table 4.150) and is followed by a brief commentary.

Table 4.150: Dogon numerals

1	túrú/tumɔ, ti(i)	7	suli/soli/soye
2	lé(y)/lɔ(y)/né(y)/nɔ(y)	8	gá(a)rà, sagi, sele (< Mande?)
3	taan	9	túwɔ
4	nay(n), kɛɛso	10	pérú/pélú
5	núnéé(n)/nũ:(yn)/nùm	20	10*2
6	kuro/kule	100	80 (sûŋ/sún) +20, < Fula
		1000	800 (múpú) +200

‘One’: Najamba-Kindige: *kúndé* ‘1’, Mombo *yè:tá:ngù* ‘1’.

‘Two’: The forms with the nasal *n-* attested in several dialects are variants of the basic form with *1-. It should be noted that the final palatal element is systematically attested in other numerical terms, e.g. in Ben Tey (Table 4.151).

Table 4.151: Final palatal in ‘2’

2	yěy	6	kúròy
4	nĩ:y ⁿ	7	súy ⁿ ỳy ⁿ
5	nùmũy ⁿ	8	gá:rày

Regardless of whether this element is a morpheme or not, we are certainly dealing with a phonetic alignment by the final segment. Thus the final -y should not be reconstructed even in those forms that show its presence in the majority of languages.

‘Three’: This is a persistent form with only minor modifications applied to it (e.g. *taandu*, *taali*).

‘Four’: This is the only term for which the final palatal (probably nasalized) is potentially reconstructable. If so, systematic alignments by analogy attested in final segments of other numerals are probably based on the form of ‘four’. The root *kéeso*/ *ké:jó*/ *ké:jèy*/ *cézò*/ *yè-cézó* is probably an innovation (see, however, Jeff Heath who argues for its archaic nature.²¹) The term may be etymologically connected to the term for ‘eighty’, cf. Najamba-Kindige *sím*, *kè:sùm*, Tommo So *kèèsùm* and a number of other related forms (Yorno So *dəgə-sũm* ‘80’, “Dogon hundred”, Valentin Vydrin, p.c., Perge Tegu *dəgə-sũŋ* ‘80’, Yanda Dom *sĩŋ* ‘80’ etc.).

‘Five’: The etymological connection of this term with the lexical root meaning ‘hand’ *nùmà*/ *nùmó*/ *nùmó*/ *nõy* is immediately apparent.

‘Six’ and ‘seven’ are probably primary terms.

‘Eight’. The root *sagi* attested in Najamba and Yanda Dom was probably borrowed from Mande. The forms *silá*, *seele* observable in a number of dialects may be related to it. The root *gá(a)rà* is commonly attested in the majority of languages of this group, sometimes with a partial reduplication (Donno So/Yorno So/Toro So *ga-gara/ga-gira*). Partial reduplication is a popular means of deriving ‘eight’ from ‘four’ commonly attested throughout NC. In view of the fact that the Dogon counting system is based on 8, this root should probably be compared to *gàrá*, meaning ‘big, large, a large quantity, a lot, go beyond (limit), more, to a greater extent’. Tonal differences may be neglected in this case, especially since the derived forms tend to be formally marked, e.g. tonally.

‘Hundred’. The basic ‘large number’ in Dogon is ‘eighty’ rather than ‘hundred’, so this meaning should probably be reconstructed for *siĩŋ/sũŋ*. In view of this,

²¹<http://dogonlanguages.org>

the fact that the term for ‘hundred’ was borrowed from Fula in nearly all Dogon languages is not a coincidence.

‘Thousand’. Similarly, the root *mupu* (var. *mùsú* / *mùdzú*) ‘800’ incorporated into the pattern ‘1000=800+200’ is reconstructed in Dogon.

The Bangime numeral system should also be considered here, since most of the numerical terms attested in this isolated language are comparable to those found in Dogon (Table 4.152).

Table 4.152: Bangime numerals

1	tòré/tiyé (in counting)	7	kijé
2	jindò	8	sàágín (< Mande?)
3	táárù	9	tégò
4	nìjé	10	kúré
5	nündí	20	tááwá
6	kěré	100	tè̀m̀è̀déré (< Fula)
		1000	mṹzú

As in Dogon, the terms covering the sequence from ‘six’ to ‘nine’ are primary. An isolated root for ‘forty’ (also represented in some of the Dogon languages) is attested in Bangime. Interestingly, the root is the same as the one found in some of the Mande languages, cf. Bangime *dèvé*, Dogulu Dom (Dogon) *dě́*, Mombo (Dogon) *dê*, Marka Dafing *dēbē*, Bozo *dèbè/ léwè*, Bamana *dèbè*.

The root for ‘ten’ does not correspond to the one attested in Dogon. The latter finds a direct parallel in Boko (East Mande *kuri* ‘ten’).

4.9 Gur

It should be noted that the Gur languages are extremely divergent in the majority of their numerical terms (including those that prove to be fairly persistent in other families). The approach we took for the evidence studied above (i.e. the establishing of the most common forms and their further comparison to the data from other branches) may not appear fruitful in the case of the Gur languages.

To deal with the problem, we are going to use the classification of the Gur languages found in *Ethnologue*, namely A. Bariba, B. Central, C. Kulango, D. Lobi, E. Senufo, F. Teen, G. Tiefo, H. Tusia, I. Viemo, J. Wara-Natiro.²² The Gur fam-

²²This classification is accepted here with slight modifications based on recent studies. For in-

ily comprises nearly a hundred languages. In terms of the classification outlined above, their distribution is uneven. Seven groups (Bariba, Kulango, Lobi, Teen, Tiefo, Tusia, Viemo) have an isolated language as their only member. Similarly, Wara-Natorio is represented by only three idioms. This means that the majority of the Gur languages are split between the two remaining groups, i.e. Senufo and Central. The former is comprised of about fifteen languages and is relatively homogenous. Its affiliation to Gur is often considered doubtful. Compared to Central, which embraces the majority of the Gur languages (nearly seventy), this group is relatively small. Two major sub-groups are identifiable within Central, i.e. Northern (38 languages) with Oti-Volta (33 languages) as the dominant branch and Southern (31 languages) with its dominant branch of Grusi (23 languages). In other words, 71 of the Gur languages (out of a total of 91) belong to either Oti-Volta, Grusi or Senufo. In addition to that, there are more than ten branches represented by a single isolated language each. No evidence points to their possible affiliation with the major branches or to their inter-relationship. The same can probably be said about several isolated languages affiliated (often uncritically) with the Central group (the Bwamu, Kurumfe, Dogoso-Khe, Gan-Dogosé, and Kirma-Tyurama branches). This already complex picture gets even more sophisticated in view of the following:

1. Branches represented by one or two languages (e.g. Buli-Konni, Notre, Yom-Nawdm) are distinguishable even within the most reliably established bodies of genetically related languages of this family.
2. According to Ulrich Kleinewillinghöfer (p.c.), who is a renowned expert in both Gur and Adamawa comparative linguistics, a border between these two families is not clear at all. This means that some of the Gur branches may prove to be more closely related to Adamawa.

Our reconstruction of the Gur numeral system is based on nearly 120 sources that vary in regards to the evidence they offer (cf. our considerations above). By addressing one of the most problematic cases (i.e. the reconstruction of the Gur term for ‘one’) we hope to work out a general approach that will eventually allow further comparison of the Gur evidence to that of other NC families.

stance, Dyan and Lobi are treated as members of the same branch.

4.9.1 ‘One’

The table below lists several forms of the term for ‘one’ in smaller Gur branches (Table 4.153).

Table 4.153: Diversity of stems for ‘1’ in Gur

Gurma	Grusi-Eastern	Grusi-Western
Akaselem: m-bá	Bago-Kusuntu: ɲɔrɔkpákpá	Chakali: dígímáná
Bimoba: yènn	Chala: -re-, -dóndɔlɔɲ	Deg: beɲ-kpaɲ/kpee
Miyobe: n-ni (-sɛ)	Delo: daale	Phuie: déò/dùdúmí
Nateni: -cɔ̃, dèn	Kabiye: kó-yóm	Sisaala: kò-bàlá/dián
Ngangam: mi-kpiɛkm	Lama: kó-dám	Winyé: n-do

A brief study of these examples raises doubts as to whether the Gur numeral system is reconstructable at all (not to mention the Grusi-Northern system or those of the more isolated Gur branches).

Even if we consider one syllable roots of the CV(C)-type only, the impression will remain that every conceivable root for ‘one’ is attested in the Gur languages. However, none of these roots is traceable in at least half of the Gur groups. This situation is reflected in the matrix below (Table 4.154).

Table 4.154: Distribution of the CV(C)- forms for ‘1’ in the Gur languages

	I	A	U
P (p/f)	–	–	–
B (b/w/m)	3/5	1/4	1/1?
T (t)	1/1	2/2	–
D (d/l/r/n)	3/16	–	3/13
C (c/s)	–	–	1/1
J (j/y/ny)	1/18	1/1	1/1
K (k/h/x)	2/5	1/2	2/4
G (g/ŋ)	1/5	1/1	1/1

The first figure refers to the number of groups where a form is attested (with a maximum of 10 groups), whereas the second one refers to the number of lan-

guages. Thus, **B-I** denotes a form comprising a voiced labial consonant (b, w or m) and a front vowel that is attested in five languages within three groups (Central, Lobi-Dyan and Senufo) (Table 4.155).

Table 4.155: BI- forms for ‘i’ in Gur (3 groups, 5 languages)

bée	Ditammari	B. Central	1. Northern	C. Oti-Volta	ii. Eastern
biè-	Lobi	D. Lobi-Dyan			
bèg	Dyan	D. Lobi-Dyan			
nì-bín	Cebaara	E. Senufo			
nan-bin	Shempire	E. Senufo			

The remaining forms are quoted below as an illustration of their extreme divergency.

- (1) a. **BA** (1/4) (Table 4.156).

Table 4.156: BA- forms for ‘i’ in Gur (1 group, 4 languages)

Ṁ-bá	Akaselem	B. Central	1. Northern	C. Oti-Volta	Gurma
bàa	Konkomba	B. Central	1. Northern	C. Oti-Volta	Gurma
mi-ba	Ngangam	B. Central	1. Northern	C. Oti-Volta	Gurma
ṇ.-bá /-bó	Ntcham	B. Central	1. Northern	C. Oti-Volta	Gurma

- b. **BU** (1/1): only *pú-wò* (possibly *púw-ò*, **PU?**) in Wara (J.Wara-Natioro)
 c. **TI** (1/1): only *tía* in Baatonum (A.Bariba)
 d. **TA** (2/2) (Table 4.157).

Table 4.157: TA- forms for ‘i’ in Gur

ta, taà, tãã	Kulango (dial.)	C.Kulango
tani	Teen (dial.)	F.Teen

e. DI (3/15) (Table 4.158).

Table 4.158: DI- forms for ‘1’ in Gur

dè	Bwamu (Boore)	B. Central	1. Northern	A. Bwamu	
nni	Miyobe	B. Central	1. Northern	C. Oti-Volta	iii. Gurma
dèn	Nateni	B. Central	1. Northern	C. Oti-Volta	iii. Gurma
lé	Khe Southern	B. Central	2. Southern	A. Dogoso-Khe	
í-lèŋ	Khisa	B. Central	2. Southern	C. Gan-Dogose	
re-	Chala	B. Central	2. Southern	D. Grusi	i. Eastern
díŋ	Paasaal	B. Central	2. Southern	D. Grusi	iii. Western
déò	Phuie	B. Central	2. Southern	D. Grusi	iii. Western
diáng	Sisaala (dial.)	B. Central	2. Southern	D. Grusi	iii. Western
dién	Sisaala (dial.)	B. Central	2. Southern	D. Grusi	iii. Western
diige	Tampulma	B. Central	2. Southern	D. Grusi	iii. Western
déiŋ	Kirma	B. Central	2. Southern	E. Kirma-Tyurama	
dēēn-	Turka	B. Central	2. Southern	E. Kirma-Tyurama	
nō-ni	Karaboro (dial.)	E. Senufo			
dě	Tiefo (dial.)	G. Tiefo			

f. DU (3/13) (Table 4.159)

Table 4.159: DU- forms for ‘1’ in Gur

dòù	Bwamu	B. Central	1. Northern	A. Bwamu	
dòòn	Bwamu	B. Central	1. Northern	A. Bwamu	
dò	Láá Láá	B. Central	1. Northern	A. Bwamu	
rɔ	Chala	B. Central	2. Southern	D. Grusi	i. Eastern
kà-lò	Kasem (dial.) ¹	B. Central	2. Southern	D. Grusi	ii. Northern
kà-lɔ	Kasem (dial.) ²	B. Central	2. Southern	D. Grusi	ii. Northern
è-dù	Lyele	B. Central	2. Southern	D. Grusi	ii. Northern
ù-dù	Northern Nuni	B. Central	2. Southern	D. Grusi	ii. Northern
nə-dò	Southern Nuni	B. Central	2. Southern	D. Grusi	ii. Northern
n-do	Winyé	B. Central	2. Southern	D. Grusi	iii. Western
nú-nu	Nafaanra	E. Senufo			
dūde	Viemo	I.Viemo			

g. CU (1/2): only mà-cś in Nateni (Central: 1. Northern: C.Oti-Volta: iii. Gurma

h. **JI** (1/19) (Table 4.160)

Table 4.160: CI- forms for ‘1’ in Gur

yéh/ wà-ṗī	Buli	B. Central	1. Northern	C. Oti-Volta	i. Buli-Koma
yēn	Mbelime	B. Central	1. Northern	C. Oti-Volta	ii. Eastern
yènn	Bimoba	B. Central	1. Northern	C. Oti-Volta	iii. Gurma
yèn-	Gurma	B. Central	1. Northern	C. Oti-Volta	iii. Gurma
jènn	Moba	B. Central	1. Northern	C. Oti-Volta	iii. Gurma
bō-yén	Birifor (dial.)	B. Central	1. Northern	C. Oti-Volta	iv. Western
bo-yæn	Birifor (dial.)	B. Central	1. Northern	C. Oti-Volta	iv. Western
bō-yen	Dagaara	B. Central	1. Northern	C. Oti-Volta	iv. Western
	(dial.)				
yén-	Dagaara	B. Central	1. Northern	C. Oti-Volta	iv. Western
	(dial.)				
yén	Farefare	B. Central	1. Northern	C. Oti-Volta	iv. Western
yé	Moore	B. Central	1. Northern	C. Oti-Volta	iv. Western
bō-ṛjìn	Wali	B. Central	1. Northern	C. Oti-Volta	iv. Western
yín	Dagbani	B. Central	1. Northern	C. Oti-Volta	iv. Western
	(Dagomba)				
yín-	Hanga	B. Central	1. Northern	C. Oti-Volta	iv. Western
yín	Kamara	B. Central	1. Northern	C. Oti-Volta	iv. Western
yén-	Kantosi	B. Central	1. Northern	C. Oti-Volta	iv. Western
yín	Mampruli	B. Central	1. Northern	C. Oti-Volta	iv. Western
nyěṅ	Yom (Pila)	B. Central	1. Northern	C. Oti-Volta	v. Yom-Nawdm

- i. **JA** (1/1) – only *à-yà?* in Safaliba (B. Central: 1. Northern: C.Oti-Volta: iv. Western)
- j. **JU** (1/1) – only *yòn* in Waama (B. Central: 1. Northern: C.Oti-Volta: ii. Eastern)

k. KI (2/5) (Table 4.161)

Table 4.161: KI- forms for ‘1’ in Gur

ñ-hén	Nawdm	B. Central	1. Northern	C. Oti-Volta	v. Yom-Nawdm
kpee	Deg	B. Central	2. Southern	D. Grusi	iii. Western
kpée	Vagla	B. Central	2. Southern	D. Grusi	iii. Western
nì-kì	Sicité	E. Senufo			
	Senufo				
nìṅ-kìn	Supyire	E. Senufo			
	Senufo				

l. KA (1/2) (Table 4.162)

Table 4.162: KA- forms for ‘1’ in Gur

beṅ-kpaṅ	Deg	B. Central	2. Southern	D. Grusi	iii. Western
kpáṅ	Vagla	B. Central	2. Southern	D. Grusi	iii. Western

m. KU (2/3) (Table 4.163)

Table 4.163: KU- forms for ‘1’ in Gur

kpò	Khe (dial.)	B. Central	2. Southern	A. Dogoso-Khe
tì-kpó?	Dogose	B. Central	2. Southern	C. Gan-Dogose
t^{hi}-kpo	Kaansá	B. Central	2. Southern	C. Gan-Dogose
nú-kú	Toussian	H. Tusia		
	(dial.)			

n. GI (1/5) (Table 4.164)

Table 4.164: GI- forms for ‘1’ in Gur

nìṅ-gbe	Palaka Senufo	E. Senufo
nī-gbe	Nyarafolo Senufo	E. Senufo
nì-gì/nì-gĩ	Mamara Senufo (Minyanka)	E. Senufo
nìn-gin	Shempire Senufo	E. Senufo
nu-gbe	Tagwana Senufo	E. Senufo

- o. GA (1/1) – only *nun-gba* in Djimini Senufo (E. Senufo).
- p. GU (1/1) – only *gbú* in Northern Khe (B. Central: 2. Southern: A. Dogoso-Khe).

