The phonology of Proto-Central Chadic : the reconstruction of the phonology and lexicon of Proto-Central Chadic, and the linguistic history of the Central Chadic languages

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THE PHONOLOGY OF PROTO-CENTRAL CHADIC

THE RECONSTRUCTION OF THE PHONOLOGY AND LEXICON OF PROTO-CENTRAL CHADIC, AND THE LINGUISTIC HISTORY OF THE CENTRAL CHADIC LANGUAGES

The Phonology of Proto-Central Chadic

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Proto-Central Chadic Consonants

	Labial	Alveolar	Laminal	Velar	Labialized Velar
Plosive	p	t	ts	k	k^w
	b	d	dz	g	g^w
Implosive	ɓ	ɗ			
Fricative		ɬ	s	h	h^w
	v	ɮ	z	ɣ	$ɣ^w$
Nasal	m	n			
Pre-nasalized	^mb	nd	^ndz	(^ŋg)	$(^ŋg^w)$
Liquid		r			
Approximant			j		w

The Classification of the Central Chadic Languages

Sub-branch	Major Group	Group	Subgroup	Language
South		Bata	Bata Proper	Bachama, Bata, Fali, Gude, Gudu, Holma, Jimi, Ngwaba, Nzanyi, Sharwa
			Tsuvan	Tsuvan, Zizilivakan
		Daba	Daba	Daba, Mazagway Hidi
			Mina	Mina, Mbudum
			Buwal	Buwal, Gavar
		Mafa		Mafa, Mefele, Cuvok
		Tera	East	Boga, Ga'anda, Hwana Jara, Tera
		Sukur		Sukur
Hurza		Hurza		Vame, Mbuko
North	Margi-Mandara-	Margi	Bura	Bura, Cibak, Kofa, Putai,

Mofu			Nggwahyi
		Margi	Kilba, Margi South, Margi
	Mandara	Wandala	Mandara, (Malgwa), Glavda
		Dghwede	Cineni, Dghwede, Guduf, Gava, Gvoko
		Podoko	Podoko, Matal
	Mofu	Tokombere	Ouldeme, Mada, Muyang, Moloko
		Meri	Zulgo, (Gemzek), Merey, Dugwor
		Mofu	Mofu North, Mofu-Gudur
	Maroua		Giziga North, Giziga South, Mbazla
	Lamang		Lamang, Hdi, Mabas
	Higi		Bana, Hya, Psikye, Kamwe
Musgum-North Kotoko	Kotoko Island		Buduma
	Kotoko North		Mpade, Afade, Malgbe, Maltam
	Musgum		Musgum, Mbara, Muskum
	Kotoko Centre		Lagwan, Mser
	Kotoko South		Zina, Mazera
	Gidar		Gidar

Abbreviations

... ^{y}	Palatalization prosody
... ^{w}	Labialization prosody
/.../	Phonemic form
[...]	Phonetic form
*...	Reconstructed form
→	Historic change
1pEx	1st person exclusive plural
1S	1st person singular
C	Consonant
LAB	Labialization prosody
n	noun
N	Nasal
n.d.	no date
NUL	Null (place-holder) suffix
PAL	Palatalization prosody
PCC	Proto-Central Chadic
PERF	Perfect
SF	Surface Form
UF	Underlying Form
v	verb
V	Vowel

Section I - BACKGROUND

1 Introduction

1.1 Goals

The goal of this study is to reconstruct the phonology of Proto-Central Chadic. Central Chadic is a language group spread across Chad, Cameroon and Nigeria and is a primary branch of the Chadic language family within the Afroasiatic phylum of languages. It is characterised by a high degree of phonological diversity, much higher than within the other branches of Chadic. Previous reconstructions of Chadic or its branches have focussed on the consonantal system. Here we will also tackle what may loosely be called the vowel system. The result is a reconstruction of the sound system of Proto-Central Chadic (though not including tone or stress), and of the daughter languages of Proto-Central Chadic, the ancestors of the present day groups of Central Chadic languages. The study includes a detailed sub-classification of the Central Chadic languages, and the reconstruction of more than two hundred lexical items.

In general, the Central Chadic languages are described as possessing very few underlying vowels, typically two, but in some cases just one (Barreteau 1988; Bow 1999). However the number of surface vowels is often considerably higher. There are two principal causes for this. Firstly, labialized and palatalized consonants play an important role in modifying the underlying vowels. Secondly, word-level vowel-harmony can cause the fronting or back-rounding of vowels throughout a word.

In the languages where vowel harmony is present, it is analysed as being caused by a phonemic entity known in Chadic linguistics simply as a 'prosody'. In this study we will show that there are languages where the palatalization of consonants is also due to the presence of a prosody.

From this basis we will categorise the Central Chadic languages typologically as following one of four phonological systems. The first is the Vowel Prosody system, where the predominant feature is the presence of vowel harmony. The second is the Consonant Prosody system, where the languages possess large sets of palatalized and labialized consonants. The third system is the Mixed Prosody system, where features of both Vowel Prosody and Consonant Prosody are present, and the fourth system is the Kotoko system, where there are no active prosodies.

In the Central Chadic languages, as well as in the history of Central Chadic languages, there is a strong interplay between the vocalic, consonantal and prosodic systems. Before any comparative analysis can be done, it is essential that the roles of these three components are understood in the individual languages.

Our task, then, is not only to reconstruct the underlying vowels and consonants of Proto-Central Chadic, but also to reconstruct the history of labialized and palatalized consonants, along with the palatalization and labialization prosodies.

There are several important results that come out of the study. The first is the reconstruction of a palatalization prosody for Proto-Central Chadic that has reflexes that cause front vowel harmony in Vowel Prosody languages and palatalize consonants in Consonant Prosody languages (see chapter 11).

The second is to show that back-rounding vowel harmony and the labialization of labial consonants are not due to the existence of a Proto-Central Chadic labialization prosody, but are of comparatively recent origin, and are the result of processes that have affected labialized velars.

A third result is the reconstruction of three underlying vowel phonemes for Proto-Central Chadic. This system was largely preserved in the Consonant Prosody Languages, but was reduced to a two vowel system in the Vowel Prosody languages.

This study is divided into three sections. The first section gives the background to the languages and peoples, the research carried out to date, the theoretical issues important to the study, and the areal and genetic groupings that are important in the history of Central Chadic languages.

The second section describes the phonologies of the different Central Chadic languages, grouped under four different phonological types. It also establishes the broad phonological characteristics of the ancestor languages of the different groups within Central Chadic, constituting an intermediate step between Proto-Central Chadic and the present day languages.

The third section presents the reconstruction of the phonological system of Proto-Central Chadic. This includes the reconstruction of the consonantal, vocalic and prosodic systems.

Full data for the reconstructions used in the analysis can be found at http://centralchadic.webonary.org/, and a summary of the Proto-Central Chadic lexicon can be found at http://protocentralchadic.webonary.org/.

1.2 Methodology

The methodology used here follows the well-established comparative method (Bynon 1977; Campbell 2004; Crowley and Bowern 2009). The first stage is to inspect the data from the languages under study and to identify words with similar meaning and form, i.e. apparent cognates. When a good number of apparent cognates has been found, the data is again inspected to identify regular sound correspondences between groups of languages. For example, one group of languages may have /n/ in all the apparent cognates, whereas another group has /r/ in the same place in the word. These regular correspondences serve to establish four things. Firstly, they provide evidence that the apparent cognates are genuinely cognate and not just chance similarities. Secondly, they allow for the proposal of rules for regular historical sound changes. For example we may propose that the ancestor language had *n, but that there was a change *n→r in one group. Thirdly, they allow us to group languages that have a shared linguistic history on the basis of these shared innovations, i.e. the languages that have /r/ share a common ancestor, but we cannot say the same for the languages with /n/ as there is no shared innovation. Fourthly, the cognates together with the corresponding rules for sound changes allow for the reconstruction of the forms of the words in the ancestor language.

This is a very simplified summary of the method, and there are many pitfalls to be avoided. Loanwords may show correspondences that are not there in the indigenous vocabulary, language contact can spread phonological changes between languages that are not directly related, and identical sound changes can occur independently in different languages implying a relationship that doesn't exist. Where a sound change is used to justify a genetic grouping, it is also necessary to look at the degree of similarity of the lexicons of the languages involved and to consider the likely history of the people groups involved in order to establish that the genetic grouping is plausible. If several highly similar neighbouring languages share a sound change, it is likely to be evidence of genetic affiliation. If dissimilar languages hundreds of kilometres apart share a sound change, this is more likely to be due to chance. Ideally, genetic groupings should be supported by several sound changes, and these should be found in a good number of core lexical items.

Following this method gives four results: a lexicon of reconstructed forms for the proto-languages; a set of regular sound changes linking different historical stages of the language; a classification of the languages based on shared innovations; a reconstruction of the phonemic inventory of the proto-language. (It should be noted that the reconstructed inventory is phonemic rather than phonetic, though in most cases the phonetic realisations can be deduced.)

For this particular study there are two important methodological considerations. Firstly, the reconstructions are made based on at least two layers of history. Reconstructions are made for each group within Central Chadic, and then these are used to reconstruct the form for Proto-Central Chadic. In some cases it is possible also to reconstruct forms for the proto-languages of sub-groups within a group, or of the proto-language of a major group that was ancestral to a number of groups.

The second consideration is that the analysis must be made on the basis of a deep analysis of the underlying forms of the words in the individual languages. Examining the surface segments is inadequate for establishing regular correspondences and sound changes, particularly for Central Chadic vowels (Wolff 1983a). Only by working from the underlying segments and prosodies is it possible to understand the historical processes involved.

For example, the following table gives some sample phonetic data for the word 'nose'.

Language	Surface Form
Zulgo	hitir
Merey	həter
Ouldeme	hu^{n}dar
Malgwa	əktare
Dghwede	xtire
Hdi	hətsiŋ
Vame	hətʃeŋ
Bana	kʃən
Jimi	ʃən-ən
Sukur	ʃin

Table 1- Sample cognates of the root 'nose'

We can see variations in the consonants, with the initial consonant having as reflexes [k], [x], [h] or zero, the middle consonant having the reflexes [t], [^{n}d],

[ts], [tʃ] or [ʃ], and the final consonant having the reflexes [r], [n] or [ŋ]. With the vowels, the surface forms vary between [e], [i], [a], [u], [ə] and zero, and it is not clear either where the vowels should be placed, or how many there should be in the proto-form.

A phonemic representation of Table 1 by contrast looks as in Table 2, from which the Proto-Central Chadic root for 'nose' can be reconstructed as *hʷɨtsɨn ^{y}. (The superscript ^{y} represents the palatalization prosody.)

Language	SF	UF
Zulgo	hitir	hɨtɨr ^{y}
Merey	həter	hɨtar ^{y}
Ouldeme	huⁿdar	hʷɨⁿdar
Malgwa	əktare	ɨktarɨ
Dghwede	xtire	xtirɨ
Hdi	hətsiŋ	hətsin
Vame	hətʃeŋ	hətsan ^{y}
Bana	kʃən	ksʲən
Jimi	ʃən-ən	sɨn ^{y}
Sukur	ʃin	sɨn ^{y}

Table 2 - Sample phonemic forms for 'nose'

This palatalization prosody has different effects in different languages. In some it fronts some or all of the vowels of the word (Zulgo, Merey), in others it palatalizes certain consonants (Jimi, Sukur), and in some it does both (Vame). In some languages the palatalization prosody is no longer a word-level feature, but is frozen in a vowel (Dghwede, Hdi) or a consonant (Bana). In addition, many languages have a phrase-final vowel lowering rule (Merey, Malgwa, Dghwede, Vame).

Simple comparison of the surface segments will therefore not yield the correct reconstruction. Only a deep phonemic analysis is able to reveal the phonemic form of the root. Unfortunately, neither of these will be able to tell us for sure what the original surface form of *hɨtsɨn ^{y} actually was! We can deduce the presence of the palatalization prosody, but only guess at its effect.

It should also be remembered that language contact plays a major role in how languages change. The Central Chadic region is densely populated with people and languages, and has been the site of many migrations (see section 3.5). Words, sounds and phonological processes have all been borrowed and spread

between languages. In this study we will also be taking into account the influence the languages have had on each other, as well as the influence from non-Chadic peoples.

1.3   The Languages and Peoples

Chadic is one of the six families within the Afroasiatic family, alongside Cushitic, Omotic, Semitic, Egyptian and Berber. More than half of the Afroasiatic languages spoken today are Chadic languages. The Ethnologue (Lewis 2009) lists 195 Chadic languages, of which 78 are Central Chadic (called Biu-Mandara in the Ethnologue and by certain authors).

The following map shows the present-day distribution of the branches of Afroasiatic.
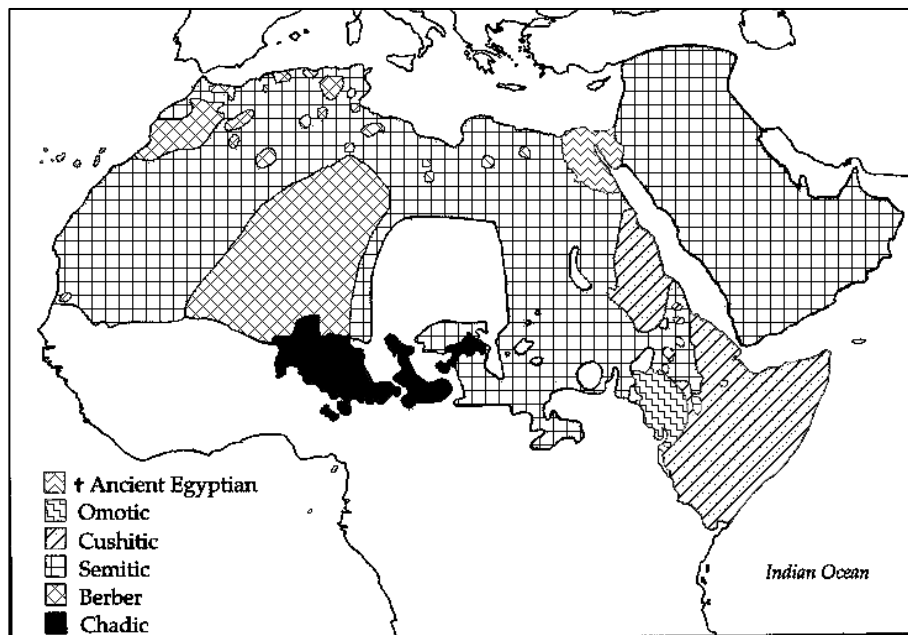
Map 1 - Chadic and Afroasiatic (Starostin 2008)

Central Chadic is one of the four branches of the Chadic language family, with the others being West Chadic, East Chadic and Masa. (Some scholars, beginning with Jungraithmayr and Shimizu (1981), prefer to treat the Central Chadic and

Masa branches as a single branch, though Shryock (1990) provides convincing arguments against this.)

The Central Chadic or Biu-Mandara languages are spoken in an area covering north-eastern Nigeria, the north of Cameroon and the western edge of Chad. This area is within the Sahel, the region of Africa just to the south of the Sahara desert.

The following map shows the current locations of the languages of the four branches.
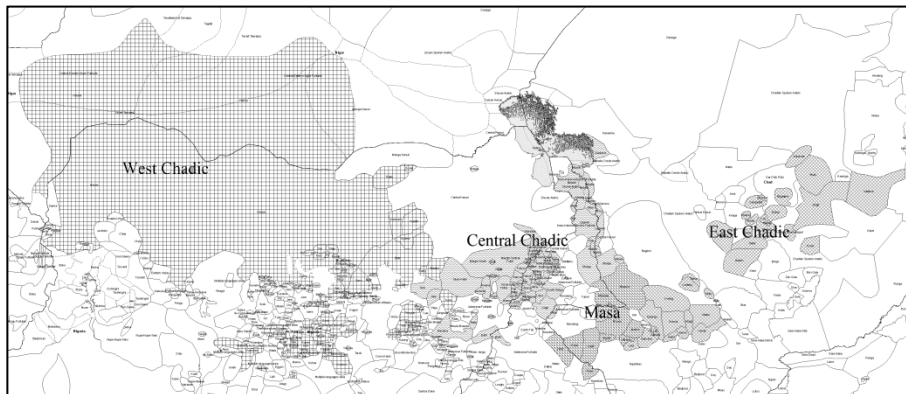
Map 2 - The branches of Chadic

The Central Chadic region can be divided between three different ecological environments which are significant for the linguistic history of the region. The first is the Mandara Mountains, a range of mountains up to 1,500m high in the western part of northern Cameroon, located to the north and south of a line between Maroua and Mokolo. This area has higher rainfall than the surrounding land and is more densely populated. The second environment is the grassland areas to the west and east of the Mandara Mountains. Thirdly there are the riverain areas around the south of Lake Chad and along the Logone and Chari rivers along the Cameroon-Chad border. (Lake Chad is one of the largest lakes in Africa. The lake expands considerably during rainy season, and then contracts during dry season. The Logone and Chari rivers flow in to Lake Chad, but there is no river flowing out of the lake; water loss is entirely due to evaporation.)

The following map shows the geography of the region within which the Central Chadic languages are spoken.
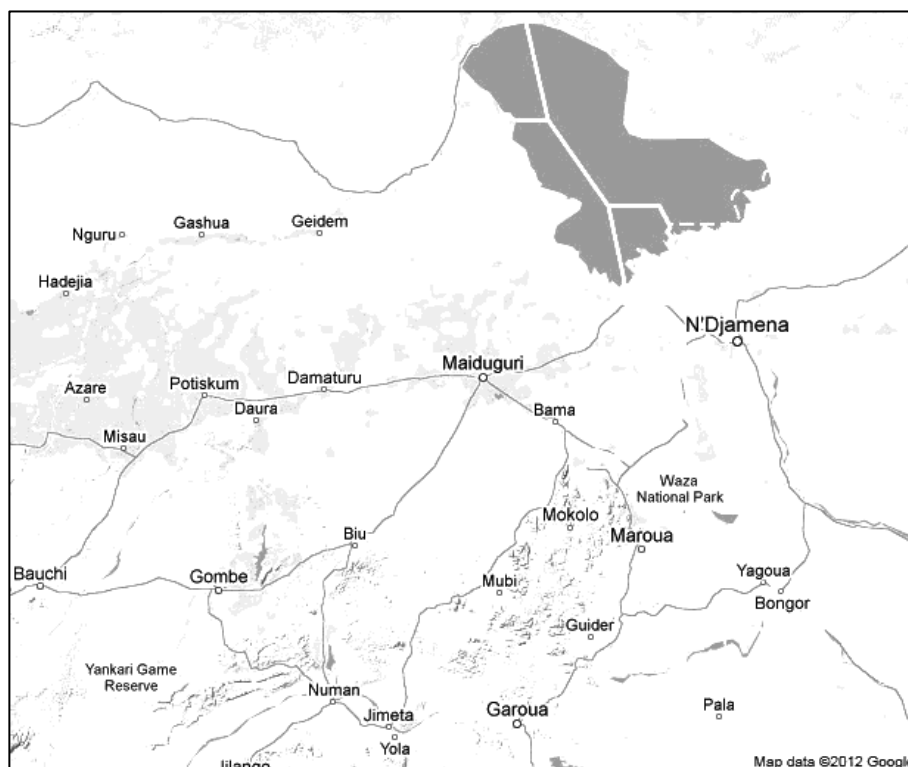
Map 3 - Modern map of the Central Chadic region

1.4   Sources and Conventions

The data used in this study comes in a wide variety of forms. At one end there are published reference grammars and dictionaries produced by linguists, either from the region itself or from overseas. At the less formal end we have word lists and dictionaries collected by local people with little or no linguistic training, or by priests, anthropologists and other interested expatriates who not have any linguistic training. In between we have a number of unpublished wordlists collected by linguists, and various phonologies or academic articles on the languages that contain useful data.

In this study, I have mostly disregarded 'historic' data from early European explorers, and the more casual wordlists such as the Chadic Wordlists (Kraft 1981), the ALCAM data (Dieu and Renaud 1983) and data from SIL surveys. These wordlists were often collected in a very short time, and were not backed up by testing or phonological research. When compared with the data from longer term studies, there are numerous transcription errors. However, these sources are occasionally used alongside more reliable data to support a reconstruction.

The data varies not only in quality but also in type. Some is raw phonetic data, some is phonemic and some is orthographic. A number of different phonetic or orthographic systems are used in the sources. Here we will present the data using IPA symbols for clarity. The type of data is denoted by the standard conventions of […] for phonetic, /…/ for phonemic and '…' for orthographic, or by the column headings in tables. Reconstructed forms and phonemes are preceded by an asterisk *. Any reconstructions or underlying forms given that are not credited are my own. Surface forms given use a broad phonetic transcription.

The lexical data sources used are given in the following table. Phonological studies will be referenced in the sections on the individual languages. The present study includes data from 60 of the 78 Central Chadic languages listed in Lewis (2009), together with data from six varieties treated as dialects in Lewis (2009), which amounts to 66 varieties used in this study. For ease of reference, the language names used are mostly those given in the Ethnologue 16th Edition (Lewis 2009). The exceptions are Bachama for Bacama, Margi for Margi Central, Mbazla for Baldemu, Ouldeme for Wuzlam, Bura for Bura-Pabir, Mabas for Vemgo-Mabas, Zina for Jina, Mazera for Majera, Maltam for Maslam and Kilba for Huba. Some varieties not listed in the Ethnologue as separate languages are included, namely Gemzek and Zulgo (in the Ethnologue as Zulgo-Gemzek); Higi, Kamwe-Futu, Kamwe-Nkafa (Kamwe); Malgwa (Mandara); and Musgum, Mulwi, Vulum, Munjuk (Musgu).

The following table lists all the Central Chadic languages listed in the Ethnologue (including the varieties just mentioned) and the data sources (where available).

Language [code]	Group	Source	Type
Afade [aal]	Kotoko North	(Allison n.d.)	Word list (unpublished)
Bachama [bcy]	Bata	(Seibert n.d.)	Word list (unpublished)
Bana [bcw]	Higi	(Lienhard and Giger 1989)	Lexicon (unpublished)
Bata [bta]	Bata	(Boyd 2005)	Lexicon (unpublished)
		(Pweddon and Skinner 2001)	Dictionary
Boga [bvw]	Tera	none	
Buduma [bdm]	Kotoko Island	(McKone 2009)	Lexicon (unpublished)
Bura [bwr]	Margi	(Blench 2009a)	Dictionary (unpublished)
		(Schuh n.d.)	Word list (unpublished)
Buwal [bhs]	Daba	(Viljoen and Viljoen in progress)	Lexicon (unpublished)
Cibak [ckl]	Margi	(Hoffmann 1955)	Linguistic article
Cineni [cie]	Mandara	none	
Cuvok [cuv]	Mafa	(Ndokobaï in progress)	Lexicon (unpublished)
Daba [dbq]	Daba	(Lienhard and Giger 1982)	Dictionary
Dghwede [dgh]	Mandara	(Frick 1977)	Linguistic article
Dugwor [dme]	Mofu	(Gravina and Jubumna 2004)	Word list (unpublished)
Fali [fli]	Bata	none	
Ga'anda [gqa]	Tera	(Ma Newman 1978)	Word list (unpublished)
Gavar [gou]	Daba	(Viljoen and Viljoen in progress)	Word list (unpublished)
Gemzek [gnd]	Mofu	(Gravina, Sabathaï, and Gwala-Madang n.d.)	Word list (unpublished)

Language [code]	Group	Source	Type
Gidar [gid]	Gidar	(Schuh 1982)	Word list
		(Hungerford n.d.)	Word list (unpublished)
		(Noukeu 2002)	Linguistic article
Giziga North [gis]	Maroua	(Gravina 2004)	Word list (unpublished)
Giziga South [giz]	Maroua	(Michielan and Jaouen n.d.)	Dictionary (unpublished)
Glavda [glw]	Mandara	(Rapp and Benzing 1968; Rapp and Muehle 1969)	Dictionary
		(Owens n.d.)	Word list (unpublished)
		(Nghagyiva n.d.)	Database
Gude [gde]	Bata	(Hoskison 1983)	PhD Thesis
		(Schuh n.d.)	Word list (unpublished)
Gudu [gdu]	Bata	none	
Guduf-Gava [gdf]	Mandara	none	
Gvoko [ngs]	Mandara	none	
Hdi [xed]	Lamang	(Bramlett 1996)	Lexicon
		(Eguchi 1971)	Lexicon
Higi [hig]	Higi	(Mohrlang 1972)	Phonology
Holma [hod]	Bata	none	
Hwana [hwo]	Tera	(Harley n.d.)	Word list (unpublished)
Hya [hya]	Higi	none	
Jara [jaf]	Tera	none	
Jilbe [jie]	Kotoko	none	
Jimi [jim]	Bata	(Djibi n.d.)	Dictionary (locally published)
Kamwe Futu [hig]	Higi	(Harley 2009a)	Word list (unpublished)
Kamwe Nkafa [hig]	Higi	(Harley 2009b)	Word list (unpublished)
Kilba [hbb]	Margi	(Schuh n.d.)	Word list (unpublished)
Kirya [hig]	Higi	(Blench and Ndamsai 2009a)	Dictionary (unpublished)

Language [code]	Group	Source	Type
Kofa [kso]	Margi	none	
Lagwan [kot]	Kotoko Centre	(Shryock n.d.)	Database
Lamang [hia]	Lamang	(Wolff n.d.)	Word list (unpublished)
Mabas [vem]	Lamang	none	
Mada [mxu]	Mofu	(Barreteau and Brunet 2000)	Dictionary
		(Nkoumou and Telemnke 2003)	Dictionary
Mafa [maf]	Mafa	(Barreteau and le Bléis 1990)	Dictionary
Malgbe [mxf]	Kotoko North	(Allison n.d.)	Word list (unpublished)
Malgwa [mfi]	Mandara	(Löhr 2005)	Lexicon (unpublished)
Maltam [msv]	Kotoko North	(Allison n.d.)	Word list (unpublished)
Mandara [mfi]	Mandara	(Fluckiger and Whaley n.d.)	Lexicon (unpublished)
Margi [mrt]	Margi	(Hoffmann 1963)	Grammar
Margi South [mfm]	Margi	(Harley n.d.)	Word list (unpublished)
Matal [mfh]	Mandara	(Branger in progress)	Word list (unpublished)
Mazagway [dkx]	Daba	(Noussi n.d.)	Word list (unpublished)
Mazera [xmj]	Kotoko South	(Allison n.d.)	Word list (unpublished)
Mbara [mpk]	Musgum	(Tourneux, Seignobos, and Lafarge 1986)	Word list
Mbazla [bdn]	Maroua	(Seignobos and Tourneux 1984; Tourneux 1987)	Word list
Mbudum [xmd]	Daba	(Ndokobaï in progress)	Lexicon (unpublished)
Mbuko [mqb]	Hurza	(Gravina in progress)	Dictionary (unpublished)
Mefele [mfj]	Mafa	none	

Language [code]	Group	Source	Type
Merey [meq]	Mofu	(Gravina and Doumok in progress)	Lexicon (unpublished)
Mina [hna]	Daba	(Frajzyngier, Johnston, and Edwards 2005)	Grammar
Mofu North [mfk]	Mofu	(Barreteau and Hollingsworth 1990)	Lexicon (unpublished)
Mofu-Gudur [mif]	Mofu	(Barreteau 1988)	Dictionary
		(Hollingsworth and Hollingsworth 2009)	Dictionary
Moloko [mlw]	Mofu	(Friesen and Starr n.d.)	Lexicon (unpublished)
Mpade [mpi]	Kotoko North	(Allison n.d.)	Lexicon (unpublished)
Mser [kqx]	Kotoko North	(Allison n.d.)	Word list (unpublished)
Mulwi [mug]	Musgum	(Tourneux 1978a)	Linguistic article
Munjuk [mug]	Musgum	(Tourneux 1991)	Dictionary
Muskum [mje]	Musgum	(Tourneux 1977)	Linguistic article
Muyang [muy]	Mofu	(T. Smith forthcoming)	Dictionary
Nggwahyi [ngx]	Margi	none	
Ngwaba [ngw]	Bata	none	
Nzanyi [nja]	Bata	none	
Ouldeme [udl]	Mofu	(W. Kinnaird in progress)	Lexicon (unpublished)
Podoko [pbi]	Mandara	(Zagba, Jarvis, and Siddi 1986)	Lexicon
Psikye [kvj]	Higi	(Mazzucci 2006)	Locally published description
Putai [mfl]	Margi	none	
Sharwa [swq]	Bata	(Gravina n.d.)	Lexicon (unpublished)
Sukur [syk]	Sukur	(David 1996)	Word lists
		(Thomas in progress)	Lexicon (unpublished)
Tera [ttr]	Tera	(Newman 1964)	Word list
Tsuvan [tsh]	Bata	(Johnston n.d.)	Word list (unpublished)

Language [code]	Group	Source	Type
Vame [mlr]	Hurza	(W. Kinnaird in progress)	Lexicon (unpublished)
Zina [jia]	Kotoko South	(Schmidt, Odden, and Holmberg 2002)	Word list
Zizilivakan [ziz]	Bata	none	
Zulgo [gnd]	Mofu	(Haller 1986)	Lexicon

Table 3 - Lexical data sources

2   Genetic and Areal Affiliations

2.1   Introduction

This chapter deals with the genetic classification of the Central Chadic languages, and with the areal influences that have affected the development of these languages. We will first look at the previous research into the classification of Central Chadic, and then look at the areal influences and genetic splits that have been important in the history of the Central Chadic languages. Finally, we will present a new subclassification of Central Chadic.

2.2   Research on the Classification of Central Chadic Languages

2.2.1   *Studies in African Linguistic Classification (Greenberg 1950)*

As a starting point we will take Greenberg's major work on the classification of African languages. In the (1950) article he identifies a family that he terms 'Hamito-Semitic', though in later works the name 'Afroasiatic' is used (Greenberg 1966).

From this group he excludes certain languages whose classification was a matter of dispute. These were Fulani, which he placed in the West Atlantic branch of Niger-Congo, the 'Nilo-Hamitic' languages, which he linked with the Nilotic languages, and 'Hottentot', which he linked with the 'Bushman' languages.

Of significance for us is his inclusion of the Chad languages as a branch within Afroasiatic. This branch corresponds to the Chad-Hamitic group proposed by Lukas (Lukas 1936).

Greenberg divided up the Chad languages into nine groups as follows:

1. The languages now classified as West Chadic (Newman 1977a), including Hausa
2. The Kotoko languages, amongst which he included Shuwa Arabic
3. The Bata-Margi group, which comprised what are now known as the Bata, Higi, Margi, Tera and Lamang groups, as well as Podoko from the Mandara group
4. The languages now classified in the Daba, Maroua, Mofu and Mafa groups
5. Gidar (as the sole language in the group)
6. Mandara (including Malgwa)
7. Musgu (the Musgum group)
8. The Masa languages (i.e. Newman's (1977a) Masa branch of Chadic)
9. The languages now classified as East Chadic

The group names I've used are from Gravina (2011), and are the ones I use in the rest of the present study. The names are the same as Newman's (1977a) group names, except where the classification differs.

It is interesting to compare Greenberg's classification with Newman's (1977a) classification of Chadic into four branches. Three of the four branches correspond with individual groups in Greenberg's classification. However what is classified by Newman as Central Chadic is spread over six of Greenberg's groups (2 to 7). This highlights the surprising degree of variation found within Central Chadic.

As evidence for the classification of the 'Chad' languages as a single unit within Afroasiatic, Greenberg cites a number of grammatical features shared between the 'Chad' languages and other languages in Afroasiatic, and lists a number of roots that he reconstructs for Afroasiatic.

Although many of the details of Greenberg's classification have not stood the test of time, his work was broadly correct and laid the foundations for more detailed studies of the Chadic languages.

2.2.2 Chadic Classification and Reconstruction (Newman 1977a)

Newman's 'Chadic Classification and Reconstruction' is probably the most influential work on Chadic classification published to date. It followed on from an earlier work, 'Comparative Chadic: Phonology and lexicon' (Newman and Ma Newman 1966). In it he presents a detailed classification of the Chadic languages, divided into branches, sub-branches, major groups, groups and subgroups. He also proposes a phonemic inventory for Proto-Chadic, gives numerous sound laws and presents reconstructions for 150 Proto-Chadic roots.
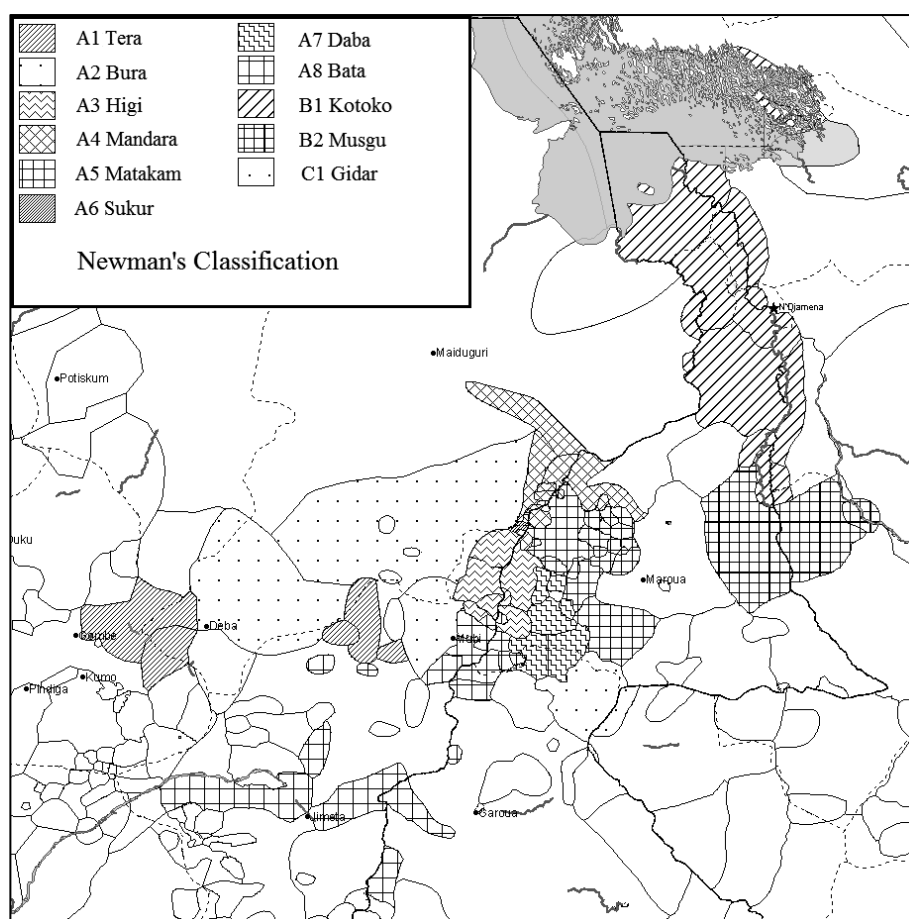
Map 4 - Newman's classification

For Central Chadic (which he termed 'Biu-Mandara'), Newman's classification is as follows:

Sub-branch A
1. Tera group
    a. Tera, Jara
    b. Ga'anda, Hwana
2/3 Bura/Higi major group
    2. Bura group
        a. Bura-Pabir, Cibak, Putai
        b. Margi, Kilba
    3. Higi Group
            Higi, Bana
4/5/6 Mandara/Matakam/Sukur major group
    4. Mandara group
        a. Mandara, Podoko, Glavda, Guduf, Dghwede, Gvoko
        b. Lamang
    5. Matakam (Mafa) group
            Mafa, Mofu, Giziga, Mada, Hurza, Matal
    6. Sukur group
            Sukur
7. Daba group
        Daba, Gavar, Hina
8. Bata group
        Bata-Bachama, Gude, Nzanyi, Gudu
Sub-branch B
1. Kotoko group
        Kotoko, Lagwan, Buduma
2. Musgu group
        Musgu
Sub-branch C
1. Gidar group
        Gidar

The term 'major group' is used for a level between the group and the sub-branch. Not all groups are part of a major group. The geographical distribution of the groups is shown in

Map 4 above.

The classification of Gidar in a separate sub-branch, Biu-Mandara C, comes from a later publication (Newman 1977b). In the original classification, Gidar was classified as part of Biu-Mandara B.

Newman (1977a) separated off the Masa languages into a separate branch, coordinate with West, Central and East Chadic. This was disputed (Jungraithmayr and Shimizu 1981), with Jungraithmayr and Shimizu considering the Masa languages to be part of Central Chadic. However, later work (Shryock 1990) supported Newman's conclusion. We will be following the analysis proposed by Newman and Shryock, and so the Masa languages do not form a part of this study of Central Chadic.

For a synoptic table of the various sub-classifications discussed here, see section 2.2.5.

Newman's consonantal inventory for Proto-Chadic is as follows:

p	t	ts	k	kʲ	kʷ
b	d	dz	g	gʲ	gʷ
ɓ	ɗ	ƒ			
f	ɬ, ʂ	s (ʃ)	x	xʲ	xʷ
		z			
m	n				
	r				
w		j			

Table 4 - Newman's Proto-Chadic consonantal inventory

The symbol 'ʂ' denoted a 'sibilant distinct from *s and *ɬ but of unknown quality'. The (ʃ) is from Newman's (sh), but the significance of the parentheses is not given.

For vowels, Newman was of the opinion that there were at most four vowels *i, *ə, *a, *u, but possibly only two *ə and *a. He described the vowels in his reconstructions as being extremely tentative. He also allowed the possibility that Proto-Chadic had a long vowel *aː.

Newman has published a slightly revised version of this classification (Newman 2013), though it does not present any further justification for the classification.

2.2.3   Lexicostatistical Classification (Barreteau, Breton, and Dieu 1984)

In this classification, Barreteau, Breton and Dieu studied the Chadic languages of Cameroon, and determined their relative degrees of relatedness according to the percentage of shared apparent cognates in a list of core vocabulary items, based upon the Swadesh 100 word list (Swadesh 1955). The classification is given in Table 5. The names and numbering system used are their own.

The principle differences with Newman's classifications concern the Kotoko languages, where the lexicostatistical classification spreads them over three groups, as opposed to Newman's single group. Barreteau et al. also link the Margi group (which here includes only members of Newman's Higi group) and the Bata group into a major group, while Newman does not.

Barreteau further developed this lexicostatistical classification (Barreteau 1987a; Barreteau and Jungraithmayr 1993) to include Chadic languages from all branches, though with a reduced number of languages. The classification of Central Chadic which resulted is given in Table 6.

These and other classifications will be compared to my own classification in section 2.2.5.