The only lacuna in this presentation is due to the lack of forms with voiceless labial consonants (this, however, may not prove true in the case of Wara-Natorio, as we hope to demonstrate below). It should be noted that the general distribution pattern is that a single form is attested in one branch out of ten, three forms are found in both two and three branches, and none of the forms is recorded in four or more branches. This makes an attempt at tracing them down to a source form (with its further comparison to the evidence of the other families) unreasonable. In view of the genetic classification of the Gur languages and the considerations presented above, the optimum solution to the problem probably lies within separate reconstructions of numerals in the following sixteen Gur branches that belong to ten major language groups of this family, assuming that each of them may shed some new light on the reconstruction of the Niger-Congo numeral system:

1. Bariba
2. Central: 1. Northern: A. Bwamu
2. Central: 1. Northern: B. Kurumfe
2. Central: 1. Northern: C. Oti-Volta
2. Central: 2. Southern: A. Dogoso-Khe
2. Central: 2. Southern: C. Gan-Dogose
2. Central: 2. Southern: D. Grusi
2. Central: 2. Southern: E. Kirma-Tyurama
3. Kulango
4. Lobi-Dyan
5. Senufo
6. Teen
7. Tiefo

Contents

8. Tusia
9. Viemo
10. Wara-Natioro.

Numerical terms as attested in each of these branches will be examined below.

4.9.2 Bariba

Table 4.165: Bariba numerals

1	tiā	7	5+2
2	ru	8	5+3
3	i-ta	9	5+4
4	ñ-nɛ	10	wɔ-kuru
5	nɔɔbù	20	yɛndu
6	5+1	100	20*5
		1000	fɔ̀ròtɔ?

4.9.3 Central Gur

4.9.3.1 Northern Central Gur

4.9.3.1.1 Bwamu

Table 4.166: Bwamu numerals

1	do	7	5+2
2	pū	8	5+3
3	tĩ	9	dĩiní/dènú
4	náa	10	pílú/píru/?búruù
5	hò-nú	20	bóní/bénle/kēwēnī
6	5+1	100	k ^h iminù (< Mande keme)
		1000	100*10, muaseé

4.9.3.1.2 Kurumfe

Table 4.167: Kurumfe numerals

1	dom	7	pěě
2	hĩĩ	8	tɔɔ
3	tãã	9	fa
4	nãã	10	fɪ
5	nɔm	20	sofe (<10?)
6	hɔrɔ	100	bɛrɔ
		1000	tɔsrɪ < from Moore

4.9.3.1.3 Oti-Volta

i. Buli-Koma (Table 4.168)

Table 4.168: Buli-Koma numerals

1	yérɛ (adj.), ní (count)	7	yòpɔ̃āĩ, pɔ̃ĩ
2	yè, li	8	nāāniŋ/à-nû (<* 4 redupl., 4PL?)
3	tà	9	nèũk/ŋwé
4	nààsi/nísà	10	pĩ/bân
5	nù	20	10*2
6	yùèbì/óbìŋ	100	kòòk, kobɪga/bórà
		1000	< Engl.

ii. Eastern (Table 4.169)

Table 4.169: Eastern Oti-Volta numerals

1	cārā, bée, dènnì (counting), yēnde/yòn, *de	7	pèléi/bérén, yīēkà/nyiekε, doodē (6+1)
2	dyā, déé, diání/dεeni, yēdē/yéndí	8	nēi/nēi/ni/ninyē
3	tāati/tāadi/tāārī	9	wái/wεi/wē
4	naa(si)	10	pwígā/pííkà/piíkε/piite , *pi
5	num(mu)/nun	20	10*2
6	kūā/kuo, dūo, hādwàm, kpàrùn	100	kòyā/kooke/kóúkpà/kòòtà
		1000	túsirè

Please note the extreme divergency of languages within this branch: the variety of forms presented in the table above are attested in only four languages, i.e. Biali, Ditammari, Mbelime and Waama.

iii. Gurma (Table 4.170)

Table 4.170: Gurma numerals

1	bá, yènn(do), den (isol.: ni, cǝ)	7	lòlé/lèlé (isol.: sééi, yehì)
2	le/dé/té	8	ni(n)
3	tà	9	wèʔ/wéε/wóì/wái
4	nà(hì)	10	píík/pʷíʔ/fi/pita
5	mù/nùm/nu(pū)/ɲùn	20	10*2 (isol.: kòó, mùṛkú < mande?)
6	loòb/luu, kòdì/kouulú	100	kúb (isol.: píle, kòta)
		1000	< kùtùkú'sack', borrowing

iv. Western (Table 4.171)

Table 4.171: Western Oti-Volta numerals

1	yen/yin, dam?, (dàkǒʔ)	7	yopoi (< yo-poi?)
2	yi(?)	8	nii(n)
3	ta	9	way/wey
4	naasi/naar/nāan	10	pia/pie
5	nú	20	10*2
6	yobu	100	kob/kɔɔ
		1000	tur/tudi (borrowed?)

v. Yom-Nawdm (Table 4.172)

Table 4.172: Yom-Nawdm numerals

1	hén, nyǎŋ-/nyǎryə-	7	lèbléʔ (<6?), 5+2
2	li/réʔ/*ryaʔ	8	nì:ndí; 10-2
3	ta/tâʔ	9	wéʔ, 10-1
4	naa/nèèsà	10	?ríʔ, fɛya
5	nu	20	2PL
6	m̀rò:ndí (X+1?), lèèwàr	100	lému, wɔr-

Proto-Oti-Volta The evidence of five Oti-Volta branches (isolated forms excluded) is summarized in Table 4.173.

Table 4.173: Numerals in Proto-Oti-Volta

	i. Buli-Koma	ii. Eastern	iii. Gurma	iv. Western	v. Yom-Nawdm	*Proto-Oti-Volta
1	yén, ní	dènnì, yènde/yòn, *de	yènn(do), den, ni	yen/yin, dam	hén, nyəŋ	den/ yen, ni, de?
2	yè, li	déé(ni), yēdē	le/dé	yi(?)	li/réʔ/*rɣa?	li/yi
3	tà	tāati	tà	ta	ta	ta(t)
4	nààsì	naa(si)	nà(hì)	naasi	naa/nèèsə	naa(si)
5	nù	nun	nùm/nu/ɲùn	nú	nu	nu
6	yùèbì/óbìŋ	dūo	loòb/luu	yobu	lèèw-ər	lob/ yob
7	yòpḡāi, pḡi	doodē (6+1)	lòlé/lèlé	yopoi	lèblé?	*lob-le (6+1)? poi(n)?
8	nāāniŋ/à-nī	nēí/ni/ninyē	ni(n)	nii(n)	nì:ndí	ni
9	nèūk/ɲwé	wái/wei/wē	wèʔ/wéé/wái	way/wey	wéʔ	wey/ weʔ
10	pī	pwígə/píikà/*píik	pʷíʔ/fi	pia/pie	fɛɣa	pi(k)
20	10*2	10*2	10*2	10*2	2PL	10*2
100	kòòk, kobiga	kòγə/kookɛ/kúkpà	kob/kɔɔ	kob/kɔɔ	lé mú, wɔr-	kob, kook

The reconstruction of the Oti-Volta numeral system is surprisingly unproblematic. In addition to the expectedly persistent reflexes of ‘three’ and ‘four’, homogeneous forms for ‘two’, ‘five’, and ‘ten’ are noteworthy. The term for ‘eight’ seems to be based on ‘four’ (either via the partial reduplication or according to the ‘4PL’ pattern). In addition to that, Oti-Volta is characterized by the presence of the primary (homogeneous) forms of ‘six’, ‘eight’, and ‘nine’. The forms of ‘seven’ are probably derived and follow the pattern ‘6+1’. It appears that the derivative form *lob-le > lole is already reconstructable at the Proto-Oti-Volta level.

Table 4.174: Dogoso-Khe numerals

1	kpò, lé	7	5+2
2	jɔ(n)	8	5+3
3	thɔ	9	5+4
4	dáa	10	kpélé
5	nɔ(n)	20	cúkúri/gòʊsì
6	5+1	100	20*5
		1000	kpé

4.9.3.2 Southern Central Gur

4.9.3.2.1 Dogoso-Khe

The forms pertaining to these languages that are not present in the main databases are quoted according to Kerstin Winkellmann in (Miehe; Reineke; [Winkellmann 2007d](#): 181–210). Although the numerals attested within the two languages of this group are quite persistent, Kerstin Winkellmann stresses their grammatical difference: “... while Dɔgɔ-sʊ uses noun suffixes, sʊ-Khe is a prefixing language” (Winkellmann 2007d: 209).

4.9.3.2.2 Gan-Dogose

Table 4.175: Gan-Dogose numerals

1	kpo/po, (lèn)	7	5+2
2	yɔ̃/pɔ̃/ḑɔ̃ʒ̃	8	5+3
3	sáa/tʰɔ̃ʔ	9	5+4, 10–1
4	nee/i-yìi, (á-dàa)	10	(kpoogo, gbùnè, kpélé, sí-nɔ̃y - 5PL)
5	mwã/wãa, nɔ̃n	20	gbeere, (tfúkúri)
6	5+1	100	20*5
		1000	kpíe ‘a goat’

Three of the languages belonging to this branch show too many forms, suggesting that we are dealing with a heterogeneous branch. In view of its numerical terms, it is not immediately apparent why this branch has been singled out.

4.9.3.2.3 Grusi

i. *Eastern Grusi (Table 4.176)

Table 4.176: Eastern Grusi numerals (*)

1	dám/lòm/yóm, re/ódé	7	lɔbɛ, 6+1, 4+3, 10-3
2	la/lè	8	4 redupl., 4PL, 10-2, toozo, (kɔ̀pèèrè)
3	tòòsó/tooro	9	10-1, isolated forms
4	násá/naara	10	fu, (nóá - 5PL, sàlá)
5	nó/nón, kpási/gbáanzi	20	ko/kuo/koowu, (sao, neélè, 10*2)
6	loḍò/looro/lèèjò, (3PL)	100	20*5, < Ewe, ('guinea fowl')
		1000	kòtòkó, kpon

ii. *Northern Grusi (Table 4.177)

Table 4.177: Northern Grusi numerals (*)

1	du/lu, (téngí)	7	pè, (4+3, 5+2)
2	le/lè/(nii)	8	nānā (4 redupl.), (lyele, bàndá)
3	tò/twà/cóò	9	nògɔ, nibu, (10-X)
4	na/nīān/nàas	10	fúgá, (fo)
5	nu	20	10*2, (sāpōā, 10+10, swéní)
6	dò, (5+pi)	100	bì, (zóm)
		1000	mòrò

iii. *Western Grusi (Table 4.178)

Table 4.178: Western Grusi numerals (*)

1	kpán/kpee, bala, do/deo/díín/digi	7	lɔp,péé/pie , 5+2
2	le/nɛ/lìɛ	8	córi/kyóri, 5+3, (pɔɔ)
3	toro	9	némé/nibí, 10-1, 5+4
4	naa/naasi/naare	10	fi
5	nue/nwǎ́/nòŋ	20	méré, mɔgɔ (< Mande?), (máágí, toko, ma-cu?)
6	lòrò/*lug/dò, 5+1, (go)	100	kòwá/kóó, zóló, lafa
		1000	gboŋ/bóí

The most probable *Proto-Grusi reconstructions based on the roots attested in at least two Grusi branches are summarized in the table below (Table 4.179).

Table 4.179: Proto-Grusi numeral system (*)

1	do/du/lu, de/re	7	pɛ/lʊ-pɛ/lʊ-bɛ, 5+2
2	lɛ/lɛ/ne/ni	8	4 redupl.
3	toro/tosoto	9	10-1, nibi/nibu (ni-bi/bu?)
4	naare/naasi/na	10	fu/fi
5	nu/nʊ	20	10*2?
6	dʊ/lo-ɖo/lo-ro, 5+1	100	20*5? bi? kɔwa/kɔɔ?
		1000	kpoŋ/gboŋ

4.9.3.2.4 Kirma-Tyurama

Table 4.180: Kirma-Tyurama numerals

1	déiŋ/děēná	7	5+2
2	hǎi/hāl	8	5+3
3	síei/siel	9	5+4, 10-1
4	na(a)	10	nǔśśǎ/cǐŋciélùó
5	di	20	kómòrré/guř
6	5+1	100	gundi, 20*5
		1000	200*5, 800+200

4.9.4 Kulango

The source form of the term for ‘one’ with a nasalized vowel is reconstructed on the basis of the evidence presented by Stefan Elders (2007: 323). As we have seen, the Gur term for ‘five’ is reconstructed as **nu* on the basis of the evidence provided by the groups discussed above. It should be noted that this form goes back to the lexical root meaning ‘hand’ (Kulango *nu-gò*). The term for ‘ten’ in Kulango is a reduplicated **nu*, whereas a different root is attested for ‘five’. It is also noteworthy that the terms for ‘two’, ‘three’, ‘hundred’ and ‘thousand’ are borrowed from Mande.

Table 4.181: Kulango numeral system

1	ta(a) < *taà	7	5+2
2	bila(< Mande), nyɔ̀ɔ̀	8	5+3
3	sããbe (< Mande)	9	5+4
4	na	10	nuunu (< *5redupl.), *ji/yi
5	tɔ	20	yipi-/dzipi-
6	5+1	100	kɛmɛ (< Mande)
		1000	wulo (< Mande)

4.9.5 Lobi-Dyan

According to Anthony Naden’s classification (Naden 1989), these languages belong to different groups of the Gur languages, so their evidence will be presented separately.

“More recent classifications (Labouret and Manessy) regarded Lobi (Lobiri) and Jaane as closely related” (Miehe & Tham 2007: 212) (Table 4.182).