Sub-division	Group	Subgroup	Section	Language
1/2 Wandala-Mafa	1 Wandala	East		Wandala, Glavda, Podoko
		West		Vemgo-Mabas, Hdi, Gvoko
	2 Mafa	North-East		Vame, Mbuko
		North-West		Matal
		South	a)	Ouldeme, Muyang, Mada, Moloko
			b)	Zulgo, Dugwor, Merey
			c)	Giziga N, Giziga S, Mofu N, Mofu S
			d)	Cuvok, Mefele, Mafa
3/4 Margi-Gbwata	3 Margi			Psikye, Hya, Bana
	4 Gbwata	North	a)	Jimi, Gude
			b)	Zizilivakan
			c)	Sharwa, Tsuvan
		Centre		Nzanyi
		South		Bata
	5 Daba	North		Buwal, Gavar
		South		Hina, Daba
	6 Gidar			Gidar
	7 Munjuk			Munjuk
	8 Mida'a			Zina, Mazera
	9 Kotoko	South		Lagwan, Mser
		North		Afade, Maltam, Malgbe, Mpade
	10 Buduma			Buduma

Table 5 - Lexicostatistical classifiation of Cameroonian Chadic languages

Sub-branch	Division	Sub-division	Group	Subgroup	Language
Tera-Dzepaw	Tera-Hwona				Tera, Hwana
	Gbwata				Bata
	Bura-Pelasla	Bura-Gude	Bura-Bana	Bura-Margyi	Bura, Margi
				Higi-Bana	Kamwe
					Psikye, Bana
			Ziziliveken-Gude		Zizilivakan, Gude
		Xedi-Mofu	Xedi-Wandala	Xedi	Hdi
				Parekwa-Wandala	Podoko, Mandara
			Matal-Mofu	Matal	Matal
				Mada	Mada
				Mafa-Mofu	Mafa, Mofu
		Pelasla			Vame
	Kada-Munjuk				Gidar, Musgum
	Buwal-Daba				Buwal, Daba
	Masa-Dzepaw				Masa
Jina-Yedina	Jina				Zina
	Lagwan-Yedina		Lagwan-Mpade		Lagwan, Mpade
			Yedina		Buduma

Table 6 - Lexicostatistical Classification of Central Chadic

This later classification changes the degrees of separation of several groupings, but is otherwise broadly similar to the earlier classification.

The following map shows the geographical distribution of the sub-divisions according to this classification.
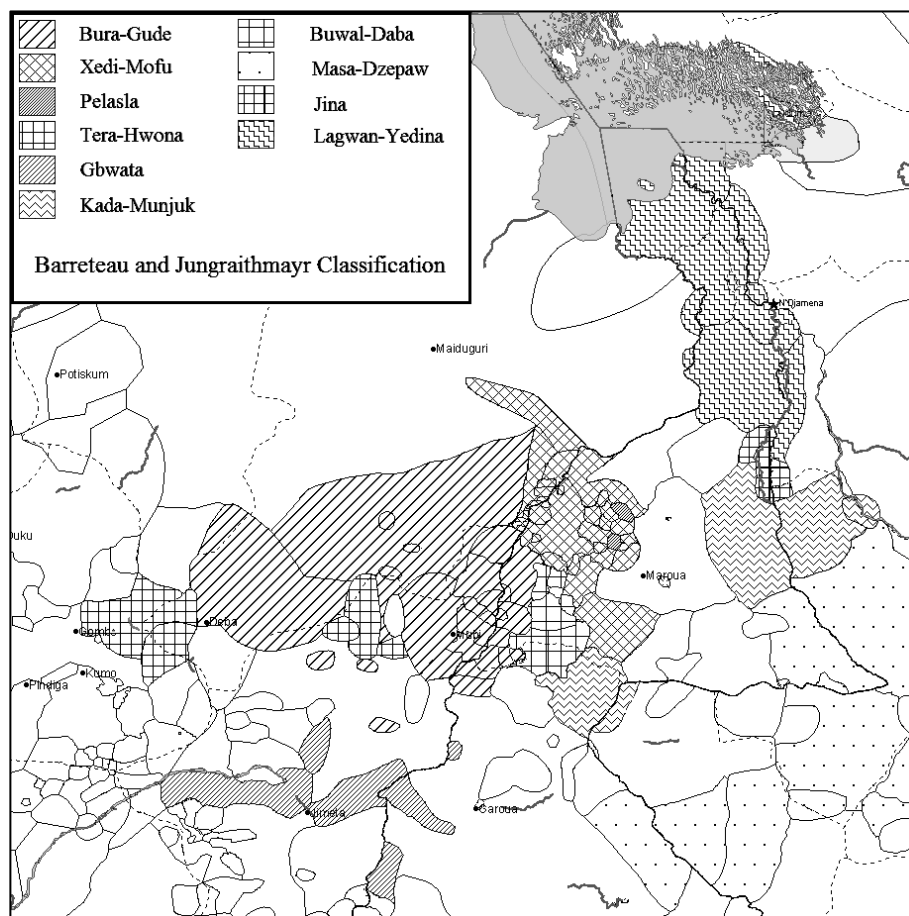
Map 5 - Barreteau and Jungraithmayr (1993) classification

This later classification is important as it covers the whole of Central Chadic, though it lacks some of the fine detail of the earlier classification. The earlier classification is used in the *Atlas Linguistique du Cameroun* (Dieu and Renaud 1983) and is widely cited within Cameroon and in research on Cameroonian languages.

2.2.4 The Internal Classification of Chadic Biu-Mandara (Gravina 2011)

In my own classification of Central Chadic languages (Gravina 2007a; Gravina 2011), I followed the techniques of the comparative method, building on Newman (1977a), but restricted to Central Chadic. The same classification is used in this study, except that the existence of a Mafa-Sukur-Daba major group is now considered to be unproven, and Sharwa has been reclassified in the Bata Proper subgroup. The updated classification is presented below. Names in parentheses at the language level are for varieties listed as dialects in the Ethnologue (Lewis 2009). The withdrawn Mafa-Sukur-Daba major group is given in parentheses.

Sub-branch	Major Group	Group	Subgroup	Language
South	(Mafa-Sukur-Daba)	Mafa		Mafa, Mefele, Cuvok
		Sukur		Sukur
		Daba	Daba	Daba, Mazagway Hidi
			Mina	Mina, Mbudum
			Buwal	Buwal, Gavar
		Bata	Bata Proper	Bachama, Bata, Fali, Gude, Gudu, Holma, Jimi, Ngwaba, Nzanyi, Sharwa
			Tsuvan	Tsuvan, Zizilivakan
		Tera	East	Boga, Ga'anda, Hwana
				Jara, Tera
Hurza		Hurza		Vame, Mbuko

North	Margi-Mandara-Mofu	**Margi**	**Bura**	**Bura, Cibak, Kofa, Putai, Nggwahyi**
			Margi	Kilba, Margi South, Margi
		Mandara	Wandala	Mandara, (Malgwa)
			Glavda	Cineni, Dghwede, Guduf, Gava, Glavda, Gvoko
			Podoko	Podoko, Matal
		Mofu	Tokombere	Ouldeme, Mada, Muyang, Moloko
			Meri	Zulgo, (Gemzek), Merey, Dugwor
			Mofu	Mofu North, Mofu-Gudur
		Higi		Bana, Hya, Psikye, Kamwe
		Lamang		Lamang, Hdi, Mabas
		Maroua		Giziga North, Giziga South, Mbazla
		Gidar		Gidar
	Musgum-North Kotoko	Musgum		Musgum, Mbara, Muskum
		Kotoko North		Mpade, Afade, Malgbe, Maltam
		Kotoko Island		Buduma
		Kotoko Centre		Lagwan, Mser
		Kotoko South		Zina, Mazera

Table 7 - Internal Classification of Central Chadic

The following map shows the geographical distribution of the groups.
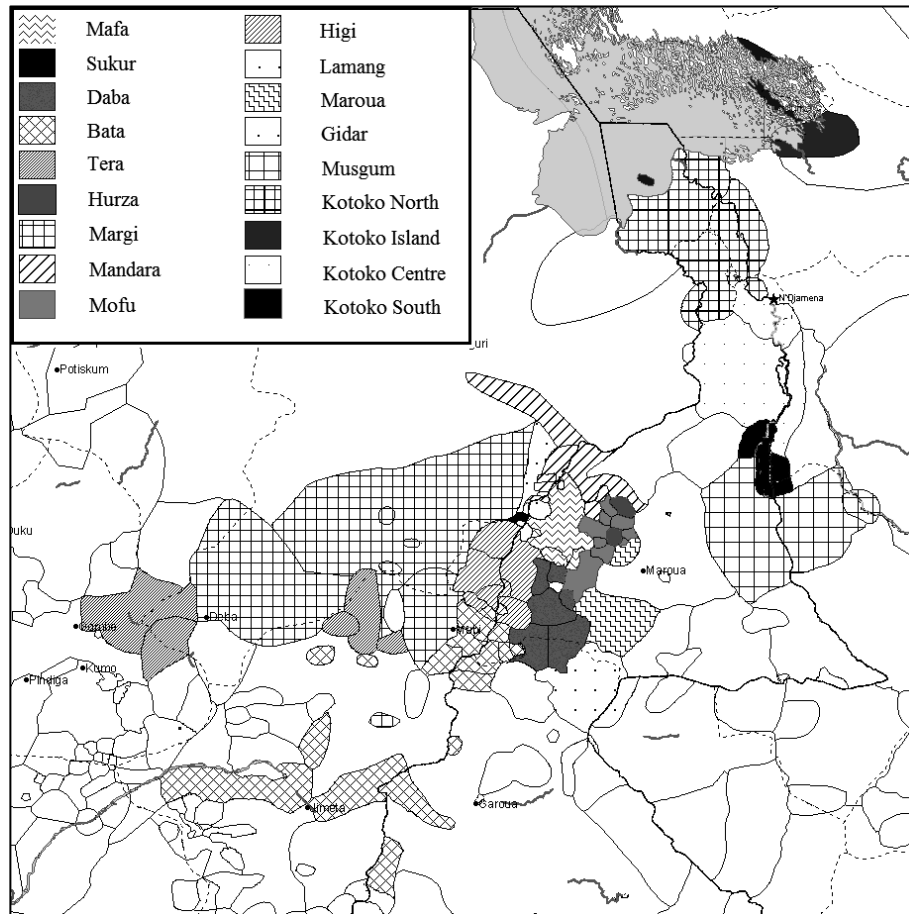
Map 6 – Gravina (2011) classification

2.2.5   Comparison of the classifications

The classifications fall into two types. Newman (1977a) and Gravina (2007a; 2011) base their classifications on shared sound changes, whereas Barreteau et al (1984; 1987a; 1993) use lexicostatistics. The classifications based on sound changes use a methodology designed to focus upon the most reliable indicators of genetic transmission of features (Kaufman and Thomason 1988; Matras 2007), and so can be expected to provide the best genetic classification. Lexicostatistical classifications test for lexical similarity, which is more likely to

be gained through language contact. As such they give classifications which combine both genetic and areal relationships.

In this section we will compare the classifications based on sound changes. In section 2.3 we will compare these classifications with the results from the lexicostatistical classifications, and go on to identify areas of language contact.

The classifications to compare here are those of Newman (1977a) and Gravina (2007a; 2011). They are based on the same methodology, and the differences that exist are due to advances in the quantity and quality of data available in the analysis.

Gravina Sub-branches	Gravina Groups	Newman Groups	Newman Sub-branches
South	Tera	Tera	A
	Bata	Bata	
	Daba	Daba	
	Sukur	Sukur	
	Mafa	Matakam	
Hurza	Hurza		
North	Mofu		
	Maroua		
	Lamang	Wandala	
	Mandara		
	Margi	Bura	
	Higi	Higi	
	Musgum	Musgum	B
	Kotoko South	Kotoko	
	Kotoko Centre		
	Kotoko North		
	Kotoko Island		
	Gidar	Gidar	C

Table 8 - Comparison of Newman and Gravina subclassifications

The groups are for the most part identical between the two classifications, but there are a few exceptions. Newman's Matakam (A5) group has been split up into four separate groups: Mafa, Hurza, Mofu and Maroua. His Wandala (A4) group has also been split into the Mandara group and the Lamang group. At the language level, Matal was classified by Newman in the Matakam group, but has been moved into the Mandara group. Newman classified all the Kotoko

languages in one group, but the differences justify splitting them into four groups: Kotoko Island, Kotoko North, Kotoko Centre and Kotoko South (Tourneux 2001).

There are more significant differences in the division of Central Chadic into primary sub-branches. Newman divided Central Chadic into three sub-branches. Sub-branch C comprised just the single language Gidar. Sub-branch B included the Kotoko languages (B1) and the Musgum group (B2). Sub-branch A was much the largest, containing all the other Central Chadic groups. In an earlier paper (Gravina 2011), I argued that Newman's division into sub-branches was not justified by the linguistic data, but was essentially geographical. Instead, I divide Central Chadic into two main Sub-branches, North and South, which do not correlate with Newman's sub-branches. I also have the Hurza group as a third separate sub-branch. Evidence for this classification will be given in chapter 3, though it should be noted that the evidence for these higher level groupings is limited, and may be subject to future revision.

There are also differences in the major groupings that have been proposed (a level between the sub-branches and the groups). Newman proposed two major groupings. The first was the Bura/Higi major group. There are no sound changes given to justify this grouping, though the languages do share some typological characteristics (see chapter 6). The second major grouping is the Mandara-Matakam-Sukur major group. The languages are all spoken on or around the Northern Mandara Mountains. Again there are no sound changes to justify this grouping, but it does represent a linguistic area (see section 2.3). This grouping covers seven groups in Gravina (2011).

Gravina (2011) included three major groups. The first is the Mafa-Sukur-Daba major group, the second is the Margi-Mandara-Mofu major group and the third is the Northern Kotoko-Musgum major group. However, the Mafa-Sukur-Daba major group was proposed on the basis of a sound change *t→ts in word-final position. A review of the data has led to *ts being considered here as the original Proto-Central Chadic phoneme in the words where this change was proposed. This means that there was no regular sound change in these groups, and the basis for proposing the Mafa-Sukur-Daba major group no longer exists. The definition of the remaining two major groups is justified by shared sound changes, but further data from morphology or from isoglosses is needed before these groupings can be considered to be fully established. For the Margi-

Mandara-Mofu major group, there is some backing from historical studies (Seignobos 2000; MacEachern 2002). For the Northern Kotoko-Musgum major group, there is a no known historical backing.

The classification used in this study is presented in chapter 3, along with the supporting data used to justify the existence of the different groupings. Overall, whilst the different groups within Central Chadic are fairly well defined, the higher relationships between these groups are less well understood and further research is needed.

It is surprising that so few lexical roots have been reconstructed for either Central Chadic or Chadic as a whole. Newman (1977a) includes 150 Chadic roots, and Gravina (2007a) gives 219 Central Chadic roots. Jungraithmayr and Ibriszimow (1994) give several hundred Chadic roots and roots found within Chadic, and Stolbova (1996; 2005; 2006) gives a very large number of Chadic roots, though not all of them are reliably established.

In the roots that have been reconstructed by all these authors, the focus has been on reconstructing the consonants, with little attention given to reconstructing vowels or prosodies.

2.3   Contact-induced Change

In order to understand the processes involved in the history of the Central Chadic languages, it is necessary to look both at the genetic linguistic history and at the history of language contact. In this section we will look at the linguistic evidence for areas of contact between languages.

We will first look at the geography of the region, and its role in language contact.

The second section compares the classification used in this study with the classifications based on lexicostatistics, in order to build a picture of the interplay between genetic and areal relationships amongst the Central Chadic languages. There will be a particular focus on the mismatches between the two types of classification.

The third section presents a brief summary of the phonological types found within Central Chadic, and their geographical distribution.

The fourth section combines the results of the comparison of the classifications with the geography and the phonological typology, leading to the identification of four primary areas of language contact.

2.3.1   Geography

The geography of the Central Chadic region divides into four broad areas.

Firstly there is the area of the Mandara Mountains. The main massif – the Northern Mandara Mountains – is home to the Mafa group languages. Around the periphery of the Northern Mandara Mountains we have the Sukur and Lamang groups to the west, the Mandara group to the north, the Mofu and Hurza groups to the east, and the Daba group to the south.

The second geographic area is the Nigerian Plains area, situated to the west of the Mandara Mountains. It is in this area that the Bata, Margi, Tera and some Higi languages are spoken. The Tera group is quite distinctive, and shows few signs of contact with the other Central Chadic languages of the Nigerian Plains.

The third area is the Eastern Plains, another area of plains lying to the south and east of the Mandara Mountains. Here we find the Maroua, Gidar and Musgum groups.

The final area is the Lake Chad Area around the southern end of Lake Chad and along the rivers that flow into it. In this area we find the languages of the four Kotoko groups.

To the east and west there has been influence from other Chadic languages. In the east, the Masa group languages have had some effect on the languages of the Musgum group, and possibly also the Kotoko languages. To the west there has been contact with the West Chadic languages, especially Hausa.

In the following sections we shall examine in more detail how the linguistic evidence combines with the geographic situation to establish the areas of contact-induced change.

2.3.2   Synthesis of the classifications

Barreteau et al's classifications based on lexicostatistics (1984; 1987a; 1993) differ markedly from the classifications based on sound changes, and comparing these classifications can help to highlight what are genetic groupings and what are areal groupings. Where languages and groups of

languages appear closely related in lexicostatistical classifications, but are more distant in the genetic classifications, this can be attributed to contact between the languages or groups. The opposite situation – where languages that are genetically closely related appear distant in the lexicostatistical classifications – does not exist in the classifications of Central Chadic. In the following paragraphs we will highlight where there is a mismatch between the genetic and lexicostatistical classifications, and discuss the reasons for the mismatches.

The following table shows the higher level groupings from Barreteau and Jungraithmayr (1993), along with the corresponding groups as defined in the classification presented here. (See Table 6 on page 24 for the full classification.)

Sub-branch	Division	Sub-division	Groups
Tera-Dzepaw	Tera-Hwona		Tera
	Gbwata		Bata (Bata language only)
	Bura-Pelasla	Bura-Gude	Bata (excluding Bata language)
			Margi, Higi
		Xedi-Mofu	Lamang, Mandara (excluding Matal)
			Mandara (Matal only), Mofu, Mafa (possibly Maroua)
		Pelasla	Hurza
	Kada-Munjuk		Musgum, Gidar
	Buwal-Daba		Daba
	Masa-Dzepaw		Masa branch (not included within Central Chadic)
Jina-Yedina	Jina		Kotoko South
	Lagwan-Yedina		Kotoko Centre, Kotoko North
			Kotoko Island

Table 9 - Overview of Barreteau and Jungraithmayr (1993)

In Barreteau and Jungraithmayr (1993), the Kotoko languages (i.e. their Jina-Yedina grouping) are placed in a separate sub-branch, coordinate with the rest of Central Chadic. In the genetic classifications, the Kotoko languages are not separated to this extent. This degree of lexical separation is due to to the effect

of language contact. The Kotoko languages have gained a large number of lexical items from Kanuri (Allison 2007), displacing part of the Chadic lexicon and reducing the lexical similarity of the Kotoko languages with the rest of Central Chadic. Within this division, the Kotoko South group (i.e. Zina and Mazera) has a very low degree of similarity with the rest of Kotoko, which ties in with their lower degree of genetic affiliation to the other Kotoko languages in the classification presented here. Buduma (or Yedina, the only language in the Kotoko Island group) is separated from the remaining Kotoko languages, but at a less distant level. The lower degree of similarity is possibly due to increased contact with Arabic and Kanembu.

Barreteau and Jungraithmayr divide the rest of Central Chadic into six divisions. One division contains the Masa languages, which have been classified as a separate branch of Chadic, coordinate with Central Chadic (Newman 1977a; Shryock 1990). Lexical similarities with the rest of Central Chadic may be due to contact between the Masa languages and the Musgum group, and it is this that has resulted in the closer relationship found in the lexicostatistical classification.

Two of the divisions – Tera and Daba – correspond to individual genetic groups. For the Tera group, this degree of separation is in agreement with the genetic data. For the Daba group, the low lexical similarity with the rest of Central Chadic may be due to the geographical separation of the Daba group, or possibly to contact with Adamawa languages such as North Fali, Mundang or their ancestors.

A fourth division in this sub-branch includes two groups, the Musgum and Gidar groups. In Newman's classification Gidar is in a different sub-branch from Musgum. In Gravina (2011), they are less distant, but still quite distinct. Their lexical similarity is possibly due to contact between the two groups at some point in the past. These are not currently neighbouring groups, but are separated primarily by Fulfulde speakers around Maroua, and by Tupuri and Mundang speakers further south. However, these languages are all comparatively recent arrivals in the area, and it is possible that Proto-Musgum and Proto-Gidar were in contact in the area to the south of Maroua.

Bata is given as a separate fifth division, though it includes only the Bata language and not the other languages from the Bata group of Newman/Gravina. The low lexical similarity implies a high degree of separation between Bata and

the other languages of the Bata group. This can be explained as being a result of the geographical separation of Bata (spoken near Jimeta, see Map 7 below) from the other Bata group languages (spoken near Mubi), which also resulted in different environments for contact-induced change.

The sixth of Barreteau and Jungraithmayr's divisions covers the remaining Central Chadic genetic groups, namely Margi, Higi, Lamang, Mandara, Mafa, Mofu and Hurza, along with the rest of the Bata group. (The Sukur and Maroua groups are not represented in this classification, though the Maroua languages are placed close to the Mofu languages in the earlier (1984) classification.) These are divided into three sub-divisions.

The first sub-division covers the Margi and Higi groups and most of the Bata group, which are not genetically closely related. These share a phonological type (see section 2.3.3) and are located around the plains of north-east Nigeria. This all provides good evidence for contact between the languages in this area.

The second sub-division covers the Lamang, Mandara, Mafa and Mofu groups. Genetically, the Mandara and Mofu groups are close, the Lamang group less so, and the Mafa group is quite distantly related. The languages belonging to these groups are all found in the Northern Mandara Mountains, and so we can propose another area of language contact on the main massif of these mountains.

The Hurza languages (Vame and Mbuko), spoken on hills at the eastern edge of the Northern Mandara Mountains, form a third sub-division in Barreteau and Jungraithmayr's classification. This group has a varied classification history. Newman included the languages within his Matakam group (A5), i.e. at the lowest level of separation from other languages, whereas in Gravina (2011) they appear on their own as a sub-branch of Central Chadic, i.e. at the highest level of separation. The lexicostatistics place them halfway between the two, showing a certain similarity with the languages around them, but no close relationships. Vame and Mbuko do not neighbour each other, but are neighboured by Mofu group languages and Mandara for Vame. The most likely scenario is that there is a high genetic distance between the Hurza group and the rest of Central Chadic, and the degree of proximity to other groups shown by the lexicostatistics is due to contact with the surrounding Mofu group languages.

The geographical locations of the groups in the classification presented here can be seen from the following map (repeated from page 28). The green arrows represent paths of language contact, and the red arrows represent paths of separation where there was once contact.
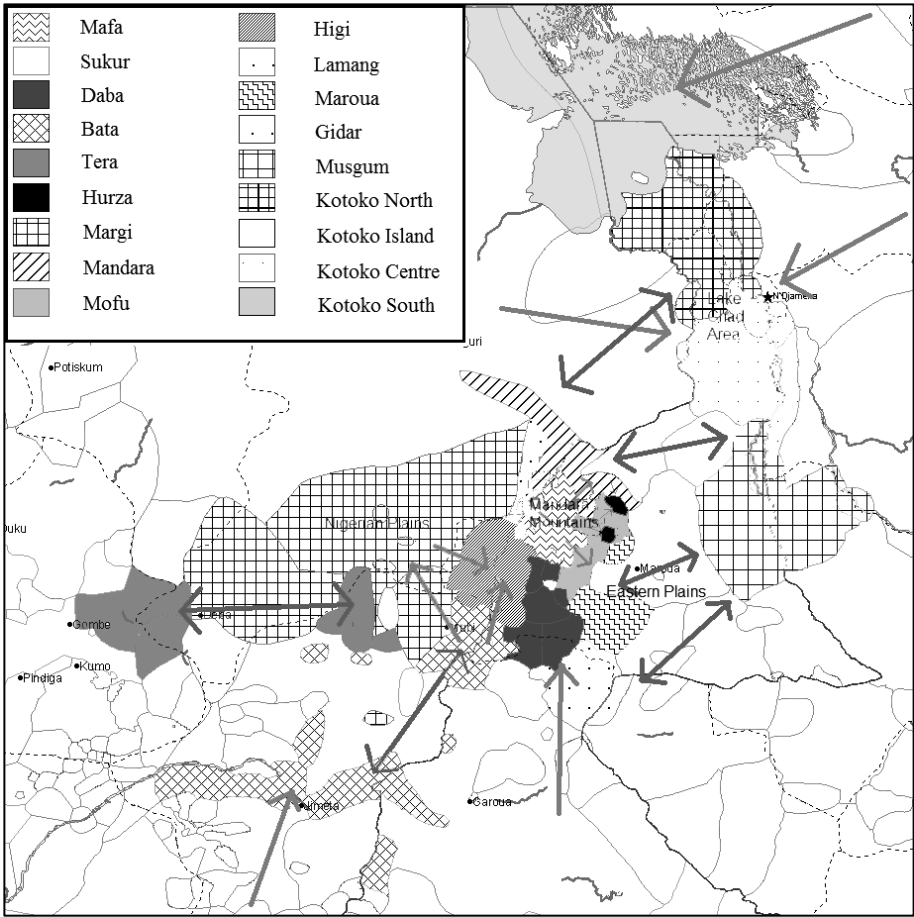
Map 7 - Location of the groups within Central Chadic

2.3.3   Phonological Systems

We will see later in this study that there are three broad phonological systems operating amongst the Central Chadic languages, namely the Consonant Prosody system, the Vowel Prosody system and the Kotoko system. In addition there are languages described as using a Mixed Prosody system, combining features of the Consonant Prosody and Vowel Prosody systems.

The phonological systems do not correspond directly with the genetic structure established on the basis of regular sound changes. Broad phonological systems are more easily influenced by language contact than regular sound changes on the core vocabulary. When we find neighbouring groups that are not closely related, but which share a phonological system, this can be taken as evidence for contact between these groups.

These phonological systems correspond with the areas we have described in the previous section. The Consonant Prosody system is the system used in the Nigerian Plains area. The Vowel Prosody system is used in the Mandara Mountains area (including the Daba group) and in the Eastern Plains area. The Kotoko system is used in the Lake Chad area. The Mixed Prosody is used in the groups in the area covering the western edge of the Mandara Mountains and the adjacent part of the Nigerian Plains. It is unclear which phonological system is used in the Tera group.

The following map shows the geographical distribution of the different phonological types.
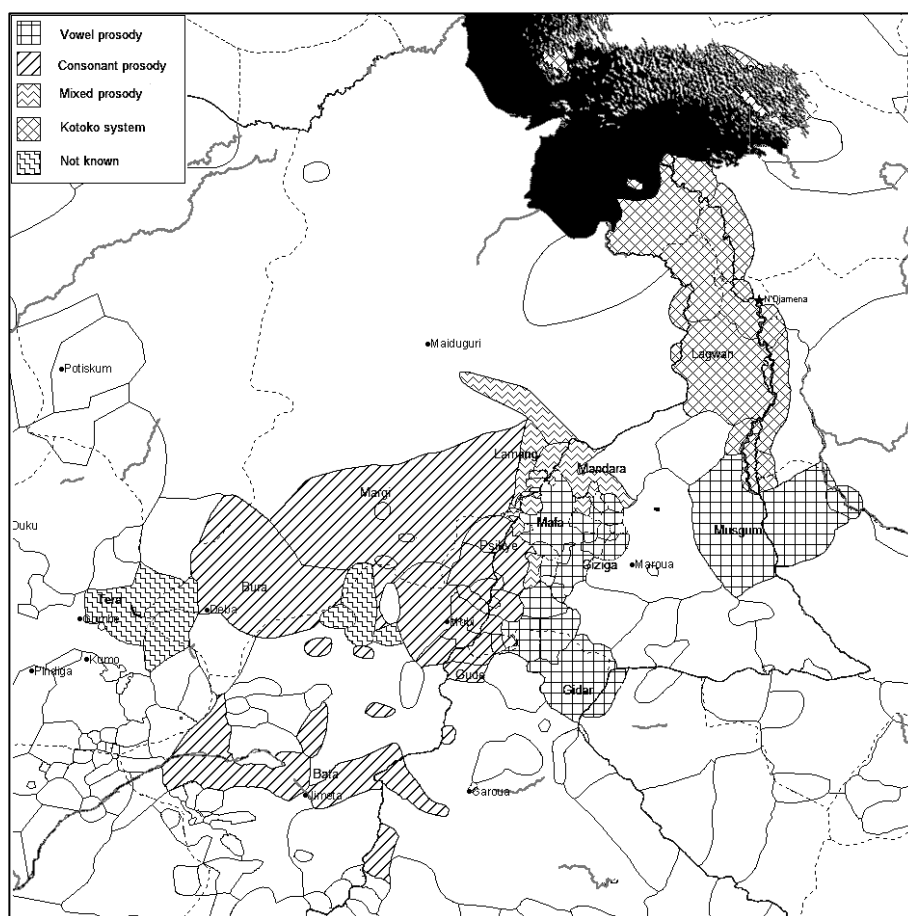
Map 8 - Phonological types

2.3.4   Linguistic areas
We will now summarise the relationship between geography and areas of language contact.

The lexicostatistical classifications argue for the existence of four broad areas of contact, namely the Lake Chad area, the Nigerian Plains, the Northern Mandara Mountains, and the Eastern Plains.

Each of these geographic areas corresponds broadly with a linguistic area within which certain phonological and lexical features have been shared. (There may also be shared grammatical features, but that is beyond the scope of this study.)

In the Lake Chad area there are the four groups of Kotoko languages. They have a low degree of lexical similarity with the rest of Central Chadic, which may be due to the prolonged separation of these languages from the rest of Central Chadic, and also to contact with Kanuri and other languages. The languages share a phonological type and many lexical items, but they do not form a distinct genetic unit. The similarities between the groups can be put down to the effect of language contact, and to the shared environment of contact with languages such as Kanuri.

In the Nigerian Plains area we find the Margi, Bata, Tera and Higi groups. These groups are genetically very distinct. Margi and Higi are from the North sub-branch and Bata and Tera from the South sub-branch. Even within the sub-branches these groups are not closely related. Tera is the most lexically dissimilar of the groups, with the other three falling mostly into the same lexicostatistical grouping. Not enough is known about the Tera group to reach conclusions about the pattern of language contact or separation from related languages. The other three groups share the same phonological type and many lexical items, which is due to language contact rather than genetic inheritance. The contact between the Bata and Margi groups appears to be older than the contact between these groups and the Higi group. Within the Bata group, the Bata language has a low degree of lexical similarity with the other members of the group. This is most likely due to its present geographical separation from the rest of the group, and the resultant contact with the surrounding Niger-Congo languages.

The Northern Mandara Mountains area is home to the Mafa group, with the Sukur, Lamang, Mandara, Mofu, Hurza and Daba groups being spoken around the edge of the main massif and on the smaller mountains nearby. For many groups, the mountains afforded protection from attack, and so created a separation from the languages of the Nigerian Plains and the Eastern Plains. However, within the mountains there has been much language contact through trade and inter-marriage. Most of the groups follow the same phonological type and there are widespread isoglosses in this area.

The languages of the Daba group live around the smaller mountains to the south of the Northern Mandara mountains, resulting in a degree of geographical separation, and increased contact with Niger-Congo speakers. These languages are now quite lexically distinct from the rest of the languages in this area.

The fourth linguistic area is the Eastern Plains area. This is the hardest area to interpret. Within this area we find the Maroua, Gidar and Musgum groups. However the area is also now occupied by speakers of Kanuri (Nilo-Saharan), Fulfulde (Niger-Congo: Atlantic), Mundang and Tupuri (both Niger-Congo: Adamawa), with the Waza game park creating an uninhabited zone at the northern end of the area. Up until about five centuries ago this was not the case, and the area was most likely occupied by speakers of Central Chadic languages, though it is not possible to know which ones. There is evidence of contact between Gidar and the Musgum group, and also between Mandara and Kotoko Centre. The Kotoko South languages share some isoglosses with languages from the Mandara Mountains area, which may imply a time of contact in the past. The Mbuko (Hurza group) moved to the edge of the Mandara mountains as recently as 1800 when the Fulani arrived in Maroua, but it isn't known where their home was before this. The Giziga lived in a large area that included Maroua until this same event. There is strong evidence of close contact with the Mofu-Gudur people (Mofu group) of the Mandara mountains (Vincent 1987), but also evidence of contact with other Eastern Plains groups, and languages of the Daba group. In this area, we have evidence of contact, but also the reality of separation between groups. This leads to competing interpretations of the relatedness of the groups to each other.

There are also outside influences on the Central Chadic languages. To the south of the area there are various Niger-Congo languages spoken, though their influence on Central Chadic languages may be marginal (Blench 2012). A far stronger influence comes from Kanuri, a Nilo-Saharan language spoken to the north of the Central Chadic area. This was the language of the empires of Kanem and Bornu, and has had a strong effect since around 1400 AD (Collelo and Nelson 1990; Seignobos 2000), particularly on the Kotoko languages (Allison 2005a).

We will be looking at the relationship between language, geography and history again in section 3.5, where we will be focussing on the patterns of genetic inheritance and the factors that caused proto-languages to split into separate linguistic communities.

3 Presentation of the Classification

In this section we will lay out the evidence for the genetic classification that we will be using in the rest of this study. The evidence is in the form of regular sound changes that are attested across the core vocabulary of the languages concerned. This is taken to be a more reliable indicator of genetic relatedness than evidence from shared isoglosses or phonological typology. Morphological evidence is of limited value. Where there is good comparative data available, such as with verb morphology in the Mofu group (de Colombel 1991), or noun morphology in the Bata group (Gravina 2009), there is considerable variation on the forms used, and little can be deduced to inform the classification.

The classification is as follows:

Sub-branch	Major Group	Group	Subgroup	Language
South		Bata	Bata Proper	Bachama, Bata, Fali, Gude, Gudu, Holma, Jimi, Ngwaba, Nzanyi, Sharwa
			Tsuvan	Tsuvan, Zizilivakan
		Daba	Daba	Daba, Mazagway Hidi
			Mina	Mina, Mbudum
			Buwal	Buwal, Gavar
		Mafa		Mafa, Mefele, Cuvok
		Tera	East	Boga, Ga'anda, Hwana Jara, Tera
		Sukur		Sukur
Hurza		Hurza		Vame, Mbuko

North	**Margi-Mandara-Mofu**	**Margi**	**Bura**	**Bura, Cibak, Kofa, Putai, Nggwahyi**
			Margi	Kilba, Margi South, Margi
		Mandara	Wandala	Mandara, (Malgwa), Glavda
			Dghwede	Cineni, Dghwede, Guduf, Gava, Gvoko
			Podoko	Podoko, Matal
		Mofu	Tokombere	Ouldeme, Mada, Muyang, Moloko
			Meri	Zulgo, (Gemzek), Merey, Dugwor
			Mofu	Mofu North, Mofu-Gudur
		Maroua		Giziga North, Giziga South, Mbazla
		Lamang		Lamang, Hdi, Mabas
		Higi		Bana, Hya, Psikye, Kamwe
	Musgum-North Kotoko	Kotoko Island		Buduma
		Kotoko North		Mpade, Afade, Malgbe, Maltam
		Musgum		Musgum, Mbara, Muskum
		Kotoko Centre		Lagwan, Mser
		Kotoko South		Zina, Mazera
		Gidar		Gidar

Table 10 - The genetic classification of Central Chadic languages

3.1   Sound Changes at Sub-branch level

Here we will present a summary of the sound changes that operate at levels higher than the group, i.e. in the three sub-branches and in the major groups. More detailed data will be given in chapter 10, which will present the history of each Proto-Central Chadic consonant. Full data can also be found at http://centralchadic.webonary.org/.

The following map shows the current geographical locations of the languages of the three sub-branches.

Map 9 - Central Chadic Sub-branches

3.1.1   South sub-branch

The South sub-branch comprises five groups: the Tera, Bata, Sukur, Mafa and Daba groups. There is one sound change that identifies the South sub-branch of Central Chadic, which is a general change from *ɬ→ɮ.

(1) *ɬ→ɮ   *ɬa→*ɮa   'cow'
          *ɬa→*ɮa   'to cut'
          *ɬimiɗ ʸ→*ɮimiɗ ʸ   'ear', 'name'
          *ɗiɬij→*ɗiɮij   'egg'
          *ɬiwiɗ ʸ→*ɮiwiɗ ʸ   'meat'
          *ɬin→*ɮin   'to send'
          *ɬidin ʸ→*ɮidin ʸ   'tooth'
          *ɬini→*ɮini   'to work'

3.1.2   North sub-branch

The North sub-branch of Central Chadic comprises the following groups: Higi, Lamang, Margi, Mandara, Mofu, Maroua, Gidar, Musgum, Kotoko South, Kotoko Centre, Kotoko North and Kotoko Island (Gravina 2011). The Margi, Mandara and Mofu groups form a major group, as do the Musgum, Kotoko North and Kotoko Island groups.

There are two sound changes that identify the North sub-branch, a general *r→l change, and a word-medial *d→r change. The *d→r change was subsequent to the *r→l change. The examples given in (2) below show the Proto-Central Chadic form and the resulting forms reconstructed for the proto-language of the North sub-branch.

(2) *r→l   *ɣʷirip→*ɣʷilip   'blind'
          *rigiɗ ʸ→*ligiɗ ʸ   'bow'
          *piri→*pili   'butterfly'
          *ra→*la   'to dig'
          *kirip ʸ→*kilip ʸ   'fish'
          *siwra→*siwla   'to fry'
          *gir→*gil   'to grow'
          *riwits ʸ→*liwits ʸ   'hearth'
          *piris ʸ→*pilis ʸ   'horse'
          *sirik ʸ→*silik ʸ   'jealousy'
          *siraj→*silaj   'leg'
          *tira→*tila   'moon'
          *mar→*mal   'oil'
          *wiriɗ ʸ→*wiliɗ ʸ   'pus'
          *kir→*kil   'to steal'
          *ᵐbiwran→*ᵐbiwlan   'tamarind tree'
          *pira→*pila   'to untie'

The medial *d→r change is less clear. This innovation was proposed for Musgu (Tourneux 1990) and for all the Musgum and Kotoko groups (Shryock 2010).

Evidence comes from three roots: 'eye', 'monkey' and hare. We must discount the root *kɨdɨm* 'crocodile' as the variation between *d and *r in the medial consonant is due to the word entering Central Chadic in two different cognate forms (Stolbova 2006). A similar situation occurred with the root *kɨri* 'dog'.

The root *hadaj* 'eye' has support for the internal *d from across Chadic. There is good support for the retention of *d in Central Chadic South, the only exceptions being some languages of the Daba group. In Central Chadic North there is also good support for intervocalic *d→r, with the only exceptions being in some Mandara group languages and Mofu-Gudur (Mofu group).

The root *vɨdɨj* 'monkey' is absent from the Central Chadic South languages except for the Tera group. Support for the reconstruction of *d comes from other branches of Chadic. The Central Chadic South data provides good evidence for intervocalic *d→r.

The root *vida* 'hare' has a number of reflexes within Central Chadic. The limited data supports intervocalic *d→r in Proto-Central Chadic North.

(3) *d→r word-medial   *hadaj→*haraj   'eye'
                        *vɨdɨj→*vɨrɨj   'monkey'
                        *vida→*vira   'hare'

3.1.3   Hurza sub-branch

The Hurza sub-branch comprises only one group, namely the Hurza group, which in turn comprises just two languages. The Hurza sub-branch does not exhibit the sound changes that would place it within either the North or South sub-branches of Central Chadic, and so it must be considered to be a separate sub-branch in its own right.

3.2   Sound Changes at Major Group Level

In this section we will present the evidence for the existence of three possible major groups. In two cases, we give evidence to support the existence of the major group, but in the case of Mafa, Sukur and Daba we are unable to do so.

The sound changes are described in terms of the change from Proto-Central Chadic to the proto-language of the major group. Full data giving evidence for the reconstructions can be found at http://centralchadic.webonary.org/.

3.2.1   Mafa, Sukur and Daba

In an earlier publication (Gravina 2007a), it was proposed that the Mafa, Sukur and Daba groups shared a common ancestor on the basis of a shared sound change *t→ts word-finally. However, wider analysis of the data makes it more likely that the change was in fact *ts→t, in which case there is now no evidence for linking these three groups.

In the lexicon, these three groups are more similar to each other than they are to the Tera and Bata groups, the other groups within the South sub-branch. It is still possible that these groups share a common ancestor, but for the time being this cannot be deduced from sound changes.

3.2.2   Margi-Mandara-Mofu Major Group

Within the North sub-branch, the Margi, Mandara and Mofu groups share a common ancestor. The proto-language of the Margi-Mandara-Mofu major group underwent a change *n→r in word-final position.

(4) *n→r word-final   *ɣʷɨvɨn ʸ→*ɣʷɨvɨr ʸ   'charcoal'
                         *ɓɨwɨn→*ɓɨwɨr   'fear'
                         *kʷɨzɨn ʸ→*kʷɨzɨr ʸ   'grass'
                         *wɨvɨn→*wɨvɨr   'grinding stone'
                         *dzavɨn→*dzavɨr   'guinea fowl'
                         *ɣɨn→*ɣɨr   'head'
                         *vɨn ʸ→*vɨr ʸ   'hut'
                         *sɨn→*sɨr   'to know'
                         *hʷɨtsɨn ʸ→*hʷɨtsɨr ʸ   'nose'
                         *vɨn→*vɨr   'rain'
                         *ɬɨn→*ɬɨr   'to send'
                         *ᵐbɨwlan→*ᵐbɨwlar   'tamarind'
                         *hɨkin→*hɨkir   'three'
                         *ɬɨɗɨn ʸ→*ɬɨɗɨr ʸ   'tooth'
                         *ɬɨn→*ɬɨr   'to work'

3.2.3   North Kotoko-Musgum Major Group

The North Kotoko-Musgum major group within the North sub-branch comprises the Kotoko Island, Kotoko North and Musgum groups. It is identified by two sound changes, *v→f and *z→s. In the data presented here and in the following sections, we will give the proto-form for the immediately preceding level (e.g. Proto-North sub-branch) and the reconstructed form for the proto-language in question (e.g. Proto-North Kotoko-Musgum).

(5) *v→f   *wɨvɨn→*wɨfɨn   'grinding stone'
             *dzavɨn→*dzafɨn   'guinea fowl'
             *vɨn ^y→*fɨn   'hut'
             *vɨnah→*fɨnah   'to vomit'

(6) *z→s   *zɨm→*sɨm   'to eat'
             *zi→*si   'body'

There is some evidence for a regular change *ɣ→h in these same groups. The data is consistent with this, but the number of examples is quite small (eight roots), with data coming from just a few languages, and is mostly comprised of less widely-attested roots. However it is significant to note that /ɣ/ exists in Kotoko Centre and Kotoko South, but not in any of the languages of the North Kotoko-Musgum major group.

If this change is valid, then we can generalise the changes in this major group as the devoicing of fricatives, though there is only one root to support the devoicing of voiced lateral fricatives.

3.3   Sound Changes at Group Level and Below
In the following sections we will list the sound changes that took place for the proto-language of each group, and those changes known for each sub-group and each language in the group. The sound changes will be given from the proto-form at the immediately preceding level. The group-level sound changes serve as evidence of relatedness of the members of the group. The language-level sound changes are useful for interpreting the data. Full data can be found at http://centralchadic.webonary.org/.

3.3.1   Bata Group
The Bata group consists of twelve languages: Bata, Bachama, Fali (of Muchella), Gude, Gudu, Holma, Jimi, Ngwaba, Nzanyi, Sharwa, Tsuvan and Zizilivakan. The Bata group is part of the Central Chadic South sub-branch of Central Chadic.

There is one change so far found for Proto-Bata, namely a general change *ts→t.

(7) *ts→t   *pitsɨ→fitɨ   'sun'
              *tsɨwi→tɨwɨ   'to cry'
              *mɨts→mɨt   'to die'

Within the Bata group, almost all of the languages for which data is available have undergone *ɮ→l. Note that the Proto-Bata *ɮ comes from Proto-Central

Chadic *ɬ. The only language known not to have undergone this change is Tsuvan, with wordlist data (Kraft 1981) indicating that the same may be true for Zizilivakan and Fali of Muchella, though [ɮ] is not always well transcribed in these wordlists. These three languages are found in the north-east of the Bata group area. Zizilivakan and Fali of Muchella are contiguous, whilst Tsuvan is separated by a distance of 15-20km. The rest of the languages share the *ɮ→l innovation, and can be considered to be a subgroup – denoted the Bata Proper subgroup – with a common ancestor. They are spread over a comparatively large geographical area (see Map 21).

(8) *ɮ→l   *iɮɨ→ilɨ   'bone'
            *ɮɨmi ʸ→lɨmi ʸ   'ear'
            *ɮa→la   'cow'
            *ɮɨwɨ ʸ→lɨwɨ ʸ   'meat'

In **Tsuvan** (which is not a part of the Bata Proper subgroup), there has been a consistent change *r→l, possibly influenced by the same change in the neighbouring Daba group.

(9) *r→l   *gɨr→gəl   'to grow'
            *wɨrɨfɨ→wəlfe   'blind'
            *wɨra→wəla   'neck'

3.3.2   Daba Group

The Daba group consists of six languages: Buwal, Gavar, Mbudum, Mina, Daba and Mazagway Hidi. It is part of the Central Chadic South sub-branch of Central Chadic.

There is a general change *r→l.

(10)   *r→l   *kɨrɨp ʸ→*kɨlɨf ʸ   'fish'
               *pɨra→pɨl   'to untie'
               *kɨr→hɨl   'to steal'

In **Mbudum** there is a change *n→ŋ word finally.

(11)   *n→ŋ   *ban→baŋ   'to wash'
               *van→vaŋ   'rain'
               *sɨn→səŋ   'to know'

3.3.3   Mafa Group

The Mafa group consists of three languages: Mafa, Cuvok and Mefele. It is part of the Central Chadic South sub-branch of Central Chadic. Proto-Mafa is probably most closely related to Proto-Sukur and Proto-Daba.

No sound changes have been found for Proto-Mafa.

In **Cuvok**, there are two sound changes. The first is a general change *r→l.

(12)   *r→l   *ⁿdar→ⁿdala   'to burn'
               *ᵐbɨram ʷ→ᵐbəlam   'tamarind'
               *rɨwats ʸ→ləwats ʸ   'hearth'

The second is a word-final change *n→ŋ.

(13)   *n→ŋ   *madɨwan→madwaŋ   'rat'
               *ɮan ʸ→ɮaŋ ʸ   'tooth'
               *zapan→zapaŋ   'guinea fowl'

Although these sound changes are also found in the Daba group (see section 3.3.2), we cannot infer that Cuvok should be classified as part of the Daba group. There are differences in the lexical items where the *r→l change occurred, implying that there may have been particular environments involved in the change that were not the same in both cases. Also, the lexicostatistics (Barreteau, Breton, and Dieu 1984) show a degree of similarity of 76% with Mafa, compared with 54% with the closest members of the Daba group. This would argue against classifying Cuvok within the Mafa group, unless stronger evidence is found.

In Mafa, compensatory prefixation is used when an initial consonant has been lost. In this case the consonant is replaced by /v/.

(14)   Compensatory prefixation   *hɨtak→vatak   'thorn'
                                    *haradz→varadza   'scorpion'
                                    *hakʷa→/vagʷa/ [vogʷa]   'fire'

3.3.4   Tera Group

The Tera group consists of five languages, divided into two subgroups (Newman 1977a):

- West Tera: Tera, Jara
- East Tera: Boga, Ga'anda, Hwana

The Tera group is part of the Central Chadic South sub-branch of Central Chadic. The group appears to be quite distantly related to the rest of Central Chadic South.

In Proto-Tera, *ɗ was deleted in word-final position.

(15)   *ɗ→∅ word-final   *ɣanaɗ ʸ→ɣina   'tongue'
                           *ɬɨmɨɗ ʸ→ʒim   'ear'

In the East Tera subgroup, there has been a general devoicing of obstruents (Newman 1977a).

(16)   Devoicing of obstruents   *viɗ→fɨɗ   'night'
                                 *zɨm→sɨm   'to eat'
                                 *dzɨwan ʸ→tsɨwan ʸ   'elephant'

In the West Tera subgroup there was a general voicing of word-initial fricatives (Newman 1977a).

(17)   Voicing of word-initial fricatives   *sɨn→zɨni   'to know'
                                            *foɗa→vat   'four'

3.3.5   Sukur Group

The Sukur group consists of the single language Sukur. It is part of the Central Chadic South sub-branch of Central Chadic. Within this sub-branch, it is probably most closely related to Proto-Mafa and Proto-Daba.

The only sound change that can be ascribed to Sukur is *ts→s.

(18)   *ts→s   *vats→vus   'to blow'
               *pitsɨ→pis   'sun'
               *hʷɨtsɨn ʸ→sɨn ʸ   'nose'

3.3.6   Hurza Group

The Hurza group consists of two languages, Mbuko and Vame. No consistent sound changes have been identified that are distinctive for this group. The Hurza group is the only group within the Hurza sub-branch.

3.3.7   Margi Group

The Margi group consists of eight languages, subdivided into two subgroups (Hoffmann 1988). Hoffmann referred to these as West Margi and East Margi, but here we shall refer to them as the Bura and Margi sub-groups respectively.

The Bura sub-group contains Bura, Cibak, Kofa, Nggwahyi and Putai; the Margi sub-group comprises Margi, South Margi and Kilba. The Margi group is part of the Margi-Mandara-Mofu major group, which in turn is part of the Central Chadic North sub-branch.

There are two sound changes that apply to Proto-Margi.

(19)   *d→t word-initial   *dɨlɨm→tɨlɨm   'horn'
                           *d→ta   'to cook'

(20)   *z→s   *zɨm→sim   'to eat'
             *kʷɨzɨr ʸ→kʷɨsar   'grass'

In addition, there is a widespread change in individual languages *ɬ→hʲ, triggered by palatalization of *ɬ. This phenomenon is also found in the Wandala subgroup of the Mandara group.

(21)   *ɬ→hʲ   *ɬir→ɬʲir→hʲir   (Margi)   'tooth'
               *ɬɨmi ʸ→ɬʲɨmi→hʲimi   (Kilba)   'ear'

In **Bura** there is a regular change *ɗ→r.

(22)   *ɗ→r   *fʷaɗu→nfʷar   'four'
             *vʷɨɗi→viri   'night'

No other regular changes for languages within the group, or for the two subgroups, have been identified.

3.3.8   Mandara Group
The Mandara group consists of eight languages divided into three subgroups as follows:

- Wandala subgroup – Mandara, including the Malgwa dialect, Glavda
- Dghwede subgroup – Dghwede, Cineni, Guduf, Gvoko
- Podoko subgroup – Podoko, Matal

The Wandala and Dghwede subgroups share a common ancestor at the same level as the ancestor of the Podoko subgroup.

The Mandara group is part of the Margi-Mandara-Mofu major group, which is in turn part of the Central Chadic North sub-branch of Central Chadic.

In the proto-language of the Margi-Mandara-Mofu major group there was a regular change *n→r word-finally (see section 3.2.2). In Proto-Mandara there was a further change *n→r in word-medial position.

(23)   *n→r word-medial   *kʷɨnɨj→kʷɨrɨj   'urine'
                                    *vɨnah→vɨraha   'to vomit'

There was also a change *m→w in word-final position.

(24)   *m→w word-final   *ɗijɨm→jɨwɨ   'water'
                                    *kɨrɨm→kɨrwɨ ʸ   'crocodile'

In the ancestor of the Wandala and Dghwede subgroups, this change also took place in word-initial position. The environment was probably restricted to those words where the *m preceded a vowel.

(25)   *m→w word-initial   *malɨ→walɨ   'oil'
                                    *majɨ→waja   'hunger'

Compensatory prefixation is also a common feature in Mandara (language), Malgwa and Podoko. This is a phenomenon that is widely-attested in Central Chadic (see section 3.4.5). The loss of an initial consonant is compensated for by the addition of a dummy consonant. This consonant is /n/ in Mandara and Malgwa, and /m/ in Podoko. The addition of a consonant may be motivated by the constraint that words cannot begin with a vowel.

Gloss	Proto-Mandara	Word	Language	
tree	hʷɨfa	nafa	Mandara	cf. Glavda uufa
honey	ɗama	nama	Malgwa	cf. Glavda mam
blood	mɨzɨ ʸ→wɨzɨ ʸ	muzə	Podoko	cf. Mandara uʒe
grindstone	uvɨra	mavarə	Podoko	cf. Glavda vaara

Table 11 - Compensatory prefixation in the Mandara group

Another unusual feature, affecting the Wandala subgroup, is the sporadic shift of palatalized alveolar consonants to become palatalized palatal or velar consonants. Note that this only affects the alveolar consonants, and not the laminal consonants.

Gloss	Proto-Mandara	Intermediate	Word	Language
moon	tila	tʲɨla	kʲla	Glavda
to cry	tɨwa ʸ	tʲɨwa	kʲuwa	Malgwa
to cook	da ʸ	dʲa	gʲa	Malgwa
girl	dahɨlɨ ʸ	dʲahɨlɨ	gʲaːle	Mandara
three	hɨkirɨ→kidɨ	kɨɗʲɨ	kɨɗʲɨ	Malgwa
ear	ɬɨmɨ ʸ	ɬʲɨmɨ	hʲɨmɨ	Glavda
meat	ɬɨwɨɗ ʸ	ɬʲɨwɨ	hʲuwa	Mandara

Table 12 - Velarisation of palatalized alveolars in the Mandara group

The phonemes *ɣ and *ɣʷ have been lost in much of the Mandara group, but not in Glavda. In Dghwede both phonemes have merged with *g. In Mandara and Malgwa, in most cases *ɣ has merged with *h or been lost, and *ɣʷ has merged with *w, though there are exceptions. In Podoko there is a variety of reflexes for the two phonemes.

In **Matal**, there is a consistent change *r→l. Note that *r in Proto-Mandara has come only from Proto-Central Chadic word-final *n, since Proto-Central Chadic *r→l in the North sub-branch.

(26)   *r→l   *ɣʷɨvɨrɨ→aval   'charcoal'
                *uvɨra→vəl   'grinding stone'
                *ɣɨra→gəl   'head'
                *sɨr→səl   'to know'

3.3.9   Mofu Group

The Mofu group consists of nine languages, divided into three subgroups as follows:

- Mofu subgroup: Mofu-Gudur, Mofu North
- Meri subgroup: Dugwor, Merey, Zulgo (and Gemzek, considered a dialect of Zulgo)
- Tokombere subgroup: Moloko, Mada, Muyang, Ouldeme

The Mofu group is part of the Margi-Mandara-Mofu major group, which is in turn part of the Central Chadic North sub-branch of Central Chadic.

There are no specific sound changes found for Proto-Mofu which can justify the unity of the group. All the Mofu group languages exhibit the *n→r word-final change from Proto-Margi-Mandara-Mofu, and do not exhibit the changes particular to either the Mandara or Margi groups. The classification of these

languages as a single group is based on the high degree of lexical similarity between them, though the low degree of morphological similarity allows a degree of doubt about the unity of the group.

For Proto-Meri, the ancestor language of the Meri subgroup, there are two distinctive sound changes. Firstly, there is a regular change *v→b. This is the reverse of a change *b→v that took place in Proto-Central Chadic. The same change took place separately in the Gidar group (see section 3.3.18).

(27)   *v→b   *vɨta ^{y}→bəta ^{y} 'ashes'
                  *vaw→ba   'body'

The second change is *ɬ→ʑ. This change only affects certain roots. The data is limited, but implies that the change took place in roots that were palatalized in Proto-Meri.

(28)   *ɬ→ʑ   *ɬɨmaj→*ɬɨm ^{y}→ʑəm   'ear'
                  *ɬɨr ^{y}→ʑər ^{y} 'tooth'

The voiced velar fricatives have been lost in all languages of the Mofu group except for Ouldeme in the Tokombere subgroup.

In the Mofu subgroup, *ɣ is deleted and *ɣ^w→w.

(29)   *ɣ→∅   *ɣaj→aj   'house'
                    *ɣɨr→ar   'head'
          *ɣ^w→w   *ɣ^{w}ɨlɨf→wələf 'blind'

In the Meri subgroup, *ɣ→g and *ɣ^w→g^w.

(30)   *ɣ→g   *ɣaj→gaj   'house'
                     *ɣɨr→gər   'head'
          *ɣ^w→g^w *ɣ^{w}ɨlɨf→g^{w}ɨlɨf→gələf ^{w} 'blind'

Within the Tokombere subgroup, for Muyang and Moloko, the change is towards /h/.

(31)   *ɣ→h   *ɣaj→haj   (Moloko)   'house'
                     *ɣɨr→ahar   (Muyang)   'head'
          *ɣ^w→h^w *ɣ^{w}ɨlɨf→həlaf ^{w} (Moloko)   'blind'

It is possible to analyse the changes within the Mofu subgroup as being developments of the changes in the Tokombere subgroup, i.e. *ɣ→*h→∅ and

*ɣʷ→*hʷ→w. If this is the case then the Mofu subgroup should be considered as a subdivision within the Tokombere subgroup.

There are two other regular changes within the Tokombere subgroup. Firstly, Mada has undergone a change *r→l word-finally. There was a much earlier change *r→l in Proto-Central Chadic North. However in Proto-Margi-Mandara-Mofu there was a change *n→r word-finally, and it is the resultant *r that is affected by the rule.

(32)   *r→l word-final   *sɨr→masəla   'to know'
                         *ɮɨwɨr ʸ→maɮawal   'fear'

Secondly, Moloko has undergone *l→r word-finally, reversing the Proto-Central Chadic North change.

(33)   *l→r word-final   *haᵐbɨl→haᵐbar   'skin'
                         *hʷɨtɨl ʸ→hʷətal ʸ   'tail'

One of the unusual features of the Mofu group is the widespread use of reduplication to compensate for a lost consonant (see also section 3.4.5). This is analogous to the process of compensatory prefixation described for the Mandara group (section 3.3.8) and for Mafa (section 3.3.1).

Gloss	Proto-Mofu	Word	Language
to belch	*gɨɗɨɮ	ɮaɮa ʸ	Zulgo
blood	*haᵐbɨz ʸ	baᵐbaz	Gemzek
to cough	*hʷɨɗɨɬ ʸ	ɮəɮah ʸ	Merey
egg	*ɗɨɬɨj	ɬaɬaj	Ouldeme
shoulder	*hɨpaɬ ʸ	papaɬ ʸ	Mofu-Gudur
to suck	*sɨwɨɓ	sasəɓ	Mofu North
wind	*hɨmɨɗ ʸ	mamaɗ ʸ	Mofu-Gudur

Table 13 - Compensatory reduplication in the Mofu group

3.3.10 Maroua Group

The Maroua group consists of two languages, Giziga and Mbazla. Giziga is divided into two main dialects, North (or Marva) and South (or Moutourwa).

The Maroua group is part of the Central Chadic North sub-branch of Central Chadic.

The group is defined on the basis of lexical similarity (Seignobos and Tourneux 1984), though Mbazla is quite distinct from the Giziga dialects. There are no

sound changes so far identified that are innovations in Proto-Maroua, so the unity of the group cannot be firmly established. All the other nearby groups within Central Chadic have defining sound changes, so it is clear that the Maroua group languages are distinct from these other groups.

One noticeable feature of the group is the word-final change *n→ŋ which occurs consistently in Mbazla and sporadically in the Giziga dialects.

(34)   *n→ŋ word-final   *wɨvɨn→vaŋ   'grinding stone' (Mbazla)
                          *vɨn ʸ→veŋ   'hut' (Giziga Marva)

This change is also found in the Tera, Hurza and Mafa groups.

3.3.11 Lamang Group

The Lamang group consists of three languages: Lamang, Hdi and Mabas. The Lamang group is classified within the Central Chadic North sub-branch of Central Chadic. Proto-Lamang is probably most closely related to Proto-Higi.

In Proto-Lamang there was a general change *ts→t.

(35)   *ts→t   *pitsɨ→fiti   'sun'
                *mɨts→mɨta   'to die'
                *tsɨvɨɗ ʸ→tɨvɨj   'path'

There was also a general change *n→ŋ word-finally. The environment excludes those words that have been revocalised in the time immediately prior to the time of the change in Proto-Lamang such that they have gained a final vowel.

(36)   *n→ŋ word-final   *ɬɨɗɨn ʸ→ɬɨɗɨŋ   'tooth'
                         *ɡ̡ɨwɨn→ɡ̡ɨwɨŋ   'fear'
                         *vɨn ʸ→ivɨŋ   'hut'
                but   *hɨkin→hɨkɨna   'three'

In Hdi, many of the nouns carry a frozen suffix *-k (Wolff 2006).

(37)   Suffix petrification   *ɬɨɬi→ɬɨɬik   'egg'
                              *fiti→fitik   'sun'
                              *ɣanɨj→ɣanik   'tongue'
                              *liti→litik   'hearth'
                              *haɗi→haɗik   'earth'
                              *rɨvidi→rɨvidik   'night'
                              *ziwɗi→ziɗikʷ   'fly (insect)' (with reanalysis of
                                                 *w as labialization of *k)

3.3.12 Higi Group

The Higi group consists of five languages: Bana, Psikye, Kamwe, Kirya-Konzel and Hya. Kamwe has several dialects, including Kamwe Futu and Kamwe Nkafa, and is also known as Higi.

The Higi group is part of the Central Chadic North sub-branch of Central Chadic. Based on lexical similarity and shared isoglosses, Proto-Higi is probably most closely related to Proto-Lamang, though there is no evidence from sound changes that supports this.

There are two changes which may have been innovations in Proto-Higi, though in neither case is the evidence entirely consistent. The first is a change *d→t word-initially.

(38) *d→t   *dɨlɨm→tɨlimʷɨ   'horn'
              *hadik→*dik→tikɨ   'thorn'
              *d→ta   'to cook'

In the second example, it must be assumed that the initial *h was lost prior to this change.

The second change is a general *kʷ→gʷ, possibly confined to Bana and Psikye.

(39) *kʷ→gʷ   *kʷɨzɨn→gʷɨzɨn   'grass'
               *ɗɨjɨkʷɨ→ʔʷɨgʷɨ   'bird' (Bana)

Within the Higi group there is a consistent change *ɗ→r word-finally in **Kamwe** (Nkafa), **Kirya** and **Bana**.

(40) *ɗ→r word-final   *hʷiɗ→xʷɨr   (Bana)   'belly'
                        *wɨfaɗɨ→fʷar   (Kirya)   'four'
                        *viɗ→vɨrɨ   (Nkafa)   'night'

There is also a reasonably consistent change *l→r in the same three languages.

(41) *l→r   *lɨgɨj→rəgi   (Bana)   'bow'
              *kɨlipɨ→kɨripɨ   (Kirya)   'fish'
              *lɨtwɨ→rɨtwɨ   (Nkafa)   'hearth'
              *ɣɨli→ɣirɨ   (Futu)   'to steal'

These two changes give evidence for considering Kamwe, Kirya and Bana to share a common ancestor, distinct from Psikye and Hya.

A feature of the Higi group languages is the frequent, but not consistent, loss of final consonants.

(42)   Final consonant loss   *pɨɗikʷ→pirɨ   (Bana)   'razor'
                                *sʲɨwɨn→ʃiwu   (Kirya)   'dream'
                                *ɣʷɨlɨfi→ɣuli   (Nkafa)   'blind'
                                *tsʲɨwɨn→tʃiwe   (Futu)   'elephant'
                                *gʷɨzɨn→gʷəzə   (Psikye)   'grass'

3.3.13 Kotoko Island Group

The Kotoko Island group – named following Tourneux (2001) – is part of the North Kotoko-Musgum major group, which in turn is part of the Central Chadic North sub-branch. It consists of the single language Buduma. Besides the sound changes inherited from its ancestors, the following sound changes are well-attested for Buduma.

(43)   *s→h   *sɨn→hən   'to know'
                *sa→hi→[xi]   'to drink'

(44)   *ɬ→h   *ɬa→ha   'cow'
                *ɬɨmɨj→həmu   'ear'

3.3.14 Kotoko North Group

The Kotoko North group is also part of the North Kotoko-Musgum major group, which in turn is part of the Central Chadic North sub-branch. It consists of the four languages Afade, Mpade, Malgbe and Maltam.

There are no sound changes unique to Proto-Kotoko North. Its status as a group follows Tourneux (2001). There are sound changes to distinguish Kotoko Island and Musgum, the other two groups in this major group, and there are sufficient similarities between the remaining languages for it to be safer to treat them as a single group rather than to propose that they are not a single group.

Malgbe has undergone three regular sound changes: *s→j, *ts→s (subsequent to *s→j) and *gʷ/*kʷ→g͡b.

(45) *s→j *saware→jaware 'dream'
            *sɨre→jire   'string'

(46) *ts→s *tsɨ→sɨ   'eye'
             *tsafan→safan 'guinea fowl'

(47) *gʷ/kʷ→g͡b *eⁿgʷi→em͡g͡bi 'faeces'
                  *kʷɨsɨm→g͡bim 'mouse'

Note that the change *s→j also applies in this last example, i.e. *kʷɨsɨm→*g͡bɨjɨm→g͡bim.

For **Maltam** there is the change *ts→s.

(48) *ts→s *tsɨhɨn→sɨn   'nose'
             *tsɨmtsɨm→sɨmsɨm 'navel'

For **Mpade** there are two changes, *ts→s and *ɬ→ʃ.

(49) *ts→s *tsɨwe→swe   'to cry'
             *tsafan→safan 'guinea fowl'

(50) *ɬ→ʃ *ɬɨm→ʃimu 'ear'
            *ɬa→ʃa   'cow'

There are no well-attested sound changes for **Afade**.

The change *ts→s applies in three of the four languages of the group. However it is not possible to use this as evidence for a genetic relationship between these languages. In Malgbe the change has to have occurred after *s→j, and since this change is not shared by the other languages, the *ts→s change must have taken place independently in Malgbe.

There is no a priori reason why the change could not have applied to a putative ancestor of Maltam and Mpade, the other two languages affected by *ts→s. However, the languages are not neighbours, and Tourneux classifies them in different subgroups of Kotoko North (Tourneux 2001), so a close relationship appears unlikely.

We therefore assume that the change happened in the languages individually, perhaps as part of an areal process.

In general, the sound changes involving *ts are difficult to interpret, and need to be examined in the light of any other evidence. There is some question about the status of *ts as a Proto-Central Chadic phoneme, and further insights may lead to better interpretations of the data. See section 10.4.1 for further discussion.

3.3.15 Musgum Group

The Musgum group is also part of the North Kotoko-Musgum major group, which in turn is part of the Central Chadic North sub-branch. It consists of the three languages Musgum, Mbara and Muskum (now extinct).

There are two changes that apply to Proto-Musgum.

(51)   *dz→d   *dzɨwɨɗ ʸ→dɨwaj   'fly (insect)'
                        *hɨrɨdz ʸ→hɨrɨdɨw   'scorpion'

(52)   *ts→t   *tsɨwi→tɨwa   'to cry'
                        *lɨwɨts ʸ→lɨwɨt ʸ   'hearth'

3.3.16 Kotoko Centre Group

The Kotoko Centre group consists of the two languages, Lagwan and Mser. The Kotoko Centre group is part of the Central Chadic North sub-branch. It is not known how the group relates to other groups within Central Chadic North. However its lexicon is most similar to those of the North Kotoko-Musgum major group.

There are two related sound changes that apply to the group as a whole, where the affricates are reduced to fricatives.

(53)   *dz→z   *dzavɨn→zavan   'guinea fowl'
                        *dzɨwɨɗ ʸ→zɨwɨj   'fly (insect)'

(54)   *ts→s   *hʷɨtsɨn ʸ→hɨsɨni   'nose'
                        *tsɨwi→sɨwe   'to cry'

In **Mser**, there are two changes, a consistent change *ɬ→s, and a widespread change *n→r.

(55)   *ɬ→s   *ɬin→sin   'to send'
                  *ɬa→sa   'cow'

(56)   *n→r   *kʷine→kure   'urine'
                  *siwane→sware   'dream'

There are no sound changes so far identified unique to **Lagwan**.

3.3.17 Kotoko South Group

The Kotoko South group consists of the two languages Zina and Mazera. The Kotoko South group is part of the Central Chadic North sub-branch, but it is not known how this group relates to the other groups within Central Chadic North. Although it has often been assumed that it is most closely related to the other Kotoko groups, it is quite distinct from them in its lexicon, and shares some isoglosses with the Mofu, Maroua and Hurza groups. In terms of lexico-statistics, it is as close to the Mofu and Maroua groups as it is to the other Kotoko groups (Barreteau 1987a).

There is one consistent change applying to the Kotoko South group, *ɬ→s. The same change was noted for Mser in the Kotoko Centre group. These must be independent changes, since the Kotoko South languages do not exhibit the changes found for Proto-Kotoko Centre.

(57)   *ɬ→s   *ɬa→sa   'cow'
                  *naɬij→nisa   'tongue'

There is a consistent change *k→h in **Zina**.

(58)   *k→h   *kilfi→həlfə   'fish'
                  *kija→hija   'moon'

No changes have been identified for **Mazera**.

3.3.18 Gidar Group

The Gidar group consists of the single language Gidar. The Gidar group is part of the Central Chadic North sub-branch.

There are four sound changes identified for Gidar.

(59)   *v→b word-initial   *vɨn ^{y}→biːna   'hut'
                            *wɨvɨn→*vɨwɨn→bwən 'grinding stone'

(60)   *dz→z   *dzaraj→zaraj   'locust'
                *dzavɨn→zamvɨna   'guinea fowl'

(61)   *ɮ→ɬ   *ɮɨɗɨm→ɬeʔ   'five'
                *ɮɨgʷamɨ ^{y}→ɬagama ^{w} 'camel'

(62)   *ts→t   *tsɨvɨɗ ^{y}→tɨva ^{y} 'path'
                *mɨts→ɨmta   'to die'

3.4   General and Non-systematic Sound Changes

In this section we will take a brief look at some of the most common general sound changes that are found in the history of Central Chadic languages. These sound changes are not innovations confined to a particular genetic unit or to a particular area, but rather they are sporadic changes that have taken place in more than one language. Full data can be found at http://centralchadic.webonary.org/.

3.4.1   *ts→t

There is alternation between /ts/ and /t/ in the reflexes of roots containing *ts across the different groups. The groups in which *ts→t are not genetically related, and do not correspond to any particular geographical location. The groups concerned are the Bata, Lamang, Mofu and Musgum groups.

	Proto-Central Chadic	Proto-Bata	Proto-Lamang	Proto-Mofu	Proto-Musgum
to die	mɨts	mɨt	mɨta	mɨt	mɨɗɨ ^{y}
hearth	rɨwɨts ^{y}	rɨtɨ ^{y}	liti	lɨwɨt ^{y}	lɨwɨt ^{y}
ashes	pɨtsiɗ	fɨtiɗ	-	vɨta ^{y}	-
path	tsɨvɨɗ ^{y}	tɨvɨ	tɨvɨj	tɨvɨ ^{y}	tɨfɨj
to cry	tsɨwi	tɨwɨ	tawa	tɨwɨ	tɨwa
sun	pitsɨ	fitɨ	fiti	pat	futɨj

Table 14 - Groups with the change *ts→t

3.4.2   *n→ŋ word-finally

The change *n→ŋ word-finally is found very widely in Central Chadic. In some languages, such as Mbuko of the Hurza group (T. Smith and Gravina 2010), this change is part of the phonology of the language, with [ŋ] being the realisation of

/n/ in word-final position. At the group level, the change is especially common in Proto-Maroua and Proto-Lamang.

3.4.3 *ɗ→j

There are very widespread changes from *ɗ→j. This is the result of the effect of palatalization on the *ɗ (to be discussed fully in section 11.2), i.e. the change is more precisely *ɗʲ→j.

(63)   *ɬimɨɗ ʸ→ɬimaj   Proto-Mofu   'ear'
         *ɣanaɗ ʸ→ɣanaj   Sukur   'tongue'
         *dzɨwɨɗ ʸ→dɨwaj   Proto-Musgum   'fly (insect)'
         *zɨwɨɗ ʸ→zawaj   Proto-Hurza   'string'

3.4.4 Velar consonants

There are numerous instances of velar consonants changing their voicing, or of moving from plosive to fricative or vice versa. However these changes are not systematic, and can't be taken as evidence of any generalised innovation.

3.4.5 Compensatory reduplication

There is a widely-attested process of compensatory reduplication within Central Chadic (see (Alan 2005) for an overview of this unusual phenomenon). Compensatory reduplication occurs when one of the consonants of a root is lost, typically *h or *ɗ in initial position. When this consonant is followed by *ɨ, the result may be the loss of a syllable. In some languages, the loss of this syllable is compensated for by the reduplication of the initial consonant of the following syllable along with a vowel. This vowel is in many cases not copied from the following syllable, but *a is used.

Compensatory reduplication of the following consonant can also occur when the vowel of the first syllable is *a.

The following examples show data where the initial consonant of the root has been retained, where it has been lost and compensatory reduplication has occurred, and where it has been lost without compensation.

(64)   *hʷɨpɨɗ 'eat'

Retain		Reduplicate		Delete	
Merey	həpəɗ	Zulgo	papəɗ	Ouldeme	paɗ
Muyang	həpəɗ			Mbuko	pa
Gemzek	həpəɗ				

(65)   *ɗɨɬij 'egg'

Retain		Reduplicate		Delete	
Merey	ɗəɬa [y]	Zulgo	ɬaɬa [y]	Mbuko	ɬaj
Gemzek	ɗəɬa [y]	Mafa	ɬaɬaj	Mandara	ɬaja
		Mofu-Gudur	ɬaɬaɗ [y]	Margi	ihʲi
		Bana	ɬiɬi		

(66)   *haᵐbɨz 'blood'

Retain		Reduplicate		Delete	
Mbazla	haᵐbus	Mofu-Gudur	maᵐbaz	Podoko	muza
		Sukur	muᵐbus	Mbuko	maz [y]
		Merey	baᵐbaz		

(67)   *hɨmɨɗ [y] 'wind'

Retain		Reduplicate		Delete	
Moloko	həmaɗ	Cuvok	mamaɗ [y]	Mada	amaɗ
Zulgo	həᵐbəɗ [y]	Mofu North	mamaɗ [y]	Gude	meɗa

(68)   *hadzak 'smoke'

Retain		Reduplicate		Delete	
Gemzek	hədzak	Cuvok	tsatsak	Muyang	azak [y]
Moloko	hazak	Giziga	tsəndza [w]		
		Mbuko	dzəⁿdzak [y]		

In Mofu-Gudur (Barreteau 1988, 333–334) there is, in some circumstances, free variation between compensatory reduplication and compensatory vowel lengthening. This applies to all verbs with a reduplicated stem, and a large proportion of nouns with a reduplicated stem.

(69)   ya bebeɗey ~ yaa beɗey   'I speak'
        mebebeɗey ~ meebeɗey   'to speak'

(70)   háalay ~ hálálay   'holy place'
        máadəban ~ madádəban   'apprentice'
        maagʷaf ~ magʷagʷaf   'flea'
        méeceɗ ~ mécéceɗ   'flea'

In these examples the roots contain an extra timing unit (i.e. a syllable or mora) with no phonological material attached. The timing unit is expressed either by lengthening the preceding vowel, or else by reduplicating the following syllable. The existence of this extra timing unit can be accounted for by the historical

loss of phonological material, which is then compensated for by either the lengthening or the reduplication strategy.

This can be seen in the Mofu-Gudur root -*lál*- 'to steal', which has the cognate -*hul*- in Mofu North. Both are reflexes of Proto-Central Chadic **kɨr*, which became **kɨl* in the proto-language of the Mofu group and **hɨl* in the immediate ancestor of the two Mofu subgroup languages. Here the initial *h has been lost in Mofu-Gudur, triggering the compensatory processes.

(71)   meléley ~ méeley   'to steal'
        ya léley ~ yáa ley   'I steal'

When reconstructing forms for the proto-languages of groups or for Proto-Central Chadic, the existence of reduplication in a root can be an indication of a lost initial consonant. In cases where, for example, an initial *h is present in just a few languages, but there is reduplication in several more, the reduplicated data can be used to justify the reconstruction of *h.

3.4.6   Compensatory prefixation

Compensatory prefixation is a similar process to compensatory reduplication. It also occurs to compensate for the loss of an initial consonant. In this case, the lost consonant is typically followed by a vowel other than *ɨ. A consonant is added to the root replacing the lost consonant in order to avoid a root commencing with a vowel. This process takes place primarily in languages where word-initial vowels are not permitted.

The consonant chosen to replace the lost consonant is fixed for an individual language, but it is difficult to find motivation for the choice. In Mafa the consonant is /v/, in Mandara it is /n/, and other languages may use /m/ or another consonant.

(72)   *haradz→varadza   Mafa   'scorpion'
        *hɨtak→vatak   Mafa   'thorn'
        *hak^{w}a→vok^{w}a   Mafa   'fire'
        *h^{w}itsɨn^y→mitsɨn^y Proto-Daba   'nose'
        *h^{w}a^{n}dav→ma^{n}daf Proto-Maroua   'hare'
        *h^{w}ɨfa→nafa   Mandara   'tree'
        cf. nafrika   Malgwa   'Africa'

This last example illustrates the application of the process to a vowel-initial borrowed word, where it takes place to satisfy the constraint forbidding initial vowels.

The following data shows examples from Mafa (Mafa group), Dugwor (Mofu group) and Podoko (Mandara group), giving cognates from other languages.

In Mafa, the compensatory consonant is /v/. The reason for the choice of /v/ is unknown.

(73)   varadza   'scorpion'   cf. Moloko   harats
         vajak ^{w} 'grasshopper'   cf. Moloko   hajaw ^{y}
         vatsak ^{w} 'smoke'   cf. Moloko   hazak
         vatak   'thorn'   cf. Moloko   hadak

For Dugwor the compensatory consonant is /m/.

(74)   mətar ^{y} 'nose'   cf. Merey   hətar ^{y}
         mətal ^{y} 'tail'   cf. Merey   hʷətal ^{y}

For Podoko the compensatory consonant is /n/.

(75)   nabəga   'rain'   cf. Glavda   ɣabaga
         nafa   'tree'   cf. Muyang   haf

3.4.7   Fusion

There are cases where two consonants fuse to form a new consonant with features taken from the original consonants. The most widespread examples are *ɗ+*w→ɓ, *ɗ+*w→ʔʷ and the fusion of an implosive with another consonant to form an ejective. This last situation is confined to the Kotoko Centre and Kotoko North groups. This is a sporadic process and cannot be predicted.

For the fusion of *ɗ with *w, the plosive and glottal components of *ɗ combine with the labial component of *w to give the labial glottalised plosive (implosive) /ɓ/ in some languages, or the labialized glottal plosive /ʔʷ/ in others.

(76) *ɗɨwah→ɗɨwa→uɓa   Lamang   'breast'
      *zɨwɨɗ ʸ→zɨɓɨ ʸ   Sukur   'string'
      *ɬɨwɨɗ ʸ→ɬɨʔʷi   Proto-Lamang   'meat'
      *zɨwɨɗ ʸ→zaʔʷɨ   Proto-Bata   'string'
      *dzɨwɨɗ ʸ→ts'ɨwi   Proto-Kotoko North   'fly (insect)'
      *ɗɨkɨn ʸ→nk'ɨn   Proto-Kotoko Centre   'claw'

3.5 Language Contact and Language Separation

In this section we will take a somewhat speculative look at the history of the Central Chadic languages and peoples. The history must take into account both the genetic structure of the Central Chadic branch and also the areal influences amongst the languages.