Table 4.182: Lobi-Dyan numerals

	Lobi	Dyan	*Lobi-Dyan
1	bièl, *do	bɛg/ɓɛ̀(ŋ)kù/biɛle, *dù	bièl, *dò
2	nyò/nò	nyɔ̀	nyò(n)
3	tʰɛr	thɛ̀s(i)	thɛ̀s(i)/tʰɛr
4	ná	nàà	ná
5	mòl/*mà	dièmà, *mòlò	mòl/*mà/*mòlò, dièmà,
6	5+1	5+1	5+1
7	5+2	5+2	5+2
8	5+3	5+3	5+3
9	10–1	10–1	10–1
10	nyòór	ni-kpo	ni-kpo, nyòór
20	kpèle	ceeru	kpèle, ceeru
100	tàmâ	tàmúgú	tàmâ
1000	gbòlanɪ	100*10	gbòlanɪ, 100*10

4.9.6 Senufo

Table 4.183: Senufo numerals

1	nòn-, ɲgbe/nuŋgba, nikì/ningin	ni-	7	5+2, 6+1
2	sin/soin/sun/syen		8	5+3, 6+2
3	tãã/taàr		9	5+4, 10-1, 6+3
4	tésyàr/sīcērē/tityere		10	ke
5	bwa/bwɔ, guru/kuru (<'fist'), guno, (nɔ)		20	gbèɲ/gbēy, fulo, toko/togo, nafa, isolated forms
6	kwàh/kwāy, gbaara, gɔlɔŋ , 5+1, (nōli)		100	20*5, lafa (< Kwa)
			1000	200*5, (gben-, bɔlɔ, pwoo, sakere)

Many of the forms are quoted in brackets, i.e. they are isolated forms attested within the Senufo group comprising about fifteen idioms. As in a number of other Gur branches, the last syllable/segment of a numerical term often represents a coordinating noun class suffix. Below is an excerpt from the table showing the inflection of numerals by class in Tenyer (Syer variety), as published by Klaudia Dombrowsky-Hahn in (Miehe; Reineke; [Winkelmann 2007a:420](#)) (Table 4.184).

Table 4.184: Tenyer numerals (a fragment)

Class SG	u	li	ke	te dim.
'one'	nun	nuni	nuɲ	nunge
Class PL	pi	ki	yi	te dim.
'two'	syob ~ syou	syã	syii	syimbi
'three'	trab	tar	tar	tarbi
'four'	tikyireb	tihyer	tihyer	tihyerbi

This presentation illustrates how problematic defining the numerical roots can be.

Contents

4.9.7 Teen

Table 4.185: Teen numerals

1	tani	7	5+2
2	nyor	8	5+3
3	sanr	9	10-1
4	nan	10	pərwə
5	tə	20	toko
6	5+1	100	20*5
		1000	danyε

4.9.8 Tiefo

Table 4.186: Tiefo numerals

1	dě	7	5+2
2	jǝ	8	5+3
3	sá	9	5+4
4	ʔuʔǝ/ɲɔɔ	10	támú, kě
5	kǎ	20	kpǎ
6	5+1	100	20*5
		1000	waga (< Mande)

4.9.9 Tusia

Table 4.187: Tusia numerals

1	nónkì, *nǝɲ	7	5+2
2	nínó, *nǝɲ	8	5+3
3	tónó	9	5+4
4	nyáh/jǎ	10	gbām/*gbǝ/bwə
5	k(w)lǝ	20	túkúrí, *tiki
6	5+1	100	20*5, kwě
		1000	< píy ‘goat’, náʔ ‘cow’

4.9.10 Viemo

Table 4.188: Viemo numerals

1	dūde, *dun-	7	5+2?
2	niinĩ	8	4*2, 5+3
3	sāsi	9	10-1
4	jumĩ	10	kwomũ
5	kuεge, *kɔ	20	ferεɔ
6	5+1	100	tāmō
		1000	vie-?

4.9.11 Wara-Natorio

It should be noted that the most important evidence pertaining to this group is relatively recent. In his publication of the comparative lexical list Tasséré Sawadogo noted that Faniagara is radically different from both Wara and Natorio ([Sawadogo 2002](#)). Its similarity index with the Natorio and Wara dialects is 12 and 30 percent respectively (the SIL list? idem., p. 15). Thus he had every reason to postulate the existence of an isolated language (Palen) in the Wara-Natorio group.

Since the data collected by Tasséré Sawadogo is absent from the major databases that are now incorporated into the RefLex database by Guillaume Segerer, it seems reasonable to present it below for each Wara-Natorio-Paleni idiom in order to suggest the reconstruction of numerical terms within each of the three sub-groups and within the group as a whole (Table [4.189](#)).

According to other sources, the forms *wá/ nwō, sɔ* are attested in Wara-Natorio for ‘twenty’. The patterns ‘20*5’ and ‘400*2+200’ are attested for ‘hundred’ and ‘thousand’ respectively.

²³Regarding the Natorio forms for ‘one’ André Prost remarks: ‘*puwolo* (après un substantif: *kaaba*)’ ([Prost 1968](#): 78). Thus, the opposition between the Wara and Natorio forms of ‘one’ reflected in the table may be purely functional (for Wara Prost quotes the *puwo* and *kapo* forms).

Table 4.189: Wara-Natorio-Paleni numerals

		‘1’	‘2’	‘3’	‘4’	‘5’
Natorio	Dinaoro	ká:bà	jíndí	táe	ɲnàe	sùsù
Natorio	Timba	ká:bà	jíndí	tá	ná	sùsù
Natorio	Kawara	kābà	jìdí	tá	ná	sùsù
*Natorio		ká:bà	jíndí	tá(é)	ná (é)	sùsù
		(ka-ba?) ²³				
Wara?	Sourani	pó	bǒ	tá	nàsá	sùsù
Wara	Negeni	kàpó	bǒ	tí:	ná:sú	sùsù
Wara	Niansogoni	pó:wò	bǒ	tí:	ná:só	sùsù
*Wara		pó	bǒ, *nǐntó	tá(i)	naaso	sùsù,
Palen	Faniagara	káfā	bá	tá:ré	ná:ré	sùsù
*Palen	Faniagara	ká-fā	bá, *nǐnté	tá:ré	ná:ré	sùsù,
						*si/sɔ
*Wara-		ba/fa,	nǐnté, bǒ	ta(r)i	na(r)i	sùsù,
Natorio-		pɔ				sV
Paleni						
		‘6’	‘7’	‘8’	‘9’	‘10’
Natorio	Dinaoro	ɲzàbǒ	té:ndé	nǎngànángàni	kāwó	pwò:
Natorio	Timba	ɲzà:bǒ	dé:ndí	nángánángàni	kāwòmú	pwó:
Natorio	Kawara	nsàbǒ	téndí	nàngānàngádí	kāwūmò	pó
*Natorio		nsàbǒ	téndí	4+4	kawo	p(w)ó
		(sa-1?)				
Wara?	Sourani	sùrpó	sūrùdó	sìntá	sìn:á	kàn:sú
Wara	Negeni	sírípò	sínǐntó	sìntí	sìn:á:sú	kà:sá
Wara	Niansogoni	sírípò	sùrùntó	sì:ntí:	sìn:á:sú	kà:sá
*Wara		si-1	si-2	si-3	si-4	kà:sá
Palen	Faniagara	sínífā	sínǐnté	sǔtá:ré	sōn:á:ré	fó
*Palen	Faniagara	si-1	si-2	sǔ-3	sǔ-4	fó
*Wara-		5+1	5+2, téndí?	5+3, 4+4	5+4, kawo?	p(w)ɔ/
Natorio-						fɔ,
Paleni						kà:sá?

4.9.12 Proto-Gur

4.9.12.1 ‘One’

The main forms of ‘one’ reconstructable in sixteen branches of Gur are as follows (Table 4.190).

Table 4.190: Stems for ‘1’ in Gur

A. Bariba				tiā
B. Central:	do			
1. Northern				
A. Bwamu				
B. Kurumfe	dom			
C. *Proto-Oti-Volta		den/yen, de?		ni
Southern		le	kpò	
A. Dogoso-Khe				
C. Gan-Dogose		lèŋ	kpo/po	
D. *Proto-Grusi	do/du/lu	de/re		
E. Kirma-Tyurama		déiŋ/děēná		
C. Kulango				ta(a) < *taà
D. Lobi-Dyan	*dò			
E. Senufo			ni- ŋgbe/nu- ŋgba	nìkĩ/ningin
F. Teen				
G. Tiefo		dě		
H. Tusia			tani	nónkì
I. Viemo	dūde, *dun-			
J. Wara-Natoro-Paleni			pɔ	

An attempt to reconstruct a Proto-Gur form is probably not reasonable at this point, since all the forms quoted above are important for comparative purposes.

Contents

4.9.12.2 ‘Two’

Table 4.191: Stems for ‘2’ in Gur

	‘2’	‘2’	‘2’	‘2’	‘2’
A. Bariba	ru				
B. Central:					
1. Northern					
A. Bwamu	ɲũ				
B. Kurumfe				hĩĩ	
C. *Proto-Oti-Volta		li/yi			
Southern					
A. Dogoso-Khe	jɔ(n)				
C. Gan-Dogose	yɔ̃/ɲɔ̃/dʒɔ̃ŋ				
D. *Proto-Grusi		le/le	ne/ni		
E. Kirma-Tyurama				hãĩ/hãl	
C. Kulango	nyʊò				bila (< Mande)
D. Lobi-Dyan	nyò(n)				
E. Senufo					sin/soin/sun/syen
F. Teen	nyor				
G. Tiefo	jɔ̃				
H. Tusia			nínó, *nĩŋ		
I. Viemo			niinĩ		
J. Wara-Natioro-Paleni			nínté		bõ

Apparent isolates and obvious borrowings are presented in the rightmost column.

4.9.12.3 ‘Three’ and ‘Four’

Table 4.192: Stems for ‘3’ and ‘4’ in Gur

	3	3	4	4
A. Bariba	i-ta		ñ-ne	
B. Central:				
1. Northern				
A. Bwamu	tĩ		náa	
B. Kurumfe	tãã		nãã	
C. *Proto-Oti-Volta	ta(t)		naa(si)	
Southern				
A. Dogoso-Khe	tho		dáa	
C. Gan-Dogose	sáa/tʰɔʔ		ɲee/i-yìi, (á-dàa)	
D. *Proto-Grusi	toro/tosó/tɔ		naare/naasi/na	
E. Kirma-Tyurama	síei/siɛl		na(a)	
C. Kulango		sããbe (< Mande)	na	
D. Lobi-Dyan	thès(i)/tʰɛr		ná	
E. Senufo	tãã/taàr			tésyàr/sicērē/tityere
F. Teen	sanr		nan	
G. Tiefo	sá			ʔuʔɔ́/ɲɔɔ
H. Tusia	tɔ́nó		nyáh/jã	
I. Viemo	sãĩ			jumĩ
J. Wara-Natioro-Paleni	ta(r)i		na(r)i	

The reflexes of the most persistent NC roots are observable in the majority of the branches.

4.9.12.4 ‘Five’

Table 4.193: Stems for ‘5’ in Gur

	‘5’	‘5’	‘5’	‘5’	‘5’
A. Bariba	nòòbù				
B. Central:					
1. Northern					
A. Bwamu	hò-nú				
B. Kurumfe	nɔm				
C. *Proto-Oti-Volta	nu				
Southern					
A. Dogoso-Khe	nɔ(n)				
C. Gan-Dogose	nɔ̃n	mwã/wàa			
D. *Proto-Grusi	nu/nɔ				
E. Kirma-Tyurama				di	
C. Kulango			tɔ		
D. Lobi-Dyan		mòl/*mà/*mòlò		dìemà	
E. Senufo	guno, (nɔ)	bwa/bwɔ			
F. Teen			tɔ		
G. Tiefo					kǎ
H. Tusia					k(w)lɔ
I. Viemo					kuege, *kɔ
J. Wara-Natioro-Paleni			sùsú, sV		

The etymological relationship of **nu* ‘5’ and ‘hand’, is attested in Central Gur and possibly in Bariba and Senufo. Isolated bases may go back to this meaning as well. At the same time, the base preserved in Kulango, Teen and possibly Wara-Natioro-Paleni is comparable to **tan* found in BC and some other families.

4.9.12.5 ‘Six’ and ‘Seven’

Table 4.194: Stems and patterns for ‘6’ and ‘7’ in Gur

	‘6’	‘6’	‘7’	‘7’	‘7’
A. Bariba	5+1		5+2		
B. Central:					
1. Northern					
A. Bwamu	5+1		5+2		
B. Kurumfe		hɔrɔ		pěě	
C. *Proto-Oti-Volta		lob/yob		poi(n)?	*lob-le (6+1)?
Southern					
A. Dogoso-Khe	5+1		5+2		
C. Gan-Dogose	5+1		5+2		
D. *Proto-Grusi	5+1	dɔ/lo- dɔ/lo-ro	5+2	pɛ/lɔ- pɛ/lɔ-bɛ	
E. Kirma-Tyurama	5+1		5+2		
C. Kulango	5+1		5+2		
D. Lobi-Dyan	5+1		5+2		
E. Senufo	5+1,	kwaj̃/kwāỹ gbaara, nōli	5+2		6+1
F. Teen	5+1		5+2		
G. Tiefo	5+1		5+2		
H. Tusia	5+1		5+2		
I. Viemo	5+1		5+2?		
J. Wara-Natioro-Paleni	5+1		5+2		téndí?

The patterns *‘6=5+1’ and *‘7=5+2’ can be safely reconstructed at the Proto-Gur level. The exceptionally wide range of forms for ‘six’ attested in Senufo is noteworthy.

4.9.12.6 ‘Eight’ and ‘Nine’

Table 4.195: Stems and patterns for ‘8’ and ‘9’ in Gur

	‘8’	‘8’	‘8’	‘9’	‘9’	‘9’
A. Bariba	5+3			5+4		
B. Central:						
1. Northern						
A. Bwamu	5+3					d̥iini/d̥enu
B. Kurumfe			tɔɔ			fa
C. *Proto-Oti-Volta			ni			wey/weʔ
Southern						
A. Dogoso-Khe	5+3			5+4		
C. Gan-Dogose	5+3			5+4	10-1	
D. *Proto-Grusi		4 redupl.			10-1	nibi/nibu (ni-bi/bu?)
E. Kirma-Tyurama	5+3			5+4	10-1	
C. Kulango	5+3			5+4		
D. Lobi-Dyan	5+3				10-1	
E. Senufo	5+3		6+2	5+4	10-1	6+3
F. Teen	5+3				10-1	
G. Tiefo	5+3			5+4		
H. Tusia	5+3			5+4		
I. Viemo	5+3	4*2			10-1	
J. Wara-Natorio-Paleni	5+3	4+4		5+4		kawo?

In addition to the common patterns ‘8=5+3’ and ‘9=5+4’, alternative ones are attested for ‘eight’ and ‘nine’ (‘8=4 redupl.’ and ‘9=10-1’ respectively).

4.9.12.7 ‘Ten’

Table 4.196: Stems for ‘10’ in Gur

A. Bariba	wɔ-kuru			
B. Central:				
1. Northern				
A. Bwamu	pílú/píru/°búruù			
B. Kurumfe	fɪ			
C. *Proto-Oti-Volta	pi(k)			
Southern				
A. Dogoso-Khe	kpélé			
C. Gan-Dogose		kpoogo	nɔ̃y - 5PL	gbùnè, kpélé, sí-
D. *Proto-Grusi	fu/fi			
E. Kirma-Tyurama			núśsǝ	cíŋciélùó
C. Kulango				nuunu (< *5 redupl.), *ji/yi
D. Lobi-Dyan		ni-kpo	nyòór	
E. Senufo				kɛ
F. Teen	pɔrwɔ			
G. Tiefo			kɛ̃	támú
H. Tusia				gbām/*gbɔ̃/bwɔ̃
I. Viemo		kwɔmũ		
J. Wara-Natorio-Paleni	p(w)ɔ̃/fɔ̃			
				kà:sá?

This term exhibits a variety of isolated (and possibly non-primary) forms. The main form has a voiceless labial as its initial consonant.

4.9.12.8 ‘Twenty’

Table 4.197: Stems and patterns for ‘20’ in Gur

	‘20’	‘20’	‘20’	‘20’	‘20’
A. Bariba					yendu
B. Central:					
1. Northern					
A. Bwamu			ḡóní/ḡénle/kēwēnî		
B. Kurumfe	sofe (<10?)				
C. *Proto-Oti-Volta	10*2				
Southern					
A. Dogoso-Khe		gòṛsì	cúkúrí		
C. Gan-Dogose		gbeere	tʃúkúrí		
D. *Proto-Grusi	10*2?				
E. Kirma-Tyurama		guř			kómòrré
C. Kulango					yipì- /dʒipi-
D. Lobi-Dyan		kpèle	ceeru		
E. Senufo		gbèṇ/gbēy,		toko/togo fulo, nafa	
F. Teen				toko	
G. Tiefo					kpā
H. Tusia			túkúrí		*tiki
I. Viemo					fereyo
J. Wara-Natioro-Paleni					wá/nwō, sɔ

In view of the great variety of forms and patterns attested for this term, the existence of the term for ‘twenty’ in Proto-Gur is uncertain.