On the genetic side, we are looking at the reasons for a proto-language to divide into different languages. In order for a division to occur, there needs to be a separation of the people speaking the proto-language into two or more distinct geographic areas. With areal influences, the opposite is true. The languages influencing each other need to be in close and sustained contact.

We have proposed that Proto-Central Chadic split into three sub-branches, North, South and Hurza. At the time of the split, the speakers of Central Chadic North and Central Chadic South would have been in locations where they were in contact with members of their own group, but separate from the members of the other group. Although little is known about the pre-history of the Central Chadic peoples, we can speculate, based on the current location of the languages, that perhaps the Central Chadic South people were located south of Lake Chad, and the Central Chadic North people were located to the east of Lake Chad. Certainly, these two groups were not in their current locations at that time (Seignobos 2000).

The Central Chadic South peoples may have moved to inhabit the mountainous areas, and so become split between the two massifs. The Proto-Mafa and Proto-Sukur peoples would have occupied the main massif within the Maroua, Mora, Mokolo triangle, and the Proto-Daba peoples would have occupied the mountains to the south of the present Maroua-Mokolo road. The Proto-Bata peoples would have settled in the mountains around Mubi in Adamawa state, Nigeria, and the Proto-Tera speakers would have been located possibly in the hills near Biu in Borno state, Nigeria.

Within Central Chadic South, the Tera and Bata group languages are linguistically quite dissimilar from each other and from the Mafa, Daba and Sukur group languages. This indicates a high degree of time-depth for this separation. The separation of the Mafa, Daba and Sukur groups looks to be less ancient.

The Central Chadic North peoples would have moved south or south-east, probably in several waves (Seignobos 2000). The Proto-Higi and Proto-Lamang peoples would have been early to arrive on the Nigerian side, occupying the western edge of the Northern Mandara Mountains. On the eastern side, the Proto-Gidar and Proto-Maroua peoples travelled furthest south. They would have come into contact with the Proto-Daba people, forming an area of linguistic influence.

The people speaking the daughter languages of the proto-language of the Margi-Mandara-Mofu major group now occupy a large area covering the eastern and northern edges of the Northern Mandara Mountains, and the plains to the west of the mountains, over to the hills around Biu. We can speculate that their homeland was in the centre of this area, perhaps around the northern edge of the Northern Mandara Mountains. At some point the Proto-Margi people moved westward and the Proto-Mofu people moved southward, causing a separation and resultant split.

The arrival of the Proto-Margi people around Biu may have caused the displacement of the Proto-Tera peoples, with one part moving westwards towards Gombe, forming what was to become the West Tera subgroup of languages. The other part moved eastwards across the Hawal river, becoming the ancestors of the East Tera subgroup. Another consequence of the arrival of the Proto-Margi speaking peoples was the creation of an area of linguistic influence, involving speakers of Margi group, Higi group and Bata group languages.

The Proto-Mofu peoples eventually settled on the eastern fringes of the Northern Mandara Mountains, coming into contact with speakers of Mafa or its ancestor. This resulted in another area of linguistic influence, which also encompassed the Maroua and Hurza group languages.

The peoples of the various Proto-Kotoko languages and Proto-Musgum either occupied or remained in the area from Lake Chad southwards along the Logone and Chari rivers.

At some point in this history, or possibly at more than one time, the development and changes within the Kanem and Borno empires caused migrations and separations amongst the Central Chadic peoples. One result of this is the separation of the four Kotoko groups and the Musgum group from the rest of Central Chadic. This separation was reinforced by the arrival of the Fulani from the south to Maroua in 1800. The five groups remained in contact with each other, allowing areal influences between the languages to create similarities even where the genetic relationship was not close.

It should be stressed again that this scenario is based almost entirely on linguistic evidence and the current locations of the various languages. It is to be hoped that further research from archaeologists, ethnographers and geneticists will shed more light on these histories (MacEachern 1991; MacEachern 2001; MacEachern 2002; Cernỳ et al. 2006; MacEachern 2012a; MacEachern 2012b; MacEachern 2012c; MacEachern and David 2012; Blench 2012; Seignobos 2000; Barreteau and Tourneux 1988).

4   Studies on Central Chadic Phonology

In this section we will be looking at how knowledge about the phonology of Central Chadic languages has developed in the academic world. First we will look at the main issues that have been addressed, and then we will review the main publications on Central Chadic languages, as well as general works on Chadic that cover Central Chadic historical linguistics and phonology.

4.1   Linguistic Issues

There are a number of linguistic issues that are important to the research on Central Chadic languages. These include questions about the existence and behaviour of 'prosodies', questions about the number of underlying vowels, questions as to the status of schwa as a full or epenthetic vowel, questions about the existence and analysis of palatalized and labialized consonants, and questions about the analysis of pre-nasalized consonants. A brief summary of the research on these issues will be presented in the following sections.

4.1.1   Prosodies

Many branches of linguistics have adopted their own terminology, and Chadic studies is no exception. The term 'prosody' has come to be used to refer to a phonemic unit affecting a syllable, morpheme or word that causes phenomena such as the fronting of vowels or the labialization of consonants. The term was first used in this way by Mohrlang in his analysis of Higi 'Vectors, Prosodies, and Higi Vowels' (Mohrlang 1971).

The most common prosodies in the literature are the palatalization prosody (often denoted as PAL) and the labialization prosody (LAB). Some have also included a pre-nasalization prosody, though this analysis no longer receives any support.

In this study we will be distinguishing between prosodies (which are phonemic units), and their effects (such as vowel harmony or the modification of consonants).

4.1.2   How Many Underlying Vowels?

Many Central Chadic languages have a large variety of surface vowels, which can be analysed as being the result of combinations of a small number of underlying vowels and prosodies. Early studies tended to propose too many

underlying vowels, with later studies reducing the number. In one analysis, it was shown to be theoretically possible to reduce the number of underlying vowels to zero, and to predict the surface vowels just from the consonants, prosodies and tone (Barreteau 1988).

4.1.3   The Status of Schwa

One issue in the study of individual languages is the status of schwa. In many languages schwa has been analysed as an epenthetic vowel (e.g. Mofu (Barreteau 1988), Buwal (Viljoen 2009)), i.e. a vowel that is not present in the underlying form. In other studies it is treated as a full vowel (e.g. Bana (Hoffman 1990), Mbuko (T. Smith and Gravina 2010)).

The analysis of the status of schwa is problematic at the level of an individual language, and is much more so when attempting to reconstruct vowels for an historic language. It is also a subject about which linguistic theory has much to say, and to address the theoretical issues in a deep way is beyond the scope of this study. However, a brief word is necessary.

There are three types of vowel that are referred to as epenthetic, differentiated according to whether they are phonetic, phonological or lexical. A phonetically epenthetic vowel, or intrusive vowel, is simply a sound introduced to make an unpronounceable sequence pronounceable.

A phonologically epenthetic vowel is one that does not appear in the underlying form of a morpheme, but is inserted to satisfy phonological criteria, such as syllabification rules, and is then subject to phonological processes such as vowel harmony or conditioning by adjacent consonants.

A lexically epenthetic vowel, or zero vowel, is one that exists in the underlying form of a morpheme, but which is not realised phonetically in all environments. In other words, it is present structurally but not necessarily phonetically. This zero vowel can be treated as a phoneme.

All three types of epenthetic vowel exist in Central Chadic languages.

In this study we shall take a practical approach. We shall be talking a lot about the historic changes in the realisation of schwa, its behaviour under the influence of vowel harmony or local conditioning, and about whether it can be reconstructed for the different ancestor languages. For ease of notation and clarity of description, we shall refer to schwa almost always as a phoneme.

However, this does not imply that we are taking a particular position concerning its epenthetic status.

There will be further discussion of the status of schwa in Proto-Central Chadic in section 12.4.

4.1.4   Palatalized and Labialized Consonants

Palatalized and labialized consonants have been analysed in a number of different ways. In some analyses they are treated as phonemes. However they have also been analysed as the result of the effect of prosodies, either acting at the morpheme/word level or else at the syllable level.

There were some attempts to transfer a successful analysis from one language to another, not closely-related language. However it has become apparent that the relationship between palatalized and labialized consonants and the prosodies differs substantially across the Central Chadic languages. This relationship will be the subject of the bulk of the rest of this study.

4.1.5   Pre-nasalized Consonants

Pre-nasalized consonants have also been the subject of varied analyses. The number of NC sequences treated as phonemes has varied, with some analyses allowing for syllabic nasals, and others treating almost all such sequences as single phonemes. In some cases the presence of the pre-nasalization component has been attributed to the effect of a pre-nasalization prosody, though this analysis is no longer used. None of the analyses treat these systematically as CC sequences.

More recent analyses have typically settled on five pre-nasalized phonemes: /^{m}b/, /^{n}d/, /^{n}dz/, /^{ŋ}g/ and /^{ŋ}g^w/.

4.2   Literature Review

This section presents an historical view of the advances made in the study of Central Chadic languages, in particular focussing on the developments made in the understanding of Central Chadic phonologies. We will be looking at the major publications in chronological order.

4.2.1   A Grammar of the Margi Language (Hoffmann 1963)

This grammar by Carl Hoffmann represents the first formal description of a Central Chadic language. The second and third reference grammars of Central

Chadic languages did not appear until twenty years later (Wolff 1983b; Hoskison 1983).

In terms of the phonology, Margi excited interest due to the inclusion of a set of labio-coronal consonants in the phonemic inventory (e.g. /p͡t/). Also of note was the large number of palatalized and labialized consonants and a huge wealth of pre-nasalized consonants. Hoffmann's analysis found six phonemic vowels and 96 phonemic consonants, though he added that there may be more for which he did not yet have data!

This unusual situation provoked further analysis of the data by other linguists (Schuh 1971; Maddieson 1987). Maddieson's analysis reduced Hoffmann's six vowel inventory to just two (/a/ and /ə/), and allowed phonemic palatalized and labialized consonants and homorganic voiced pre-nasalized consonants, but treated the other pre-nasalized consonants and the labio-coronal consonants as CC sequences, thus removing them from the inventory.

4.2.2   Higi Phonology (Mohrlang 1972)

Mohrlang's phonology of Higi builds on an earlier analysis presented as a conference paper by Hoffmann (Hoffmann 1965), and on his own paper 'Vectors, Prosodies, and Higi Vowels' (Mohrlang 1971), the first published work to make use of the notion of prosodies in the analysis of a Central Chadic language. Mohrlang includes three prosodies in his analysis: labialization, palatalization and pre-nasalization. He used the analysis to explain labialized consonants, palatalized consonants, pre-nasalized consonants and labio-coronal combinations as the result of the application of these prosodies. Thus sequences such as [pt] and [mt] are analysed as /^{w}t/ and /^{nw}t/ respectively, with the superscript ^{w} and ^{n} representing the labialization and pre-nasalization prosodies. These prosodies affect syllables rather than entire morphemes. The way that the prosody is expressed depends on the type of the consonant.

(77)   /xa ^{w}/   [x^{w}a]   'bench'
         /ta ^{w}/   [pta]   'leather skin'
         /ʃa ^{w}/   [^{w}ʃa]   'things'
         /ne ^{w}/   [^{m}nɛ]   'salt'
         /ta ^{y}/   [t^{j}a]   'sweet beer'
         /me ^{y}/   [m^{j}ɛ]   'ladies'
         /dza ^{n}/   [^{n}dza]   'to sit'
         /tse ^{n}/   [^{n}tsɛ]   'eye'

For the vowel system, he proposes four phonemic vowels in word-final position: /i/, /e/, /ɛ/, /a/, reduced to three in word-medial position. He also raises the thorny question of the treatment of schwa. He posits the existence of a phonemic schwa vowel in word-medial position, which reduces to a transition break or zero in certain environments.

The use of prosodies in the analysis was proposed in order to simplify the consonantal system. A straight segmental analysis would have had to include large sets of pre-nasalized, palatalized and labialized consonants. Analysing individual syllables as carrying combinations of prosodies vastly reduced the number of phonemes required.

However the syllable-prosody analysis was disadvantageous in that it obscured many of the phonological processes in the language. This approach was only attempted on two further occasions, in the analysis of Zulgo (Haller 1980) and Bana (Hoffman 1990). Only in the case of Bana, where palatalization was analysed as a syllable-level prosody, did the analysis appear at all productive (see section 6.5.1).

4.2.3   Notes on the Phonology of Gude (Hoskison 1975)

Gude is a language of the Bata group spoken on both sides of the Cameroon-Nigeria border. Hoskison's MA thesis built on his earlier paper 'Prosodies and Verb Stems in Gude' (Hoskison 1974) and was later incorporated into his doctoral dissertation 'A Grammar and Dictionary of the Gude Language' (Hoskison 1983).

In contrast to Mohrlang's analysis of the typologically related Higi (Mohrlang 1972), Hoskison treated palatalization and labialization as features of consonants in Gude, present as such in the underlying representation. He describes 56 phonemic consonants in total, 23 'plain' consonants, 11 labio-velarised consonants (all of which are modifications of labial or velar consonants) and 22 palatalized consonants.

Hoskison noted that phonetically pre-nasalized consonants were of two types: those consisting of a voiced stop preceded by a homorganic nasal; and those where the non-nasal component was either voiceless or a fricative, or else the nasal was not homorganic. Rather than analysing these situations differently (as the situation merits), Hoskison chose to treat them all as tautosyllabic NC sequences.

For the vowels, Hoskison posits four phonemes: /ɨ/, /a/, /ɨː/, /aː/. These phonemes are conditioned by adjacent labialized and palatalized consonants to produce a variety of surface vowels.

Of particular interest is the palatalization strategy adopted by Gude for marking motion-to-speaker on verbs. Motion-to-speaker is marked by the fronting of the final vowel, and also the palatalization of one or more consonants of the root. The consonants to be palatalized are chosen according to a hierarchy, where the sibilants, /ɗ/ and /n/ are chosen first, but when absent the palatalization falls on other coronal consonants, or if they are absent then on non-coronal consonants. This is the first recorded instance of palatalization functioning as a morphological feature.

4.2.4   Daba (parler de Pologozom): Description phonologique (Lienhard and Giger 1975)

Lienhard and Giger's phonology is of note as probably the first description of vowel harmony in a Central Chadic language. The terminology of prosodies is used, with morphemes able to carry either the palatalization prosody, the labialization prosody or no prosody. The prosodies cause the fronting or back-rounding of vowels, but do not affect the consonants.

A single morpheme cannot carry both palatalization and labialization prosodies. However prosodies can spread from roots to affixes and vice versa, which can result in a word that carries both prosodies. For instance, if the root carries the labialization prosody and the affix carries the palatalization prosody, both prosodies will spread across the word, and the word will carry both the palatalization and the labialization prosodies.

Amongst the consonant phonemes they included a set of pre-nasalized voiced stops.

Only two underlying vowels are proposed: /ə/ and /a/. /ə/ is treated as a phoneme, though one which may be deleted in certain environments (e.g. following /r/ in a medial syllable).

4.2.5   Y-prosody as a morphological process in Ga'anda (Ma Newman 1977)

Ma Newman describes processes occurring in Ga'anda that make use of the palatalization prosody. Two processes are described, one for creating the noun

stem used with certain affixes and the other affecting the verb stem in various inflected forms.

Nouns belong to one of two classes, the T class or the Y class. With Y class nouns, the stem is palatalized for singular nouns followed by a determiner. Any central vowels in the stem are fronted, but front and back vowels are unaffected. The consonant /s/ becomes /ʃ/ and /ŋ/ becomes /j/.

(78) ʔal-tsa   'bones'   ʔel-a   'a bone'
      naf-tsa   'people'   nef-a   'a person'
      ɓəɓ-tsa   'breasts'   ɓiɓ-a   'a breast'
      ɬəm-tsa   'names'   ɬim-a   'a name'
      ʃemeɗ-tsa   'spirits'   ʃemeɗ-a   'a spirit'
      kutər-tsa   'chiefs'   kutir-a   'a chief'
      wassan-tsa   'squirrels' weʃʃen-a   'a squirrel'
      xəraŋ-tsa   'noses'   xirej-a   'a nose'

Verbs are palatalized in the second and third persons singular. The palatalization follows the same rules as for nouns.

(79) kar-   ə ker-ən   'you (s) refused'
      fəɗ-   ə fiɗ-ən ɬiᵐbira   'you (s) beat a drum'
      taxs- kə texʃ-ən   'you (s) should prepare'

For the nouns, the palatalization prosody is said to originate in a now-defunct nominal class marker. Following on from Gude, this is the second language in which there is published evidence for the palatalization prosody acting as a morphological process.

4.2.6   The Phonology of Dghwede (Frick 1977)

In this paper, which is only the fifth published work on phonology in Central Chadic, Frick describes Dghwede, a language of the Mandara group. Amongst the consonants she includes a set of pre-nasalized voiced stops and a set of labialized velar consonants. There are three vowel phonemes /i/, /a/ and /u/, plus the schwa vowel, described as a 'transition' rather than as a phoneme.

Frick finds no vowel harmony in Dghwede. The vowel /i/ causes a preceding alveolar sibilant to be realised as an alveolo-palatal sibilant. The notion of prosody is not used in the analysis, nor is it required to explain the data.

4.2.7   Reconstructing Vowels in Central Chadic (Wolff 1983a)

In this paper, Wolff addresses the task of reconstructing the vowels in Central Chadic, which he describes as 'one of the most difficult and challenging tasks of Chadic comparative linguistics'.

Following work done on individual languages which introduced the concept of 'prosodies' into Central Chadic phonology (Mohrlang 1971; Ma Newman 1977), Wolff included prosodies in his analysis as phonological units distinct from vowels or consonants. He posited two prosodies, palatalization and labialization, which work along with two underlying vowels *ə and *a to create the ranges of surface vowels found in individual languages.

He showed for languages of the Mandara and Lamang groups that any conventional search for vowel correspondences using a straightforward application of the comparative method would fail to yield 'satisfactory results'. The following table (from Wolff), shows the considerable variation in the surface vowels for two roots.

Language	'nose'	'ear'
Dghwede	xtire	ɬeme
Glavda	xtɨra	hʲimia
Gvoko	xtor	ɬuwo
Guduf	xtere	ɬime
Lamang	xtsini	ɬəməŋi
Podoko	ftra	ɬama
Mandara	əktare	ɬəma

Table 15 - Comparing vowels in the Lamang and Mandara groups

Wolff presented four hypotheses which together account for the vowel system of Proto-Wandala-Lamang (the ancestor of a group of languages corresponding to Newman's Mandara group, but not considered to be a single group in Gravina (2007a)). In the first hypothesis he proposed a single underlying vowel phoneme *a and an epenthetic vowel, which worked alongside the approximants *j and *w to produce the system of six surface vowels. The second proposed a distinction between a-vocalised and zero-vocalised roots, based on the presence or absence of *a before the final consonant of the root. The third stated that many lexical items were formed from a base plus petrified affixes, some of which were labio-velar consonants and gave rise to rounded vowels. (He expanded on this concept later (Wolff 2006), see section 4.2.11.) The fourth hypothesis was that there was some form of marking in the nominal

system of the ancestor language which contained a palatal or palatalized segment. This segment became an integral part of the nominal system of the daughter languages and was manifested in the form of a palatalization prosody.

The result of this analysis is that, in comparing Central Chadic languages, it is important to focus on the presence of approximants, labio-velar consonants and palatalization more than on the quality of individual vowels. This is probably the most important paper that has been written on the subject of Central Chadic phonology. Most of Wolff's ideas will feature in the rest of this study: The relationship between labio-velar consonants and rounded vowels will be discussed in section 11.3 and the role of palatalization will be discussed in section 11.2, though both will feature all the way through the study. There is a difference in the analysis of the underlying vowel system. Where Wolff had a two-way distinction between *a and schwa/zero, here I will give evidence for a three-way distinction between *a, *i and schwa/zero.

4.2.8   A grammar of the Lamang language: gwàd làmàn (Wolff 1983b)

In terms of its grammar, Lamang is amongst the most complex of the Central Chadic languages, and its phonology likewise presents difficulties. This is in part due to the fact the Lamang has neither a neat system of vowel harmony, such as found in Daba, nor a clear system of consonant prosodies as found in Gude. We will be including Lamang amongst the Mixed Prosody languages (see chapter 7), a set of languages located between and to the north of the vowel prosody and consonant prosody areas.

Wolff analyses Lamang as having a set of labialized consonants, but no palatalized consonants. He also includes a set of pre-nasalized voiced stops in the phonemic inventory.

Two possible analyses are given for the vowel system. In one there are four vowel phonemes, /i/, /a/, /u/ and /ə/. Under this analysis /ə/ is accorded phonemic status. In the other, [ə] is treated as epenthetic rather than phonemic, and a diphthong is added to the inventory, notated as /aY/, with allophones [e] and [o].

4.2.9   *Du vocalisme en tchadique (Barreteau 1987b)*

In this paper, Barreteau notes the extreme level of variation in the vowel systems of Central Chadic languages, and also the wide variety of methods used to analyse them. He states that only three features are needed for the analysis of the vowel systems of the Cameroonian Central Chadic languages: A segmental feature 'laxness' (French 'relâchement') and two prosodies, palatalization and labialization.

The lax (i.e. [+lax]) vowels are short, high and often interpreted as epenthetic. The tense vowels ([-lax]) are longer, low and more stable. In other words this feature corresponds to a distinction between two degrees of openness, or, more essentially, differentiates /ə/ and /a/. The palatalization prosody causes the fronting of vowels, and the labialization prosody causes the rounding of vowels.

Barreteau identifies seven different phonological systems amongst the Central Chadic languages of Cameroon. These differ in whether there is a [lax] feature, whether there is a palatalization prosody, whether there is a labialization prosody, whether the labialization prosody can co-occur with the palatalization prosody, and in how much the lax vowel is affected by the prosodies.

For example, the most complex system (attributed to Mafa, Zulgo, Daba and Gidar) is analysed as follows:

	+PAL		-PAL	
	-LAB	+LAB	-LAB	+LAB
+lax	i	y	ə	u
-lax	e	œ	a	ɔ

A less complex system without the labialization prosody is found in languages such as Mofu-Gudur. Here the vowels are distinguished only by the features [lax] and [PAL].

	+PAL	-PAL
+lax	i	ə
-lax	e	a

Barreteau goes on to propose that the [±lax] distinction is better understood as a vocalisation contrast. In other words, the lax vowel is best treated as epenthetic, and the real contrast is between the presence and the absence of a vowel. This distinction therefore is structural rather than segmental. In a later

work (Barreteau 1988), he goes further, showing that for Mofu-Gudur it is possible to eliminate vowels completely from the underlying representation, and to determine the presence of a full vowel from the tones of the word. He presents this as a possible analysis, but does not claim this as the most desirable analysis. The important thing to note is that for languages such as Mofu-Gudur the underlying forms need only draw upon a single vowel phoneme and at most two prosodies.

Whilst Barreteau's analysis is extremely powerful for most Cameroonian Chadic languages, it does not extend to languages such as Gude where vowel harmony plays no role. Under his system, Gude is analysed as not having the features PAL and LAB, but only the feature [lax]. This accounts for Gude's system of two underlying vowels /a/ and /ə/, but does not address the role of palatalization and labialization on consonants in producing surface front and back-rounded vowels. There is a gap in his analysis when it comes to describing languages where PAL and LAB are primarily realised on consonants.

In terms of the phonological systems found in Central Chadic, Barreteau's typology works well for the Vowel Prosody languages (see chapter 5), but is insufficient for treating Consonant Prosody languages, or languages of the Mixed Prosody or Kotoko types.

4.2.10 Palatalization in West Chadic (Schuh 2002)

Whilst focussing on West Chadic, Schuh takes as his starting point the existence of a widespread process of 'morphological palatalization' in Central Chadic. By 'morphological palatalization' Schuh means a palatalization feature that affects segments throughout an entire morpheme. He cites examples such as Podoko (Swackhamer 1981) where palatalization produces vowel fronting as well as palatalization of certain consonants, and Gude (Hoskison 1974) where palatalization affects certain consonants in a root. He speculates that this morphological palatalization might be a feature of Proto-Central Chadic, and identifies this as an area lacking in Chadic research at that time. The paper goes on to propose that this feature was also shared with West Chadic, and thus has a deep history within Chadic.

This conclusion is shared in this study, where we will show that palatalization as a feature was present at least as far back as Proto-Central Chadic (see section 11.2).

4.2.11 Suffix petrification and prosodies in Central Chadic (Lamang-Hdi) (Wolff 2006)

In this paper, Wolff uses the prosodic approach to attempt reconstructions of Proto-Lamang-Hdi. To do this he makes use of the notion of suffix petrification. Following from work by Schuh on the evolution of determiners in Chadic (Schuh 1983), Wolff proposes that certain palatalization and labialization phenomena in Lamang and Hdi can be explained by positing the presence of petrified nominal suffixes –y and –w in the reconstructed forms for Proto-Lamang-Hdi.

4.2.12 A Timeline of Central Chadic phonological studies

Here I present a timeline of all the publications relating to the phonologies of individual Central Chadic languages to date.

Language	Group	Title	Reference
Margi	Margi	A Grammar of the Margi Language	(Hoffmann 1963)
Higi	Higi	A Tentative Analysis of the Phonology of Higi	(Hoffmann 1965)
Higi	Higi	Vectors, prosodies, and Higi vowels	(Mohrlang 1971)
Ga'anda	Tera	Downstep in Ga'anda	(Ma Newman 1971)
Higi	Higi	Higi phonology	(Mohrlang 1972)
Gude	Bata	Prosodies and Verb Stems in Gude	(Hoskison 1974)
Gude	Bata	Notes on the phonology of Gude	(Hoskison 1975)
Daba	Daba	Daba (parler de Pologozom): description phonologique	(Lienhard and Giger 1975)
Dghwede	Mandara	The phonology of Dghwede	(Frick 1977)
Ga'anda	Tera	Y-prosody as a morphological process in Ga'anda	(Ma Newman 1977)
Muskum	Musgum	Une langue tchadique disparue : Le Muskum	(Tourneux 1977)
Mulwi	Musgum	Le Mulwi ou Vulum de Mogroum (Tchad) : Phonologie - Eléments de grammaire	(Tourneux 1978a)
Zulgo	Mofu	Phonology of Zulgo	(Haller 1980)

Language	Group	Title	Reference
Podoko	Mandara	From consonants to downstep in Podoko	(Anderson and Swackhamer 1981)
Podoko	Mandara	Podoko Phonology	(Swackhamer 1981)
Ouldeme	Mofu	Phonologie quantitative et étude synthématique de la langue ouldeme: langue tchadique du Nord Cameroun	(de Colombel 1982)
Higi	Higi	Phonémique et Prosodie en Higi	(Barreteau 1983)
Gude	Bata	A Grammar and Dictionary of the Gude Language	(Hoskison 1983)
Bura	Margi	The analysis of complex phonetic elements in Bura and the syllable	(Maddieson 1983)
Lamang	Lamang	A grammar of the Lamang language: gwàd làmàn	(Wolff 1983b)
Mbara	Musgum	Les Mbara et leur langue (Tchad)	(Tourneux, Seignobos, and Lafarge 1986)
Margi	Margi	The Margi vowel system and labiocoronals	(Maddieson 1987)
Mofu-Gudur	Mofu	Description du mofu-gudur	(Barreteau 1988)
Mafa	Mafa	Lexique mafa	(Barreteau and le Bléis 1990)
Bana	Higi	A preliminary phonology of Bana	(Hoffman 1990)
Munjuk	Musgum	Lexique pratique du Munjuk des rizières : Dialecte de Pouss (Français-Munjuk, Munjuk-Français)	(Tourneux 1991)
Buduma	Kotoko Island	A Phonological Description of Yedina (Buduma), language of Lake Chad	(McKone 1993)
Ouldeme	Mofu	La langue ouldémé, Nord-Cameroun	(de Colombel 1997)
Moloko	Mofu	The Vowel System of Moloko	(Bow 1999)
Dugwor	Mofu	Phonologie du Dugwor	(Ousmanou 1999)
Mbuko	Hurza	The phonology of Mbuko	(Gravina 1999)

Language	Group	Title	Reference
Mada	Mofu	Dictionnaire mada	(Barreteau and Brunet 2000)
Buduma	Kotoko Island	Grammatik des Buduma: Phonologie, Morphologie, Syntax	(Awagana 2001)
Mbuko	Hurza	Features of a Chadic language: the case of Mbuko phonology	(Gravina 2001)
Bata	Bata	Bata Phonology: A Reappraisal	(Boyd 2002)
Hdi	Lamang	A grammar of Hdi	(Frajzyngier and Shay 2002)
Malgwa	Mandara	Die Sprache der Malgwa (Nárá Málgwa)	(Löhr 2002)
Gidar	Gidar	Esquisse Phonologique du Kada (Gidar)	(Noukeu 2002)
Zina	Kotoko South	Consonant-tone interaction in Zina Kotoko	(Odden 2002a)
Gemzek	Mofu	Gemzek Phonology	(Gravina 2003)
Cuvok	Mafa	Etude phonologique du cuvok et principes orthographiques	(Ndokobaï 2003)
Mafa	Mafa	Aspect in Mafa	(Ettlinger 2004)
Gavar	Daba	Etude phonologique du Gavar	(Noukeu 2004)
Mina	Daba	A grammar of Mina	(Frajzyngier, Johnston, and Edwards 2005)
Mpade	Kotoko North	Esquisse de la phonologie lexicale du Mpade (langue tchadique centrale groupe B)	(Mahamat 2005)
Zina	Kotoko South	The unnatural phonology of Zina Kotoko	(Odden 2005)
Lagwan	Kotoko Centre	Phonology of Lagwan (Logone-Birni Kotoko)	(Ruff 2005)
Bura	Margi	Bura Phonology and Orthography	(Warren 2005)
Gidar	Gidar	A Grammar of Gidar	(Frajzyngier 2007)
Zina	Kotoko South	The unnatural tonology of Zina Kotoko	(Odden 2007)
Bura	Margi	Bura phonology and some suggestions concerning the orthography	(Blench 2009b)

Language	Group	Title	Reference
Kirya	Higi	An Introduction to Kirya-Konzəl	(Blench and Ndamsai 2009b)
Buwal	Daba	A Phonology of Buwal	(Viljoen 2009)
Vame	Hurza	A Phonological sketch of the Plata dialect of the Vamé language	(A. Kinnaird 2010)
Muyang	Mofu	The Phonology of Two Central Chadic Languages	(T. Smith and Gravina 2010)
Mbuko	Hurza	The Phonology of Two Central Chadic Languages	(T. Smith and Gravina 2010)

4.3   Summary

After fifty years of study, many of the questions about Central Chadic phonology have been resolved. Within the consonant inventory almost all languages are described with at least five 'places' of articulation: labial, alveolar, laminal (a term coined to describe the alveolar sibilants (Roberts 2001)), velar and labialized velar. There is a set of pre-nasalized voiced stops and a set of glottalised consonants, normally implosive. Open questions concern the status of palatalized consonants and labialized consonants other than labialized velars and the presence or absence of certain individual phonemes such as the velar implosive, velar nasal and the voiced lateral fricative.

In describing the vowel systems of Central Chadic languages, there is a marked difference between the languages displaying vowel harmony and those which don't. For those with vowel harmony, there is general agreement that at most two phonemic vowels /a/ and /ə/ are required, along with the palatalization prosody and in some cases the labialization prosody. At dispute is whether schwa should be treated as phonemic or not.

In the languages which do not display vowel harmony, most analyses only require two or three underlying vowels, with the status of schwa again being in question. Whereas for the languages with vowel harmony the prosodic analysis has proved highly successful as a theoretical framework, there does not seem to be any overarching theory to explain the functioning of labialization and palatalization in these languages. There is also a lack of an overall understanding of the nature of Proto-Central Chadic phonology, and of how it developed into such diverse systems.

Studies in the development of Central Chadic tone systems are at a very early stage.

Section II - TYPOLOGY OF CENTRAL CHADIC PHONOLOGIES

This section comprises five chapters looking at the different phonological systems present in the Central Chadic languages. We will examine the phonological characteristics of each language, where data is available, and reconstruct the broad phonological features of the proto-language of each of the eighteen groups within Central Chadic.

First (chapter 5) we shall look at the Vowel Prosody languages, where their primary characteristic is the presence of vowel harmony caused by prosodic features of palatalization or labialization.

The second chapter in this section (chapter 6) deals with the Consonant Prosody languages. These languages are characterised by complex systems of labialized and palatalized consonants.

The third chapter in the section (chapter 7) looks at the two groups of languages that exhibit a Mixed Prosody system, where elements of vowel prosody and consonant prosody have combined.

The fourth chapter in the section (chapter 8) covers the Kotoko languages, whose phonological system doesn't fit any of the other systems.

The final chapter (chapter 9) gives a summary of the phonological characteristics of the languages and proto-languages.

The focus of this section is to establish the vowel and prosody systems of the proto-languages at the group level. In the following section (Section III) we will be using the reconstructions of the group proto-languages to establish the phonological features of Proto-Central Chadic. In particular, we will be looking at the history of the development of the different phonological sub-types (chapter 11).

5   Vowel Prosody

5.1   Introduction

In this chapter we will be looking at the phonological features of Vowel Prosody languages. These languages all display vowel harmony caused by prosodic features of palatalization and labialization. The palatalization prosody causes front vowel harmony, and in most cases changes the point of articulation of the laminal consonants from alveolar to post-alveolar. All of these languages have the palatalization prosody.

Some languages also have a labialization prosody, which causes back-rounding vowel harmony, and may also labialize velar phonemes.

We shall first of all present a stereotypical example of a Vowel Prosody language in the form of a case study of Moloko (Mofu group). We shall then go through each of the groups within Central Chadic where the Vowel Prosody system is present and, as far as possible, reconstruct the phonological system of the proto-language of the group.

It should be noted that the presence of vowel harmony in the languages of a group does not imply that the proto-language of the group also possessed vowel harmony. We must show that for individual words a particular prosody is present across a range of languages in the group. If this is true for a significant number of words, then that prosody can be reconstructed for the proto-language of the group.

5.2   Case Study – Moloko

Moloko (Bow 1999), a language of the Mofu group, exhibits all of the phenomena typical of languages using the Vowel Prosody system. The most important of these for our discussion are:

- a vowel system consisting of two vowels /a/ and /ə/ (or one vowel /a/ and an epenthetic [ə])
- two prosodies – palatalization and labialization (see section 5.2.2)
- the existence of a set of labialized velar phonemes;
- the movement of laminal phonemes to the post-alveolar place of articulation under the influence of the palatalization prosody
- the labialization of velars under the labialization prosody
- the leftward spread of prosodies, both from suffixes to roots and from roots to prefixes

5.2.1   Consonants

The consonantal inventory of Moloko is as follows:

	Labial	**Alveolar**	**Laminal**	**Velar**	**Labialized Velar**
Plosive	p	t	ts	k	k^w
	b	d	dz	g	g^w
Implosive	ɓ	ɗ			
Nasal	m	n		(ŋ)	
Pre-nasalized	^{m}b	^{n}d	^{n}z	^{ŋ}g	$^ŋg^w$
Fricative	f	ɬ	s	h	h^w
	v	ɮ	z		
Trill		r			
Approximant		l	j	w	

Table 16 - Moloko consonants

/h/ is realised as [x] word-finally, which is typical of languages in the groups in question here.

As with other languages in the Mofu group, [ŋ] is only found word-finally, and is in complementary distribution with [n]. It is analysed by Bow as being an allophone of /n/ and therefore not phonemic.

In common with many Central Chadic languages, voiced plosives and pre-nasalized plosives do not occur in word-final position.

5.2.2   Vowels and Prosodies

The vowel system of Moloko is analysed as consisting of the single underlying phoneme /a/ along with two word-level prosodies, labialization and palatalization.

These word-level prosodies are supra-segmental features that are a property of the entire word. In the case of Moloko, and other languages of this type, they are realised primarily on the vowels. The palatalization prosody fronts the vowels of the word, while the labialization prosody backs and rounds the vowels. The prosodies are denoted by ʷ or ʸ placed at the end of the word, and separated from the word by a space. For example, the name of this language, Moloko, has the underlying form /malaka ʷ/. The interaction of the prosody with the vowels gives the phonetic realisation [mɔlɔkʷɔ].

Besides the vowel /a/, there is also a [ə] which Bow considers to be absent from the underlying form but which is inserted to break up most CC clusters. Only word-medial CC clusters with /r/, /l/, /w/ or /j/ as the first consonant are permitted.

The prosodies and the vowels interact to produce the following surface forms:

	No Prosody	Palatalization	Labialization
/a/	a	ɛ	ɔ
[ə]	ə	ɪ	ʊ

Table 17 - Moloko vowels

(80)   /mdga/   [mədəga]   'older sibling'
         /matabaɬ/   [matabaɬ]   'cloud'
         /mababak ʸ/   [mɛbɛbɛk]   'bat'
         /gva ʸ/   [gɪvɛ]   'game'
         /gza ʷ/   [gʊzɔ]   'kidney'
         /talalan ʷ/   [tɔlɔlɔŋ]   'chest'

(In the underlying forms ʸ is used for the palatalization prosody and ʷ for the labialization prosody.)

Morphemes cannot carry both the palatalization and labialization prosodies at the same time.

The vowel system is complicated by two other factors. Firstly, the vowel of the final syllable before a pause is neutralised to /a/, as in (80). This occurs after

schwa insertion but before the application of prosodies. Secondly, a word-initial vowel (always /a/) is impervious to the effects of the prosodies. The non-pre-pausal form is given for the underlying form from now on.

(81)   /ɗf atsr/   [**ɗəf** atsar]   'the food is good'   (word boundary)
        /na zm ʷ ɗf/   [na zʊm **ɗaf**]   'I eat food'   (pre-pausal)

(82)   /ala ʸ/   [alɛ]   'eye'
        /ałałaɗ ʸ/   [ałɛłɛɗ]   'egg'
        /amam ʷ/   [amɔm]   'bee, honey'
        /azⁿga ʷ/   [azʊⁿgʷɔ]   'donkey'

5.2.3 Local Conditioning

Vowels are conditioned by adjacent labialized consonants and the approximants /w/ and /j/ in some environments. The conditioning acts on the vowels after the effect of the prosodies has been applied. The environments and effects are as follows:

(83)   wə→wu
        əw→uw
        jə→ji
        əj→ij
        Cʷa→Cʷɔ
        Cʷə→Cʊ
        əCʷ→ʊCʷ
        ɛCʷ→œCʷ

This last process results in the presence of non-high phonetic front rounded vowels. This is the only environment where this occurs. Front rounded vowels are always due to the combination of the palatalization prosody and a labialized consonant and never to the presence of both the palatalization prosody and the labialization prosody on the same root. The following examples show the effect of a labialized consonant on adjacent vowels.

(84)   /hʷaɗa/   [hɔɗa]   'dregs'
        /tkʷrak/→/təkʷərak/   [tʊkʊrak]   'partridge'
        /dzagʷr ʸ/→/dzagʷar ʸ/   [dʒœgʷɛr]   'limp'

/ə/ is affected by an adjacent semivowel, being realised as [i] adjacent to /j/ and [u] adjacent to /w/. /a/ is unaffected by adjacent semivowels.