4.9.12.9 ‘Hundred’

Table 4.198: Stems and patterns for ‘100’ in Gur

A. Bariba	20*5			
B. Central:				
1. Northern				
A. Bwamu				k ^h iminù (< Mande keme)
B. Kurumfe			berɔ	
C. *Proto-Oti-Volta		kob, kook		
Southern				
A. Dogoso-Khe	20*5			
C. Gan-Dogose	20*5			
D. *Proto-Grusi	20*5?	kɔwa/kɔɔ?	bi?	
E. Kirma-Tyurama	20*5		gundi	
C. Kulango				kemè (< Mande)
D. Lobi-Dyan		tâmâ		
E. Senufo	20*5			lafa (< Kwa)
F. Teen	20*5			
G. Tiefo	20*5			
H. Tusia	20*5	kwě		
I. Viemo		tãmõ		
J. Wara-Natioro-Paleni	20*5			

4.9.12.10 ‘Thousand’

Table 4.199: Stems and patterns for ‘1000’ in Gur

A. Bariba			fɔ̀ròtɔ?	
B. Central:				
1. Northern				
A. Bwamu		100*10	muaseé	
B. Kurumfe				tɔ̀srɪ (< Moore)
C. *Proto-Oti-Volta				
Southern				
A. Dogoso-Khe	kpé			
C. Gan-Dogose	kpíɛ			
	‘a goat’			
D. *Proto-Grusi			kpoŋ/gboŋ	
E. Kirma-Tyurama		200*5, 800+200		
C. Kulango				wulo (< Mande)
D. Lobi-Dyan		100*10	gbòlanɪ	
E. Senufo		200*5	gben-, bòlɔ, pwoo, sakere danyɛ	
F. Teen				
G. Tiefo				waga (< Mande)
H. Tusia	< píy ‘goat’, náʔ ‘cow’ vie-?			
I. Viemo				
J. Wara-Natoro-Paleni		400*2+20		

No evidence supports the reconstruction of the term for ‘thousand’ in this family.

4.10 Mande

The intermediate step-by-step reconstructions available for the Mande languages in Vydrin's Mande Etymological Dictionary and in Vydrin 2007²⁴ has made treatment of the data easier.

The genetic classification of Mande, outlined in the latter work, will serve as the basis for our analysis. This classification differs from the one suggested by Kastenholz and is accessible via *Ethnologue* (SimonsFenning2018). According to V. Vydrin,

Its major innovations, in comparison with that of Kastenholz, are the following:

- the Susu–Jalonke group is put together with the Southwestern group, rather than with Kastenholz's "Central Mande" (in fact, it is a return to the proposal of André Prost 1958);
- Soninke–Bozo, Samogho and Bobo are no longer considered as branches of the same genetic unit (Kastenholz's "Northwestern Mande"), but rather as independent groups inside Western Mande;
- the Mokole group is put together with Vai–Kono, rather than with Manding;
- in the Southern Mande group, Mwan is separated from Wan and put together with the Guro–Yaure subgroup;
- San (Samo) is put together with Bisa, rather than with Busa-Boko' (Vydrin 2016: 110).

Let us note an important fact: the numeral system of Jowulu differs considerably in certain points both from other Samogho languages and from Mande languages in general. It is interesting to outline that in R. Kastenholz's classification (based on the method of shared innovations, rather than on lexicostatistics) Jowulu is given a special status, more precisely, the first split in his Northwestern Mande branch (Bozo-Soninke + Bobo + Samogo + Jowulu).

Our further analysis will be based on the evidence from twelve branches of Mande represented in Figure 4.1.

²⁴I would like to thank V. Vydrin for his suggestions and comments on the preliminary draft of this chapter.

1. Manding		7. Bozo-Soninke	
2. Jogo-Jeri		8. Bobo	
3. Mokole	5. Susu	9. Samogo	11. Eastern
4. Vai-Kono	6. SWM	10. Jowulu	12. Southern

Figure 4.1: Mande languages

4.10.1 ‘One’

Table 4.200: Mande stems for ‘1’

Manding	*dɔ	*kɛ́len			
Jogo-Jeri	*do	*kɛ́le (?)			dié(n)/dúli
Mokole	*dɔ́ndɔ	*kɛ́le			
Vai-Kono	*dɔ́ndɔ	*N-kɛ́len			
Susu		*kédén	nde/ndá		
SWM		*giláaŋ	*tà		
Bozo-Soninke		kuɔn/kɛnɛ/ke/ko	sana	bane, fie	
Bobo			tàlá/tèlé		
Dzuun (Samogo)		*ké		*so/sɔʔi/swě	
Jowulu			těēna/tenŋ		
SE-Eastern	*do	gòrɔ́/gòon?			
SE-Southern	*dɔ				

Vydrin’s preliminary reconstructions, as well as isolated forms resulting from the analysis of the numerical terms, are marked with an asterisk [*].

The isoglosses for ‘one’ suggest the existence of two alternative roots (*dɔ́ and *kɛ́len) attested in both major Mande groups. The latter root is distinguishable under the assumption that the forms with a voiced velar attested in the Eastern branch of the South-Eastern group (Matya Samo *gòrɔ́*, Southern Samo (Maka) *gòon*) are related to the *k*-forms found in Western Mande.

The next two roots, if related, may be suggestive with regard to the classification of Western Mande (otherwise, they probably represent similar unrelated forms). It should be noted that the root *ndá* (Susu *nde* ‘one, certain’, *ndende* ‘anybody, whoever; nobody’, Jalonke *ndá* ‘certain’) attested, according to Vydrin, in

Susu-Jalonke may be related to **dɔ*. The determiner **dɔ*, which can be reconstructed at the Proto-Mande level, goes back to the root **do*.

The rightmost column of the table embraces the isolated forms.

4.10.2 ‘Two’

Table 4.201: Mande stems for ‘2’

Manding	<i>*fílá</i>
Jogo-Jeri	<i>*fálá</i>
Mokole	<i>*fíla</i>
Vai-Kono	<i>*fèLá</i>
Susu	<i>*fidín</i>
SWM	<i>*fèelé</i>
Bozo-Soninke	<i>pè:ndé, fillò</i>
Bobo	<i>pálà</i>
Dzuun (Samogo)	<i>fí:(kí)</i>
Jowulu	<i>fúúli</i>
SE-Eastern	<i>*pela</i>
SE-Southern	<i>*pù-lāŋ</i>

A common root for ‘two’ that may be tentatively recorded as **pila / fila* is attested in all Mande branches. Its precise phonetic reconstruction is beyond the scope of our investigation. The reader can refer to the works of specialists in the historical phonetics of Mande. A reference designation that will enable us to compare this root to the evidence of the other NC families is sufficient for our reconstruction purposes.

4.10.3 ‘Three’

The common root **sakpa/ sagba/ sawa* is represented in all Western branches. The relationship between some of the forms attested in the Eastern group (Southern Samo (Maka) *sɔ̃*, Matya Samo *tjɔwɔ*) remains uncertain. The Jowulu form is especially peculiar. It should be noted that the forms of some numerical terms differ significantly depending on the source. Our study is based on four Jowulu sources that provide the following evidence²⁵ (Table 4.203).

²⁵Hochstetler <https://mpi-lingweb.shh.mpg.de/numeral/Jowulu.htm>, Djilla et al. (2004); Robert J Carlson (1993); Prost (1958).

Table 4.202: Mande stems for ‘3’

Manding	sàbá	
Jogo-Jeri	sègbá/sigbù	
Mokole	sàwa/saba	
Vai-Kono	sàkpá/sagba/sáwa	
Susu	sàxán/sàqán/sawa	
SWM	sàwá/sāafā	
Bozo-Soninke	síkkò, sike	
Bobo	sàà (?)	
Dzuun (Samogo)	ʒiʔi/ʒi:gi /fwe/yei	
Jowulu	bʒei < *jɔŋŋ/i?	
SE-Eastern	sɔɔ/cɔw?	ʔààkɔ
SE-Southern		*yààká

Table 4.203: Jowulu numerals

Source	‘1’	‘2’	‘3’	‘4’	‘5’
Hochstetler (1996)	tēēna	fuuli	bʒei, *dʒɔ	pʃɪɾɛ¹	tāā
Djilla et al. (2004)	tenɲ	fúúli	byàŋ, *jɔn	pyiiraŋ	táánɲ
Robert J Carlson (1993)	tèèni	fu'u'li	byāī, *jɔ̃ɔ̃	pi'i'rēi	tā'ā'
Prost (1958)	tēna	fole	dyue, *dyô	piœe	tā
Source	‘6’	‘7’	‘8’	‘9’	‘10’
Hochstetler (1996)	tāmānɪ	dʒɔm-pɔn	ful-pɔn	tēm-pɔn	bʒiī
Djilla et al. (2004)	tāán-mání	jɔn-pɔnni	fuuli-pɔnni	ten-pɔnni	byinɲ
Robert J Carlson (1993)	tā'ā'-mānī	jɔ̃ɔ̃-po'nì	fu'l-po'nì	tèè-po'nì	byì
Prost (1958)	ton-te	dyômpônô	filepônô	têpônô	bî

The terms for ‘seven’, ‘eight’ and ‘nine’ follow the pattern ‘3,2,1+‘to lose’’ respectively (cf. their inaccurate interpretation in Hochstetler, see §4.10.9), hence the reconstruction of the term for ‘three’ with the initial palatal (*jɔn). The forms quoted in Jowulu for ‘three’, ‘four’, and ‘ten’ are uncommon. If we were dealing with a language with a noun class system, we would have to conclude that a noun class marker (CL19?) with two allomorphs (p- and b- before voiced and voiceless respectively) is traceable in the pertinent forms. However, we are dealing with a language that undoubtedly belongs to Mande, so no class-related morphemes

can be involved. This leaves the presence of the initial labial in the term for ‘three’ unexplained. A borrowing from Gur or Kru cannot be assumed since these languages lack the comparable forms. The only plausible solution is the alignment of ‘three’ and ‘four’ by analogy with ‘ten’ where it must have been originally present.

A special term for ‘three’ appears in South-Eastern. In Eastern it can be reconstructed as **ʔààk̃* or possibly ***ʔàà-(k̃)*, cf. Bisa *kakó*, Boko *ʔàà̃* (in Koelle 1963[1854] *ááyó*), Bokobaru (Zogbẽ) *ʔààgõ*, Busa *ʔààk̃*, Maya Samo *kàakú*, Kyanga *ʔàà*, and Shanga *ʔà*. The latter reconstruction is supported by the fact that the terms for ‘three’ and ‘four’ share the ultima, cf. the data are presented in Table 4.204.

Table 4.204: Final morphemes in the Boko-Busa numerals

	Boko	Boko (Koelle 1963[1854])	Bokobaru	Busa
‘3’	ʔàà-ṣ	áá-yó	ʔàà-gõ	ʔàà-k̃
‘4’	síí-ṣ	síí-yó	síí-gõ	ʃíí-k̃

It should be noted that in these languages, the syllable in question is also present in the terms for ‘eight’ that are built according to the pattern ‘5+3’ (cf. e.g. Bobo Karu *sór-ààgõ*). Here we may be dealing with alignment by analogy, possibly with an additional final morpheme of uncertain meaning. It should be stressed that the ultima in ‘three’ and ‘four’ is never the same in the Eastern subgroup of the South-Eastern languages, whereas the medial velar is only attested in ‘three’ but not in ‘four’. Assuming that the forms of the two Eastern branches are related, the term for ‘three’ can be reconstructed as **ʔààk̃/yààká*, whereas the term for ‘four’ may be interpreted as resulting from the alignment by analogy with the forms of ‘three’ attested in the Eastern branch of South-Eastern Mande. The evidence in favor of its etymological connection with **sákpa* is inconclusive.

4.10.4 ‘Four’

An easily recognizable NC form (**náání/ nãĩ*) can be reconstructed in Western Mande, whereas in South-Eastern Mande it is replaced with an innovation (**sĩĩyá*). This innovation may also be attested in Jowulu.

Table 4.205: Mande stems for ‘4’

Manding	*náani	
Jogo-Jeri	náani	
Mokole	náani	
Vai-Kono	náani	
Susu	náani	
SWM	*náani	
Bozo-Soninke	na:na/nàtá/nà:rà/naxat-	
Bobo	náà/niã	
Dzuun (Samogo)	nãĩ/naai/nà:lě	
Jowulu		pʃɪɾɛ¹ <ʃɪɾɛ¹?
SE-Eastern		sì/sííkɔ̃
SE-Southern		*yìi-siyyá: zĩě/yĩi-siě

4.10.5 ‘Five’

Table 4.206: Mande stems for ‘5’

Manding	dúuru/loolu	*wo (cf. ‘7’)	
Jogo-Jeri	sóólò/sóolo		
Mokole	lɔɔlu	*wo (cf. ‘7’)	
Vai-Kono	dúʔu/sóó(ʔ)ú		
Susu	suuli/sùlù	*fò (cf. ‘7’)	
SWM	dóólú/lóólú	*wɔ/ngò	
Bozo-Soninke		kólóhò/karágò	
Bobo		kõ/kóò	
Dzuun (Samogo)			nũ
Jowulu		tãã	
SE-Eastern	*sodu: sósóro/sósò		
SE-Southern	sósódú/sólú		

There is a correspondence between **d-/l-/s-** within Western Mande, hence the Eastern forms with the initial **s-** should not necessarily be treated separately. A discussion of the exact phonetic reconstruction is better left to specialists in the field. For our purposes, it is sufficient to record that the Proto-Mande root for

‘five’ is reconstructed as *dúuru/ sóru*.

However, the root(s) **wo*, **ko* are traceable in the compound numerical terms attested in Western Mande. They may be etymologically related to the lexical root meaning ‘hand’ (Vydrin, p.c.; cf. Proto-South-Mande **kɔ* ‘hand’). The latter may be a NC root, cf. e.g. the term for ‘hand’ in Proto-Gbaya (*kɔ̃*), Dida (Kru) (*kɔ*) and in other languages.

The Jowulu and Samogo forms are peculiar. As we hope to demonstrate in the next chapter, two alternative roots for ‘five’ can be reconstructed for NC, namely **tan/ ton* and **nu(n)*. Both roots are directly attested in these marginal groups. Is this enough to reconstruct the terms for ‘five’ traceable in NC for the Mande languages? We will return to this question in the last chapter of the book.

4.10.6 ‘Six’

Table 4.207: Mande stems and patterns for ‘6’

Manding	wɔ́ɔ (5+1)	
Jogo-Jeri	mɔ̀ɔ̀dɔ̀ (5+1?)/mì:lù	
Mokole	wɔ́ɔɛ/wɔ́ɔɔ (5+1)	
Vai-Kono	wɔ́ɔɔ/wɔ́ɔɔɔ (5+1)	
Susu	sénni (5+1?)	
SWM	*5+1	
Bozo-Soninke	goro? (5+1?)	tú̀mù/tū̀mi
Bobo	5+1	
Dzuun (Samogo)		t(s)ũ̀mẽ́ /tsìi
Jowulu	5+1	
SE-Eastern	5+1	
SE-Southern	5+1, wáǰ?	

The reconstruction of the Mande term for ‘six’ is problematic. The root *t(s)um* is worth considering, since it is attested in both Bozo-Soninke and Samogo (the root found in Susu is probably isolated). Its reconstruction at the Proto-Mande level is, however, unlikely. The common pattern ‘6=5+1’ is attested in both major branches. The root *wɔ́ɔ* is non-primary and eventually goes back to the aforementioned pattern (or to the pattern ‘6’=‘hand’+1’ to be precise). This hypothesis is supported by the forms of ‘seven’ as well.