(85)   /kja/→/kəja/   [kija]   'moon'
        /ɗwr ʸ/→/ɗəwar ʸ/   [ɗuwɛr]   'to sleep'
        /jaɗj/→/jaɗaj/   [jaɗaj]   'to tire'
        /mawr/→/mawar/   [mawar]   'tamarind'

5.2.4   Consonants and Prosodies

Whilst the prosodies primarily affect vowels, they also have effects on certain sets of consonants. (We will see a similar phenomenon in chapter 6 with Consonant Prosody languages.)

The palatalization prosody causes the point of articulation of all laminal consonants in the word to be moved from alveolar to post-alveolar, i.e. /s/ is realised as [ʃ], /z/ as [ʒ] etc.

(86)   /dzn/   [dzaŋ]   'to prick'
        /dzn ʸ/   [dʒɛŋ]   'chance'
        /mtsapr/   [mətsapar]   'multiple'
        /mtsapa ʸ/   [mɪtʃɛpɛ]   'to drape'

The labialization prosody causes the labialization of all the velar consonants in the word.

(87)   /gara ʷ/   [gʷɔrɔ]   'kola'
        /maza ᵑga ʷ/   [mɔzɔŋgʷɔ]   'chameleon'
        /magadak ʷ/   [mɔgʷɔdɔkʷ]   'large hawk'

5.2.5   Spread of Prosodies

Prosodies spread leftwards within the word, either from the root onto prefixes, or from a suffix onto the root and prefixes. Data is taken from Friesen and Mamalis (2008).

In the following example, the vowels of the stem and prefix are labialized due to the spread of the labialization prosody from the suffix.

(88)   /na-ʐr/
         [na-ʐar]
         1s-kick
         'I kicked'

         /ma-ʐr-ak ʷ/
         [mɔ-ʐʊr-ɔkʷ]
         1pEx-kick-1pEx
         'We (excl.) kicked'

Likewise, the palatalization prosody can spread from a suffix onto the root and prefix of a verb.

(89)   /n-tsk va/
         [nə-tsək va]
         1s-move PERF
         'I moved already'

         /n-tsk-a ʸ/
         [nɪ-tʃɪk-ɛ]
         1s-move-NUL
         'I moved'

It may be possible to have multiple suffixes with different prosodies attached to the same verb root, but no examples of this are provided.

5.3   Analysis and Reconstructions

The Vowel Prosody system is the most common system amongst Central Chadic languages, and is found in around 35 languages. It predominates amongst the languages from Mafa southwards and eastwards. The languages documented as using the Vowel Prosody system are:

Podoko	(Swackhamer 1981)
Cuvok	(Ndokobaï 2003)
Mafa	(Barreteau and le Bléis 1990)
Mina	(Frajzyngier, Johnston, and Edwards 2005)
Daba	(Lienhard and Giger 1975)
Mbudum	(Ndokobaï in progress)
Buwal	(Viljoen 2009)
Mofu-Gudur	(Barreteau 1988)
Dugwor	(Ousmanou 1999)
Merey	(Gravina)
Gemzek	(Gravina 2003)
Zulgo	(Haller 1980)
Moloko	(Bow 1999)
Muyang	(T. Smith and Gravina 2010)
Mada	(Barreteau and Brunet 2000)
Ouldeme	(de Colombel 1997)
Mbuko	(T. Smith and Gravina 2010)
Vame	(A. Kinnaird 2010)
Mbara	(Tourneux, Seignobos, and Lafarge 1986)
Musgum	(Tourneux 1991; Tourneux 1978a)
Muskum	(Tourneux 1977)
Gidar	(Frajzyngier 2007; Noukeu 2002)

Table 18 - Works on vowel prosody languages

It should be remembered that the groups exhibiting the Vowel Prosody system do not form a genetic unit. This phonological system is an areal feature (see section 11.2.4).

In the case of Moloko we saw that words carried either the palatalization prosody or the labialization prosody, but not both. This is not the case with all of the languages that fall into this phonological type. Some languages only have the palatalization prosody, not the labialization prosody. Some have both prosodies, and these can co-occur on the same morpheme. However there are no languages which have the labialization prosody but not the palatalization prosody.

The following map shows the geographical distribution of the Vowel Prosody system and its sub-types.

<div align="center">**Map 10 - Distribution of the Vowel Prosody system**</div>

We will see that in all the groups discussed here it is possible to reconstruct the palatalization prosody for the proto-language of the group. However, only in one case, the Musgum group, is the labialization prosody reconstructed for the proto-language of the group.

In this section we shall give brief descriptions of the phonologies of the Vowel Prosody languages group by group from a typological perspective, and then present a reconstruction of the phonological characteristics of the proto-language for each group. In the reconstructions, *ɨ is always used, whether or not the individual languages have /ə/ or /ɨ/.

5.3.1   *Mofu Group*
In the Mofu group all nine languages exhibit vowel harmony. All have front vowel harmony, but not all have back-rounding vowel harmony. In other

words, the palatalization prosody is present in all languages of the group, whereas the labialization prosody is not.

The following map shows the locations of the Mofu group languages and the subgroups.
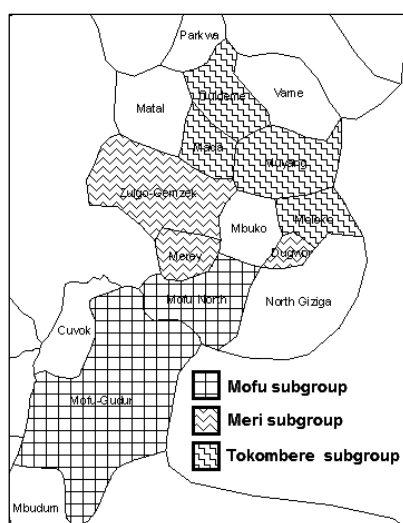
Map 11 - Mofu group languages

In Ouldeme (de Colombel 1997), the most northerly of the languages, there is front vowel harmony but no back-rounding vowel harmony. Muyang (T. Smith and Gravina 2010) has both palatalization and labialization prosodies, as do Moloko (Bow 1999) and Mada (Barreteau and Brunet 2000). In the case of Mada, both prosodies can occur on a single morpheme. For Zulgo (Haller 1980), Gemzek (Gravina 2003), Merey (Gravina) and Dugwor (Ousmanou 1999) both palatalization and labialization prosodies are present. Mofu-Gudur (Barreteau 1988), the most southerly of the languages, has only front vowel harmony, though the available data (Barreteau and Hollingsworth 1990) indicates that closely related Mofu North has both front and back-rounding vowel harmony, and that the two can co-occur simultaneously on a single morpheme resulting in front-rounding vowel harmony.

In most of the Mofu group languages, /ə/ is only mildly affected by the palatalization and labialization prosodies, with realisations tending towards [ɪ]

or [ʊ]. However in Zulgo and Ouldeme /ɨ/ is fully affected, being realised as [i] or [u].

5.3.1.1 Prosodies

In this and the following section we shall examine the languages of the Mofu group to determine if it is possible to reconstruct the prosodies of palatalization and labialization, and also the vowels, for the proto-language of the group. The Mofu group offers an excellent test case for the reconstruction of vowels and prosodies. It contains nine languages which are largely well-documented, and has an internal structure which is understood. In addition, the languages of the group display each of the three attested vowel harmony options: palatalization only, palatalization and labialization separately (i.e. both cannot occur on the same morpheme), and palatalization and labialization together (i.e. both can occur on the same morpheme).

The Mofu group has been divided into three genetic subgroups (Gravina 2007a): Tokombere (Ouldeme, Muyang, Mada, Moloko); Meri (Zulgo, Gemzek, Merey, Dugwor); and Mofu subgroup (Mofu-Gudur, Mofu North).

The analysis will focus on nouns. Establishing the underlying prosody for verbs is difficult in the Mofu group. Prosodies play a role in the verbal affixation process, and it is not always a straightforward task to determine the underlying prosody. There is almost no noun morphology in the Mofu group, so nouns are far easier to work with.

Amongst the 109 Proto-Mofu roots that have been reconstructed, the vast majority carry no prosody. 22 (20%) carry the palatalization prosody. None carry the labialization prosody, or both prosodies.

Although none of the Proto-Mofu roots carry the labialization prosody, the prosody is present in many of the reflexes in present day languages. In most cases, the presence of the labialization prosody on individual words can be easily explained by the spread of the labialization component of a labialized velar onto the whole word. The data in the following table is presented at a broad phonetic level. With a few exceptions, the words from Gemzek, Merey and Mada carry the labialization prosody. However the labialization prosody does not exist in Mofu-Gudur or Ouldeme.

Gloss	Root	Mofu-Gudur	Merey	Gemzek	Mada	Ouldeme
baboon	*hɨlɨgʷɨv	/lagʷav/ lagʷav	/wələv/ wuluv	/hələv ʷ/ hulov		alkʷəv alkuv
beer	*ɣʷɨzam	/wəzam/ wuzam	/gəzam ʷ/ guzom	/gəzam ʷ/ guzom	/wzam ʷ/ wzom	wəzam wuzam
blind	*gʷɨlɨf	/wəlaf/ wulaf	/gələf ʷ/ guluf	/gəlaf ʷ/ gulof	/məwlafa ʷ/ muwlofa	/wələf/ wuləf
broom	*sɨlakʷ	/salakʷ/ salakʷ	/səlak ʷ/ sulok	/səlak ʷ/ sulok	/səlakʷ/ səlakʷ	/səlakʷ/ səlakʷ
donkey	*azɨŋgʷa	/zəŋgʷaw/ zəŋgʷaw	/zəŋgaw/ zəŋgaw	/zəŋga ʷ/ zuŋgo		/azəŋgʷa ʸ/ aziŋgʷa

Table 19 - Labialization in the Mofu group

We can see in the data a process which leads to the development of the labialization prosody. The first step is the local conditioning of a vowel by a labialized consonant or /w/, producing a back-rounded vowel. The second step is the harmonisation of the other vowels in the word with the back-rounded vowel. Once this second step has taken place, the word can be analysed as carrying the labialization prosody.

For example, the underlying form of the root 'beer' in Mofu-Gudur is /wzam/. After schwa-insertion, local conditioning produces the surface form [wuzam]. However, in the case of Mada, the back-rounding influence of the /w/ has spread to the entire word. The underlying form is therefore /wzam ʷ/, with a labialization prosody.

There are words where two analyses are possible. The Gemzek 'donkey' [zuⁿgo] could be analysed as /zəŋga ʷ/ or /zəŋgʷa/. It is not possible to be certain that this word carries the labialization prosody. For the labialization prosody to be included in the phonological inventory of a language there need to be unambiguous cases where the presence of back-rounded vowels cannot be attributed to the presence of labialized consonants or /w/.

The development of the labialization prosody in this way is very widespread, but it is not predictable. We cannot say for any individual language that every word with a labialized consonant in the proto-language will develop the labialization prosody. For example, in the Merey data cited in Table 19, all words have developed the labialization prosody, except for /zəŋgaw/ 'donkey', though in this case the exception may be due to the word being a borrowing from Mofu North.

In every case in the data we can attribute the development of the labialization prosody in a particular word of a particular language to the presence of a labialized consonant in the proto-form. The labialization prosody is not therefore a feature of Proto-Mofu. It is also unlikely to have been present in the proto-languages of the three subgroups within the Mofu group. If it were, we would expect to see consistent labialization across the languages within a subgroup for an individual root. However, when we examine its presence across the roots of the languages of each subgroup, we see a lack of consistency.

 A possible exception to this is the Meri subgroup, where there is more uniformity in the labialization of roots. For example, in the data presented, the two languages Merey and Gemzek have labialized all the roots, with the sole exception of the Merey entry for 'donkey' mentioned above. It is therefore possible that the labialization prosody was present in Proto-Meri.

Although the labialization prosody was not a part of the phonemic inventory of Proto-Mofu, the palatalization prosody was very much present, and we can reconstruct the palatalization prosody for a number of roots. For many roots there are languages where the palatalization prosody has been lost. Where a good majority of the reflexes carry the prosody, this is taken as evidence of its presence in the proto-language.

Gloss	Root	Mofu-Gudur	Dugwor	Zulgo	Moloko
ashes	*vɨta ^{y}		/bəta/ bəta	/bəta ^{y}/ bite	/vəta ^{y}/ vəte
hole	*vɨɗ ^{y}	/vəgaɗ ^{y}/ vəgeɗ	/abaɗ ^{y}/ abeɗ	/bəja ^{y}/ bije	/pəɗa ^{y}/ pəɗe
nose	*h^{w}ɨtɨr ^{y}	/hatar ^{y}/ heter	/mətar ^{y}/ məter	/hətər ^{y}/ hitir	
porcupine	*tsɨhaɗ ^{y}		/^{n}dzahaɗ ^{y}/ ^{n}dzeheɗ	/tsaha ^{y}/ tsehe	/a^{n}dzahaɗ ^{y}/ e^{n}dzeheɗ
tongue	*ɗɨrɨnah ^{y}	/ɗərna ^{y}/, /nanah ^{y}/ ɗərne, neneh	/hərnaɬ ^{y}/ hərneɬ	/arah/ arah	/hərnak ^{y}/ hərnek
tooth	*ɬɨr ^{y}	/ɬar ^{y}/ ɬer	/ɮar ^{y}/ ɮer	/ɮər ^{y}/ ɮir	/aɬar/ aɬar
wind	*hɨmɨɗ ^{y}	/mamaɗ ^{y}/ memeɗ	/həmaɗ ^{y}/ həmeɗ	/hə^{m}bəɗ ^{y}/ hi^{m}biɗ	/həmaɗ/ həmaɗ

Table 20 - Palatalization in the Mofu group

In the data presented in Table 20 above, only two entries are consistently palatalized across the data, 'hole' and 'porcupine'. In some cases, the absence of palatalization can be put down to borrowing from a different group. For example, the reflex of 'tongue' found in Zulgo has probably come from Mandara *nara<ara* (the Mandara initial *n-* is prefixed to words to avoid forms beginning with a vowel (see section 3.4.5)).

The entries for 'tooth' and 'wind' show consistent palatalization for the languages of the Mofu and Meri subgroups, but consistent absence of palatalization for the languages of the Tokombere subgroup.

In some cases the palatalization prosody has developed in individual words due to the presence of /j/. In these cases, the palatalization prosody is not reconstructed for Proto-Mofu. In the following data, the prosody has developed in both examples in Merey and Muyang. In Dugwor and Moloko it has developed in 'bird' but not 'squirrel'.

Gloss	Root	Mofu-Gudur	Dugwor	Merey	Moloko	Muyang	Ouldeme
bird	*ɗɨjɨŋʷ	ɗijaŋ	ɗijeŋ	ɗijeŋ	eɗəjen	eɗîŋ	aɗeŋʷ
squirrel	*hajaŋ	ajaŋ	hijaŋ	hijeŋ	ajah	ejeŋ	ajeŋ

<div align="center">Table 21 - Palatalization due to /j/</div>

In summary, the palatalization prosody can be reconstructed for a number of roots for Proto-Mofu. Palatalization has also developed in other roots in individual languages of the Mofu group where it was not present in Proto-Mofu. Similarly, palatalization that was present in Proto-Mofu has been lost in individual words in the various languages. The labialization prosody is an innovation within the languages of the group and was not a feature of Proto-Mofu.

5.3.1.2 Underlying Vowels

As with Moloko (see section 5.2.2), the languages of the Mofu group can be analysed as consisting of at most two vowels /a/ and /ə/, which interact with the prosodies, labialized velars and approximants to produce a more extensive system of surface vowels.

In many of the languages a rule operates that lowers underlying /ə/ to /a/ in the final syllable before a pause. Since this is the form most commonly used as

the citation form in the data under examination, it is not possible to determine from these languages whether the final vowel in a word is underlying /ə/ or /a/. However there are several languages – Merey, Gemzek, Zulgo and Ouldeme – which do not have this rule, and so these languages can be used for reconstructing final vowels.

Gloss	Root	Mofu-Gudur	Dugwor	Moloko	Muyang	Ouldeme
baboon	*hɨlɨgʷɨv	/lagʷav/ lagʷav		/hərgʷav/ hərgov	/aləgəv ʷ/ aluguv	/alkʷəv/ alkuv
beer	*ɣʷɨzam	*hʷɨzam→ /wəzam/ wuzam	*gʷɨzam→ /gəzam ʷ/ guzom		*hʷɨzam→ /zəm ʷ/ zum	*hʷɨzam→ /wəzam/ wuzam
blind	*ɣʷɨlɨf	*hʷɨlɨf→ /wəlaf/ wulaf	*gʷɨlɨf→ /gəlaf ʷ/ gulof	*hʷɨlɨf→ /həlaf ʷ/ həlof		*hʷɨlɨf→ /wələf/ wuləf
body	*vaw		/ba/ ba	/va/ va	/vaw/ vu	/vaw/ vo
breast, milk	*ɗɨwah	/ɗəwa/ ɗəwa	/awah/ awah		/ɗəwa/ ɗuwa	/aɗəwa/ aɗuwa
cow	*ɬa	/ɬa/ ɬa	/ɬa/ ɬa	/ɬa/ ɬa		/ɬa/ ɬa
ear	*ɬɨmaj	/ɬəmaj/ ɬəmaj	/ʒam/ ʒam		/ɬəma ʸ/ ɬimi	/ɬəmaj/ ɬəmaj
fly (insect)	*dzɨwaj	/dzadzəwaj/ dzadzəwaj	/dzəwaj/ dzuwaj	/dzəwaj/ dzəwaj	/azəwa ʸ/ ezywi	/zəwaj/ zuwaj
head	*ɣɨr	/raj/ raj	/gar/ gar		/ahar/ ahar	/ɣar/ ɣar
horn	*dɨram	/təlam/ təlam	/dəram ʷ/ dərom[1]		/adram ʸ/ edrem	
locust	*dzaraj	/dzaraj/ dzaraj		/dzaraj/ dzaraj	/dzaraj/ dzaraj	/dzaraj/ dzaraj
three	*mahkɨr	/maakar/ maakar	/makar/ makar	/makar/ makar	/mahkər/ mahkər	/makar/ makar
water	*jam	/jam/ jam	/jam/ jam	/jam/ jam	/jam/ jam	/jam/ jam
youth	*gawɨla	/gəwla/ gula	/gəwla/ gula			

Table 22 – Vowel reconstructions in the Mofu group

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[1] The /ə/ is not necessarily affected by the labialization prosody, but is affected by adjacent labialized consonants, as in 'blind' and 'fly'.

Individual languages also have specific rules which apply. For example, Mofu-Gudur raises vowels in a closed mid-phrase syllable, Dugwor neutralises vowels in the antepenultimate syllable to /ə/, and Muyang raises word-final vowels.

Once these factors are taken into consideration, there is a great deal of consistency in the underlying vowels across the group, and it is possible to provide good reconstructions for many roots, a selection of which are given in Table 22 above. From this we can conclude that Proto-Mofu had a system of two underlying vowels.

5.3.2   Daba Group
The Daba group is made up of six languages. In all except one (Mazagway Hidi), there is either a published phonology, or else work is in progress.

The six languages can be divided into three subgroups: Daba and Mazagway Hidi; Mina and Mbudum; Buwal and Gavar. The locations of the Daba group languages and their subgroups are shown in the following map.
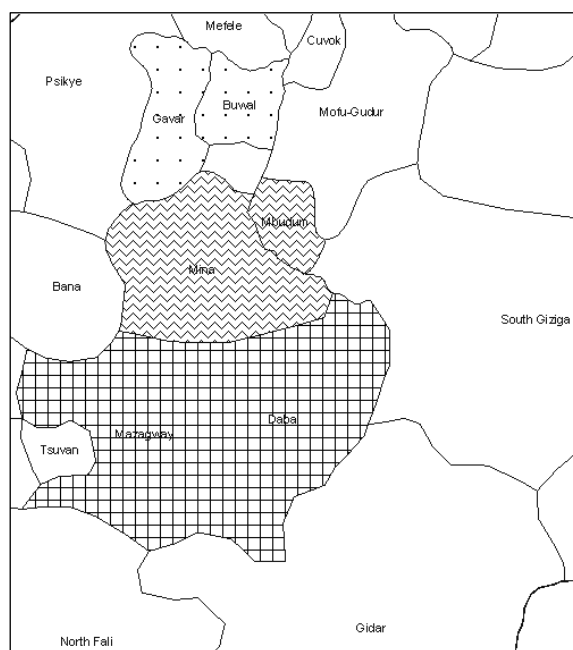
Map 12 - Daba group languages

Within the Daba group, only Daba (Lienhard and Giger 1975) has been analysed as having both front and back-rounding vowel harmony. Buwal (Viljoen 2009) and Mbudum (Ndokobaï in progress) both have the palatalization prosody, and also show signs of an emergent labialization prosody. In Mina (Frajzyngier, Johnston, and Edwards 2005) there is no labialization prosody and the palatalization prosody only affects underlying /a/. Gavar (Noukeu 2004) is the only language in the group whose phonology does not follow the Vowel Prosody system. Vowel harmony has been lost, though its trace can be seen on certain vowels and consonants.

5.3.2.1 Prosodies

In this section we shall look at whether the two prosodies of palatalization and labialization can be reconstructed for Proto-Daba. We will show that for this group it is possible to reconstruct the palatalization prosody for the proto-language, but not the labialization prosody.

In all languages except for Buwal and Gavar, the prosodies affect both /a/ and /ə/. In Buwal, only /a/ is affected, and in Gavar there are no prosodies.

The labialization prosody exists fully only in Daba. Amongst the 136 items reconstructed for the group, only a handful carry the labialization prosody in Daba, and in most cases the presence of labialization can be seen to originate from a labialized velar or /w/. The table below gives examples of roots where the reflex in Daba carries the labialization prosody. In two of these words labialization has also developed in Mbudum. In all cases there is either a labialized velar or /w/ in the root to provide the source of the labialization.

Gloss	Root	Daba	Mbudum	Buwal	Gavar
beer	*mavɨw	/mavə ^{w}/ movu	/mavəw/ mavu	/mavaw/ mavaw	/mavə/ mavə
fire	*kʷahʷɨ	/kəhə ^{w}/ kuhu	/kahaw/ kahaw	/kʷahʷaw/ kʷahʷaw	/kʷahʷə/ kʷahu
grass	*ⁿkʷɨsaf		/ⁿgəsaf ^{w}/ ⁿgusof	/ŋkʷəsaf/ ŋkusaf	/ŋkəsaf/ ŋkəsaf
cricket	*dazɨkʷ	/dazə ^{w}/ dozu		/dazakʷ/ dazakʷ	/dazə/ dazə
crocodile	*hʷɨzɨm		/həzəm ^{w}/ huzum	/hʷəzam/ huzam	/hʷəzəm/ huzəm

Table 23 - Origins of labialization in the Daba group

However there are two roots for which an explanation for labialization in Daba cannot be found within the Daba group.

Gloss	Root	Daba	Mbudum	Buwal	Gavar
four	*wɨfaɗ	foɗ	nfaɗ	ŋfaɗ	ŋfaɗ
bee	*ɗawam	ɓoɓom	ɓəɓam	ɓamam	amam

Table 24 - Labialization in Daba

Looking outside the group gives the Proto-Central Chadic forms *wɨpaɗ for 'four' and *ɗawɨm for 'bee'. In these examples, the /w/ has been reanalysed as the labialization prosody in Daba, but has been lost in the other languages presented here.

We can conclude that the labialization prosody is an innovation in the Daba language, and was not present in Proto-Daba, the ancestor language of the group.

Gloss	Root	Daba	Mbudum	Buwal	Gavar
bird	*vɨgam ^{y}		/vəgam ^{y}/ vəgem	/vəgam ^{y}/ vəgem	/vigin/ vigin
bone	*kɨrɨⁿgɨɬ ^{y}	/gaⁿgərəɮ ^{y}/ geⁿgiriɮ	/kərⁿgəɬ ^{y}/ kirⁿgiɬ	/karəⁿgaɬ ^{y}/ kerəⁿgeɬ	
bow	*vɨlah ^{y}		/vəlah ^{y}/ vəlleh	/vəlah ^{y}/ vəleh	/vəleh/ vəleh
dew	*nɨm ^{y}	/mənmən ^{y}/ minmin	/mənəmnəm ^{y}/ minimnim	/namnam ^{y}/ nemnem	
dream	*sɨnɨ ^{y}	/sənə ^{y}/ sini	/səsən ^{y}/ səsin	/saŋsaŋ ^{y}/ seŋseŋ	/ʃiŋʃiŋ/ ʃiŋʃiŋ
egg	*naɮɨɗ ^{y}	/naɮəʔ ^{y}/ neɮiʔ	/məɬəɗ ^{y}/ miɬiɗ	naɬa ^{y}/ neɬe	/anɬi/ anɬi
fish	*kɨlif ^{y}	/kələf ^{y}/ kilif	/kələf ^{y}/ kəllif	/ŋkəlaf ^{y}/ ŋkələf	/ŋkilif/ ŋkilif
fly (insect)	*dzɨwɨɗ ^{y}		/dzədzəwəɗ ^{y}/ dʒidʒiwəɗ	/dzadzəwaɗ ^{y}/ dzedzəweɗ	/dʒiwiɗ/ dʒiwiɗ
grain	*sɨsɨŋ ^{y}	/sasən ^{y}/ sesin	/səsəŋ ^{y}/ sisiŋ	/nsaŋ ^{y}/ nseŋ	/ʃiŋ/ ʃiŋ
hunger	*matɨs ^{y}	/matəs ^{y}/ metis	/mətəs ^{y}/ mətis	/matas ^{y}/ metes	/metiʃ/ metiʃ

Table 25 - Palatalization in the Daba group

The palatalization prosody can be easily reconstructed for more than thirty roots, of which a sample is presented in Table 25 above. (It should be remembered that Gavar has now lost the palatalization prosody, and front and central vowels can occur in the same morpheme. As a result Gavar has gained the vowel phonemes /i/ and /e/.)

However, there are a number of roots where it is not obvious whether the palatalization prosody was present in Proto-Daba. In these roots, palatalization is present in some reflexes, but not in others.

Gloss	Root	Daba	Mbudum	Buwal	Gavar
wind	*mɨɗ^y	/məɗ^y/ miɗ	/maɗ/ maɗ	/maɗ/ maɗ	/məɗ^y/ miɗ
nose	*mɨtsɨn^y	/mətsəʔn^y/ mitsiʔn	/ntsər^w/ ntʃur	/mtsar/ mtsar	/mtsər/ mtsər
hump	*ɗɨg^{w}ar		/ɗəᵑgər^y/ ɗiᵑgir	/ɗəg^{w}ar/ ɗəg^{w}ar	/ɗəᵑg^{w}ər/ ɗəᵑgur
hare	*maⁿdavan	/maⁿdavən / maⁿdavən	/məⁿdavaŋ^y / məⁿdeveŋ	/maⁿdəvan / maⁿdəvan	/maⁿdəvan / maⁿdəvan
ear	*ɮɨmɨʔ^y	/ɮəməʔ^y/ ɮimiʔ	/ɮəm/ ɮəm	/ɮam/ ɮam	/ɮəm/ ɮəm

Table 26 - Possible palatalization in the Daba group

Given the quantity of palatalized roots that have been reconstructed, it can safely be deduced that the palatalization prosody was a feature of Proto-Daba, the proto-language of the Daba group.

5.3.2.2 Underlying Vowels

Each of the languages of the Daba group (except for Gavar) can be analysed has having two underlying vowels, /ə/ and /a/. When the palatalization prosody is present, the vowels are realised as [i]~[ə] and [ɛ] respectively. If the labialization prosody is present then the vowels are realised as [u]~[ə] and [ɔ]. /ə/ is also affected by labialized velars, /w/ and /j/ to become [u] and [i]. Reconstructing the underlying vowels of Proto-Daba is therefore a question of determining which of the two underlying vowels is present in the light of the conditioning processes that are active in the individual languages.

In the bulk of the roots that have been examined, the underlying proto-vowels can be reconstructed in a straightforward manner. In Buwal the final vowel in

the citation form is lowered, neutralising the contrast between the two underlying vowels (as is the case in geographically close Mofu-Gudur and Mafa in the Mofu group). However, the vowel of the proto-form can be deduced from the other languages.

There is one language that doesn't follow this pattern, namely Gavar. In Gavar vowel harmony has been lost, resulting in a four-vowel system of /a/, /ə/, /i/, /e/. Palatalization is now a dead process in Gavar – there are no morpho-phonemic processes where palatalization is still productive. Comparison with its lexically similar neighbour, Buwal, leads to the following general rules for establishing the vowels in Gavar for roots carrying the palatalization prosody in Proto-Daba.

- If the final vowel is underlying *a, then this vowel has the reflex /e/ in Gavar. Preceding *a have the reflex /e/, but *ɨ remains as /ə/.
- If the final vowel is underlying *ɨ, then this vowel and any preceding *ɨ have the reflex /i/. Preceding *a have the reflex /e/.
- If the root contains a laminal consonant, then these are palatalized. Note that in Gavar laminals contrast with palatalized laminals, i.e. /s/ and /ʃ/ are different phonemes. In the other languages of the group palatalized laminals are created by the influence of the palatalization prosody on the laminal phonemes, and do not contrast.

The following table gives some sample reconstructions, showing the consistency in the reflexes of the vowels. Note that in Buwal final syllable *ɨ has been lowered to *a.

Gloss	Root	Daba	Mbudum	Buwal	Gavar
ear	*ʤɨmɨʔ ʸ	/ʤəməʔ ʸ/ ʤimiʔ	/ʤəm/ ʤəm	/ʤam/ ʤam	/ʤəm/ ʤəm
guinea fowl	*zavɨn	/zavən/ zavən	/zavaŋ/ zavaŋ	/zavan/ zavan	/zavən/ zavən
fish	*kɨlɨf ʸ	/kələf ʸ/ kilif	/kələf ʸ/ kəllif	/ŋkəlaf ʸ/ ŋkəlef	/ŋkilif/ ŋkilif
cow	*ʤa	/ʤa/ ʤa	/ʤa/ ʤa	/ʤa/ ʤa	/ʤa/ ʤa
to know	*sɨn	/sən/ sən	/səŋ/ səŋ	/san/ san	/sən/ sən
to untie	*pɨl	/pəl/ pəl		/pal/ pal	/pəl/ pəl

Table 27 - Vowel reconstructions in the Daba group

For Proto-Daba, therefore, we have the underlying vowel system consisting of just the two vowels /a/ and /ɨ/.

5.3.3 Musgum Group

Data for the Musgum group comes from each of the three languages in the group: Mbara (Tourneux, Seignobos, and Lafarge 1986), Muskum (Tourneux 1977) and three dialects of Musgu, Mulwi (Tourneux 1976; Tourneux 1978a; Tourneux 1978b; Tourneux 1978c; Tourneux 1980), Munjuk (Tourneux 1991) and Vulum (Tourneux 1978a; Wolff 1985). Except for Musgu, the data is somewhat limited. For Muskum (now extinct) we only have 276 entries and for Mbara 771 entries. In addition, there is not a great amount of information available on the phonology or grammar of these languages. The effect of this is to put a limit on the amount that can be deduced about the phonological make-up of Proto-Musgum, the ancestor of these languages.

The locations of the living languages are given in the following map.
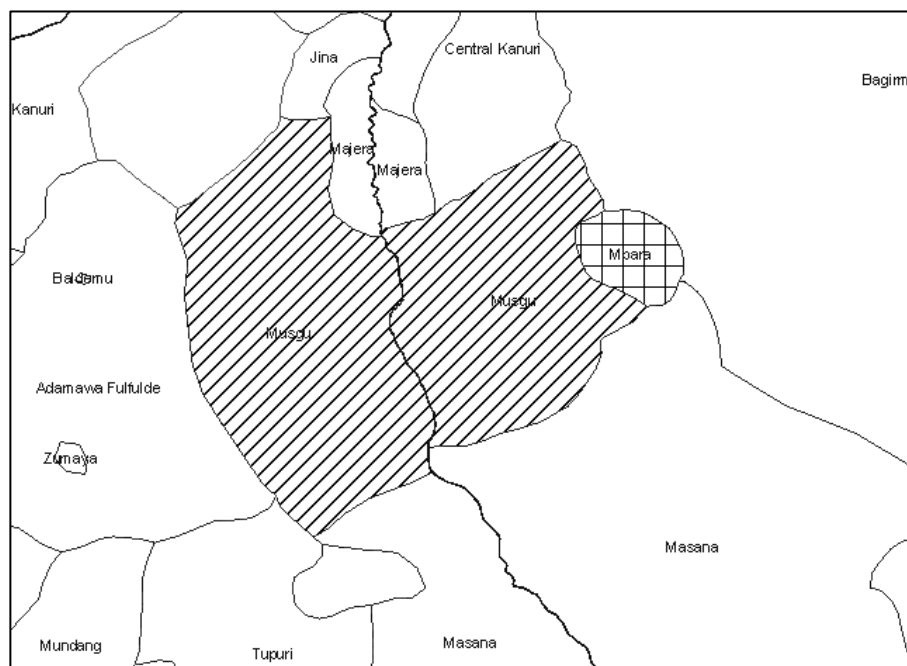
Map 13 - The Musgum group

5.3.3.1 Prosodies

The languages in the Musgum group all have both front and back-rounding vowel harmony. As with the other groups, this is analysed as being due to the presence of a prosody of palatalization or labialization. In Muskum and Mbara the prosodies affect both /a/ and /ə/, but in the Musgu dialects only /a/ is affected.

The following table shows the roots for which palatalization can be safely reconstructed for Proto-Musgum. In general the data is consistent, with few entries showing palatalization in some languages and no palatalization in others.

Gloss	Root	Muskum	Mbara	Vulum	Mulwi
grave	*jɨɬ ^{y}	/jɨɬit ^{y}/ jiɬit		/jaɬ ^{y}/ jeɬ	/jaɬ ^{y}/ jeɬ
to spit	*tɨnak ^{y}	/taːnat ^{y}/ teenet	/tɨnak ^{y}/ tinek	/taːnak ^{y}/ teenek	
bone	*kaɬka ^{y}	/kɨɬit/ kiɬit	/^{ŋ}gɨɬ ^{y}/ ^{ŋ}gɨɬ	/kaɬka ^{y}/ keɬke	/kaɬka ^{y}/ keɬke
horse	*pɨlɨs ^{y}	/pɨlasaka ^{y}/ pleseke	/pɨlɨs ^{y}/ pilis	/apɨlɨs ^{y}/ aplis	/apɨlɨs ^{y}/ aplis
moon	*tɨla ^{y}	/kɨla ^{y}/ kile	/tɨla ^{y}/ tile	/tɨla ^{y}/ tle	
bird	*fɨːn ^{y}	/fɨːtɨw ^{y}/ fiituw	/fɨːna/ fiina	/fɨːnɨ ^{y}/ fiini	
body	*sɨj ^{y}	/sɨt ^{y}/ sit	/sɨː ^{y}/ sii	/sɨː ^{y}/ sii	
to die	*mɨɗɨ ^{y}		/mɨɗɨŋ ^{y}/ midîŋ	/mɨrɨ ^{y}/ miri	/mɨrɨ ^{y}/ miri
to swim	*nӡɨ ^{y}		/nɨɬ ^{y}/ niɬ	/ɨŋӡɨ ^{y} iŋӡi	/ɨŋӡɨ ^{y}/ iŋӡi

<div align="center">**Table 28 - Palatalization in the Musgum group**</div>

Labialization was also present as a word-level feature in the proto-language of the group. This contrasts with the situation in the Mofu and Daba groups where the labialization prosody is an innovation that took place after the split of the proto-language into its descendants.

There are a number of roots that consistently display back-rounding vowel harmony across the Musgum group data, and in these cases we can reconstruct the labialization prosody for Proto-Musgum.

Gloss	Root	Muskum	Mbara	Vulum	Mulwi
crocodile	*hɨrɨm ʷ		/hɨrɨm ʷ/ hurum	/harɨm ʷ/ horum	
chicken	*jɨgɨr ʷ			jɨgɨr ʷ/ jugur	/jɨgɨrɨj ʷ/ jugurii
to dig	*vɨrak ʷ		/vɨrak ʷ/ vurok		/vɨrgɨj ʷ/ vurgi
mouse	*kɨsɨm ʷ	/gɨzɨm ʷ/ guzum	/kɨsɨm ʷ/ kusum	/kɨsɨm ʷ/ kusum	
ashes	*bana ʷ			/bana ʷ/ bono	/(ba)na ʷ/ (bo)no
to come	*tsɨj ʷ		/tsaː ʷ/ tsoo		/sɨj ʷ/ sʉ
four	*fɨdɨ ʷ	/fɨːɗɨj ʷ/ fuuɗi	/pɨdɨ ʷ/ puɗu	/pɨdɨ ʷ/ puɗu	
hump	*ʒama ʷ			/ʒama ʷ/ ʒlomo	/ʒama ʷ/ ʒomo
meat	*ɬɨwɨt	/ɬɨwɨt/ ɬuwut	/ɬɨk ʷ/ ɬuk	/ɬɨk ʷ/ ɬuk	
tree	*lɨwɨŋ		/lɨŋ ʷ/ luŋ	/alɨwɨŋ/ aluwuŋ	
woman	*mɨwɨn	/mɨwɨn/ muwun		/mɨnɨj ʷ/ munii	/mɨnɨj ʷ/ munii

Table 29 - Labialization in the Musgum group

For some, such as 'meat', 'tree' and 'woman', the back-rounded vowels in Mbara, Mulwi and Vulum can be seen by comparison with the Muskum data to be the result of the vocalisation of /w/ at a point subsequent to the languages' split from the proto-language. The resultant vowel is then reanalysed as /ɨ/ under the influence of the labialization prosody. However, other entries show consistent, reconstructable labialization coming from Proto-Musgum.

In other groups, such as the Mofu and Daba groups, back-rounding vowel harmony could be traced to the influence of labialized velar consonants or /w/. However, in the Musgum group all labialized velar consonants have been lost from the inventory. In all the data examined so far, only two words – Mbara *ngwa* 'who' and Musgum *muɗukwii* 'white'- show possible evidence for labialized velars.

This patterning argues in favour of ascribing the presence of the labialization prosody in Proto-Musgum to the reanalysis of /w/ or the labialization

component of labialized velars in its ancestor language as the word-level labialization prosody. The consistency of this loss across the languages and the consistency of the resultant vowel harmony argue for this process to have taken place in Proto-Musgum at the latest. In other words, the reanalysis of labialized velars as word-level labialization prosodies took place before the split of Proto-Musgum into individual languages.

5.3.3.2 Underlying Vowels

All the languages in the group have six basic phonetic vowels: [a], [i], [e], [u], [o] and [ɨ]. In addition, all the vowels except for [ɨ] have lengthened versions. There are also a few instances of front rounded vowels.

The short vowels can be reduced to a two vowel system /ɨ/ and /a/, with labialization producing [u] and [o] and palatalization producing [i] and [e]. Long [eː] and [oː] are due to the influence of palatalization and labialization on /aː/, or possibly the result of the combinations /aj/ and /aw/ (see Tourneux et al (1986, 148) for Mbara). However [iː] and [uː] cannot be analysed as the realisations of underlying /ɨː/ under palatalization and labialization, since there is no underlying /ɨː/. Instead these should be analysed as the sequences /ɨjɨ/ and /ɨwɨ/.

There are no roots found in the data where *aː can be reconstructed for Proto-Musgum, with or without a prosody. When /aː/ appears in the data, the cognates do not show any regular patterning. This vowel cannot therefore be reconstructed for Proto-Musgum.