4.10.7 ‘Seven’

Table 4.208: Mande stems and patterns for ‘7’

Manding	x+2	
Jogo-Jeri	ma+2	
Mokole	x+2	
Vai-Kono	5+2	
Susu	5+2	
SWM	5+2	
Bozo-Soninke	ɲérù/jeeni	
Bobo	5+2	
Dzuun (Samogo)	ɲɛ̃:nú (<5?)/ɲɛ̃ɛ	
Jowulu		3+ ‘to lose’
SE-Eastern	5+2	
SE-Southern	5+2	

A few remarks are in order before we turn to the discussion of the term for ‘seven’. In the majority of the Mande branches, the term represents a compound. Its second element goes back to the term for ‘two’, cf. e.g. Jula *wólonfilà* ‘7’, *filà* ‘2’.

The relationship between the terms for ‘six’ and ‘seven’ is based on alignment by analogy. This bond sometimes results in unification of the terms, so that sources may explain ‘seven’ as ‘6+1’ (despite the fact that ‘two’, not ‘one’, is manifestly present in ‘seven’). This interpretation has become recurrent for the Mokole languages. According to Phillip Logan,²⁶ the Kuranko evidence is as follows: *wərɔnfilà* (‘6+1’) (?! –K.P.), *wərɔ* ‘6’, *filà* ‘2’, *kelen* ‘1’. The same idea is applied to Lele (cf. Marc Gebhard:²⁷ *wərɔŋ kela* (‘6+1’),²⁸ *wərɔ* ‘6’, *fela* ‘2’, *keleŋ* ‘1’) and Kakabe (cf. Daria Mishchenko:²⁹ *wórɔwila* (‘6+1’), *wórɔ* ‘6’, *filà* ‘2’, *kélen* ‘1’). Other scholars are more reserved, stating that ‘Kono has a decimal system with special construction for 7’.³⁰ It is, however, quite evident that the forms in ques-

²⁶<https://mpi-lingweb.shh.mpg.de/numeral/Kuranko.htm>

²⁷<https://mpi-lingweb.shh.mpg.de/numeral/Lele-Mande.htm>

²⁸According to (Vydrine 2009), the Lele term for ‘seven’ is *wórɔncela* (or *wɔyɛnkela* in the Southern dialect). <https://mpi-lingweb.shh.mpg.de/numeral/Jowulu.htm> *núú gbɔyɔ́ngo* ‘20’ (‘person finished’). <https://mpi-lingweb.shh.mpg.de/numeral/Mende.htm>

²⁹<https://mpi-lingweb.shh.mpg.de/numeral/Kakabe.htm>

³⁰Raimund Kastenholz, <https://mpi-lingweb.shh.mpg.de/numeral/Kono.htm>

tion follow the pattern ‘5+2’ (or at least ‘X+2’ with X being an unidentified component).

It is not a mere coincidence that the interpretation outlined above is recurrent in the Mokole languages, where the forms of ‘six’ and ‘seven’ have become partially unified. In a number of languages from other groups that have etymologically related terms for ‘six’ and ‘seven’, these terms differ in their second consonant, cf. Bamana (Manding): *wólonwula* ‘7’, *wóɔrɔ* ‘6’.

In both groups of South-Eastern Mande the patterns ‘5+1’ and ‘5+2’ for ‘six’ and ‘seven’ respectively are still clearly recognizable (Table 4.209).

Table 4.209: Stems for ‘6’ and ‘7’ in South-Eastern Mande

	‘5’	‘1’	‘6’	‘2’	‘7’
SE: Eastern: Busa	sóo	do	sóo-do	pia	soo-pia
SE: Southern: Beng	só-ŋ	do	só-do	pla-ŋ	só-pla

Taking all of this into consideration, the most likely evolution scenario for ‘six’ and ‘seven’ is as follows:

- At the most archaic Proto-Mande level the terms for ‘six’, ‘seven’ (and also ‘eight’ as we hope to demonstrate below) followed the pattern ‘X+1,2,3’ respectively. The X-element in this pattern possibly represented an archaic root with the meaning ‘hand’ (?) **ko* (**N-ko* > **go/wo?*).
- Proto-Mande developed the root **dúuru/ sóru* ‘5’.
- This new root served as the basis for the South-Eastern Mande terms for ‘six’, ‘seven’ and ‘eight’.
- In Western Mande this process is only attested in single languages, e.g. in Vai (*sóóʔú* ‘5’, *sɛŋ lɛndó* ‘6’ (*lɛndó* ‘1’), *sɛŋ fɛʔá* ‘7’ (*fɛʔá* ‘2’)) and Looma (*dooluo* ‘5’, *dɔzita* ‘6’, *dɔfela* ‘7’, *dɔsáwà* ‘8’).
- The majority of the Western Mande languages retained the inherent forms for ‘six’ and ‘seven’, but their derivational motivation became unapparent (at least in the case of the first component, cf. Bandi *ndɔ́lú(ŋ)* ‘5’, but *ngòhítán* ‘6’ (*hítán* ‘1’) and *ngòfɛlàn* ‘7’ (*fɛlé* ‘2’) in contrast to Looma).
- This factor conditioned the partial unification of the terms for ‘six’ and ‘seven’ (by analogy) in some of the Western Mande languages (Mokole in particular).

4.10.8 ‘Eight’

Table 4.210: Mande stems and patterns for ‘8’

Manding	séegi/séki/séyi		
Jogo-Jeri		ma+3	
Mokole	séen/saen/seyi		
Vai-Kono	séi/séin	5+3	
Susu		5+3	
SWM		wá-yákpá/wɔ- yaagba/ngòsákábá(n) (5+3)	
Bozo-Soninke	segi-/seegu		
Bobo	séki/tfèkí		
Dzuun (Samogo)			kàà, 4pl
Jowulu			2+ ‘to lose’
SE-Eastern		*5+3	síje, kíwísí (<4)
SE-Southern		sǎǎ- gǎ/sálààkǎ/sòlàá/sé- yǎ (5+3?)	

The pattern ‘8=4*2’/‘4PL’ commonly found in the majority of the families discussed above is barely attested in Mande. Meanwhile, the phonetic similarity between *naai* ‘4’ ~ *ɲaai(n)* ‘8’ (attested in the majority of the Samogo dialects) is hardly an accident.

The etymology of *kàà* (not found outside Seenku) is unknown.

The pattern ‘5+3’ is inconclusive, because it often develops independently in various languages. The interpretation of the main Mande root (tentatively described as *seki/ segi*) is uncertain. On the one hand, its current forms suggest that this root can be reconstructed not only for Proto-Western Mande, but for Proto-Mande as well (cf. South-Eastern forms, in particular *sǎǎgǎ* ‘8’). On the other hand, such reconstruction is hindered by at least two issues.

Firstly, the second velar in the South-Eastern Mande forms does not belong to the root. It is part of a reduced segment that goes back to the term for ‘three’ (cf. Tura *yǎká* ‘3’), whereas the first segment goes back to the term for ‘five’ (cf. Tura *sǒlǔ, sǒlǔ, sǔlǔ*). The comparative analysis of the forms of ‘eight’ attested in

the South-Eastern Mande languages (not quoted here in detail) strongly suggests that the South-Eastern Mande pattern for ‘eight’ is ‘5+3’.

Secondly, this reconstruction is problematic from a typological point of view. As has been demonstrated above, our evidence prevents us from reconstructing primary roots for ‘six’ and ‘seven’. In terms of typology, a primary root for ‘eight’ would look highly unusual in this context. Such a root could be expected in those few numeral systems where ‘eight’ is a basic numeral (just like ‘twelve’ is a basic numeral in some of the Benue-Congo numeral systems described above, hence ‘100=12*8+4’). However, ‘eight’ has never been a basic unit of counting in Mande systems. The existence of a primary term for ‘forty’ (assuming that ‘forty’ is ‘8*5’) in some of the Mande languages could be interpreted as a hint at a special status of ‘eight’. However, this is not supported by any real evidence.

This raises a question about the etymology of the Western Mande term for ‘eight’ (*seki/ segi*). Its resemblance to the term for ‘three’ (especially in Bozo and Soninke, cf. Jenaama Bozo *síkěũ* ‘3’ ~ *sèk:i* ‘8’) may be suggestive here. Is there enough evidence to reject the hypothesis that ‘eight’ in the Proto-Western Mande was built according to the pattern ‘8=plus 3’ (this would assume a counting reference to ‘five’)?

Despite the doubts expressed above, these forms are worth comparing to other forms of ‘eight’ attested in other NC families.

4.10.9 ‘Nine’

Table 4.211: Mande stems and patterns for ‘9’

Manding		kòṇòntò (10–1?)	
Jogo-Jeri	ma+4		
Mokole		kòṇòndòn (10–1?)	
Vai-Kono	5+4	kòṇóntòn	
Susu	5+4		
SWM	5+4	10–1	
Bozo-Soninke			kàp:i/káfi/kabi
Bobo		kòrònòṅ	
Dzuun (Samogo)			kjè:rǒ/kle:lo/kùòmè
Jowulu		1+‘lose’	
SE-Eastern	5+4	10–1	
SE-Southern	5+4		

Two competitive patterns are distinguishable here ('9=5+4' and '9=10-1'). In some of the branches (e.g. SWM, Vai-Kono) they are attested side-by-side.

At the same time, these patterns cannot be postulated for some of the languages without additional support. The pattern '9=10-1' seems to be apparent in South-Eastern Mande and some of the SWM languages only, cf. Boko '9': *kě̀okwi* (lit: 'tear away 1 (from) 10'), *kwi* '10'; in Busa '9': *kě̀ndo/kĩ̀ndokwi* (lit: 'tear away 1 (from) 10'), *kwi* '10', *do* '1'; in Bandi (SWM) *taá-vu* '9', *itá(ŋ)* '1', *púu* '10'. According to Robert Carlson (Robert J Carlson 1993: 30), the terms from 'seven' to 'nine' in Jowulu follow the pattern '1-3' + 'lose' (*fɔ̀ni*), i.e. *jǎ́-ɓóni* '7', *fúl-ɓóni* '8', and *tě̀-ɓóni* '9' (note that these terms are misinterpreted as 3+4, 2*4, 5+4³¹ by Lee Hochstetler).

The root *kò̀nonto/kǎ̀nǎ̀ndɔ̀(n)* attested in Manding and Mokole is unclear and deserves discussion by specialists. On the contrary, the forms interpreted as the combination of '5+4' in the table below seem to be quite transparent (Table 4.212).

Table 4.212: '9 = 5+4' in Mande

Language	'9'	'5'	'4'
Kyanga	sòòfí	sóórū	ǰí
Tura	sóìsē	sólú	ǰìsē
Susu	sólómánáání	súlí	náání
Vai	sôŋ náání	sóó(?)ú	náání
Bobo Madare	kórónǎ	kóò	náá

This section, however, is not unproblematic. The Jogo-Jeri non-primary terms for '6-9' are formed by two components. The second (i.e. the terms for 'one', 'two', 'three' and 'four' respectively) is easily recognizable, whereas the etymology of the first (*ma-*) is unclear.

4.10.10 'Ten'

This term is especially interesting in light of the fact that the distribution of the isoglosses of 'ten' served as the basis for Maurice Delafosse's early classification of the Mande languages including the *Mande-tan* and *Mande-fu* groups. These two roots are indeed the main Mande roots with this meaning. However, their distribution does not correspond to the two major branches of Mande as they are

³¹<https://mpi-lingweb.shh.mpg.de/numeral/Jowulu.htm>

Table 4.213: Mande stems for ‘10’

Manding	*tán	*bí	
Jogo-Jeri	táà(n), ta		
Mokole	tán	*bí	
Vai-Kono	tân		
Susu	*tòngó	fùú	
SWM		*puu	
Bozo-Soninke	tan/téen/cemi		
Bobo		fě	m̥m̥
Dzuun (Samogo)	t(s)eũ/ceũ		
Jowulu			bɜĩ/byĩnɲ
SE-Eastern		*fu/*vu (< *pu)	kwi/kuri, wókòì
SE-Southern		*bù	gɔ́ɔ́(dō),kǝ̃ɲ sɔ́jɔ́lú,

distinguished today. The root **tan* is indeed found in all groups of the Western branch except for Bobo and SWM. However, the attestations of the root **pu/fu* are not limited to South-Eastern and extend to a number of the Western branches such as Bobo, SWM, Susu (and possibly Manding-Mokole, assuming that its reflex denotes tens in compound numerals). Isolated forms attested in South-Eastern and in peripheral Western languages are noteworthy.

The reconstruction of **pu/fu* for Proto-Mande and the interpretation of **tan* as the Proto-Western Mande innovation seem well-founded.

The etymology of **tan* is obscure. Its similarity to the locally attested root **tan* (cf. Soninke *tàán* ‘foot, leg’; ‘wheel’; ‘time’ (when counting), Bozo Tieyaxo *tɔn* ‘foot, leg’; ‘time’ (when counting), Bozo Hainyaxo *tă*, Bozo Tiemacewe *tawa*, Bozo Sorogama *taba*) is likely a coincidence. Lexical roots with the meaning ‘foot’ are attested in NC numeral systems, usually as a basis for the non-compound terms for ‘fifteen’. The logic behind this development is simple: ‘ten’ is ‘two hands’, ‘twenty’ means ‘man’, i.e. ‘two hands and two feet’, hence ‘fifteen’ is ‘foot’. This seems to be the case for Boko and Busa, where a non-compound term for ‘fifteen’ (*gěo/ gěro*) is attested (hence ‘16=15+1’ in these languages). This root is etymologically related to ‘foot, leg’ in Duungoma (Samogo) *gě*, Dan *gě*, Mano *gà* (it should be noted that within Mande a non-compound root for ‘fifteen’ is also attested in Ligbi, cf. *tígán* / *tiga* ‘15’, *tígá-ló* ‘16’).

In addition, a similarity to the term for ‘one’ as attested in some of the lan-

guages must be a coincidence.

A hypothesis assuming a semantic shift *NC **tan* ‘5’ > Proto-Western-Mande *tan* ‘10’ in parallel with the development of the Mande innovation **dúuru/ sóru* ‘five’ seems to be a better explanation.

It bears reminding that the Bokobaru root *kuri* ‘ten’ (cf. also Boko *kúúli* recorded by Koelle) has a direct parallel in the isolated Bangime language (*kúré*).

4.10.11 ‘Twenty’

Table 4.214: Mande stems and patterns for ‘20’

Manding	<‘human’?		
Jogo-Jeri			ǰālāmǰ/kèlèǰmó
Mokole	<‘human’?		
Vai-Kono	<‘human’	10*2	
Susu	<‘human’		
SWM	<‘human’?	10*2	
Bozo-Soninke		10*2	
Bobo			kpòró, còrò
Dzuun (Samogo)	<‘human’		fwé
Jowulu			kǝne/kǝnninǝ
SE-Eastern		10*2	kèè-/ka
SE-Southern	<‘human’ ³²	10*2	yɔ

There is every reason to believe that the term for ‘twenty’ was based on the lexical root(s) meaning ‘human person’ at the Proto-Mande level. The etymology of some of the isolated forms presented in the table should be sought with this in mind.