Gloss	Muskum	Mbara	Vulum	Mulwi
six		ɬira	ɬaara	
lung		bubugaf	baagaf	
to dig		paa		pi
honey, bee	amtu	momoj		aamii

Table 30 - Long vowels in the Musgum group

Whilst there is more variation in the vowel reflexes in the Musgum group than in the Mofu and Daba groups, there is still a good degree of consistency, making reliable reconstructions of the underlying vowels possible in a good number of cases. It is also possible, therefore, to conclude that Proto-Musgum also had an underlying vowel system consisting of just two vowels.

5.3.4   Maroua Group

The Maroua group comprises three languages: Mbazla (Seignobos and Tourneux 1984), Giziga North (Gravina 2004) and Giziga South (Michielan and Jaouen n.d.). In the Ethnologue (Lewis 2009), Giziga North and South are considered to be dialects of a single language.

The areas where the three languages of the Maroua group are spoken are not contiguous. The geographical split between Giziga North and South occurred as a result of the Fulani conquest of Maroua in 1800 (Seignobos and Iyébi-Mandjek 2000). It is not known at what point the Mbazla area became disconnected from the Giziga area. It may have been at this same time. However the quite significant differences between Giziga and Mbazla would be more consistent with a situation where the languages had been separated for a longer period of time.

Given the geographical distribution of the Giziga languages and Mbazla (or Baldemu) – illustrated in Map 14 below – we can suppose that the proto-language for the Maroua group was spoken in a large area around Maroua, eastwards to the area covered by the Musgum group.

No published phonology exists for any of these languages. The data available is of varying quality and quantity. For Giziga South there is an extensive database of some 13,000 entries compiled by Father Giuseppe Michielan. The Giziga North data consists of a word list of some 1,700 entries. For Mbazla, the data amounts to a total of 390 entries from various sources of differing quality.

Given the limitations of the data, which is skewed heavily towards the Giziga languages, and the lack of in-depth linguistic analysis, it is not possible to establish reliable reconstructions for the group. Instead we must limit ourselves to some observations about the typology of the languages based on a limited analysis of the available data.
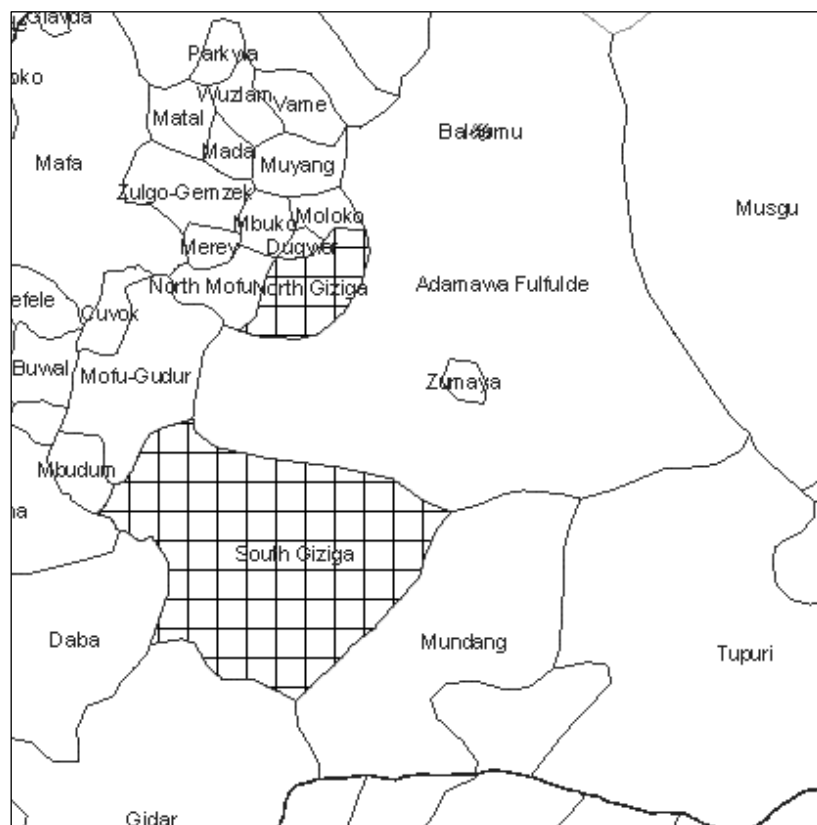
Map 14 – Maroua Group

All three languages have both front and back-rounding vowel harmony. In the case of Mbazla, most of the instances of back-rounding vowel harmony can be ascribed to the influence of a labialized velar in the word. However, in the Giziga languages there are many instances of words with back-rounding vowel harmony that do not contain a velar. The prosodies affect both /a/ and /ə/.

Comparing the situation with that of the neighbouring Mofu and Daba groups, and also the Musgum group (with which the Maroua group appears to have had contact at an earlier time), it is not easy to determine whether the proto-language of the Maroua group had back-rounding vowel harmony (like Proto-Musgum) or not (like Proto-Daba and Proto-Mofu). It is highly probable that

back-rounding vowel harmony existed in Proto-Giziga, but the data does not permit us to claim that it also existed in Proto-Maroua.

A number of roots display consistency in palatalization.

Gloss	Root	Giziga South	Giziga North	Mbazla
bow	*halak ^{y}		/halak ^{y}/ helek	/halak ^{y}/ helek
dog	*kɨrɨ ^{y}	/kərə ^{y}/ kiri	/kra ^{y}/ kre	/kəra ^{y}/ kire
ear	*ɬɨmɨɗ ^{y}	/ɬəməɗ ^{y}/ ɬimiɗ	/ɬəmaɗ ^{y}/ ɬimeɗ	/ɬəmaj/ ɬəmaj, ʃimeʔ
fish	*kɨlɨf ^{y}	/kələf ^{y}/ kilif	/kəlaf ^{y}/ kilef	/kələf ^{y}/ kilif
grass	*gɨzɨŋ ^{y}	/gəzəŋ ^{y}/ giziŋ	/gəzəŋ ^{y}/ giziŋ	/gəzəŋ ^{y}/ giʒiŋ
hearth	*lɨwɨts ^{y}	/ləwəs ^{y}/ liwis	/ləwas ^{y}/ liwes	/ləwtsə ^{y}/ lutsi
hole	*vɨgɨɗ ^{y}	/vəgəɗ ^{y}/ vigiɗ	/vəgaɗ ^{y}/ vigeɗ	/vaɗ ^{y}/ veɗ
horse²	*pɨlɨs ^{y}	/pələs ^{y}/ pilis	/pəlas ^{y}/ piles	/pələs ^{y}/ pilis
path	*dzɨvɨɗ ^{y}		/dzəvaɗ ^{y}/ dʒiveɗ	/dəvə ^{y}, dzəvə ^{y}, ɗəvəʔ ^{y}/ divi, dʒivi, ɗiviʔ
man	*zɨl ^{y}	/məʒə ^{y}/ miʒi	/zəl ^{y}/ zil	/zəl ^{y}/ zil
ram	*ɨzɨm ^{y}		/əzəm ^{y}/ izim	/azam ^{y}/ ʔeʒem, ʔaʒem
six	*markɨɗ ^{y}	/markaɗ ^{y}/ merkeɗ	/markəɗ ^{y}/ merkiɗ	/markaʔ ^{y}/ merkeʔ
tooth	*ɬɨn ^{y}	/ɬəŋ ^{y}/ ɬiŋ	/ɬən ^{y}/ ɬin	/ɬəŋ ^{y}/ ɬiŋ
wind	*hɨmɨɗ ^{y}	/həməɗ ^{y}/ himiɗ	/həmaɗ ^{y}/ himeɗ	/səmaɗ ^{y}/ simeɗ/tʃimeɗ

Table 31 - Palatalization in the Maroua group

As with the other groups so far examined, we can deduce that the palatalization prosody was a feature of the proto-language of the group.

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² This is an old loan from Arabic, that was borrowed before the time of Proto-Maroua.

5.3.5   Mafa Group

The Mafa group consists of three languages, Mafa, Cuvok and Mefele. Mafa is one of the Central Chadic languages with the highest number of speakers, estimated at around 150,000 in 1982 (Lewis 2009). The following map shows the present-day locations where the languages are spoken. Note that Mefele is spoken in two discontiguous areas.
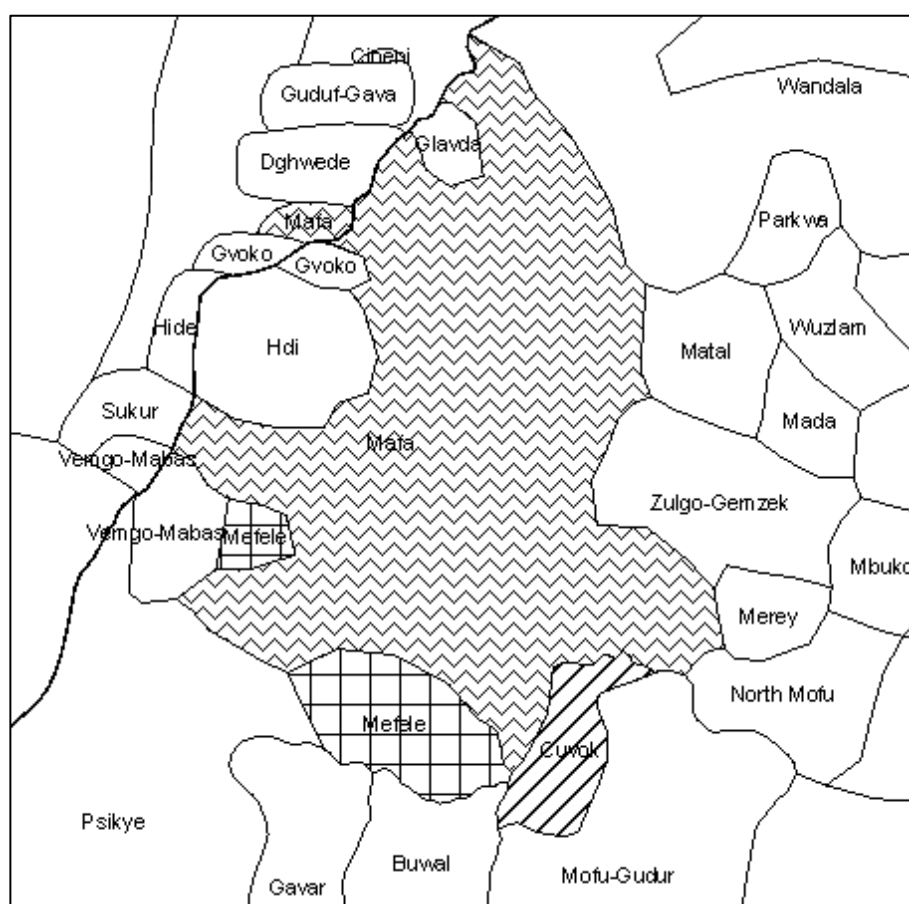
Map 15 - Mafa Group

Of the three languages in the Mafa group, there is good lexical data in two – Mafa and Cuvok – and both of these languages have published phonologies. The third language, Mefele, is as yet unstudied, and the only data available comes

from short word lists. Lexical statistics indicate that Mefele and Cuvok are more closely related to each other than either is to Mafa (Crawford 2005).

Whilst Mafa and Cuvok are closely related genetically, there are significant differences between the two languages in both the lexicon and their phonologies. Given these differences, and the problem of working with data from just two languages, it is not easy to reach firm conclusions about the phonological make-up of Proto-Mafa. Instead, we will discuss the features of the data and compare them with those of the other groups studied in this chapter.

The Mafa language (Barreteau and le Bléis 1990) possesses both front and back-rounding vowel harmony. Words may carry both the palatalization and labialization prosodies, resulting in front-rounded vowel harmony. In Cuvok (Ndokobaï 2003) there is front vowel harmony, but no back-rounding vowel harmony. Cuvok has strong contact with Mofu-Gudur, which also has front vowel harmony, but no back-rounding vowel harmony. In both Mafa and Cuvok the prosodies primarily affect /a/, but /ə/ is largely unaffected.

We must determine whether back-rounding vowel harmony was present in Proto-Mafa, and lost in Cuvok, or whether it was absent in Proto-Mafa and developed subsequently in Mafa.

5.3.5.1 Labialization

Of the 119 cognates found that are shared between Mafa and Cuvok, only twelve are labialized in Mafa. In most cases the Mafa and Cuvok forms, whilst still cognate, are quite distant and don't exhibit consistent sound changes. This indicates that the roots entered the languages from different sources and were not all inherited from Proto-Mafa (see for example 'pus' and 'tail' in the data below).

In the five words under question that are present in the Mefele word list data
(Crawford 2005), four support the presence of labialization in Proto-Mafa. The
fifth is not a close cognate. If labialization was indeed present in Proto-Mafa,
then we must conclude that the Cuvok roots either lost the labialization
prosody, or else were borrowed from Mofu-Gudur. Note that in some words
('baobab', 'horn', 'pus', 'swim'), Cuvok has palatalization or /j/ where Mafa has
labialization.

Gloss	Cuvok	Mafa	Mefele
beer	/wəzam/ wuzam	/zam ʷ/ zom	
baobab	/ᵐbaːtaj/ ᵐbaataj	/ᵐbata ʷ/ ᵐboto-ᵐbota	
cheek	/baːɮam/ baaɮam	/baɮaɮam ʷ/ boɮoɮom	
horn	/dəram ʲ/ dərem	/dəram ʷ/ durom	/dərəm ʷ/ dərum
nine	/tsaɗ ʲ/ tseɗ	/tsaɗ ʲʷ/ tsœɗ	/tsəɗ ʷ/ tsuɗ
person	/ⁿda/ ⁿda	/ⁿda ʷ/ ⁿdo	/ⁿda ʷ/ ⁿdo
pus	/lalaɓ ʲ/ leleɓ	/varaɓ ʷ/ voroɓ	
to suck	/sasɓa/ sasɓa	/sasəɓ ʷ/ sosuɓ	/səsəɓa ʷ/ susuɓa
to swim	/maɮavɮav ʲ/ meɮevɮev	/nɮaɮav ʷ/ nɮoɮov	
tail	/hʷadar/ hʷadar	/fətar ʷ/ futor	/saɣdal ʲ/ ʃeɣdel
tamarind	/ᵐbəlam/ ᵐbəlam	/ᵐbəram ʷ/ ᵐburom	
thigh	/ɗats/ ɗats	/ɗas ʷ/ ɗos	

Table 32 - Labialization in the Mafa group

5.3.5.2 Palatalization

Surprisingly few (15 out of 119) of the cognates found in the Cuvok and Mafa data are palatalized in both languages. (In Cuvok, approximately 25% of roots are palatalized.)

Gloss	Root	Cuvok	Mafa
ashes	*marɨwats ^{y}	/marəwats ^{y}/ meruwets	/mərwats ^{y}/, /malwats ^{y}/ mərwets, melwets
dew	*maman ^{y}	/mamna ^{y}/ memne	/mmən-man ^{y}/ mmin-men
fish	*kɨlaf ^{y}	/kəlaf ^{y}/ kəlef	/kəlaf ^{y}/ kilef
hearth	*rɨwats ^{y}	/ləwats ^{y}/ luwets	/rəwats ^{y}/ ruwets
horse	*pɨlas ^{y}	/pəlaz ^{y}/ pəlez	/pəlas ^{y}/ pileʃ
nine	*tsaɗ ^{y}	/tsaɗ ^{y}/ tseɗ	/tsaɗ ^{yw}/ tsœɗ
pap	*marawaɗ ^{y}	/marawaj ^{y}/ merewej	/marawaɗ ^{y}/ mereweɗ
path	*tsɨvaɗ ^{y}	/tsəvaj ^{y}/ tsəvey	/tsəvaɗ ^{y}/ tsiveɗ
porcupine	*dɨ^{m}bak^w ^{y}	/də^{m}bak^w ^{y}/ də^{m}bek^w	/də^{m}bak ^{y}/ di^{m}bek
snake	*zazak^w ^{y}	/zazak^w ^{y}/ zezek^w	/sasak ^{yw}/ ʃœʃœk^w
tongue	*lanaŋ ^{y}	/nanaŋ ^{y}/ neneŋ	/lana ^{y}/ lene
tooth	*ɮan ^{y}	/ɮaŋ ^{y}/ ɮeŋ	/ɮana ^{y}/ ɮene
two	*atsaw ^{y}	/atsaw ^{y}/ atʃew	/tsaw ^{y}/ tʃew
white	*k^{w}aɗ ^{y}	/k^{w}aɗk^{w}aɗ ^{y}/ k^{w}eɗk^{w}eɗ	/k^{w}əɗk^{w}əɗːaʔa ^{y}/ k^{w}iɗ-k^{w}iɗːeʔe
work	*maɮan ^{y}	/maɮaraj ^{y}/ meɮerej	/məɮan ^{y}/ miɮen

Table 33 - Palatalization in the Mafa group

In other examples there is inconsistency between the languages.

Gloss	Cuvok	Mafa	Mefele
blood	/baᵐbaz ʸ/ beᵐbez	/paᵐbaz/ paᵐbaz	/məᵐbaz ʸ/ məᵐbez
to whistle	/fafkʷa/ fafkʷa	/fəkʷ ʸ/ fɯkʷ	
bow (n)	/lalaŋ/ lalaŋ	/lakaɗ ʸ/ lekeɗ	
cow	/ɮa/ ɮa	/ɮa ʸ/ ɮe	
dream	/səwana/ suwana	/nsəwəna ʸ/ nʃuwine	
egg	/ɬaɬaj ʸ/ ɬeɬej	/ɬaɬaj/ ɬaɬaj	/ɬaɬəɗ ʸ/ ɬeɬiɗ
eye	/ⁿdaj ʸ/ ⁿdej	/daj/ daj	/da ʸ/ de
girl	/dam ʸ/ dem	/dam/ dam	
hair	/ⁿgʷats ʸ/ ⁿgʷets	/gʷatsə/ gʷatsə	/gʷəⁿgʷəts ʸ/ guⁿgʷits
jealousy	/səlak ʸ/ səlek	/sərak/ sərak	
to send	/ɮəra/ ɮəra	/ɮəⁿgd ʸ/ ɮiⁿgd-	
to smell	/zaka/ zaka	/zək ʸ/ ʒik	
to swim	/maɮavɮav ʸ/ meɮevɮev	/nɮaɮav ʷ/ nɮoɮov	
to vomit	/vənaha/ vənaha	/vənah ʸ/ vineh	/vənaha ʸ/ vənehe

Table 34 - Inconsistent palatalization in the Mafa group

Where Mefele data is available, it supports the presence of palatalization in the proto-form. However, for the verbs the presence or absence of palatalization may simply be due to the choice of the citation form used in the Mefele data.

Overall, the data, though weaker than with other groups, supports the presence of palatalization as a prosody in Proto-Mafa.

5.3.5.3 Underlying Vowels

Both the Cuvok and Mafa have been analysed as possessing just two underlying vowels, /a/ and /ə/. In pre-pausal position (used in most cases for the citation form, with verbs being the exception) both vowels are neutralised to /a/. For this reason we must compare vowel height in non-final syllables of polysyllabic roots. (Note that Cuvok /ə/ is not affected by the palatalization prosody, whereas Mafa /ə/ is fronted under palatalization.) A snapshot sample of the cognate data shows almost total consistency in vowel height in the data.

Gloss	Root	Cuvok	Mafa
pap	*marawaɗ ʸ	/marawaj ʸ/ merewej	/marawaɗ ʸ/ mereweɗ
path	*tsɨvaɗ ʸ	/tsəvaj ʸ/ tsəvej	/tsəvaɗ ʸ/ tsiveɗ
porcupine	*dɨᵐbakʷ ʸ	/dəᵐbakʷ ʸ/ dəᵐbekʷ	/dəᵐbak ʸ/ diᵐbek
pus		/lalaɓ ʸ/ leleɓ	/varaɓ ʷ/ voroɓ
quiver	*gʷadama	/gʷadama/ gʷadama	/gʷadama/ gʷadama
rainbow	*kʷaraj	/kʷalaj/ kʷalaj	/kʷaraj/ kʷaraj
rainy season	*vɨja	/vəja/ vija	/vəja/ vija
rat	*madɨwan	/madwaŋ/ madwaŋ	/madəwa/, /mədəwa/ madəwa, məduwa
shame	*hʷaraj	/hʷaraj/ hʷaraj	/hʷaraj/ hʷaraj
sheep	*tamak	/təmak/ təmak	/taᵐbak/ taᵐbak

Table 35 - Underlying vowels in the Mafa group

On this basis it is possible to reconstruct the underlying vowels for most of the roots examined, and also to conclude that Proto-Mafa also had an underlying two-vowel system.

5.3.5.4 Conclusion

Proto-Mafa had a phonological system largely identical to that of present-day Mafa, with two underlying vowels /a/ and /ɨ/, and word-level prosodies of palatalization and (probably) labialization.

5.3.6   Hurza Group

The Hurza group consists of two languages, Mbuko and Vame. Whilst the two languages are related, the relationship is not especially close. The two languages are separated geographically (see the map below), and have been for at least two centuries, and possibly a lot longer. Both languages have been influenced by contact with their neighbours from the Mofu group (though not the same neighbours in each case), and Vame has also been influenced by Mandara, the vehicular language of its area (which does not include the Mbuko). The result is that it is difficult to establish whether any shared cognates are inherited from the ancestor language of these two languages, or whether they are borrowed from Mofu group languages. The only clear cases are those where the root does not have cognates in the Mofu group languages. Statements about the phonological make up of Proto-Hurza must therefore be tentative.
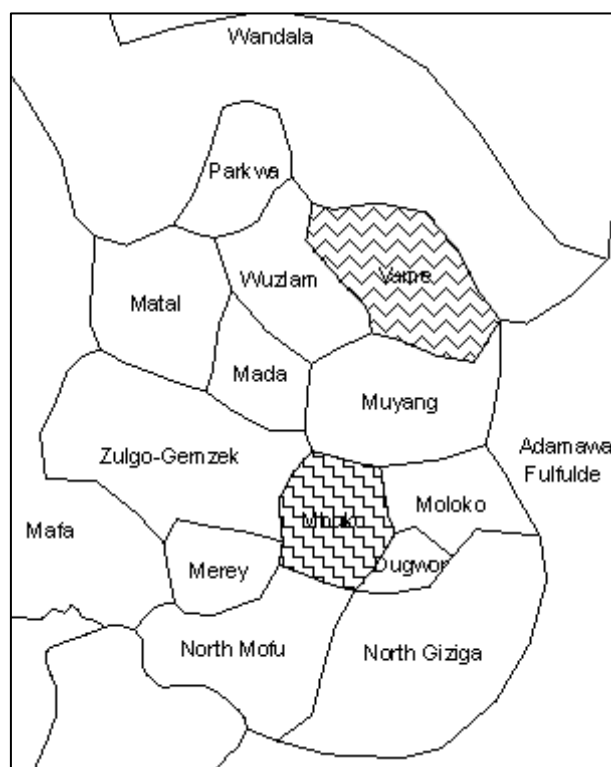
Map 16 - Hurza group

In the Hurza group, Mbuko (T. Smith and Gravina 2010) has both the palatalization prosody and the labialization prosody, whilst Vame (A. Kinnaird 2010) has only the palatalization prosody. Clearly, the labialization prosody cannot be reconstructed for Proto-Hurza, nor can its existence be ruled out. However it is possible to establish a number of roots where the palatalization prosody is present in both languages, and can therefore be tentatively ascribed to Proto-Hurza. Note that in Mbuko and Vame, /ə/ is unaffected by palatalization, whereas /a/ is realised as [e]. In Mbuko, /a/ may be realised as [i] according to its position in the word and the phonological class of the word.

Gloss	Proto-Hurza	Mbuko	Vame
black	*zan [y]	/zənzan [y]/ zənzen	/mərzaŋ [y]/ mərʒeŋ
body	*zak [y]	/zak [y]/ zek	/zak [y]/ ʒek
camel	*ɮigʷama [y]	/ɮəgʷama [y]/ ɮugʷeme	/aɮəgʷama [y]/ aɮəgʷeme
to cut	*fɨtaɗ [y]	/fətaɗ [y]/ fəteɗ	/fətəɗ [y]/ fətiɗ-ja
hole	*mɨka [y]	/məka [y]/ məke	/məka [y]/ mike
horse	*pɨlas [y]	/pəlas [y]/ pəles	/pəlas [y]/ pəleʃ
hut	*gɨm [y]	/gam [y]/ gem	/gəm [y]/ gim
nose	*hʷɨtsan [y]	/tsəwan [y]/ tʃœŋ	/hətsaŋ [y]/ hətʃeŋ
rain	*avan [y]	/avan [y]/ iven	/avaŋ [y]/ aveŋ
tongue	*mɨnaɬ [y]	/məraɬ [y]/ mireɬ	/mənaɬ [y]/ məneɬ

Table 36 - Palatalization in the Hurza group

Both languages include labialized velar consonants in their phonemic inventories, and these can be reconstructed for Proto-Hurza. In many cases, the presence of a labialized velar in Proto-Hurza is the trigger for back-rounding vowel harmony in Mbuko. In both languages, labialized velars cause following /ə/ to be realised as [u], losing their labialization component in the process. A following /a/ is largely unaffected.

Gloss	Root	Mbuko	Vame
baobab	*kʷakʷa	/kaka ʷ/ koko	/kʷakʷa/ kʷakʷa
blind	*ɣʷɨraf	/həraf ʷ/ hurof	/ɣʷəlaf/ ɣulaf
charcoal	*hʷɨvan	/avan ʷ/ uvon	/hʷəvan/ huvan
cobra	*gʷavan	/gəlgəvan ʷ/ gulguvon	/gavaŋ/ gavaŋ
field	*gʷɨvɨh	/gava ʷ/ guvo	/kʷəvak/ kuvak
fire	*akʷa	/aka ʷ/ uko	/akʷa/ akwa
house	*dahʷ	/dah ʷ/ doh	/adaw/ adaw
camel	*ɮɨgʷama ʸ	/ɮəgʷama ʸ/ ɮugʷeme	/aɮəgʷama ʸ/ aɮəgweme
grey hair	*ɗakʷar	/dəɗəkʷar/ dəɗukʷar	/akʷar/ akʷar
to boil	*kʷaɗah	/kʷaɗah/ kʷaɗah	/kʷaɗaha/ kʷaɗaha
wind	*hɨmaɗe	/maɗ/ maɗ	/hʷəmaɗe/ humaɗe

Table 37 – Development of the labialization prosody in Mbuko

Vame has a series of palatalized laminal (i.e. post-alveolar) phonemes, which contrast with the unpalatalized laminal phonemes in a few words containing only central vowels. Since this contrast is not present in Mbuko, it is not clear whether this is a feature of Proto-Hurza. The contrast is present in Mandara, so it is possible that these phonemes came into Vame through contact with Mandara.

(90)   /s/   sawa   'to drink'   /ʃ/   maʃara   'spice'
         /ts/   tsawa   'to appear'   /tʃ/   tʃapa   'to strike'
         /dz/   dzawa   'to speak'   /dʒ/   dʒaka   'argument'

Both Mbuko and Vame can be analysed with just two underlying vowels /a/ and /ə/. In the cognates so far found, the two underlying vowels correspond with a high degree of consistency, making it possible to reconstruct these underlying vowels for the Proto-Hurza forms.

We can therefore conclude that Proto-Hurza had a vowel system that consisted of two underlying vowels and a palatalization prosody causing front vowel harmony. There was no labialization prosody. The consonant system included labialized velar phonemes, but no palatalized phonemes, except possibly palatalized laminal phonemes.

5.3.7   Gidar Group

The Gidar group consists of just the one language, Gidar. It is not possible to determine whether any of the features of Gidar were present in its ancestor language. The assumption will be made that Proto-Gidar had the same phonological features as Gidar. The following map shows the location, straddling the Cameroon-Chad border, where Gidar is currently spoken.
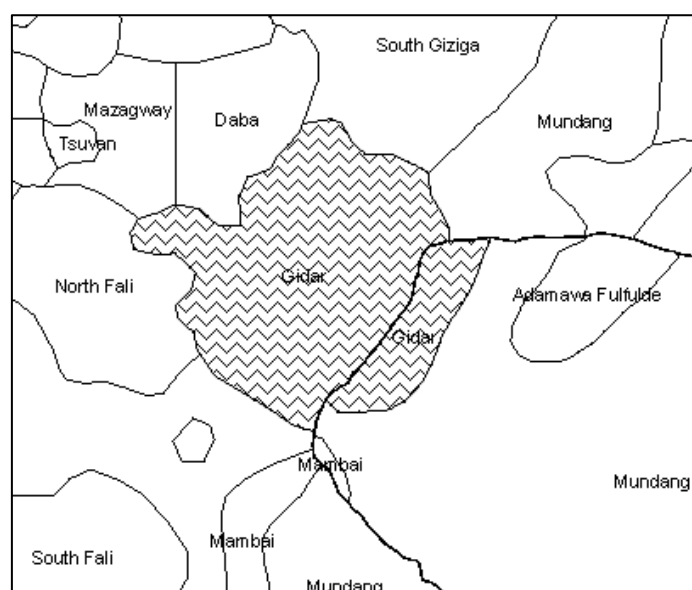
Map 17 - Gidar group

The phonological system of Gidar (Noukeu 2002; Frajzyngier 2007) includes both front and back-rounding vowel harmony. Long vowels are present, but rare, and are unlikely to be part of the core phonological system. There are two underlying vowels, /a/ and /ə/. Both vowels are affected by vowel harmony.

Gidar does not have labialized velar phonemes or palatalized laminal phonemes.

5.3.8   Mandara Group

In the Mandara group, Podoko (Swackhamer 1981) is the only language of the eight in the group where vowel harmony is recorded. There is front vowel harmony, but no underlying back-rounded vowels or back-rounding vowel harmony. It is possible that vowel harmony developed in Podoko through contact with Mofu or Mafa group languages.

A full discussion of the origins of vowel harmony in Podoko will be found in chapter 7 (see section 7.2.1), along with an analysis of the phonological systems of other languages in the Mandara group.

5.3.9   Tera Group

Although the Tera group consists of five languages, only two have been the subject of linguistic studies, and in neither case is there a full phonological analysis or a good quantity of lexical data. The two languages that have been studied, Tera and Ga'anda, are from different subgroups of the Tera group, and are geographically and linguistically quite distant. Indeed, the existence of a single Tera group may be called into question. For these reasons it is not possible to establish the phonological make up of Proto-Tera with any degree of confidence. We will confine ourselves to some observations on the features of the two languages for which we have data.

The following map shows the present-day locations of the Tera group languages.
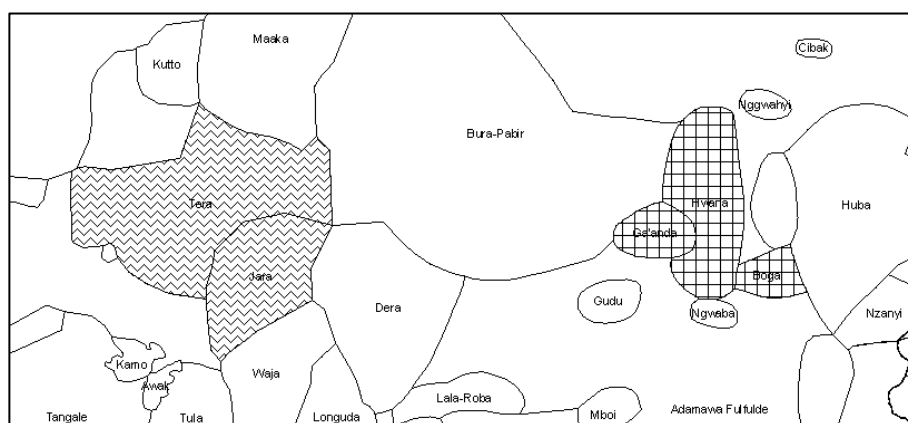
Map 18 - Tera group

Within the East Tera subgroup, Ga'anda (Ma Newman 1977) has a palatalization prosody which plays a role in the morphology of nouns and verbs. The limited data available is consistent with the existence of the labialization prosody, also giving the language back-rounding vowel harmony. For Tera itself (West Tera subgroup), very little has been written on the phonology (Newman 1970), and vowel harmony is not mentioned. However the data displays a high degree of consistency with a front and back-rounding vowel harmony system.

5.4   Summary

The reconstructions of the individual groups give a consistent picture for the phonological make-up of the proto-languages for the groups. In each case we have found that the palatalization prosody was present, along with two underlying vowels. Amongst the consonants there were labialized velars, but no other labialized or palatalized consonants. Only in the Musgum and Mafa groups was it possible to reconstruct a labialization prosody for the proto-language, and even in these cases the prosody appears closely tied to the presence of labialized velars in the root. Back-rounding vowel harmony is therefore a comparatively recent innovation in Central Chadic, whereas front vowel harmony has a longer history.

The groups presented here are not all from the same branch of the Central Chadic genetic tree, so we cannot move directly from the analysis here to a reconstruction of an earlier proto-language within Central Chadic. Rather, we see from Map 19 below that the groups (with the exception of Tera) are located in a geographical area. We shall therefore treat this phonological system as an areal phenomenon.

Map 19 - Vowel prosody languages (excluding Tera group)

In the following chapters we shall look at the other phonological systems within Central Chadic, before presenting a reconstruction of the phonology of Proto-Central Chadic.

6   Consonant Prosody

6.1   Introduction

This chapter describes a type of phonological system that we shall refer to as Consonant Prosody. The previous chapter described the Vowel Prosody system, where the languages were characterised by a system of vowel harmony caused by word-level prosodies of palatalization or labialization. With the Consonant Prosody languages, there is no vowel harmony. Instead, the languages are characterised by the palatalization and labialization of consonants. The relationship between these two types of prosody will be examined in chapter 11.

One feature of the Consonant Prosody languages is that the palatalization prosody can be analysed as acting at the level of the morpheme. When a morpheme carries this prosody, one of the consonants in the morpheme is palatalized, with the consonant being selected according to a hierarchy depending primarily on the place of articulation of the consonants in the morpheme. This process is exemplified in Jimi, a language of the Bata group (see section 6.2.5).

We saw with the Vowel Prosody languages that the palatalization prosody could be reconstructed for the proto-languages of each group, but that the labialization prosody was in most cases an innovation that took place within the groups. We will see a similar picture for the Consonant Prosody languages. It is possible to reconstruct a palatalization prosody for each group, though one with very different behaviour from the same prosody in Vowel Prosody languages. However labialization has a much shorter history. We will see that all labialized consonants other than labialized velars are the result of the historic reassignment of the labialization component from a labialized velar.

Only three of the eighteen groups that make up Central Chadic exhibit the Consonant Prosody system. These are the Bata, Margi and Higi groups. Newman (1977a) classified these groups together as one major group, possibly on the basis of the similarity of their phonological systems. However we have shown that these three groups are not directly related (see chapter 3). The Consonant Prosody system is best understood as an areal feature, as illustrated in the following map.
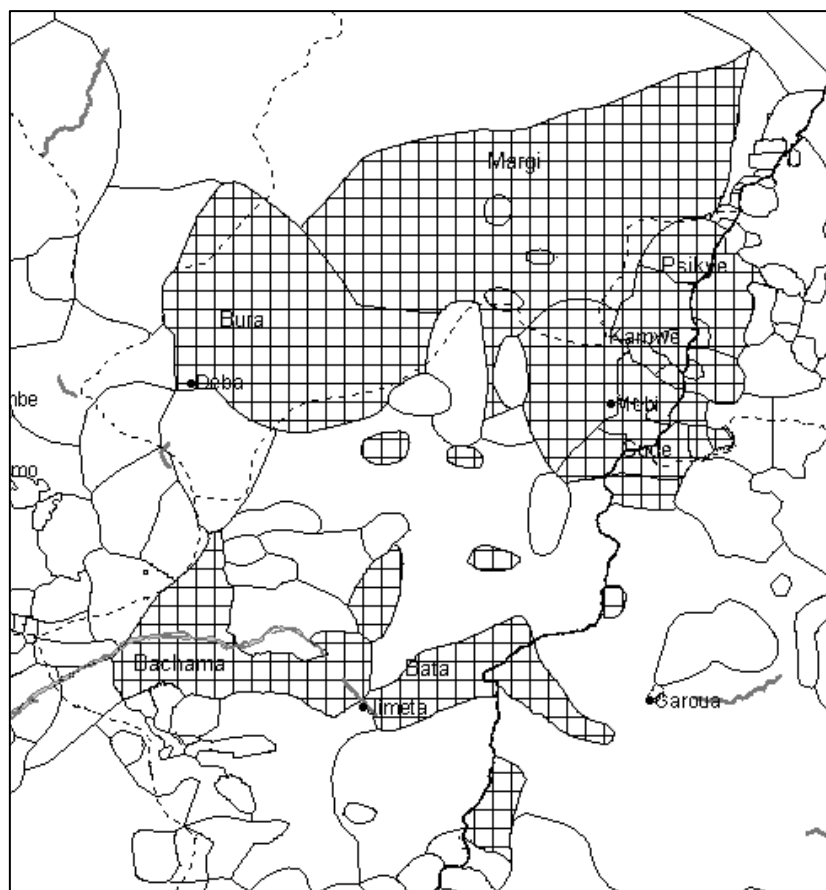
Map 20 - Consonant Prosody languages

The chapter begins with a case study of two languages of the Bata group, Jimi and Sharwa (section 6.2). Of particular interest is the behaviour of the consonant palatalization prosody in Jimi, where palatalization is a property of the morpheme, but is realised on one consonant chosen according to a priority ranking.

We will then take a more general look at the phonologies of other languages from these groups (sections 0, 0 and 6.5). For each of the groups we will establish which features can be reconstructed for the proto-language of the group.

Finally (section 6.6) we shall look at the issues raised by the consonant prosody system for the reconstruction of Proto-Central Chadic, though the actual reconstruction will appear in Section I.

6.2   Case Study – Jimi and Sharwa

In this section we will take a detailed look at the phonologies of two languages of the Bata group, Jimi and Sharwa. These languages exemplify some of the key features of Consonant Prosody languages, such as the consonant palatalization prosody, the extended set of labialized consonants, and the underlying three-vowel system. However, these three features affect the resulting surface vowels in very different ways.

6.2.1   Consonant phonemes

Both Jimi and Sharwa share the same basic consonantal inventory.

Labial	Alveolar	Laminal	Velar
p	t	ts	k
b	d	dz	g
ɓ	ɗ		ʔ
f	ɬ	s	h
v		z	ɣ
m	n		ŋ
ᵐb	ⁿd	ⁿdz	ᵑg
	l		
	r		
		j	w

Table 38 - Jimi and Sharwa basic consonants

The consonants /ɣ/ and /ŋ/ have only been so far attested in Jimi. The velar nasal is rare, being confined almost exclusively to root-final position.

The absence of a voiced alveolar lateral fricative in both languages is due to an historic change *ɮ→l within the Bata group, affecting almost all the languages in the group (see section 3.3.1).

The alveolar phonemes are divided into two sets, labelled 'alveolar' and 'laminal' following Roberts (2001). Each of the groupings forms a distinct phonological set in these languages.

6.2.2   Labialized and Palatalized Consonants

Besides the basic consonant phonemes (i.e. consonants which are neither palatalized nor labialized), both languages have large sets of labialized and palatalized consonants in their inventories.

6.2.2.1 Labialized consonants

In both Jimi and Sharwa, almost all the labial and velar consonants have labialized counterparts.

Labial	Velar
pʷ	kʷ
bʷ	gʷ
ɓʷ	ʔʷ
fʷ	hʷ
vʷ	
mʷ	
ᵐbʷ	ᵑgʷ

Table 39 - Jimi and Sharwa labialized consonants

The exceptions are /ɣ/, /ŋ/ and /w/. The phonemes /ɣ/ and /ŋ/ are absent from the Sharwa inventory, and rare in the Jimi inventory. It is possible that the labialized forms may exist in Jimi, but are not attested in the data available.