4.10.12 ‘Hundred’

check
keng/kai

The root *keme*, widely attested throughout Western Africa, is noteworthy. Its original semantics deserve a separate study: it is well known that in some languages this root can be used for ‘sixty’ or ‘eighty’ and not for ‘hundred’ (the

³²Mende *núú ǰǝyǝngo* ‘20’ (‘person finished’). <https://mpi-lingweb.shh.mpg.de/numeral/Mende.htm>

Table 4.215: Mande stems and patterns for ‘100’

Manding	*kèmé	
Jogo-Jeri	čěmé/tfíímí	20*5
Mokole	kème	
Vai-Kono	keme	
Susu	kèmé	
SWM	keme(ŋ)	Kpelle: <‘head’ (ŋwúŋ)
Bozo-Soninke	kame/keme	‘islam’-60
Bobo		ʃɔ̃(lì)/zò(ló)
Dzuun (Samogo)		20*5, 80+20
Jowulu		‘rope’*5
SE-Eastern		*20*5
SE-Southern	*kèmé?	kěŋ/kắŋ, la/lú

archaic Bamana counting system: *mànkème* ‘60’, *bámanankème* / *kème* ‘80’, *kème ní mùgan* ‘100’ (80+20)) (Vydrin & Perekhvalskaya 2015a: 360).

4.10.13 ‘Thousand’

The roots for ‘thousand’ attested in the Mande languages were borrowed from by the Western African languages. The original meaning of the Mande root *wáa*/*wága* may be ‘a basket of cola nuts’ (Perekhvalskaja, Vydrin & Perekhvalskaya 2015a: 361), cf. Bamana *wágá* ‘panier à colas’, Bobo *wágá* ‘panier qui sert à transporter les colas ou wòlōwágá.’

Table 4.216: Mande stems and patterns for ‘1000’

Manding	wúlú/wúli	wáa/wá/wà/wága	bà
Jogo-Jeri	búlí, wúlú (< manding)		
Mokole		wàa/wá/waga	
Vai-Kono	wúl		
Susu	wúlù/wúli		
SWM	wùlù	wála/wáá	
Bozo-Soninke	gulu	waxa	(‘islam’)- muso, wúdzùné
Bobo			
Dzuun (Samogo)		gbà’à, baa	bi ‘goat’, 800+200, <juula
Jowulu		wa ‘a’	800+200
SE-Eastern		wàà ‘200’	200*5, vûû, ‘dúú, pàdí, pə, boro
SE-Southern	wúlù/wlú/gblú (?)	*wágá: wáá	kpi, kən

Table 4.217 gives an overview of Mande forms and patterns that will be used for further comparison to the evidence of other families (Table 4.209).

Table 4.217: Numerals in Proto-Mande

1	do, kelen	7	wɔ-X-fila (‘hand’+2?)
2	pila/fila	8	seki/segì (< ‘plus’-3?)
3	sakpa/sagba/sawa, ʔààkɔ̃/yààkáʔ	9	kònonɔ̃/kònonɔ̃(n) (10-1, 5+4)
4	náání/nǎ̃i	10	pu/fu, tan (< *‘5’?)
5	dúuru/sóóru, woʔ koʔ **tanʔ (> ‘10’?), nǎ̃ʔ	20	< ‘human’
6	wɔɔ (wɔɔ-rɔʔ ‘hand’+1?), t(s)umʔ	100	kɛmɛ, 20*5
		1000	wulu, wa(g)a

4.11 Mel

A narrow definition of the Mel family is preferred here (in accordance with the classification of the Atlantic languages suggested in (Pozdniakov & Segerer 2017). This family comprises two compact language groups, namely Northern (Temne, Landuma, and all Baga languages except for Baga Fore and Baga Mboteni, namely Baga Koba, Baga Maduri, Baga Sitemu and others) and Southern (Kisi, Sherbro, Mani, and Krim). Sua, Limba and Gola are not included within the Mel family and are viewed as isolated NC languages. The numeral systems of the two Mel groups comprised of the distant languages are treated separately below.

4.11.1 Southern Mel

Table 4.218: South Mel numerals

	Kisi	Sherbro	Bullom	Mani (Bullom So)	Krim
1	pilèé/pilɔ, *pum?	bul	(nim)-bul	nìm-búl	yì-mo
2	dín/C-ín/C- ón,danyō	tiŋ	(nin)- tsiŋ/tiŋ	nìn-cáŋ	yì- ym/yèèn, dím
3	ŋg-àá/y-àá	ræ	(niin)-ra	nìn-rá	yì-ya/gàà
4	hìsólú	hyol	(nii)-hiɔɔl	nìŋ-nyól/- nyól	yì-hiɔn
5	ŋùèénú	mɛn	(nii)-man	nìmán < niN-wán?	yì-wɛn/n- wén
6	5+1	5+1	5+1	5+1	5+1
7	5+2	5+2	5+2	5+2	5+2
8	5+3	5+3	5+3	5+3	5+3
9	5+4	5+4	5+4	5+4	5+4
10	tó	wāŋ	waan	wàm	wāŋ/wàn
20	bídii(ŋ)/bélé	‘finished it is man’	u-tɔɔŋ	ù-tòŋ	<‘person’
100	< Mande	< English		pé, < Susu	
1000	< Mande	< English		< Susu	

Noun class markers are usually positioned as suffixes in Kisi. However, the first numerical terms in this language have noun class prefixes, which makes the forms look inconsistent, cf. *mùúŋ/ mǐǐǐŋ / ɲǐǐǐŋ / díŋ, tiǐǐŋ/là-tiǐǐŋ* ‘two’.

The terms for ‘hundred’ and ‘thousand’ were probably absent in Proto-South-Mel. The similarity between Kisi *tó* ‘ten’ and Bullom-Mani *təŋ* ‘twenty’ is noteworthy. ‘Twenty’ may follow the pattern ‘20=10PL’. If so, the original *təŋ* ‘ten’ should be viewed as an early borrowing from Western Mande (**tan* ‘10’). In this case, **wan* ‘10’ is an innovation (probably based on **wan/wen* ‘five’) that developed in South Mel after Kisi had separated. The numeral system of modern Kisi exhibits no significant changes from the forms described by Koelle. It includes the form *ɲam-puum* ‘6’ (Tucker Childs: *ɲəŋpúm*) that may have retained an archaic allomorph of ‘one’ (**pum*). The forms that will be used for further comparison are summed up in the table below (Table 4.219).

Table 4.219: Proto-South Mel numeral system (*)

1	pìlè/pilɔ (< *lɛ/lɔ?), bul, mɔ	7	5+2
2	tsɪŋ/tɪŋ	8	5+3
3	ra	9	5+4
4	hiɔl	10	5PL?, < *West Mande?
5	wan/wen	20	‘person’, 10PL?
6	5+1	100, 1000	absent

4.11.2 Northern Mel

A higher degree of homogeneity observable in these languages allows an instant reconstruction of their numeral system at the Proto-Northern Mel (Table 4.220)

Table 4.220: Proto-Northern Mel numeral system (*)

1	-in	7	5+2
2	-rəŋ	8	5+3
3	-sas	9	5+4
4	-ŋkɪlɛ/-nlɛ	10	tɔfɔt (< tɔ-f-ɔt?)/pu, witʃɔ?
5	kə-ʈamaʈ (< *kə- ʈa ‘hand’?)	20	10*2, kə-gba (< *bay/bey ‘chief’?)
6	5+1	100, 1000	absent

4.11.3 Proto-Mel

The table below gives an overview of South Mel and North Mel forms (Table 4.221).

Table 4.221: Proto-Mel numeral system (*)

1	-in, < *lɛ/lɔ?	7	5+2
2	dɪŋ/tsɪŋ/tɪŋ, -rəŋ	8	5+3
3	*tat (> sas, ra)	9	5+4
4	hiɔl, -ŋkɪlɛ/<-nlɛ?	10	*pu/fu, 5PL?
5	wan/wen, <‘hand’	20	‘person’, 10PL?
6	5+1	100, 1000	absent

4.12 Atlantic

Our step-by-step reconstruction of numeral systems in the Atlantic languages will be based on their classification suggested in [Pozdniakov & Segerer 2017](#) (forthcoming) that distinguishes two main groups within the Atlantic family, namely Northern and Bak.

4.12.1 Northern

The numeral systems of Northern Atlantic are treated below by sub-group.

4.12.1.1 Cangin

Table 4.222: Proto-Cangin numerals (*)

1	no	7	5+2
2	nak	8	5+3
3	haj/ʔéeyə	9	5+4
4	nik-il < *nak-il?	10	sabbo (< Fula), da:ŋkah
5	jat (<‘hand’), ʔi:p	20	10*2
6	5+1	100, 1000	< Wolof? Fula?

Some of the reconstructions presented above are not immediately apparent and are in need of additional commentary. A detailed discussion of each of them

would be impossible here, so we will take the reconstruction suggested for ‘four’ (*nik-il*) as a sample.

At first glance, the forms of ‘four’ attested in the Cangin languages have nothing in common. Two of the five Cangin languages have *kinil* ‘four’ (Ndut-Palor), whereas in the remaining three (Laala, Noon, and Safin) *nikis* is used in this function. The easiest solution to the problem would be to postulate two alternative forms for this group. However, as the evidence of comparative-historical phonetics suggests, the final -l in Ndut-Palor regularly corresponds to the final -s in Laala-Ndut-Safin (Table 4.223).

Table 4.223: l ~ s regular correspondence in Cangin

*-l	‘eye’	‘black’	‘road’	‘four’
Ndut	ʔil	suul	wal	kinil
Palor	ʔil	suul	waal	kinil, enil
Laala	kɔs	*susus	was	nikis
Noon	kwas	*sujus	waz	nigis
Safin	xas	*suzus	was	nikis

This fact alone urges closer examination of the forms quoted above. Further analysis shows that a fossilized noun class prefix *kV-* is present in some of the Palor numerals, cf. *ka-nak* ‘deux’, *ke-jek* ‘trois’, *ki-nil* ‘quatre’, *kip* ‘cinq’. At the same time, the suffix -Vs is observable in the Noon numerals, cf. *jet-us* ‘five’. This evidence combined suggests the following development of the forms for ‘four’ (Table 4.224).

Table 4.224: Development of **nik-Vl* ‘4’ in Cangin

Proto-Cangin	* nik-Vl		
Laala/Noon/Safin	* nik-Vs		nikis
Ndut/Palor	* ki-nik- Vl	ki-nik-il	kinil

4.12.1.2 Nyun-Buy

Numerical terms are highly divergent within this sub-group, so it seems reasonable to treat them by branch (Table 4.225).

Table 4.225: Nyun-Buy numerals

	Nyun	Buy (Kobiana, Kasanga)
1	duk	tee(na), -anoʔ
2	nak	naŋ
3	lal	taar
4	ren(d)-ek	sannaŋ
5	ci-lax (<'hand'), -mækila	ju-roog (<'hand'?)
6	5+1	5+1
7	5+2	5+2
8	5+3	4+4
9	5+4	5+4
10	ha-lax (<'hands')	5PL, ntaajǎ
20	<'king'	< Mande, 10*2
100	< Mande	< Mande, < French
1000	< Mande	ŋ-kontu < Portuguese ³³

The pattern '5'='hand' ~ '10'='hands' is immediately apparent in Nyun. In the case of Buy, it can be accepted only under the assumption that the derived term for 'five' became phonetically distant from its source form, cf. Kasanga *ji-rek*, Kobiana *ji-hak* 'hand' (these forms must be related to Nyun *ci-lax* 'hand'). In any case, the Kasanga term *ŋa-roog* follows the pattern '5PL' that uses the same plural noun class as the one attested in *ŋa-rek* 'hands'.

The forms for 'ten' attested in Joola Ejamat (Atlantic Bak) *si-ntaaja* is important for the diachronic interpretation of the Kobiana form *ntaajǎ*. The evidence suggests that the latter was probably directly borrowed from Joola³⁴ (as was *-anoʔ* 'one').

4.12.1.3 Jaad-Biafada

The forms of 'one' (*ni/ nɛ*) are distinguishable in the compound numerals, cf. Jaad *ŋka-inɛ* '6' ('5+1'), Biafada *mpaaji nyi* '7' ('6+1'), etc. The term for 'five' goes back to the lexical root meaning 'hand' (Biafada *gə-bəda*, Jaad *ko-bəda*).

³³Guillaume Segerer (p.c.).

³⁴According to Guillaume Segerer (p.c.) it is possible that the Ejamat and Kobiana forms both come from Manjak.

Table 4.226: Jaad-Biafada numerals

1	nnəmma, *ni/nε/-inε, -kkā	7	5+2, 6+1 (< Manjak)
2	ke, ma-ae	8	5+3, wose/wase
3	jo/tfaw	9	5+4, leberebo
4	n(n)e/nnihi	10	(p)po
5	bəda (< ‘hand’)	20	10*2
6	5+1, paaji (< Manjak), ŋka-?	100, 1000	< Fula

4.12.1.4 Tenda

The reconstruction of the Proto-Tenda numerals (**Pozdniakovmstenda**) is based on a comparative analysis of five Tenda languages: Basari, Tanda, Bedik, Bapen, Konyagi.

Table 4.227: Tenda numerals (*)

1	bat, ndi/riye/diye/iye, mbə	7	5+2
2	ki	8	5+3
3	taɬ	9	5+4
4	næx	10	poxw
5	mbəd (< ‘hand’), cə/njə	20	10*2
6	5+1	100, 1000	< Fula, < Mande

The etymology of the Konyagi term for ‘five (*mbəd*)’ is based on the Jaad-Biafada evidence (these languages belong to the same sub-group as Tenda).

4.12.1.5 Fula-Sereer

The numerical terms are highly divergent within this sub-group, so it seems reasonable to treat them by language (Table 4.228).

The fact that the Seerer terms covering the sequence from ‘two’ to ‘five’ have the same final segment is noteworthy. This could potentially be interpreted as a special morpheme or as a sub-morpheme that resulted from alignment by analogy. This discussion will be resumed below. Here it can only be stated that the

³⁵Reviewing my first version of the book, Guillaume Segerer has advanced a new interesting etymology for Fula: *jow-i* ‘5’ = *jun-ngo* < *jow-ngo* ‘hand’. His hypothesis is quite possible.

Table 4.228: Fula-Sereer numerals

	Fula	Sereer
1	goʔo	leŋ
2	ɗiɗi	ɗik
3	tati	tadik
4	na(y)i	nahik
5	jo(w)i ³⁵	ɓe-tVk
6	5+1	5+1
7	5+2	5+2
8	5+3	4+4
9	5+4	5+4
10	sapp-o	xarɓ-
20	noogas/noogay	10*2
100	teeme-	< Fula
1000	< Mande, < Hausa	< Wolof?

morphological analysis of the Sereer term for ‘five’ (*ɓe-tVk*) suggested in the table below is not immediately apparent and is thus debatable. Within this approach the element *ɓe-* is interpreted as a noun class prefix despite the fact that such a class is lacking in Sereer. Complex issues pertaining to the reconstruction of the term for ‘five’ will not be treated here. We shall only note that the plural animate class is reconstructable as *ɓe-* (class 2) in Proto-Fula-Sereer.

4.12.1.6 Wolof

Table 4.229: Wolof numerals

1	CL-enn	7	5+2
2	ñaar (< *CL-(X)aar)	8	5+3
3	ñ-ett (< *CL-(X)ett)	9	5+4
4	ñ-ent (< *CL-(X)en(i)t)	10	fukk
5	jurom	20	< ‘person’, 10*2
6	5+1	100, 1000	< Fula, < Mande

The Wolof term for ‘one’ exhibits the agreement in noun class, cf. *k-enn nit* ‘one person’, *g-enn garab* ‘one tree’, *f-enn* ‘somewhere’, *l-enn* ‘something’, etc. The same can be applied to the terms covering the sequence from ‘two’ to ‘four’ as demonstrated in Pozdniakov 2015: 82. Nothing is known about the original radical of the root (assuming there was one) since it was replaced by a noun class consonant.

Speaking of ‘twenty’, it should be said that the form *nit(t)* (apparently related to the lexical root *nit* ‘person’) is widely used alongside the common Wolof pattern ‘10*2’.

4.12.1.7 Nalu-Baga Fore-Baga Mboteni

This sub-group is the most problematic within Northern Atlantic. Admittedly, the evidence pertaining to their classification as Northern is inconclusive. Moreover, the sub-group itself is highly heterogeneous, which affects its numeral systems as well. The pertinent data for each of these languages is provided below (Table 4.230).