6.2.2.2 Palatalized consonants

In both languages, all basic phonemes except /w/and /j/ have palatalized counterparts.

Labial	Alveolar	Laminal	Velar
pʲ	tʲ	tʃ	kʲ
bʲ	dʲ	dʒ	gʲ
ɓʲ	ɗʲ		ʔʲ
fʲ	ɬʲ	ʃ	hʲ
vʲ		ʒ	ɣʲ
mʲ	nʲ		
ᵐbʲ	ⁿdʲ	ⁿdʒ	ᵑgʲ
	lʲ		
	rʲ		

Table 40 - Jimi and Sharwa palatalized consonants

The phoneme /ɣʲ/ is only possible in Jimi, as Sharwa does not have the corresponding unpalatalized phoneme. Jimi also has the rare phoneme /ŋ/, but /ŋʲ/ is not permitted. In Sharwa /ɗʲ/ and /ʒ/ are as yet unattested.

Note that the palatalized forms of the laminal consonants are formed by moving the place of articulation from alveolar to post-alveolar. Note also that consonants cannot be both labialized and palatalized.

6.2.3   Vowels in Sharwa

6.2.3.1 Underlying vowels

The vowel system of Sharwa is based on three underlying vowels, /a/, /ə/ and /ɨ/.

(91)   tɨvə   'path'
            təɬ-kə[3]   'to sew'
            tarsɨʔʷ-kə   'to move whilst sitting (baby)'

6.2.3.2 Allophony

The three underlying vowels give rise to seven phonetic surface vowels as follows:

Front	Centre	Back-Round
i	ɨ	u
e	ə	o
	a	

Table 41 - Sharwa vowels

The surface vowels occur in the following environments:

- Following a palatalized consonant and before word-final /j/, /ɨ/ is realised as [i] and /ə/ as [e].
- Following a labialized consonant and before word-final /w/, /ɨ/ is realised as [u] and /ə/ as [o].
- The vowel /ɨ/ is realised as [ə] word-finally, neutralising the contrast with /ə/.

The conditioning of the underlying vowels can be seen most clearly in the formation of plurals of nouns and verbs. (Here plural verbs are those where the action is distributed over several entities.) With roots containing /ɨ/, plurals are formed by lowering each /ɨ/ to /ə/. (In some cases, a consonant is

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[3] -kə is the feminine noun suffix, and is used in the formation of infinitives.

palatalized, and with nouns a final /-j/ is added.) The vowel lowering can be seen in the following examples:

(92)   ɗɨr   'to choose'   ɗər   'to choose (many things)'
         mɨtə   'to die'   mətə   'to die (many people/animals)'

The following table gives examples of plurals of roots containing palatalized and labialized consonants, demonstrating the effect of these on the following vowel.

Gloss	Singular		Plural	
	UF	SF	UF	SF
skin	bʷɨgɨrɨ	bugɨrə	bʷəgərɨj	bogəri
rat	hʲɨmɨ	himə	hʲəmɨj	hʲemi
terrapin	kʷakʷɨrɨ	kʷakurə	kʷakʷərɨj	kʷakori

Table 42 - Sharwa plural formation

It is interesting to note that the plural is formed by the replacement of /ɨ/ with /ə/. This process of plural formation is well documented within Chadic and beyond (Newman 1990), but is generally referred to as an 'internal-a' plural. In Sharwa, however (and also Bata (Boyd 2002)), it is not /a/ that is inserted.

The vowel /ɨ/ is often unrealised between consonants. However, even when unrealised in the singular the vowel will be lowered and realised as /ə/ in the plural.

(93)   /dɨgɨlɨ/   [dɨglə]   'bank'
         /dʲəgəlɨ-j/   [dʲegəli]   'banks'

6.2.4   *Vowels in Jimi*

6.2.4.1 **Underlying vowels**
There are three basic underlying vowels in Jimi, /a/, /ə/, /i/.

(94)   /maɗ-ən/[4]   'to get up'   /miɗ-ən/   'boa'
         /tsak-ən/   'to put on a shroud'   /tsək-ən/   'to collect'
         /lim-ən/   'ear'   /ləm-ən/   'border'

---

[4] -ən is the nominal suffix in Jimi, used with all nouns and in the formation of infinitives.

In addition, the vowels /i/ and /a/ also have lengthened forms /iː/ and /aː/. In many cases, these can be analysed as due to combinations of other phonemes such as /ji/, or due to the historic loss of a consonant.

(95)   Jimi   aav-ən   'arrow'   cf. Tsuvan   ahave
         Jimi   iik-ən   'chicken'   cf. Sharwa   ʔʲɨgə

However there are many cases where such an explanation is not available and it is best to consider these long vowels as phonemic in the language.

6.2.4.2 Allophony

Unlike Sharwa, in Jimi the vowels are not normally affected by adjacent consonants.

(96)   [pʷabʷ-ən]   /pʷabʷ-ən/   'baobab flower'
         [mʲəliŋ]   /mʲəliŋ/   'nine'
         [pətʲak-ən]   /pətʲak-ən/   'type of antelope'

The exceptions are when /ə/ occurs following /j/ or /w/, adjacent to /ʔʷ/ or /ʔʲ/, or when /a/ occurs following /rʲ/ or /lʲ/. In these cases /ə/ is realised as [i] and [u], and /a/ is realised as [e]. (These are the only environments where [u] and [e] occur.)

(97)   /jən-ən/   [jinən]   'head'
         /wənʲ-ən/   [wunʲən]   'to sleep'
         /bavəʔʷ-ən/   [bavuʔun]   'scar'
         /tsʲiᵑgəʔʲ-ən/   [tʃiᵑgiʔin] 'head (millet)'
         /lʲam-ən/   [lemən]   'to get into a state'
         /kərʲa-n/   [kəren]   'to bring'

6.2.4.3 Distribution

In a number of other Central Chadic languages – e.g. Mafa (Barreteau and le Bléis 1990), Mofu-Gudur (Barreteau 1988), Daba (Lienhard and Giger 1975) – there is a strong system of vowel harmony, and front and central vowels cannot co-occur in the same root. However, in Jimi there is no vowel harmony, and /a/ and /i/ can co-occur in the same root.

(98)   kabin-ən   'to throw'
         magiw-ən   'woman'
         ɬifa-n   'palm tree'
         giwa-n   'quarter (part of village)'
         kəsik-ən   'friend'
         wirəv-ən   'jujube'

Both /i/ and /ə/ can occur adjacent to both unpalatalized and palatalized consonants. Note that /ʃ/ is the palatalized counterpart of /s/.

(99)   sik-ən   'to waste time'
        ʃigʷ-ən   'kitchen firewood'
        səpa-n   'half of an object that has been cut in two'
        ʃən-ən   'nose'

In summary, we have shown that /i/ is a distinct morpheme, and is not due to vowel harmony or conditioning of /ə/ by adjacent palatalized consonants.

6.2.5   Consonant Palatalization in Jimi

6.2.5.1 The consonant palatalization prosody in Jimi

In common with Gude (Hoskison 1983), also of the Bata group, completive aspect is marked on a verb root by the palatalization of the verb root, but this palatalization is only realised on specific consonants or vowels. The rules for its application (which differ slightly from Gude, cf. section 6.3.1) are as follows:

1. If the verb root ends in /-a/ then this final /-a/ becomes /-i/.
2. If the verb root does not end in /-a/, then the rightmost laminal consonant is palatalized, where present.
3. If no laminal consonant is present, then the placement of the palatalization is less determined. Alveolar consonants are always preferred over labial consonants, but there is no clear preference between alveolar consonants and velar consonants or between velar consonants and labial consonants.
4. If there is no unmodified consonant (i.e. ones which are not palatalized or labialized) in the root, or if the root ends with /j/, the palatalization is unrealised.

Note that palatalization is a property of the root, but is realised by the modification of a single consonant phoneme. It should also be noted that /ŋ/ does not permit palatalization.

1. Roots ending in /a/

With roots ending in /-a/, the final vowel is replaced by /-i/. The consonants are unaffected. So, for example, the completive form of *sa* 'drink' is *si* and not *ʃi* or *ʃa.

Infinitive	Completive	Gloss
dza-n	dzi	to strike (lightning)
ɗa-n	ɗi	to do
sa-n	si	to drink
fətsa-n	fətsi	to grill
gamʷa-n	gamʷi	to tell off
gəla-n	gəli	to measure
haaɗa-n	haaɗi	to repair
pʷaa-n	pʷaj	to give birth

Table 43 - Jimi verbs ending with /–a/

2. Roots containing laminal consonants

When a root does not end in /-a/, a laminal consonant in the root will be palatalized.

Infinitive	Completive	Gloss
dzal-ən	dʒal	to educate
dzəgəl-ən	dʒəgəl	to place
bʷədzək-ən	bʷədʒək	to fall
ɓats-ən	ɓatʃ	to break
ɓəz-ən	ɓəʒ	to stop
ɓəwəs-ən	ɓəwəʃ	to push

Table 44 - Jimi verbs containing a laminal consonant

3. Roots not containing laminal consonants

In roots that do not end in /-a/ and do not contain laminal consonants, alveolar consonants are palatalized in preference to labial consonants.

Infinitive	Completive	Gloss
baan-ən	baanʲ	to lie down
baɬ-ən	baɬʲ	to plait
daɓ-ən	dʲaɓ	to gather together
dəv-ən	dʲəv	to sprout
bəwəɗ-ən	bəwəɗʲ	to work (field)
ɓəlam-ən	ɓəlʲam	to stammer

Table 45 - Jimi verbs with alveolar and labial consonants

However, palatalization does not show a clear preference between alveolar and velar consonants.

Infinitive	Completive	Gloss
ɗəh-ən	ɗəhʲ	to ask
haɗ-ən	haɗʲ	to bury (body)
gər-ən	gərʲ	to grow
ɣərəv-ən	ɣərʲəv	to confiscate
həbʷər-ən	həbʷərʲ	to be full (food)
ɬəkər-ən	ɬəkʲər	to spike
dʒərak-ən	dʒərakʲ	to lie
pərak-ən	pərʲak ~ pərakʲ	to split

Table 46 - Jimi verbs with alveolar and velar consonants

In the final example, two alternative realisations were given. This is the only verb where alternatives have been recorded.

Likewise, there is no clear preference between velar and labial consonants.

Infinitive	Completive	Gloss
pak-ən	pʲak	to lift up
gap-ən	gapʲ	to fold
ᵑgaf-ən	ᵑgʲaf	to eat too quickly
bəwək-ən	bəwəkʲ	to carry out initiation

Table 47 - Jimi verbs with velar and labial consonants

4.   More than one consonant at the same place of articulation

In the cases where there are two or more candidate consonants at the same place of articulation, palatalization targets the one nearest the end of the word.

Infinitive	Completive	Gloss
dədəʔʷ-ən	dədʲəʔʷ	to coerce
ɗaar-ən	ɗaarʲ	to extract
ɗəbəl-ən	ɗəbəlʲ	to heal (scar)
lərət-ən	lərətʲ	to go out

Table 48 - Jimi verbs with two consonants at the same place of articulation

5. Modified consonants

Palatalization cannot be realised on consonants that are already palatalized or labialized. If there are no unmodified consonants then the palatalization is unrealised.

Infinitive	Completive	Gloss
tʃakʷəl-ən	tʃakʷəlʲ	to stir with a stick
tʃ-ən	tʃə	to carry fire
tʃəʔʲ-ən	tʃəʔʲ	to pay back
tʃiːkʷ-ən	tʃiːkʷ	to peck

Table 49 - Jimi verbs with modified consonants

6. Words with final /j/

The presence of /j/ in root-final position blocks the action of the consonant palatalization prosody.

Infinitive	Completive	Gloss
ɗərəbəj-ən	ɗərəbəj	to sell
hədʒəbəj-ən	hədʒəbəj	to pour

Table 50 - Jimi verbs containing /j/

7. Words containing /i/

In words containing /i/, the consonant palatalization prosody applies according to the rules outlined earlier. The presence of /i/ makes no difference to the application of the prosody, though when /i/ follows a palatalized consonant, the palatalization is not always discernible.

Infinitive	Completive	Gloss
ɣin-ən	[ɣinʲ]	to build (house)
dʒiːɗ-ən	[dʒiːɗʲ]	to swear (oath)
tʃiːɬ-ən	[tʃiːɬʲ]	to hatch
miːz-ən	[miːʒ]	to make balls of millet
ɗiːk-ən	[ɗiːk] (/ɗʲiːk/)	to not listen
fikʷ-ən	[fikʷ] (/fʲikʷ/)	to whistle

Table 51 - Jimi verbs containing /i/

6.2.5.2 Consonant palatalization in the lexicon

Uninflected roots may also include palatalized consonants, and in these roots the pattern of consonant palatalization is consistent with the rules outlined above. So, for example, we do not find roots containing a palatalized labial consonant and also an unpalatalized laminal consonant.

This being the case, it is possible to analyse all palatalized consonants in Jimi as being due to the action of a morpheme-level palatalization prosody. For example, the first morpheme in

(100)   [gʲaŋ-ən]   'type of grass'

could be analysed as /gʲaŋ/ or as /gaŋ ʸ/, where the second option represents the morpheme /gaŋ/ being acted upon by a morpheme-level consonant palatalization prosody.

For Jimi as an individual language, there is little to be gained by analysing palatalization in the lexicon in terms of a morpheme-level prosody. However this analysis is highly relevant when reconstructing the ancestral languages Proto-Bata and Proto-Central Chadic.

6.3   Bata group

In this and the following sections we shall take a look at the broad phonological features of the languages in each of the three groups that exhibit the Consonant Prosody system, i.e. the Bata, Margi and Higi groups. For each group we shall then determine which features can be reconstructed for the proto-language of that group.

The Ethnologue (Lewis 2009) lists twelve languages for the Bata group, of which one (Holma) is extinct. Many of the languages have not been studied, and there is no consensus about the internal classification of the group. The present-day locations of the Bata group languages are shown in the following map.

Map 21 - Bata group

Here we shall look at how the characteristic features of Jimi and Sharwa relate to other languages in the Bata group. In particular we shall look at the three-vowel system and labialized and palatalized consonants. The data is compared with that of Gude (Hoskison 1974; Hoskison 1975; Hoskison 1983), Bata (Boyd 2002) and Tsuvan (Johnston n.d.). We will find that Proto-Bata had three underlying vowel phonemes, and possessed labialized velar and labialized labial consonants. It also had a word-level consonant palatalization prosody.

6.3.1   Gude

The following description of Gude phonology is a short summary of Hoskison (1974).

Gude has labialized labial and velar consonants. All consonants may be palatalized, with the palatalized laminals being realised at the post-alveolar place of articulation and palatalized velars realised as palatal consonants. Unlike Jimi, Gude permits labialized consonants to be palatalized.

Hoskison also describes a consonant palatalization prosody in Gude that is similar to that described for Jimi (see section 6.2.5). He divides the consonants into four grades, as follows:

Grade I: sibilants, coronal implosives and coronal nasals.
Grade II: all coronal consonants not in Grade I.
Grade III: all non-coronal consonants not in Grade IV.
Grade IV: voiced velar continuants.

The application of the prosody follows the following rules:

1.   Obligatory for all grade I consonants everywhere in the root
2.   If no grade I consonant in the root, then obligatory for one grade II consonant (final consonant is preferred)
3.   If no grade I or grade II consonants in the root, then obligatory for one grade III consonant (final consonant is preferred)
4.   Optional for a second grade II or grade III consonant (final consonant is preferred)
5.   Never applies to grade IV consonants. There are no polysyllabic roots containing only grade IV consonants.

Gude has two vowel phonemes /ə/ and /a/. In unmarked environments /ə/ is realised as [ɨ] and /a/ as [ɜ]. When preceded and followed by palatalized

consonants the vowels are realised as [i] and [e], and when preceded and followed by labialized consonants they are realised as [u] and [o]. In mixed environments the vowels are realised at some point between these limits.

Each vowel phoneme also has a long equivalent /ə:/ and /a:/. /ə:/ is influenced by preceding consonants only, being realised as [i:] following a palatalized consonant and [u:] following a labialized consonant. /a:/ is realised as an open central vowel in unmarked environments, and is fronted or back-rounded when preceded and followed by palatalized or labialized consonants respectively.

6.3.2 Tsuvan

From the data available (Johnston n.d.), it can be seen that Tsuvan has labialized labial and labialized velar consonant phonemes. Whilst the data is limited, it appears that consonants from any place of articulation may be palatalized.

From inspection of the data, it appears that Tsuvan has a three vowel system consisting of /ə/, /a/ and /e/, with the presence of [i] and [u] being due to conditioning of /ə/ by adjacent palatalized or labialized consonants. No firm conclusions can be reached about the vowel system without access to a detailed phonological analysis.

6.3.3 Bata and Bachama

In Bata (Boyd 2002) and Bachama (Pweddon and Skinner 2001; Seibert n.d.), consonants from any place of articulation may be palatalized. The languages also have an extended system of labialized consonants which includes consonants from any place of articulation, and even allows the existence of a few consonants that are both labialized and palatalized, with [pᶣ], [gᶣ], [ᵑgᶣ] and [qᶣ] attested in the data. These are not phonemic, but are the result of the palatalization prosody acting on a phonemic labialized consonant.

Bata has three contrastive central vowels, but no underlying front or back-rounded vowels.

6.3.4 Reconstructing Proto-Bata phonology

In the following sections we shall propose a reconstruction of the phonological system of Proto-Bata. The data cited in the tables is taken from the following sources: Bata (Boyd 2005); Gude (Hoskison 1983); Jimi (Djibi n.d.); Sharwa (Gravina n.d.); Tsuvan (Johnston n.d.). Data is given in broad phonetic form,

with phonemic forms given for some entries when clarification is necessary. In several languages in the Bata group, there are nominal suffixes. In some languages these are only present on feminine nouns, but in others the suffixes are present on all nouns and on verb infinitives. These suffixes are given in the data, preceded by a hyphen.

6.3.4.1 Vowels

Among the languages studied in this section, Jimi, Sharwa, Tsuvan and Bata all have three underlying vowels. In Sharwa and Bata the vowels are all central vowels, whilst in Jimi and Tsuvan two are central and the third is a front vowel. Gude has just the two central vowels.

These vowels correspond in a reasonably regular and systematic way as follows:

Proto-vowel	Tsuvan	Sharwa	Jimi	Gude	Bata
*ɨ	/ə/	/ɨ/	/ə/	/ə/	/ɨ/
*i	/e/	/ə/	/i/	/ə/	/ə/
*a	/a/	/a/	/a/	/a/	/a/

Table 52 - Proto-Bata vowels

It is not known whether the proto-vowel *i was realised as a front vowel or as [ə] in its unmarked form, or indeed whether *ɨ was realised as [ɨ] or [ə]. Since both proto-vowels have the reflex /ə/ in certain languages, the label *ə has been avoided as being a potential cause of confusion.

We shall now look at the data for evidence of these correspondences.

*6.3.4.1.1   *a*
The evidence for this correspondence is very clear and consistent.

Gloss	Jimi	Sharwa	Tsuvan	Gude	Bata
leaf	ba-n	ba		ba	
sheep	baga-n	baga		baga	ᵐbaga-to
bachelor	gamza-n	gamdza			ⁿgamsa
tongue	gʲana-n	gana	agana		
guinea fowl	zavʷən-ən	zavunə (/zavʷɨnə/)	zavən-kən	zoovəna	
arrow/bow	aav-ən	havə	ahave	avə	
cow	la-n	la	ɮa	la	

Table 53 - Reconstructing *a for Proto-Bata

6.3.4.1.2   *ɨ*

The majority of the evidence supports the correspondence given in Table 52. In particular, in all cognates where Sharwa has /ɨ/, Jimi has /ə/.

Gloss	Jimi /ə/	Sharwa /ɨ/	Tsuvan /ə/	Gude /ə/	Bata /ɨ/
mortar	aⁿdzər-ən	/ⁿdʒɨrə/ ⁿdʒirə			
to sprout	dəv	dɨv		dəvə	
to find	gəmʷan-ən	gɨmʷan			
to wait	gəra-n	gɨra			/kʷɨla/ kula
to jump	ləɗ-ən	lɨɗ		lədə	/lɨj/ lii
to spike	ɬəkər-ən	ɬɨkɨr			
nose	ʃən-ən	/tʃɨnə/ tʃinə	/mətʃəne/ mətʃine	/ʃənə/ ʃinə	/ʃɨne/ ʃine
to grow	gər-ən		gəl-kən	gərə	kɨl
blind	wərəf-ən		awəlfe	wərəfə	wel

Table 54 - Reconstructing Proto-Bata *ɨ

However there are some cases where the correspondences are not apparent.

Gloss	Jimi /ə/	Sharwa /ɨ/	Tsuvan /ə/	Gude /ə/	Bata /ɨ/
to learn	dzəgʷən-ən	/dzəgʷən/ dzəgon		/dzəgʷənə/ dzəgonə	ɗegən
fish	hərʲəf-ən	/kʷɨrʲəfi/ kurefi	/wəlfi/ wulfi	/hərəfʲə-nə/ hərəfi-nə	qərfʲee
grass	kʷəzən-ən	/hʷɨzənə/ huzəne	/hʷəzene/ huzene	/kʷəzənə/ kuzəna	
rain	vʷən-ən	/vʷənə/ vonə	vʷenə	vənə	

Table 55 - Difficult correspondences for *ɨ in the Bata group

In the entries for 'grass' and 'rain' the presence of /e/ in the Tsuvan entries implies that the proto-vowel should be *ɨ, but for some reason its reflex in Jimi is not /i/. The same may be true for the entry for 'learn'. In the entry for 'fish' it appears that the Sharwa data is out of step (or possibly incorrectly transcribed).

6.3.4.1.3   *i

The evidence for this correspondence is also clear.

Gloss	Jimi /i/	Sharwa /ə/	Tsuvan /e/	Gude /ə/	Bata /ə/
sun	fit-ən	fətə	fete		fəre
year	fiz-ən	fəz-kə		fəzə	
to build	ɣin-ən	ᵑgən	hen	ɣənə	
work	ɬin-ən	ɬən	ɬini-kən	ɬənə	len-to
to sew	tiɬ-ən	təɬ		tələ	
blood	idin-ən	adənə	ədene	idənə	

Table 56 - Reconstructing *i in Proto-Bata

In all the available data, Tsuvan has a corresponding /e/, except for the entry for 'work' where there is [i]. Gude has /ə/, except for the initial /i/ in 'blood'. The limited Bata data implies that /ə/ is the corresponding vowel (the entry for 'work' would have to be analysed as /lʲən/).

6.3.4.2 Labialized Consonants

We saw that almost all of the Vowel Prosody languages possess a set of labialized velar phonemes, but other labialized phonemes are absent. All languages presented here have labialized velar phonemes. In addition they also have labialized labial consonant phonemes. The existence of these labialized phonemes in cognates across the group implies that they were also part of the phonemic inventory of the group's proto-language. Within Central Chadic it is only the Consonant Prosody languages and some Mixed Prosody languages that have labialized labial consonant phonemes.

The following table gives evidence for reconstructing the labialized phonemes for Proto-Bata.

	Gloss	Tsuvan	Sharwa	Jimi	Gude	Bata
pʷ	flour	/ahpʷe/ ahpʷe	/pʷə/ po	/pʷ-ən/ pʷən	/əmpʷə-nə/ əmpunə	
bʷ	elbow			/bʷir-ən/ bʷirən	/bʷəːrə/ buurə	/ɡ͡bərəⁿg-to/ ɡ͡bərəⁿgto
ɓʷ	hide		/ɓʷah/ ɓʷah	/ɓʷəɣ-ən/ ɓʷəɣən		/ɓʷəː/ ɓoo
mʷ	bee/ honey		/maⁿgəz/ maⁿgəz	/mʷazəŋa/ mʷazəŋa	/mʷaːzəŋa/ moozəŋa	/nzəmʷa-to/ nzumʷa-to
ᵐbʷ	navel		/zɨᵐbʷɨɗə/ zuᵐbuɗə	/zʲəᵐbʷəɗ-ən/ ʒəᵐbʷəɗ-ne		/səᵐbʷəɗə/ suᵐbuɗə
fʷ	tree		/fʷəgə/ fogə	/fʷ-ən/ fʷən	/ənfʷə/ ənfu	
vʷ	guinea-fowl	/zavən-kən/ zavənkən	/zavʷɨnə/ zavunə	/zavʷən-ən/ zavʷənən	/zaːvʷəna/ zoovəna	
kʷ	grass	/hʷəzene/ huzene	/hʷɨzənə/ huzənə	/kʷəzən-ən/ kʷəzənən	/kʷəzənə/ kuzənə	
gʷ	fire	/gʷəlkʷe/ gulkʷe	/rɨgʷə/ rugo	/gʷ-ən/ gʷən	/gʷə-nə/ gunə	
ʔʷ	milk	/ʔʷa-kən/ ʔʷakən	/ʔʷa/ ʔʷa	/wa-n/ wan	/ʔʷa-nə/ ʔʷanə	/wa-to/ wato
hʷ	goat	/ahʷe/ ahʷe	/hʷə/ ho		/əhʷə/ uhu	/waː-to/ wooto

Table 57 - Labialized consonants in the Bata group

6.3.4.3 Palatalized Consonants

Whilst labialized consonants can be easily reconstructed for the Bata group, the same cannot be said for the palatalized consonants. All the languages under study include palatalized consonants in their inventories. However these consonants are not consistently attested in the cognates. For this reason it seems most likely that Proto-Bata did not possess palatalized consonants as

such. However we shall see in chapter 11 that a palatalization prosody can be reconstructed to account for the presence of these palatalized consonants.

There are a few roots where palatalized consonants appear consistently across the languages and so may be reconstructable for Proto-Bata.

Gloss	Proto-Bata (segmental)	Tsuvan	Sharwa	Jimi	Gude	Bata
fingernail, claw	gʲɨɬɨ	/gʲɨɬe/ giɬe	/gʲɨgʲələ/ gigʲələ	/gʲɨɬ-ən/ giɬən	/gʲələ/ giɬə	/gʲəl-to/ geto
fish	kʷɨrʲɨfɨ	/wəlʲfən/ wulfin	/kʷɨrʲəfi/ kurefi	/hərʲəf-ən/ hərʲəfən	/hərəfʲə-nə/ hərəfinə	/qərfʲee/ qərfʲee
tooth	ɠinʲɨ	/ɠʲəne/ ɠine	/lʲinʲə/ line	/linʲ-ən/ linʲən	/lənʲə-nə/ linʲinə	/lʲən-to/ linto
nose	tsʲɨnɨ	/mətsʲəne/ mətʃine	/tsʲɨnə/ tʃinə	/sʲən-ən/ ʃənən	/sʲənə/ ʃinə	/sʲəne/ ʃine
fly (insect)	dzʲɨʔʲ		/dzʲɨʔɨj/ dʒiʔi	/dzʲəʔʲ-ən/ dʒiʔin	/dzʲəʔʲə/ dʒiʔi	/dzʲət-to/ dʒit-to

Table 58 - Palatalized consonants in the Bata group

However, there are also many roots where palatalized consonants appear sporadically.

Gloss	Proto-Bata	Tsuvan	Sharwa	Jimi	Gude	Bata
leg	sɨɗɨ	/səɗe/ səɗe	/sʲɨɗə/ ʃiɗə	/səɗ-ən/ səɗən	/səɗə/ səɗə	
navel	zɨᵐbʷɨɗɨ ʸ		/zɨᵐbʷɨɗə/ zuᵐbuɗə	/zʲəᵐbʷəɗ-ən/ ʒəᵐbʷəɗən		/səᵐbʷəɗə/ suᵐbuɗə
rock	fara		/fʲarɨj/ fʲari	/fara-n/ faran	/faara/ faara	/fara/ fara
tongue	gana ʸ	/agana/ agana	/gana/ gana	/gʲana/ gʲana		

Table 59 - Sporadic palatalization in the Bata group

We saw earlier that Jimi and Gude possess a consonant palatalization prosody which operates on particular consonants according to a priority ordering based on the place of articulation of the consonants. It was also noted earlier that this priority ordering appears to apply also to the Jimi lexicon. So, for example, we do not find words in Jimi where an unpalatalized laminal consonant appears in the same word as a palatalized consonant from a different place of articulation. The upshot of this is that it is possible to express palatalization in the Jimi lexicon by marking morphemes as palatalized, rather than by marking the individual consonants as palatalized.

The same distribution appears to apply generally in the other languages of the group. In other words, in words in any language in the group, if there is a palatalized consonant in the word, then it would be a laminal if there are any present, or if not, then it would belong to the next highest priority group according to the rules of that language. There are certain exceptions, such as ideophones in Gude ending in /s/, but overall the rule appears to hold. So for all the languages of the Bata group, palatalization can be expressed as a word-level feature and not just as a purely segmental feature.

The implication of this is that consonant palatalization in Proto-Bata was a word-level feature, and that we should look for its origin away from the individual consonant segments. Rather than trying to decide which consonants were palatalized in Proto-Bata, we should reconstruct the palatalization prosody for certain words in Proto-Bata. This issue will be further discussed in chapter 11.

6.3.4.4 Summary
When looking at Proto-Bata, we can be confident that the language possessed three underlying vowels, and that it had labialized velar consonants and labialized labial consonants in its inventory in addition to the regular consonants. Palatalized consonants should not be considered part of the inventory in Proto-Bata, but there was a morpheme-level palatalization prosody that was expressed primarily by the palatalization of consonants.

6.4   Margi group

Hoffmann (Hoffmann 1988) divides the Margi group into two subgroups: West Margi (which we here call the Bura subgroup), covering Bura, Nggwahyi, Cibak and Putai; and Eastern (here referred to as the Margi subgroup), covering Kilba (Huba), South Margi and Margi. Data is only available for Bura and the three Margi subgroup languages, Kilba (Schuh n.d.; Mu'azu 2009), Margi (Hoffmann 1963; Maddieson 1987) and South Margi (Harley n.d.).

The present-day locations of the Margi group languages and the subgroups of Margi are shown in the following map.
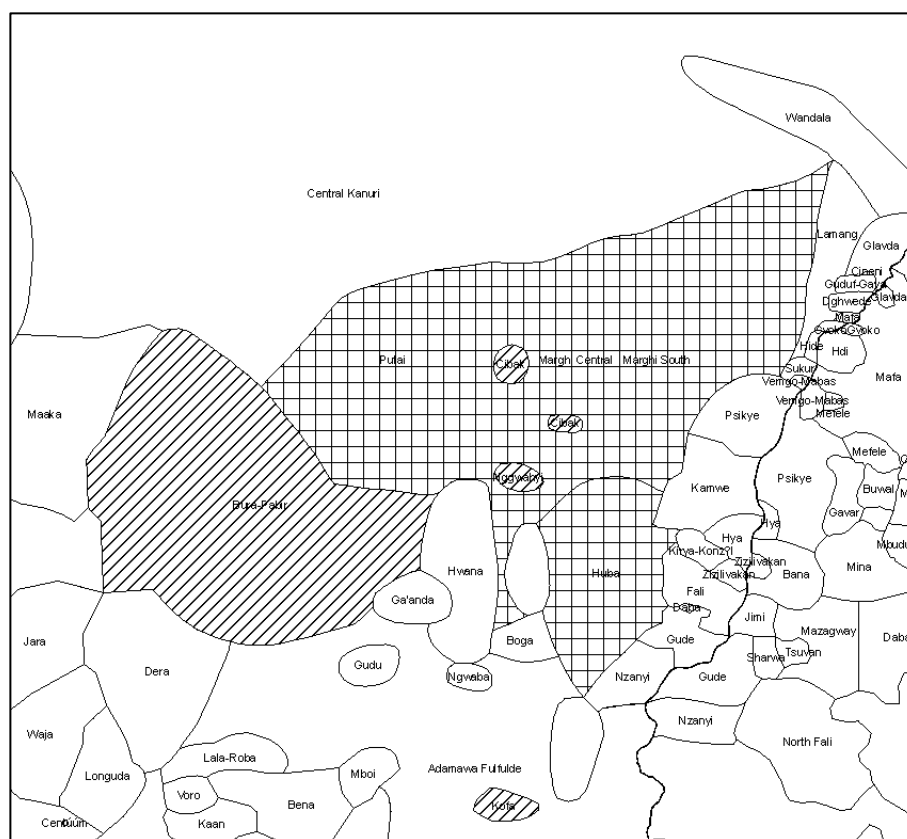
Map 22 - Margi group

6.4.1 Margi

The first description of Margi phonology was by Hoffmann (1963). The language gained some notoriety due to his inclusion of sets of labio-coronal consonants in its phonemic inventory. His data was reanalysed by Schuh (1971) and also Maddieson (1987). Maddieson presented a coherent analysis which reduced Hoffmann's six vowel system to a system of just two vowels. These combine with sets of plain, palatalized and labialized consonants to produce the six surface vowels described by Hoffmann.

Maddieson allows for palatalization and labialization to apply to consonants from any place of articulation. This includes permitting labialized alveolo-palatal consonants (e.g. [ʃʷ]). If these alveolo-palatal consonants are analysed as palatalized laminal consonants (the position we shall be adopting), then the labialized alveolo-palatal consonants can be analysed as consonants which are simultaneously palatalized and labialized.

Maddieson also demonstrates contrast between /ə/ and its absence. /ə/ must therefore be treated as a full vowel phoneme, and not (always) as the result of epenthesis, as stated by Schuh. The implication is therefore that there are two full vowel phonemes, along with a possible epenthetic or zero vowel. This 'two plus one' vowel system is in line with the system that we have found in the Bata group (see section 6.3.4.1), but contrasts with the 'one plus one' vowel system that we found in most of the Vowel Prosody languages (see section 5.3.1.2 for the situation in the Mofu group, for example).

Maddieson disputes Hoffmann's claim that the labio-coronal consonants are phonemic units. He concludes that there is no justification for treating them as single units, and prefers that they be treated as CC sequences. Viewed from an historic perspective, these complex consonants do indeed come from a sequence of two consonants.

In summary, Margi has a system of two vowels, plus a possible zero vowel, and a consonant inventory that includes labialized and palatalized consonants.

6.4.2 Bura

There have been two descriptions of Bura phonology, though both have limitations. Warren (2005, 77), in setting out proposals for writing Bura, describes the basic consonantal system as follows:

p	pt	pts	t	ts	tʃ	k
b	bd	bdz	d	dz	dʒ	g
mp	mt	mpts	nt	nts	ntʃ	ŋk
ᵐb	md	ᵐbdz	ⁿd	ⁿddz	ⁿdʒ	ᵑg
ɓ	ɓɗ		ɗ			ƙ
f	pɬ	ps	ɬ	s	ʃ	x
v	bɮ	bz	ɮ	z	ʒ	ɣ
nf	mɬ	mps	nɬ	ns	nʃ	ŋx
nv	mɮ	ᵐbz	nɮ	nz	nʒ	ŋɣ
m			n			ŋ
			l		y	w
			r			

Table 60 - Bura consonants (Warren)

The analysis is unusual in that it includes a large selection of labio-alveolar consonants. However many of these potential consonants do not appear in the data, and of those that do, many are clearly the result of the coalescence of two distinct consonants. The following words show evidence for this from related languages.

(101)　'hare'　　　　mpti　pita (Kilba)
　　　　'sun'　　　　ptʃi　pətʃi (Kilba)　　　　patsa (Podoko)
　　　　'to chew'　　ɓɗa　paɗ (Ouldeme)
　　　　'child'　　　bzər　bəzej (Mofu Gudur)
　　　　'to sprinkle'　pʃa　pəʃa (Malgwa)

Whilst it may be necessary to treat these consonants as single phonemes when analysing the language, they clearly have historical origins as two distinct consonants.

Warren lists six vowel phonemes: /a/, /ə/, /i/, /e/, /u/, /o/.

Blench (2009b) presents a similar set of consonant phonemes to Warren, along with the same six vowel phonemes. He describes the distribution of palatalized and labialized consonants in terms of which following vowels they may occur with. However, as was the case with Margi (see section 6.4.1), an analysis with a smaller set of vowels conditioned by the palatalized and labialized consonants may turn out to be more accurate.

Inspection of the data (Blench 2009a; Schuh n.d.) indicates that only velar and labial consonants occur frequently followed by [w], implying that there are sets

of labialized labial and labialized velar consonant phonemes in the language. There are instances of some other consonants followed by [w], but given their rarity, these are best treated as CC sequences. All consonants appear to permit palatalization.

The palatalized alveolar consonants are rare, with the exception of /nʲ/, /lʲ/ and /ɗʲ/. Their rarity may be just a fact of the language, or it may be that these consonants are simply best analysed as CC sequences.

The data also indicates that [ə] does not occur following a palatalized or labialized consonant. In these environments it can be presumed that /ə/ is realised as [i] following a palatalized consonant and [u] following a labialized consonant.

However it is necessary to also propose a separate /i/ phoneme, since all the occurrences of [i] cannot be due to the palatalization of /ə/. In particular, there are many instances of [i] occurring following an unpalatalized laminal phoneme. The following data comes from (Blench 2009a).

(102)   sipadu   'sorghum'
          sim   'to eat'
          zilaku   'crow'
          tsitsa   'to hatch'
          dziba   'to plaster (house)'

Similarly, it is also necessary to propose a phoneme /u/, since there are many instances of [u] following alveolar and laminal consonants, and following palatalized consonants. None of these consonants can be labialized, so there is no possibility of the underlying vowel being /ə/.

(103)   tuna   'abscess'
          ɮutsa   'to grab'
          tsutsa   'shrub (type)'
          ʃura   'to smell'
          ʒuʒa   'bird (type)'

In Schuh's data, the vowels [e] and [o] are rare, and almost always occur in Hausa loan words. These two vowels can be excluded from the core phonemic inventory.

In summary, Bura has four vowel phonemes, and a consonant inventory that includes palatalized and labialized consonants.

6.4.3   Kilba

As yet there is no published phonology of Kilba, and the only lexical data found comes from an unpublished word list (Schuh n.d.). Muazu (2003; 2009) has described a number of morphological processes in the language.

Examination of the available data shows that Kilba has sets of palatalized laminal and velar consonants, and labialized velar and labial consonants. There are a few examples of possible palatalized labial and alveolar consonants.

The vowel [o] may not be part of the core phonemic inventory in Kilba, as it occurs mostly in loan words. The vowel [e] may not be phonemic either, but may be the realisation of sequences such as /əja/.

(104)   dooⁿgal   'load (Fulfulde)'
        vamija/vamee   'boyfriend'

Looking at the distribution of vowels following velar consonants, we find that [ə] does not occur following palatalized or labialized velars. Following labialized velars, only [a] may occur (except for a couple of easily explicable exceptions). Following palatalized velars, we also have /a/ as the only vowel that can occur. There are a number of exceptions, many of which involve [i] following /hʲ/.

The implication of this distribution is that there are only two underlying vowels, /a/ and /ə/, with /ə/ being realised as [u] following labialized consonants and [i] following palatalized consonants. In these cases, the labialization and palatalization are not realised on the consonant.

All four phonetic vowels occur following unlabialized labial consonants, but only [a] occurs following labialized labials. This distribution supports the two vowel analysis. However there are examples of [i] following plain labial consonants, and these cannot be accounted for by this analysis.

Following laminal consonants, we have a few instances of [u] following both plain and palatalized laminals, but almost all of these are adjacent to /w/ or a labialized velar. Likewise, there are some occurrences of [i] following plain

laminal consonants, but these are either preceding /j/ or word final, where they could be underlying /əj/.