Table 4.230: Numerals in Nalu, Baga Fore and Baga Mboteni

	Nalu	Baga Fore	Baga Mboteni
1	de:ndik	ki-ben	mbó
2	bi-lɛ	ci-di	sà-lɛ
3	p-aat	ci-tɛt	n-dér
4	bii-naaŋ	ci-neŋ	í-nà
5	teedoŋ (< té ‘hand’?)	su-sa(n)	ì-rìβě, *ba(x)?
6	5+1	5+1	5+1
7	5+2	5+2	5+2
8	5+3	5+3	5+3
9	5+4	5+4	5+4
10	5*2, *a-lafaŋ?	ɛ-tɛ-lɛ (< ‘hands’ +2)	tèn (< “*hand”?)
20	10*2	10*2	10*2
100	m-laak	bɔ-1	< Mande
1000	m-paak (100pl?) < Susu	tengbeŋ-1	?

4.12.1.8 Proto-Atlantic North

The prospects for the reconstruction of the Proto-North Atlantic numerals are discussed below.

4.12.1.8.1 ‘One’ (Table 4.231)

Table 4.231: Numerals for ‘1’ in Northern Atlantic

Cangin	no		
Nyun			duk
Buy	nɔʔ		tee(na)
Jaad-Biafada	*ɲi/nɛ		nnəmma,pakkã
Tenda	di(ye)	mbɔ	bat
Fula-Sereer	leɲ		goʔo
Wolof	-enn		
Nalu	deendik	mbó	ki-ben

Isolated forms are quoted in the rightmost column. Direct parallels to some other forms are attested in Cangin – Buy (*nɔʔ*) and Konyagi – Baga Mboteni (*mbɔ*). The most common root is **di(n)/ li(n)/ ye(n)/ ne(n)* (assuming that these forms are related).

4.12.1.8.2 ‘Two’, ‘Three’ and ‘Four’ (Table 4.232)

Table 4.232: Numerals for ‘2’-‘4’ in Northern Atlantic

	‘2’	‘2’	‘2’	‘2’	‘3’	‘3’	‘4’	‘4’
Cangin	nak					haj	nik-il < nak-ilʔ	
Nyun	nak				lal			ren(d)-ek
Buy	naɲ				taar			sannaɲ
Jaad-Biafada			ke			jo/caw	n(n)e(hi)	
Tenda			ki		taʔ		næx	
Fula-Sereer		dik			tati(k)		na(y)i(k)	
Wolof				X-aar	X-ett		X-en(i)t	
Nalu		di/le			tet/tat		naaɲ/nɛɲ/na	

The forms of ‘two’ in Tenda-Jaad-Biafada can be explained as a shared innovation, since these two branches belong to the same sub-group. The forms quoted

in the two leftmost columns could be related, but the pertinent evidence is inconclusive. The roots **nak* and **di(k)* are reserved for further comparison.

As in the majority of other NC branches, the terms for ‘three’ and ‘four’ (tentatively recorded as **taɫ* ‘3’ and **nak* ‘4’) are fairly consistent in North Atlantic. Thus it appears that the terms for ‘two’ and ‘four’ are the same (or phonetically similar) across the languages of this branch. Cangin is the only language that does not comply with the additional distribution, because in the case of Cangin both terms are reconstructed as **nak*. Interestingly, the form of ‘four’ bears a suffix, hence it could potentially be explained as a derivative of ‘two’. At the same time, the root *nak* ‘four’ is reminiscent of one of the most persistent NC roots with this meaning.

In Jaad-Biafada we find the root **jow/caw* ‘3’. This is undoubtedly an innovation in the group which is represented by a remarkable isogloss. This is therefore an argument in favour of interpreting this group as part of the northern branch of the Atlantic family: Biafada *-njo / bíi-co/ bíi-yo* ‘3’, Jaad *ma-caō/ ma-caw/ má-cōu* ‘3’. It is possible that we are dealing with an ancient borrowing of Proto-Jaad-Biafada from Mande (from *saba* ‘three’).

In theory, it is possible that forms attested in the Cangin languages (*ka-hay / *ʔe-jɛʔ*), also originated from the Mande form (likely weakened to **habi / hawi*).

In this case, we find either reflexes of the Proto-NC form **tath* or borrowings (taking into account very ancient forms) – from the Mande languages in numerous Northern Atlantic languages.

4.12.1.8.3 ‘Four’

The root **na(h)i-k* can be securely reconstructed for Proto-Northern Atlantic. As has been demonstrated above, the initial ñ- of the Wolof term is a reflex of a noun class prefix that replaced the initial radical of the root. The final -t in the Wolof term probably resulted from the alignment by analogy with the term for ‘three’ that ends in -t, cf. **ñ-eenk ? → ñ-eent* ‘4’ by analogy with *ñ-ett* ‘3’.

4.12.1.8.4 ‘Five’ (Table 4.233) and the terms from ‘six’ to ‘nine’

The North Atlantic languages are characterized by the term for ‘five’ being systematically derived from the lexical root meaning ‘hand’. Interestingly, this development seems to post-date the replacement of the original root for ‘hand’ by an innovation in the majority of the branches. At least four independent formations of this kind are attested within eight branches (cf. the evidence quoted in the leftmost column of the table). Both Tenda and Jaad-Biafada terms for ‘five’

Table 4.233: Numerals for ‘5’ in Northern Atlantic

Cangin	jat (<‘hand’)		ʔi:p	
Nyun	ci-lax (<‘hand’)			-mækila
Buy			ju-roog	
Jaad-Biafada	bəda (‘hand’)			
Tenda	mbəd (<‘hand’?)	co/njo		
Fula-Sereer		jo(w)i	* ʃe-tVɓ	
Wolof		jurom		
Nalu	teedoŋ/*tee (‘hand’?)		ribə(l)	su-sa(n), *ba(x)?

are of common ancestry: they seem to have developed from the root **bəda* at the Proto-Jaad-Biafada level, since both languages belong to the same sub-group. This probably indicates that the pattern based on the term for ‘hand’ was used in the languages that belong to the Northern group at the proto-level (possibly as an alternative to the inherent NC root for ‘five’). In view of this, the formal alterations of ‘five’ are easily explained as those automatically caused by the replacement of the inherent term for ‘hand’ by an innovation. As we hope to demonstrate in the next chapter, the derivational pattern ‘hand’ > ‘five’ is surprisingly rare in the NC languages. It is barely attested, for example, in Benue-Congo, thus being characteristic of the North Atlantic languages (and the Atlantic languages on the whole, see below).

In view of this, the reflexes of the inherent NC root for ‘five’ could have been preserved in only a minority of North Atlantic branches. The roots **jo/ co*, **tVɓ/ rog* and **rib/ ʔi:p* unrelated to the term for ‘hand’ deserve special attention within this context.

The pattern ‘5+’ (‘hand’+) can be securely reconstructed for the terms covering the sequence from ‘six’ to ‘nine’. The uncommon pattern ‘7=6+1’ attested in Biafada was borrowed from one of the Manjak languages (Atlantic Bak), as was the derived term for ‘six’ (*mpaaji*).

4.12.1.8.5 ‘Ten’ and ‘Twenty’ (Table 4.234)

Table 4.234: Numerals and patterns for ‘10’ and ‘20’ in Northern Atlantic

	‘10’	‘10’	‘10’	‘20’	‘20’	‘20’
Cangin			< Fula, da:ŋkah	10*2		
Nyun		< ‘hands’			< ‘king’	
Buy		5PL	ntaajã	10*2		< Mande
Jaad-Biafada	(p)po			10*2		
Tenda	pəxw			10*2		lapem
Fula-Sereer			sapp-o, xarɓ-	10*2		noogas/noogay
Wolof	fukk			10*2	‘person’	
Nalu		5*2	*a-lafaŋ?	10*2?		

With the evidence of the three branches, the reconstruction of the term for ‘ten’ (tentatively recorded as **pok*) seems secure. Its attestations are admittedly limited, apparently due to its replacement with derived terms based on ‘five’ (‘hand’). This reconstruction is also supported by the presence of the final velar: as we have seen, it is reconstructable in a number of other numerical terms at the proto-level.

The pattern for ‘twenty’ is reconstructable as ‘20=10*2’. Particular derivatives based on the typologically widely attested patterns (‘20’ < ‘person’, 20 < ‘king’) seem to have formed independently.

4.12.1.8.6 ‘Hundred’ and ‘thousand’

The evidence points to the absence of these terms in Proto-North Atlantic. Attested forms are borrowings from ‘influential’ languages such as Fula, Wolof, Manding, Hausa (in the case of Niger Fulfulde). Interestingly, the terms in question are already borrowings in some of these source-languages.

4.12.1.8.7 Proto-North Atlantic numeral system (Table 4.235)

Table 4.235: Proto-North Atlantic numeral system (*)

1	di(n)/li(n)/ye(n)/ne(n), mbɔ	7	5+2
2	di(k), nak	8	5+3
3	taɫ	9	5+4
4	nak	10	pok
5	<‘hand’, jo, tVk/rog, rib/?i:p	20	10*2
6	5+1	100, 1000	absent

4.12.2 Bak

4.12.2.1 Joola languages

Over a hundred sources covering the numeral systems of fifteen major Joola dialects have been made available to us courtesy of Guillaume Segerer. His collection of evidence may be labeled a ‘dialect atlas’ of numerical terms. These terms often exhibit significant variations not only in their phonetics but in the inventory of lexical roots as well.³⁶ The name Joola pertains to a group of at least seven related languages (including Bayot). A study of their numeral systems may help set a clearer distinction between these languages. Moreover, it might shed some light on their (hitherto unclear) internal classification.

Numerical terms as attested in ten major Joola languages are discussed below.

4.12.2.1.1 ‘One’ (Table 4.236)

Table 4.236: Joola numerals for ‘1’

Bliss Banjal	Kasa Mlomp	Fogny Karon	Keeraak Ejamat	Bayot Kwaatay
-anɔʔ	-anor	-anor	-anor	
-anor	-anor	-anor	-anor	
	(akon)	əkɔn		(akon)
	(ta)			don
			yinka, (sia)	fɛnɛŋ

³⁶I wish to express my gratitude to G. Segerer for his assistance with regard to the dialectal attribution of sources.

The main form is reconstructed as **-anor*, with the initial vowel forming a part of the root. The only languages where this root is not present are Bayot (*don* ‘1’) and Kwaatay (*fɛnɛŋ* ‘1’). The root *əkon* with a vocalic opening (sporadically attested in Kasa and Bayot) is found in Fogny alongside **-anor*.

4.12.2.1.2 ‘Two’, ‘three’ and ‘four’ (Table 4.237)

Table 4.237: Joola numerals for ‘2’-‘4’

Bliss Banjal	Kasa Mlomp	Fogny Karon	Keeraak Ejamat	Bayot Kwaatay
‘2’				
si-lubəʔ	si-ʔubɣʔ	(liba)	sɪ'subə	ʔi- rigəʔ/tɪgga
si-rubə	sɪ-subəl	su-supək/ɕi- ɕipək ^h	si-lu:bəʔ	sɪ'subə
‘2’				
si-gabaʔ	si-gäbä, (ku-mənten)	si-gäbäʔ	si-gäbä	
‘3’				
si-həɕji	si-hɣ:ʔiʔ	si-feegiir/si- fe:ʔiʔ	sɪ-hə:ʔɪ	i-fiigiʔ/i- fəɕʔi
gu-fɪ:gɪr/si-fɣjɪr	sɪ-hə:ʔɪl	si-hə:ci:l	si-həɕji, (fu- footeen)	ki-hɣ:ʔiʔ
‘4’				
si-bäkir	si-bä:kiʔ/si- bäkiʔ	si-bäkir/si- ba:ci:r	si-bacir	sɪ-bəyɪr
si-baagir	sɪ-bacɪl	ɕɪ-päkil/si- ba:ci:l	si-bäkir	ki-bäkir

Two alternative roots for ‘two’ are attested in Joola, namely **si-ʔubəʔ* and a relatively wide-spread **si-gabaʔ*.

The term for ‘three’ goes back to **si-feegir*, with its reflexes being attested in all dialects.

The term for ‘four’ is securely reconstructed as **si-bääkiŋ*.

4.12.2.1.3 ‘Five’ and ‘ten’ (Table 4.238)

Table 4.238: Joola numerals for ‘5’ and ‘10’

Bliss Banjal	Kasa Mlomp	Fogny Karon	Keeraak Ejamat	Bayot Kwaatay
‘5’				
hu-tək	hu-tək ^h	fu-tək/u-sək	hu-tək	o-to/ɔ-ɬ/ɔ- rɔ
fu-tək		ɪ-çäk ^h /i-sak	fu-tək/hu- ʂok	hu-tək
‘5’				
	(naa-suan) ŋaa-suwaŋ			
‘5’				
		*fu-tam		
*tən				
‘10’				
ku-ŋɛn <‘hands’ gu-ŋɛn <‘hands’	ku-ŋɛn <‘hands’	ku-ŋɛn <‘hands’	ku-ŋɛn <‘hands’ ku-ŋɛn <‘hands’	
‘10’				
	sɛ-bɛɛs ‘hands’	ŋaa-suwan		gu-tie(pəkɔ) ‘hands’ su-moŋu/su- ŋɔmu ‘hands’

The Banjal form **tən* (reconstructed on the basis of the compound numerical terms) and the (related?) Fogny form *fu-tam* attested in a source dating to the seventeenth century (d'Avezac 1845) are of special interest.

The Mlomp form of 'five' (sporadically attested in Kasa as well) is identical to the Karon form for 'ten' (*ηaa-suwan* in both cases). The etymology of these forms is unclear. At the same time, the majority of the forms for 'ten' (but not for 'five' as in the majority of the North Atlantic languages) go back to the lexical root meaning 'hands'. To illustrate this point, the lexical stems for 'hand' in the Joola languages are quoted in the table (Table 4.239).

As can be deduced from the presentation above, at least four lexical roots for 'hand' that serve as a basis for the terms for 'ten' are distinguishable in Joola. Interestingly, the source roots and the numerical terms that depend on them are not necessarily the same within a language. The main root is **ku-ηen/ ku-jen* '10' < 'hands'. At the same time, *bεεs* 'hand' yields *εε-bεεs* 'ten' in Mlomp. This derivative is not attested in Kasa and Karon where *bεεs* 'hand' alternates with *ηen/ jen* 'hand'. The base **ka-ʔe* 'hand' attested in Bayot and Kasa yields *gu-tie-* in Bayot. Finally, *ε-mɔŋu* 'hand' > *su-mɔŋu* 'ten' in Kwaatay (also *ε-ηɔmu* 'hand' > *su-ηɔmu* 'ten' with a metathesis).

As noted above, the root *ε-ntaaʒa* attested in Keeraak and Ejamat was possibly incorporated into Kobiana (North Atlantic). This root, admittedly very rare in the Joola cluster, is the only primary one for 'ten' and as such it deserves special attention (especially in view of its later replacement with the derivatives based on 'hand').

4.12.2.1.4 'Twenty', 'hundred', and 'thousand'

Two apparent derivational patterns are used for the term for 'twenty' in the Joola languages:

<'king': Bliss *a-yuy*, Banjal *ə-vi/ə-vvi*, Kasa *a-yi/ ə-ji*, Karon *əwi*, Bayot *ə-y*;

<'person': Kasa *an / bu-k-an*, Fogny *ka-banan* 'person finished'.

In Kwaatay the term for 'twenty' is based on 'mouth' (*bu-tum-an*).

The terms for 'hundred' and 'thousand' are borrowings from Mande or 'influential' Atlantic languages (often either Fula or Wolof) in the majority of the dialects, cf. *keme/teme* '100', *wuli, juni* '1000'.

In conclusion it should be added that the Joola terms covering the sequence from 'six' to 'nine' follow the common pattern '5+':

Table 4.239: Joola stems for ‘hand’

Bliss Banjal	Kasa Mlomp	Fogny Karon	Keeraak Ejamat	Bayot Kwaatay
‘hand’ ka-ŋɛn(ak)	ka-ŋɛn	ka- ɲɛn(ak)/ka- ŋɛn ka-ɲɛn	ka-ŋɛn ka-ŋɛn(ak)	ka-ŋyɛn(ak)
ga-ɲɛn/ka- ɲɛn(ak) ‘hand’	e-bɛɛs ɛ-bɛɛs	ɛ-pɛs/ɛ-bɛs		ɛ-mɔŋu/ɛ- ŋɔmu
‘hand’	ka-seʔ			ka-te/ga- te/ʔe/kə-se
‘hand’ bu-lɛhɛj ‘hand’ bi-lɛfɛj		ɛ-lɛɛs ‘upper arm’	bu-lɛfɛc ‘inner hand’	
‘hand’				
ka- ʂɛɲum(əku)			kə-ləɲum ‘hand’	

4.12.2.2 Manjak languages

This branch is represented by three closely related languages (Manjak, Mankanya, Pepel). Numerical terms attested in them are presented in the table below (Table 4.240).

Table 4.240: Manjak numerals

1	lɔl(e)/lɔŋ	7	6+1, jand/jaanʔ/ cand (Pepel)
2	-təb/-təw, -pugut/pugus (Pepel)	8	4PL, koas/ʊʌs
3	wa-(y)ant/wa-jent/ jens	9	10-1, (8+1)
4	baakər/wakər	10	5PL ('hands'), (n)taaja/taaya, taim (Pepel)
5	ɲɛn ('hand')	20	10*2
6	paagi/paaji	100	< French
		1000	kɔnt

As can be gleaned from the table, the Manjak stems for numerals are very different from those attested in Joola. At the same time, morphological and lexical evidence strongly suggests that these two branches are genetically the closest and belong to the same Bak sub-group.

This implies that the numeral system of one of these branches must have undergone systematic innovations. We will reserve our conclusions until the evidence from the other Bak sub-groups, i.e. Balant and Bijogo, is reviewed.

4.12.2.3 Balant

Despite the fact that Balant is usually treated as one language, we will present the evidence of Balant Ganja and Balant Kentohe separately (Table 4.241), because the difference between these two idioms is of key importance to our study.

The opening sequence of the Ganja terms is quoted according to Creissels & Biaye 2015. They form the most reliable part of the presentation. A few remarks pertaining to the differences in these Balant dialects are in order. First of all, the Balant Kentohe terms for 'one', 'two', 'three' and 'six' exhibit a final homorganic nasal of uncertain origin. The forms attested by Koelle in the 19th century sources suggest that we are dealing with a morpheme -n not assimilated to a preceeding consonant by point of articulation. Secondly, Koelle's evidence speaks in favor of 'six' being a base for a larger group of numerical terms. According to him, not only 'eight' and 'nine' but also 'ten' followed the pattern '6+'.

Table 4.241: Balant numerals

	Balant Ganja	Balant Kentohe
1	hódà/wódà/-ɔdaʔ, bóódíbó/wódibó (counting)	-ɔɔdn/ho:dn/fóóda
2	sìbí/-sebe	-sɪbm/-sebm/g-ʃííbn (Koelle 1963[1854])
3	hàbí/yààbíí	-habm/káábn (Koelle 1963[1854])
4	tàllá/tàhlà	-tasla/tahla/tájiila (Koelle 1963[1854])
5	jùíf/jéèf	cɪf/‘-cef/kiif ~ ciif (Koelle 1963[1854])
6	fááj/faac	mfaacp/faad (Koelle 1963[1854]), 5+1
7	6+1	6+1, 5+2
8	táhtállà/tāntàhlā (4 redupl.), 6+2	5+3, 6+2 (Koelle 1963[1854])
9	jíntállá/jíntàhlā (5+4)	5+4, 6+3 (Koelle 1963[1854])
10	jímmín/jínminn (<5?)	cɪfmun/f-cef meen (<5?), 6+4 (Koelle 1963[1854])
20	10*2	<‘person’
100	gèmé/kémé (borrowed)	<‘5 persons’
1000	wílí (borrowed), kont	f-ko:nti

4.12.2.4 Bijogo

Let us examine an analysis of the Bijogo numeral system found in (Seeger 2002). According to him, the term for ‘one’ is *nɔɔd* (“cette forme est retenue pour l’énumération abstraite”, *ibid.* 171). His interpretation of *-d as the only true reflex of the etymon (with other segments ensuring the grammatical agreement) is immediately convincing, cf. the following examples quoted by him (*ibid.* 171):

- (2) a. *o-to ɔ-nɔɔd* ‘a person’
 b. *e-bootɪ ɛ-nɛɛd* ‘a dog’
 c. *u-gbe u-nɛɛd* ‘a road’
 d. *ka-jɔkɔ n-ka-d* ‘a house’
 e. *ɲɔ-katɔ ɲ-ɲɔ-d* ‘a fish’.

Table 4.242: Bijogo numerals

	Bijogo Kagbaga (Bubaque)	Bijogo (other dialects)
1	n-ɔɔd (*-d)	
2	n-somb (Segerer, p.c.), n-sombɛŋt	sòòbɛ́/súngb/cuuwɛ, ndank (Kamona)
3	ɲ-ɲɔ-ɔkɔ (<‘fingers’)	
4	ya-agenɛk	
5	n-de-ɔkɔ (dɛ ‘to finish’, -ɔkɔ ‘hand’)	nu-duβ-ɔkɔ (Kamona)
6	5+1	
7	5+2	
8	5+3	
9	5+4	
10	n-ruakɔ (ru ‘to rise’, -ɔkɔ ‘hand’)	
20	o-joko (‘person’), -ansak-o-to (‘to finish’+‘somebody’)	ɲɔjɛt oto (Kamona), Koelle 1963[1854]: ríakáǝto/ɲórembaǝóoto
100	20*5	
1000	kuntu	

Segerer justly observes that ‘La forme générale de l’élément ayant pour valeur ‘un (autre)’ est donc (V)-n-pC-d, où pC est le préfixe de classe du nom déterminé’ (ibid. 171).

He also quotes the form *dideeki* ‘seul’ (var. *deeki* ‘tout seul’). A variant of this form probably appears as *èdǝigé/ néédigɛ/ módiigɛ* ‘one’ in Wilson and Koelle.

As demonstrated by Segerer, the term for ‘three’ (*ɲ-ɲɔɔkɔ*) is a Bijogo innovation of a cultural origin, cf. SG *ɲɔ-ɔkɔ* - PL of *nɔ-ɔkɔ* ‘finger’ (dim. <*kɔ-ɔkɔ* ‘hand’): ‘Un roi bijogo ne se déplace jamais sans l’attribut symbolique de sa fonction, constitué par une sculpture de bois et de corne ... Cet objet, nommé u-ran kɔ-ɔkɔ, représente une main à trois doigts’ (ibid. 172). It should be noted that this root is attested in all Bijogo dialects and is already accounted for by Koelle (*-ɲɔǝgɔ*).

As established by Segerer, the same root is attested as *ɔkɔ* in the terms for ‘five’ and ‘ten’.

4.12.2.5 Proto-Bak

Now we will compare the Bak numerals.

4.12.2.5.1 ‘One’ (Table 4.243)

Table 4.243: Bak numerals for ‘1’

Joola	don	-anor, əkon, fənɛɾ, yinka, (sia), (ta)
Manjak	lɔɔl(e)/lɔŋ	
Balant		-ɔdaʔ
Bijogo	*d	-edjɛ

A comparison of the terms quoted in the leftmost column yields the form that can be tentatively recorded as **don*. The rightmost column gives an overview of roots attested in only one out of four branches.

4.12.2.5.2 ‘Two’ (Table 4.244)

Table 4.244: Bak numerals for ‘2’

Joola	si-ʔubəʔ	si-gabaʔ
Manjak		-təb/-təw, pugʊʔ/pugus
Balant	sɪbɪ/-sebe	
Bijogo	sòòbɛ́/súngb/cuuwɛ	

The leftmost column presents the root attested in three sub-groups. It is traceable to **ʔubəʔ*.

4.12.2.5.3 ‘Three’ and ‘four’ (Table 4.245)

For the first time in our step-by-step analysis of numeral systems in the numerous NC families we observe the existence of a separate root for ‘three’ in each of the branches of a language group.

The term for ‘four’ exhibits an isolated Joola-Manjak innovation as well as isolated innovations in Balant and Bijogo.

Table 4.245: Bak numerals for ‘3’ and ‘4’

	‘3’	‘4’	‘4’
Joola	si-feegir	si-bääkiɾ	
Manjak	wa-(y)ant/wa-jenɿ/jens	baakər/wakər	
Balant	habi/yabi		tasala/tahala
Bijogo	n-ɲɔ-ɔkɔ (<‘fingers’)		ya-agenek

4.12.2.5.4 ‘Five’ (Table 4.246)

Table 4.246: Bak numerals for ‘5’

Joola		fu-tɔk, tənʔ, ɲaa-suwaŋʔ (cf. ‘10’)
Manjak	ɲɛɛn (‘hand’) (cf. Joola ‘10’)	
Balant		jüf/jéèf
Bijogo	n-de-ɔkɔ (dɛ ‘to finish’, -ɔkɔ ‘hand’)	

The pattern ‘hand’ > ‘5’ is traceable within two branches. However, the roots involved are different in each case. Numerous isolated forms are grouped together in the rightmost column.

4.12.2.5.5 The terms from ‘six’ to ‘nine’ (Table 4.247)

Table 4.247: Bak numerals and patterns for ‘6’-‘9’

	‘6’	‘6’	‘7’	‘8’	‘9’
Joola	5+1		5+2	5+3	5+4
Manjak		paagi/paaji	6+1, jand/jaanʔ/cand	4PL, koas/ʊas	10–1, (8+1)
Balant		fááj/faac	6+1	4 redupl., 6+2	6+3, 5+4
Bijogo	5+1		5+2	5+3	5+4

The form **paag/paaj* ‘six’ is a common Manjak-Balant isogloss.³⁷ It is not surprising that the primary term for ‘six’ attested in these languages served as the basis for the ‘7=6+1’ pattern. This pattern received further development in Balant where it was employed for terms up to ‘ten’ (i.e. ‘10=6+4’) according to the 19th century sources. At the same time, the archaic pattern ‘8=4PL’/‘8=4 redupl.’ is attested in these languages alongside the pattern ‘8=6+2’.

4.12.2.5.6 ‘Ten’ (Table 4.248)

Table 4.248: Bak numerals for ‘10’

Joola	ε-ntaaja ³⁸	ku-ηen/ηen ‘hands’	‘hands’ (bεεs, moŋu/ηomu, tie)	ηaa-suwan
Manjak Balant Bijogo	(n)taaja/taaya		5PL (‘hands’) n-ruakɔ (ru ‘to rise’, -ɔkɔ ‘hand’)	taim jimmín, 6+4

In addition to the common pattern ‘10 = ‘hands’’, both branches share a common root (*ntaaja*) that could be interpreted as a shared Proto-Joola-Manjak innovation.

4.12.2.5.7 ‘Twenty’, ‘hundred’ and ‘thousand’

The term for ‘twenty’ is based on the lexical root meaning ‘person’ in all of the branches (except for Manjak, where it was replaced with the pattern ‘20=10*2’). The same development is observable in Balant Ganja as well.

The terms for ‘hundred’ and ‘thousand’ are most likely borrowings. However, the origin of *kont/kunt* ‘thousand’ attested in three of the Bak branches deserves special discussion (in North Atlantic this root (*η-kontu*) is found in both of the Buy languages).

³⁷Guillaume Segerer is right to note (p.c.) that the Manjak-Balant form **paag*- ‘6’ may be related to Joola **-feegir/-həəji* ‘3’

³⁸The stem is attested only in Joola Feloup, so, it seems to be borrowed from Manjak.

4.12.2.5.8 Overview of the Bak numerical terms (Table 4.249)

Table 4.249: Bak numerals

1	don/lon, -anor, əkon	7	6+1, 5+2, jand/jaan?/ cand (Pepel)
2	ɬubəʔ, -təb/-təw, -pugut/pugus	8	4PL/4 redupl., ʊʌs
3	feegir, yant/jent, habi/yabi	9	5+4, 10–1, 6+3
4	baakər/wakər, tasala/tahala	10	5PL ('hands'), (n)taaj, taim, -suwan
5	'hand', tək, tən?	20	'person', 10*2
6	paag/paaj, 5+1	100	borrowed
		1000	kənt (borrowed?)

4.12.3 North Atlantic and Bak Atlantic numerals in the comparative perspective

It should be stressed that the Atlantic family is among the most divergent within Niger-Congo. Some of the numerical terms in both of the Atlantic groups exhibit a variety of forms potentially explained as Proto-NC reflexes. Moreover, the comparative evidence presented in Tables 4.227 (Proto-North-Atlantic) and 4.241 (Proto-Bak-Atlantic) points to the near total absence of common roots present in both groups. The only exception to this is the root *tək/ tVk* 'five'.

In view of this, the only available solution would be the study of the Atlantic evidence within a wider NC context (i.e. in contrast to the reconstructions available for other NC families). A comparison of the intermediate reconstructions within the macro-family will be offered in the next chapter.

4.13 Isolated languages vs. Atlantic and Mel

According to the traditional classification outlined in Sapir 1971, Limba, Sua and Gola belong to the Atlantic languages. However, as we tried to demonstrate in Pozdniakov & Segerer 2017 (forthcoming) this hypothesis is as ill-grounded today as it was half a century ago.

An overview of the pertinent data for each language is presented in the tables below.

4.13.1 Sua

Table 4.250: Sua numerals

1	sɔn	7	5+2
2	cen	8	5+3
3	b-rar	9	5+4
4	b-nan	10	tɛŋi
5	sɔŋgun	20	10*2
6	5+1	100	kɛmɛ
		1000	uŋ-kɔntu

4.13.2 Gola

Table 4.251: Gola numerals

1	guùŋ	7	5+2
2	tì-yèe/tī-el/cel	8	5+3
3	taai/tāāl	9	5+4
4	tii-nàŋ	10	zìiyà
5	nòònòŋ	20	kpè(w)ùŋ
6	5+1	100	20*5
		1000	< English

4.13.3 Limba

Table 4.252: Limba numerals

1	ha-nthe	7	5+2
2	ka-le/kaa-ye	8	5+3
3	ka-tati	9	5+4
4	ka-naŋ	10	kɔhi
5	ka-sɔhi	20	10*2
6	5+1	100	kɛmɛ, wuli (borrowed)
		1000	wulu (< Mande)

Contents

This chapter includes 250 tables presenting the evidence by group, branch or sometimes a dialect of a certain language. Among them are summary tables that provide an overview of the numerical terms in twelve major families of Niger-Congo and in a number of isolated languages. Our attempt at reconstructing the Proto-Niger-Congo numeral system on the basis of this comprehensive evidence will be presented in Chapter 5.

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The numeral system of Proto-Niger-Congo

This book proposes the reconstruction of the Proto-Niger-Congo numeral system. The emphasis is placed on providing an exhaustive account of the distribution of forms by families, groups, and branches. The big data bases used for this purpose open prospects for both working with the distribution of words that do exist and with the distribution of gaps in postulated cognates. The distribution of filled cells and gaps is a useful tool for reconstruction.

The first chapter of this book is devoted to the study of various uses of noun class markers in numeral terms. The second chapter deals with the alignment by analogy in numeral systems. Chapter 3 offers a step-by-step reconstruction of number systems of the proto-languages underlying each of the twelve major NC families, on the basis of the step-by-step-reconstruction of numerals within each family. Chapter 4 deals with the reconstruction of the Proto-Niger-Congo numeral system on the basis of the step-by-step-reconstructions offered in Chapter 3. Chapter 5 traces the history of the numerals of Proto-Niger-Congo, reconstructed in Chapter 4, in each individual family of languages.