There are a few instances of [ə] following palatalized laminals. These may simply be transcription errors. Cognates of these words in the other languages of the group exhibit [i], as is expected.

(105)   Kilba tʃəsu   Bura ntʃisu   'eight'
         Kilba tʃədî   Bura tʃir   'honey'

Following alveolar consonants, there are instances of all four vowels. However the instances of [u] are almost all either word-final or preceding /w/. The instances of [i] also occur almost always either word-final or preceding /j/. We can surmise that /ə/ is realised as [i] preceding /j/ and as [u] preceding /w/, and that word-final [i] and [u] are the realisations of /əj/ and /əw/ respectively.

In the case of Kilba, whilst the data from vowel distribution indicates that the underlying vowel system consists of just two vowels, it is not possible to rule out the existence of /i/ and /u/ as phonemes due to the small amount of data that does not follow the regular distribution pattern. However, the weak evidence for these two vowels may suggest that they were not present in the immediate ancestor language.

In summary, Kilba probably has two phonemic vowels, and includes palatalized and labialized consonants, though the system is not as extensive as for Bura and Margi.

6.4.4   Reconstructing Proto-Margi phonology
From the three languages where information is available we can propose that the phonology of Proto-Margi consisted of a set of consonants that included labialized labials and labialized velars, along with palatalized consonants from all places of articulation, most particularly palatalized laminals and velars. The vowel system probably comprised two full vowels /a/, /i/, along with /ɨ/, which may have been an epenthetic vowel or a zero vowel.

6.4.4.1 Labialized Consonants

For the labialized velars, only *kʷ can be reliably reconstructed for the group. (The phonemic forms given are based on my own analysis. Data from Margi South is included where available.)

Gloss	Proto-Margi	Bura	Margi	Margi S	Kilba
grass	kʷɨsar	/kʷəsar/ kusar	/psar/ psar	/sar/ sar	/sar/ sar
belly	kʷɨta	/kʷəta/ kuta			/ta/ ta
buffalo	kʷɨfɨr	/kʷəfər/ kufur		/fʷər/ fur	/fʷər/ fur
girl	kʷa	/nkʷa/ nkʷa	/ŋkʷa/ ŋkʷa	/kʷa/ kʷa	/kʷa/ kʷa
goat	kʷi	/kʷi/ kʷi	/kʷə/ ku		/kʷa, kʷə/ kʷa, ku
baobab	kʷagʷɨ	/kʷagʷə/ kʷagu			/gʷə/ gu
to chew	kʷasa	/kʷasa/ kʷasa			/kʷasa/ kʷasa
quiver	kʷadza ʸ	/kʷadza ʸ/ kʷadʒa		/kʷadza/ kʷadza	/gʷadza ʸ/ gʷadʒa
six	kʷa	/nkʷa/ nkʷa		/kʷa/ kʷa	

Table 61 - Proto-Margi *kʷ

Labialized labials can be reconstructed for Proto-Margi as in the following roots:

Gloss	Proto-Margi	Bura	Margi	Margi S	Kilba
to pour	*pʷɨ	/pʷə/ pu	/pʷa/ pʷa	/pʷa/ pʷa	/pʷəə/ puu
white	*pʷakʷɨ	/pʷakʷə/ pʷaku	/pʷakʷə/ pʷaku		
snake	*pʷabʷɨ	/pʷapʷə/ pʷapu			/pʷabʷə/ pʷabu
flour	*ɨpʷɨ	/mpʷa/ mpʷa	/əmpʷə/ əmpu	/upaw/ upau	/əpʷa/ upʷa
to boil	*ɓʷa	/ᵐbʷa/ ᵐbʷa	/ɓʷa/ ɓʷa	/ɓʷaa/ ɓʷaa	/ɓʷa/ ɓʷa
roan	*mʷaʔʲ	/mʷi/ mʷi	/mʷaʔʲə/ mʷaʔʲə		/mʷaʔʲə/ mʷaʔi
hide	*ᵐbʷɨ		/ᵐbʷə/ ᵐbu		/ᵐbʷa/ ᵐbʷa
navel	*sɨᵐbʷɨɗɨwʸ			/sʲəᵐbʷəɗəw/ ʃəᵐbuɗu	/sʲəᵐbʷəɗəw/ ʃiᵐbuɗu
four	*fʷaɗu	/nfʷar/ nfʷar	/fʷaɗə/ foɗə	/fʷaɗəw/ fʷaɗu	/fʷaɗəw/ fʷaɗu
civet/jackal	*ɨfʷa	/əfʷa/ ufʷa	/əfʷa/ ufʷa	/əfʷa/ ufʷa	/əfʷa/ ufʷa
charcoal	*vʷɨni	/vina/ vina	/vʷənʲə/ vunʲi	/əvʷənʲə/ uvʷunʲi	

Table 62 - Proto-Margi labialized labials

6.4.4.2 Palatalization

Palatalized consonants can be reconstructed for the laminal series and for the velar consonants. (Note that the unpalatalized Proto-Central Chadic *z and *dz have become devoiced in the Margi group and merged with *s and *ts.)

Gloss	Proto-Margi[5]	Bura	Margi	Margi S	Kilba
eight	*tsʲɨsɨw	/ntsʲəsəw/ ntʃisu		/tsʲəsəw/ tʃisu	
elephant	*tsʲɨwar	/tsʲəwar/ tʃiwar	/tsʲəwar/ tʃuwar	/tsʲəwar/ tʃiwar	
fly (insect)	*tsʲɨɗɨ	/tsʲər/ tʃir	/tsʲəɗəj/ tʃiɗi		/tsʲəɗi/ tʃəɗi
nose	*hʷɨtsʲɨr	/kʷətsʲər/ kutʃir	/mtsʲər/ mtʃir	/tsʲər/ tʃir	/tsʲər/ tʃir
sun	*pɨtsʲɨ	/ptsʲə/ ptʃi		/pətsʲə/ pətʃi	/pətsʲə/ pətʃi
navel	*sʲɨᵐbʷɨɗɨw			/sʲəᵐbʷəɗəw/ ʃəᵐbuɗu	/sʲəᵐbʷəɗəw/ ʃiᵐbuɗu
squirrel	*sʲar	/sʲar/ ʃar		/sʲan/ ʃan	/sʲan/ ʃan
tail	*sʲɨw		/sʲəw/ ʃu	/sʲəw/ ʃu	/sʲəw/ ʃu
kidney	*kʷɨlsʲi	/kʷəlsʲə/ kulʃi	/hʷəlsʲə/ hulʃi		
tongue	*gʲar	/kʲəᵑgʲar/ keᵑgʲar	/kʲar/ kʲar	/kʲar/ kʲar	/kʲar/ kʲar
leg	*hʲɨ		/hʲə/ hʲi	/hʲə/ hi	/hʲə/ hʲi
thigh	*ʔʲa		/ʔʲa/ ʔʲa	/ʔʲa/ ʔʲa	/ʔʲa/ ʔʲa
earth	*hɨɗʲ	/həj/ hi	/həʔʲ/ həʔi		

Table 63 – Palatalized consonants in Proto-Margi

With the Bata group we noted (section 6.3.4.3) that palatalization of consonants can be analysed as a word-level feature that falls primarily on the laminal consonants, then on velar consonants where no laminal consonants are present, and then on to labials and alveolars if circumstances require it.

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[5] A provisional segmental reconstruction

Within the Margi group the same phenomenon is present, as far as can be determined from the data available. For example, in the Bura data of nearly 8,000 entries, there are no examples of words containing unpalatalized /s/ along with a palatalized consonant. The only apparent exceptions are verbs with the /mja/ 'completely' extension (Blench 2010).

(106)   masa   'to buy'
         masamja   'to buy up (more than one thing)'

However, if /mja/ is analysed as a separate particle rather than a suffix, these examples do not violate the consonant palatalization priorities.

If palatalization of consonants is indeed a word-level feature, then rather than reconstructing palatalized laminals and velars for Proto-Margi (as in Table 63 above), we should instead reconstruct the consonant palatalization prosody for Proto-Margi. This is the position we will be adopting when reconstructing Proto-Central Chadic, and we will see that historically the palatalization prosody was present at this earlier time. At some point between Proto-Central Chadic and today's Margi group languages, the prosody ceased to be productive, and resulted in the creation of a set of palatalized consonants. However we cannot be certain whether this development took place before or after the time of Proto-Margi. The position we will adopt is that the palatalization prosody was still present in Proto-Margi.

6.4.4.3 Vowels

The vowel system of Proto-Margi consisted of *a, *i and *ɨ, which may have been an epenthetic vowel.

The proto-phoneme *a is stable, and is easily reconstructed from the data.

Gloss	Root	Bura	Margi	Margi S	Kilba
four	fʷaɗu	/nfʷar/ nfʷar	/fʷaɗə/ foɗə	/fʷaɗəw/ fʷaɗu	/fʷaɗəw/ fʷaɗu
grass	kʷɨsar	/kʷəsar/ kusar	/psar/ psar	/sar/ sar	/sar/ sar
horse	takʷ	/takʷə/ taku	/tagʷə/ tagu	/tagʷə/ tagu	/takʷə/ taku
leaf	łali	/łali/ łali			/hʲali/ hʲali
oil	mal	/mal/ mal			/mal/ mal
quiver	kʷadza ʸ	/kʷadza ʸ/ kʷadʒa		/kʷadza/ kʷadza	/gʷadza ʸ/ gʷadʒa
ram	gam	/gam/ gam			/gam/ gam
woman	mʷala	/mʷala/ mʷala	/mala/ mala		/mala/ mala

<div align="center">

Table 64 - Proto-Margi *a

</div>

Proto-Margi *i is harder to reconstruct. In Bura *i has the reflex /i/, but in the languages of the Margi subgroup (Margi, Margi South and Kilba) it became /ə/. The representation *i is preferred for consistency with the reconstructions from the Bata group. The actual phonetic form in Proto-Margi cannot be deduced. The reconstruction is justified on the basis of the following data:

Gloss	Proto-Margi	Bura	Margi	Margi S	Kilba
butterfly	*pir	pirpir			pərpər
claw	*pil	mpil			pəl
to eat	*sim	sim	səm	səma	
fear	*łivira	łivira			ləvəra
goat	*kʷi	kʷi	ku (/kʷə/)		ku (/kʷə/)
head	*kir	kir	kər	kər	kər
to jump	*fila	fila			fəla
name	*łim	łim			łəm
to spit	*tifa	tifa			təfa
to steal	*hila	hila		həl	həla
three	*maakir	makir		maakər	maakəru
work	*łir	kiłir	łər		łəra

<div align="center">

Table 65 - Proto-Margi *i

</div>

Proto-Margi *ɨ can be easily reconstructed, though the widespread occurrence of palatalized and labialized consonants leads to many cases where the realisation of the reflex of *ɨ is other than [ə]. In some environments *ɨ is manifested as absence of a vowel, as in the Bura word for 'sun' below.

Gloss	Proto-Margi	Bura	Margi	Margi South	Kilba
chicken	*tɨka	mtəka		teka	təga
guinea fowl	*tsɨvɨr	tsəvəra	tsəvər		tsəvər
sun	*pɨtsi	ptʃi		pətʃi	pətʃi
tooth	*ɬɨr ^{y}	/ɬʲər/ ɬir, hʲir	/hʲər/ hʲir	/hʲər/ hʲir	/hʲər/ hʲir
ten	*kʷɨma	/kʷəma/ kuma		/kʷəmaw/ kumow	
tamarind	*ᵐbɨwla	/ᵐbəwla/ ᵐbula		ᵐbəla	ᵐbəla

Table 66 - Proto-Margi *ɨ

6.4.4.4 Summary

For Proto-Margi, we can reconstruct a proto-language with similar features to Proto-Bata. Proto-Margi had three vowel phonemes *a, *i and *ɨ, along with a word-level palatalization feature. The consonant inventory included a set of labialized velar phonemes and a set of labialized labial phonemes.

6.5   Higi group

According to the Ethnologue (Lewis 2009), the Higi group consists of five languages: Bana, Hya, Kamwe, Kirya-Konzel and Psikye. Kamwe has a number of dialects, including Futu and Nkafa. The name Higi is also used to refer to Kamwe. The locations of the Higi group languages are shown in the following map.
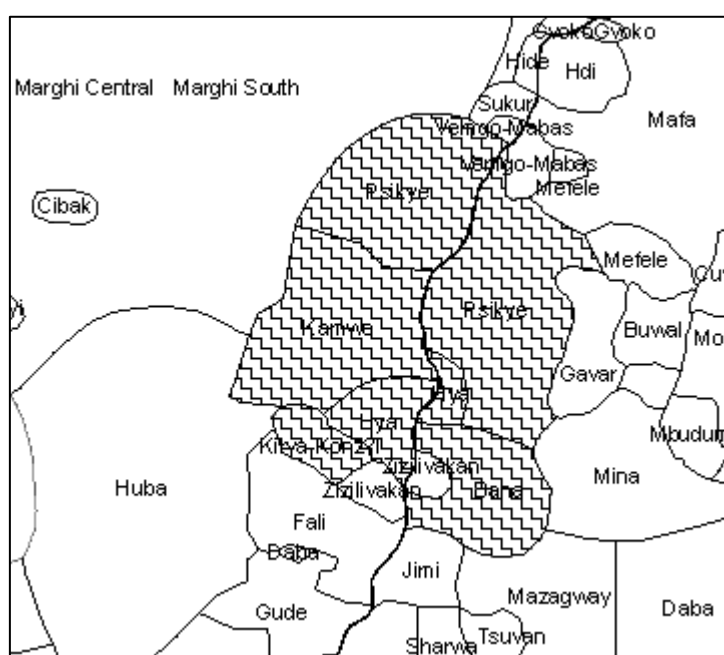
Map 23 - Higi group

There are published phonological works on Bana (Hoffman 1990) and Higi (Hoffmann 1965; Laver 1965; Mohrlang 1971; Mohrlang 1972; Barreteau 1983). The languages in the Higi group have complex phonologies, with many features of interest to theoretical phonologists. It was Hoffmann's analysis of Higi that first made use of the term 'prosody' to describe the interplay of consonants, vowels, labialization and palatalization in a Chadic language (Hoffmann 1965).

We will begin with an overview of the important phonological characteristics of the individual languages, as far as possible, before moving onto the reconstruction of Proto-Higi.

6.5.1   Bana

An excellent analysis of Bana phonology was carried out by Erica Hoffman (1990). She analysed Bana as having three vowel phonemes /ə/, /e/ and /a/. The consonant inventory includes labialized velar consonants, but no labialized labial consonants as found in the Bata and Margi groups.

Hoffman analyses consonant palatalization as the result of a palatalization prosody which acts at the level of the syllable. In a palatalized syllable, laminal and velar consonants are palatalized, and /ə/ is realised as [i]. If none of these elements are present, the palatalization is not realised phonetically.

There should be a level of caution in adopting the notion of a prosody acting on a syllable. Elsewhere in Central Chadic we have seen prosodies acting at the level of the morpheme or as modifications of individual segments, but not acting at the level of the syllable. The concept of prosodies acting on syllables comes from Mohrlang's work on Higi (Mohrlang 1972). However for Bana the notion of syllable prosody does not explain anything that cannot be explained by proposing the existence of palatalized consonants which condition adjacent /ə/ to be realised as [i].

Looking at the short Bana lexicon (Lienhard and Giger 1989), it becomes apparent that to avoid including /i/ as a phoneme it is necessary to propose not only palatalized laminal and palatalized velar phonemes, but also palatalized alveolar and labial phonemes. In other words, all consonants potentially have palatalized counterparts, as is the case with languages of the Bata group. Such an analysis fits in with the system we shall establish for Proto-Higi (see section 6.5.7) based on evidence from other languages of the Higi group.

In the Bata group it was possible to analyse palatalization as a feature of the word (see section 6.3.4.3), with palatalization being realised on a consonant according to a prioritisation system based on the place of articulation of the consonants in the word. A general look at the Bana data shows that the laminal consonants are most likely to be palatalized, with 45% of all laminals palatalized, compared with 11% of velars and 7% of alveolars, and labials rarely showing evidence of palatalization. This is consistent with the same

prioritisation sequence that we found in the Bata group. There is not enough data to be able to propose that Bana has a word-level palatalization prosody that functions in the same way as in Jimi for example (see section 6.2.5), but the same general patterning is apparent.

Hoffman notes that plurals are often formed by changing the internal vowels of the word to /e/, combined with palatalization. It is apparent from the data that there is something approaching vowel harmony, whereby in most cases /a/ and /e/ do not both appear in the same root. In addition, with only two exceptions, whenever /e/ appears in a root, the laminal consonants in the root are palatalized. This is exactly the behaviour of the palatalization prosody in Vowel Prosody languages (see section 5.2.2 in the chapter on Vowel Prosody languages). Further analysis is needed to look at the exceptional cases and to study whether the vowel prosody is a productive feature of the language.

The interesting implication of this is that there may be a twin system at work in Bana, where there are two palatalization prosodies, one vowel prosody and one consonant prosody. We will encounter this system with the Mixed Prosody languages (chapter 7).

6.5.2   Psikye

Whilst there is a published work on the grammar of Psikye (also known as Kapsiki) (D. M. Smith 1969), there are no published materials on Psikye phonology. Father Angelo Mazzucci, priest in Mogode, has collected some data for the language, along with some information on the grammar, designed for learners of Psikye. He has also set out a system for writing the language.

The data available show that labialization and palatalization are far more limited than in the Kamwe dialects. Labialization is limited to velar consonants, and palatalization of consonants is only possible for the laminal consonants.

The vowel system has three central vowels /ɨ/, /ə/ and /a/, along with the high vowels /i/and /u/. Mazzucci does not write /u/, interpreting it as the result of /ɨ/ preceded by /w/ or a labialized consonant. This analysis works in most cases, but there are some exceptions in the data, and for this reason I am retaining it as a phoneme here. /ə/ preceded by labialized consonants results in [o]. [ɨ] is not found preceded by a palatalized laminal consonant, presumably since /ɨ/ is realised as [i] in that environment.

6.5.3 Higi

Higi is a name accorded to a wide grouping of speech forms listed in the Ethnologue (Lewis 2009) under Kamwe, which includes Kamwe of Futu, Kamwe of Nkafa, and several more.

Mohrlang (1972), working mainly from Nkafa, analysed Higi using a system of prosodies acting at the level of the syllable. These prosodies are palatalization, labialization and nasalization. In the case of nasalization, which has no effect on vowels and does not spread in any way, it seems that there is little to be gained from such an analysis for understanding the sound system of the language.

Labialization of a syllable is given as the analysis for a variety of phenomena, from actual labialization of a consonant to pre-labialization and the presence of a labial plosive or a nasal (often transcribed as pre-nasalization).

(107)   /ᵂ ve/   [vᵂɛ]   'farm'
        /ᵂ ʃa/   [ᵂʃa]   'things'
        /ᵂ ta/   [pta]   'leather skin'
        /ᵂ ne/   [ᵐnɛ]   'salt'

Labialization in the narrow phonetic sense only occurs on the velar and labial consonants, as in most other languages of this group. This is also the case in the Bata and Margi groups. The motivation for analysing other consonants as carrying the labialization prosody is unclear. The three examples in (108) are better analysed simply as /wʃa/, /pta/ and /mne/.

For the vowels, Mohrlang says that there is a tendency to back and round the vowels in a syllable with the labialization prosody, and that this back-rounding may extend into adjacent syllables both before and after the labialized syllable.

Palatalization applies to almost every consonant, and is realised as the palatalization of the consonant. The following vowel may also be affected by this palatalization, especially the high vowel. Mohrlang also notes that an /i/ in a word can cause the fronting of previous vowels, most noticeably /a/.

Four vowel contrasts are given for word-final position, though only three in word-medial position. The four vowels are /ɨ/, /e/, /a/ and /ɛ/. /ɛ/ is neutralised with /ɨ/ in word-medial position.

6.5.4   Kamwe Nkafa

Kamwe Nkafa data comes from a wordlist of just over 1,000 entries taken in 2008 (Harley 2009b). There is as yet no analysis of the data, except that this is probably the same language that was described in Mohrlang's Higi Phonology (Mohrlang 1972).

The data gives a vast array of phonetic consonants, including many with labialized or palatalized forms. Consonants permitting labialization include the velars and labials, but also others from the alveolar and laminal sets. There are even instances of labialized post-alveolar consonants such as [tʃʷ]. Consonants from all places of articulation can be palatalized, though palatalized laminal consonants (e.g. [ʒ], [tʃ]) are by far the most common.

It is very difficult to analyse the vowel system. The fact that all consonants have palatalized and labialized forms, means that any front or back-rounded surface vowel could be analysed as the result of the influence of a modified consonant on a central vowel. However there are certain environments where we can determine the true status of the underlying vowel.

For [i], in sequences such as [ki] it is possible that the underlying form is /kʲə/. However, if [i] occurs after an unpalatalized laminal, e.g. [si], or after a labialized non-laminal consonant, e.g. [kʷi], then we can be sure that [i] is not /ə/ conditioned by the preceding palatalized consonant. For Kamwe Nkafa there are plenty of examples of [i] occurring in these environments, and we can propose /i/ as a phoneme in this language. We will see in section 6.5.7 that the two Kamwe dialects have preserved *i where the other languages have the reflex /ə/.

For [e], there are many examples in the data. However a large number of entries include duplicates where [e] appears as [ə]. The data as it stands does not suggest the existence of /e/. Its presence in the data may be as an allophone of /ə/, or may be due to mistakes in keyboarding.

For the back-rounded vowel [u], the only environment where we can be sure that the vowel is not underlying /ə/ is following a palatalized consonant other than a palatalized laminal, since these are the only consonants that cannot be labialized. Only one such example exists in the data. The balance of probability is that there is no /u/ phoneme in the language, but that all instances of [u] are due to an adjacent labialized consonant.

The Kamwe Nkafa vowel system is taken to consist of three vowels /a/, /i/ and /ə/, though further research is very necessary.

6.5.5   Kamwe Futu

As with Kamwe Nkafa, no phonological analysis is yet available, but there is a wordlist of just under 1,500 entries (Harley 2009a). The data indicates that labialization and palatalization can be applied to almost every consonant in much the same way as for Kamwe Nkafa.

With the vowels, there are significant numbers of [u] and [o]. None of these occur following a palatalized, non-laminal consonant, so it is theoretically possible to ascribe their presence to the influence of a labialized consonant on /ə/ and /a/.

For the front vowels [i] and [e], the evidence for /i/ is similar to that for Kamwe Nkafa, and is reasonably clear. For [e] the evidence is less clear.

6.5.6   Kirya-Konzel

Blench (2009b) gives a few notes on the phonology of Kirya-Konzel (abbreviated to Kirya henceforth). He lists six possible vowel phonemes, /i/, /e/, /ə/, /a/, /u/ and /o/, and states that palatalized and labialized consonants are common. From the data available, it can be seen that almost all consonants can be labialized, including velars, labials, laminals and post-alveolar laminals, and a few alveolars.

In the vast majority of cases [u] and [o] occur following either a velar consonant or a labial consonant. However there remain a significant number of exceptions. It is entirely possible that these instances may be due to the presence of other labialized consonants. Detailed analysis of the Kirya data and cognates for evidence of transferred labialization gives justification for this, and allows both back-rounded vowels to be eliminated from the list of phonemes.

As with Bana, the only consonants to allow palatalization are the velars and the laminals. Interestingly, the laminals permit both palatalization and labialization, which is not possible with consonants from other places of articulation. This may be an indication that the language considers the post-alveolar consonants, i.e. palatalized laminals, as segments in their own right, and therefore palatalization should not be analysed as a prosody in this language.

The phoneme /i/ occurs for the most part in environments that could be explained by a Bana-type palatalization phenomenon, i.e. in all environments except following unpalatalized laminal or velar phonemes. However there are examples of [i] following these consonants, so it is not possible with the current data to eliminate /i/ as a phoneme.

The existence of [e] after unpalatalized consonants, and [a] after palatalized consonants appears to rule out the possibility that [e] is a palatalized allophone of /a/.

Kirya is unusual in possessing a retroflex [ɽ] sound, described by Blench and Ndamsai (2009b) as 'not a true retroflex but pronounced with the tongue towards the alveolar ridge'. From the data it can be seen that in two thirds of cases [ɽ] is followed by [i]. In contrast [r] is almost always found before central vowels, and only before [i] in a small fraction of cases. This patterning may indicate that [ɽ] is the palatalized form of /r/, though a thorough check of the data would be necessary before reaching a firm conclusion.

6.5.7   Reconstructing Proto-Higi

There are several issues to be addressed in reconstructing the phonology of Proto-Higi. First we shall establish that the only labialized consonants in Proto-Higi are the labialized velars. Secondly we shall look at the status of the palatalized consonants in the languages of the group and determine how best to treat the palatalized consonants of Proto-Higi. Finally we shall attempt to reconstruct the vowel system of Proto-Higi.

6.5.7.1 Labialized consonants

All velar consonants can be labialized in all the languages of the group for which information is available. In Kirya, Kamwe Futu and Kamwe Nkafa almost all consonants are attested in labialized form. However in Bana and Psikye only the velar consonants can be labialized.

Gloss	Proto-Higi	Bana	Psikye	Kamwe-Futu	Kirya
goat	kʷɨ	kʷə	kʷə	/kʷa/ ko	/kʷə/ ku
grass	gʷɨzɨn	gʷəzən	gʷəzə		sʷən
belly	hʷiɗ	xʷər		hʷi	/hʷər/ hʷur
fire	ɣʷi	ɣʷə	/gʷə/ gʷu	ɣʷi	/ɣʷə/ ɣu

Table 67 - Labialized velars in Proto-Higi

The data below indicates that labialized labial consonants have been created in Kamwe, rather than lost in Psikye. They have been created as a result of the merging of *w with a labial phoneme.

(108)   'tree'   wufə /wɨfə/ (Psikye)   fʷə (Kamwe-Nkafa)
        'four'   wufaɗə /wɨfaɗə/ (Psikye)   fʷaɗo (Kamwe-Futu)
        'field'   wuvə /wɨvə/ (Psikye)   vʷə (Kamwe-Nkafa)

In these cases, we see that the /w/ present in the Psikye data has become desegmentalised in the Kamwe languages, and has attached to the labial consonants /f/ and /v/, resulting in the labialized labial phonemes /fʷ/ and /vʷ/.

The same applies for labialized alveolar and laminal consonants. If indeed the sequences such as /tw/ are phonetically labialized (the source data is unclear), their existence is due to the merging of *w with another consonant. In some cases the *w is itself the reflex of a labialized velar phoneme. If the sequences such as /tw/ are in fact CC sequences, then they are the result of metathesis.

(109)   'skin'   xuta /xʷɨta/ (Psikye)   wta (Futu)   twa (Kirya)
        'grass'   gʷəzən (Bana)   wuzən (Tera)   swən (Kirya)
        'tail'   hutɨrə /hʷɨtɨrə/ (Sharwa)   twələ (Kirya)
        'thing'   wusu /wɨsə/ (Psikye)   wsi (Futu)   swə (Kirya)
        'hearth' ruwetʃ /rəwəts ʸ/ (Mafa)   rətwə (Nkafa)
        'five'   hutaf /hʷətaf/ Hdi   mtʃef (Psikye) mtʃʷafə (Nkafa)

The last item shows the creation of labialized post-alveolar consonants (at the phonetic level, at least) in Kamwe. These are in effect labialized palatalized laminal consonants. Kamwe is the only Central Chadic languages where these sounds occur.

The existence of labialized post-alveolar consonants in Kamwe argues for two things. Firstly, the spread of labialization onto non-velar consonants is a more recent process than the palatalization of laminals, since palatalization of laminals occurs across the group, whereas this labialization is an innovation that only applies to a subset of languages within the group. Secondly, consonant palatalization cannot be treated as a word-level prosody in these languages. It is difficult to argue that a labialized consonant has received the prosody, since in many other Consonant Prosody languages, labialization blocks the application of palatalization to a consonant.

6.5.7.2 Palatalization

All languages in the Higi group have a set of palatalized laminal consonants. All the languages except Psikye also permit the palatalization of velars. In Kamwe Nkafa and Kamwe Futu almost all consonants may be palatalized.

There are three possibilities to consider. The first is that palatalization in Proto-Higi was limited to the laminal consonants, and then developed in other sets of consonants in some of the languages in the group. Secondly, palatalization could have been found on several sets of consonants, but was lost from certain consonant series in some of the languages. Thirdly, there may have been a consonant palatalization prosody in Proto-Higi, of the same type as that found in the Bata and Margi groups, i.e. one that applies palatalization to a consonant in the word according to a hierarchy based largely on the place of articulation.

First we shall see that the only phonemes that are palatalized consistently across the group are the laminals, and that these can be reconstructed for Proto-Higi. Then we will show that the other palatalized consonants developed during the time after Proto-Higi split into the different languages.

The palatalized laminal series are easily reconstructable at least as far as Proto-Higi.

Gloss	Proto-Higi	Bana	Psikye	Kamwe Nkafa	Kamwe Futu	Kirya
elephant	tsʲɨwɨn	/tsʲəwə/ tʃiwə		/tsʲəwə/ tʃiwə	/tsʲəwe/ tʃiwe	/tsʲəwənə/ tʃuunə
five	wɨtsʲɨfɨ	/tsʲəfə/ tʃifə	/mtsʲəfə/ mtʃefə	/ntsʲʷəfə/ ntʃufə	/mtsʲʷafə/ mtʃwafə	
nose	hɨtsʲɨn	/kəsʲən/ kʃən		/ntsʲə/ ntʃi	/ntsʲə/ ntʃi	/nsʲən/ nʃin
broom	sʲɨmɨ	/sʲəm/ ʃəm	/sʲəmu/ ʃimu	/sʲəmi/ ʃimi	/sʲəme/ ʃime	/sʲəmə/ ʃimə
navel	zʲɨᵐbʷiɗ	/zʲəᵐber/ ʒiᵐber		/zʲəᵐbʷi/ ʒiᵐbwi	/zʲəᵐbʷi/ ʒeᵐbwi	/zʲəᵐbʷər/ ʒiᵐbur

<p align="center">Table 68 - Proto-Higi palatalized laminals</p>

There are a few roots that may indicate consistent palatalization of a non-laminal consonant.

Gloss	Proto-Higi (provisional)	Bana	Kamwe Nkafa	Kamwe Futu	Kirya
bow	lɨgʲi	/rəgʲə/ rəgi	/ləgʲi/ ligʲi	/rəgi/ regi	
grasshopper	hagʲi	/xaj/ xaj	/hagʲi/ hagʲi	/hagi/ hagi	/haji/ haji
neck	wɨlʲi	/wərʲə/ wəri	/wəlʲə/ wulʲə	/wəlʲi/ wulʲi	/wərʲi/ wurʲi

<p align="center">Table 69 - Palatalization of non-laminal consonants in Proto-Higi</p>

The data is weak, consisting only of three consonants appearing before a final *i. The palatalization heard on these consonants can be ascribed to the presence of the *i. We cannot therefore conclude that there were any palatalized non-laminal consonants in Proto-Higi. Without any palatalized consonants from non-laminal places of articulation, there is no motivation for proposing a word-level consonant palatalization prosody.

If there were no palatalized non-laminal consonants in Proto-Higi, we would need to find a way to explain their appearance in the present-day Higi group languages. The following table shows how some of the palatalized consonants

have come into languages of the Higi group. There are two paths. The first is the palatalization of a consonant by a following /i/ (the first eight entries). The second is the reanalysis of *j as /i/, leading to palatalization of a preceding consonant (the following three entries – note that Proto-Central Chadic *ɗ^{y}→*ɗ^{j}→j in Proto-Higi).

Gloss	PCC	Proto-Higi	Bana	Kamwe-Nkafa	Kamwe-Futu	Kirya
black		ⁿgɨri	/ⁿgɨrʲə/ ⁿgri	/ⁿgəlʲə/ ⁿgəlʲə	/ⁿgərə/ ⁿgəre	/nkərʲə/ nkərʲi
dog	kɨri	kɨli	/kərʲə/ kəri	kəlʲə	kəlʲe	/kərʲə/ kərʲi
neck	wɨraj	wɨlɨj	/wərʲə/ wəri	/wəlʲə/ wulʲə	/wəlʲə/ wulʲi	/wərʲə/ wurʲi
saliva		ⁿdiɣʷɨɗi	/ⁿdiɣʷər/ ⁿdiɣʷər	/ⁿdigʷəlʲi/ ⁿdigulʲi	/ⁿdigʷəɗi/ ⁿdiguɗi	
to spit	tif	tifi	/tfə/ tfə	/ntivi/ ntivi	/ntʲəvi/ ntʲivi	/ntəfə/ ntəfə
earth	hʷaɗik	hɨɗi	/hʲɨɗi/ xʲiɗi		/hʲɨɗi/ hʲiɗi	/hahaj/ hahaj
grass-hopper	haɗikʷ	haɗik	*haɗi→/haj/ xaj	/hagʲə/ hagʲi	*haki→/hagʲə/ hagi	/hajə/ haji
wind		lini	/rəniki/ rəniki	/nili/ nili	/rinʲə/ rinʲə	
bow	rɨgɨɗ^{y}	lɨgɨj	/rəgəj/ rəgi	/ləgʲə/ ligʲi	/rəgi/ regi	
hut	ɣaj	ɣaj	/ɣʲə/ ɣʲi		/ɣʷa/ ɣʷo	/ɣaj/ ɣaj
meat	ɬɨwɨɗ^{y}	ɬɨj			/ɬʲə/ ɬʲi	/ɬəj/ ɬe

Table 70 - Origins of palatalized consonants in the Higi group

From this data, the palatalized non-laminal consonants can be seen to have originated within the Higi group, and were not present in Proto-Higi.

We conclude, then, that Proto-Higi possessed palatalized laminal phonemes, but no other palatalized phonemes. There is no evidence for a word-level consonant palatalization prosody in Proto-Higi.

In the reconstructions for Proto-Higi, we will notate the palatalized laminals as *s^{j} etc.

6.5.7.3 Vowels

We have seen that the following vowel systems are present in the languages of the Higi group (parentheses indicate marginal phonemes):

- Bana: /ə/, /a/, /e/
- Higi: /ɨ/, /a/, /e/, (/ɛ/)
- Psikye: /ɨ/, /ə/, /a/, (/i/, /u/)
- Kamwe Nkafa: /ə/, /a/, /i/
- Kamwe Futu: /ə/, /a/, /i/
- Fali Kirya: /ə/, /a/, /i/, /e/

It should be remembered that for most of the languages there is no published phonology, so any conclusions are provisional.

All of the likely systems consist of at least three vowels. In most cases there are two central vowels and one front vowel. This goes against Barreteau (1983), who analysed Higi with just two vowels and a vowel prosody.

Proto-Higi *a has the reflex /a/ across the group.

Gloss	Proto-Higi	Bana	Psikye	Kirya	Futu	Nkafa
tongue	ɣanɨj	/ɣanəj/ ɣani		/nɣanə/ nɣanə	/ɣani/ ɣani	/anʲə/ anʲə
breast	ʔʷa	/ʔʷa/ ʔʷa		/ʔʷa/ ʔʷa	/əwa/ uwo	
cough	ʔʲɨɬa	/ʔʲəɬa/ ʔʲɨɬa	/ʔʲəɬa/ ʔʲɨɬa		/tsajɬa/ tsajɬa	/ʔʲaɬa/ ʔʲaɬa
four	wɨfaɗɨ	/faɗə/ faɗə	/wəfaɗə/ wufaɗə	/fʷaɗə/ fʷaɗə	/fʷaɗəw/ fʷaɗo	/fʷarə/ fʷarə

Table 71 - Proto-Higi *a

Proto-Higi *ɨ has the reflexes /ə/ or zero.

Gloss	Proto-Higi	Bana	Psikye	Kirya	Futu	Nkafa
crocodile	kɨlɨm	/kələ^mbə/ kələ^mbə		/hələmə/ hələmə	/kələmən/ kələmən	/kəlmi/ kəlmi
to die	mɨtɨ	/mətəj/ m(ə)ti	/mtə/ mtə		/mtəw/ mto	/mtə/ mtə
field	wɨvɨhɨ	/vəhə/ vəxə	/wəvə/ wuvə	/nv^wəkə/ nv^wəkə		/v^wə/ v^wə
tree	wɨfɨ	/fə/ fə	/wəfə/ wufə	/fwə/ fwə	/fwə/ fwo	/fwə/ fwə

<div align="center">Table 72 - Proto-Higi *ɨ</div>

There is evidence, especially from Kamwe Nkafa and Kamwe Futu, for reconstructing a Proto-Higi *i.

Gloss	Proto-Higi	Bana	Psikye	Kirya	Futu	Nkafa
belly	h^wiɗ	/h^wər/ x^wər		/h^wər/ h^wur	/h^wi/ h^wi	/h^wi/ h^wi
hare	vira	/vəle/ vəle		/pitə/ pitə	/vira/ vira	
work	ɬinɨ	/ɬənəj/ ɬəni	/ɬənə/ ɬənə	/ɬənə/ ɬənə	/ɬinə/ ɬinə	/ɬənə/ ɬənə
to spit	tifi	/tfə/ tfə		/ntəfə/ ntəfə	/ntivi/ nt^jivi	/ntivi/ ntivi
horn	tɨlim^wɨ	/təl^jəmə/ təlimə			/tərim^wə/ tərimo	/tərm^wi/ tərm^wi

<div align="center">Table 73 - Proto-Higi *i</div>

In the two varieties of Kamwe, in most cases *i has the reflex /i/.

For Bana, there is no evidence to link /e/ to Proto-Higi *i. Instead, /e/ maybe the result of a vowel palatalization prosody acting on /a/. The /ə/ phoneme in Bana is described by Hoffman as not being a zero vowel (i.e. it is not an epenthetic vowel), though as she states (Hoffman 1990, 91): 'My own hypothesis is that for Bana, there are two cases of phonetic [ə]: one being the high vowel phoneme…, and the other being a zero vowel.' If this is the case then we could hypothesise that the full vowel was a reflex of *i and the zero vowel was a reflex of *ɨ.

Likewise, with Psikye there is contrast between /ɨ/ and /ə/, and we can hypothesise that /ɨ/ is the reflex of *ɨ and /ə/ is the reflex of *i.

This gives us the following provisional equivalences for the three vowels of Proto-Higi.

	Bana	Psikye	Kirya	Futu	Nkafa
*a	/a/	/a/	/a/	/a/	/a/
*i	/ə/	/ə/	/ə/	/i/	/i/
*ɨ	/ə/ or zero	/ɨ/	/ə/	/ə/	/ə/

Table 74 - Reflexes of Proto-Higi vowels

In the reconstructions for Proto-Higi, the vowels are more difficult to reconstruct than for other groups. This is partly due to the limited number of languages that contrast the reflexes of *i and *ɨ, and partly due to the obscuring effect of the palatalized laminals on the underlying vowels. It is difficult to propose exact correspondences, but the correspondences described above hold in many cases.

6.5.7.4 Summary

For Proto-Higi, we can reconstruct sets of labialized velar phonemes and palatalized laminal phonemes. There were three underlying vowel phonemes.

6.6   Issues for reconstructing Proto-Central Chadic

The three distinctive features of the languages exhibiting the Consonant Prosody system – a three-vowel system, labialized consonants and a morpheme-level consonant palatalization prosody – raise important questions for the study of other languages in Central Chadic. How does the three-vowel system relate to the two-vowel system of the Vowel Prosody languages? Why are there more labialized consonants in these languages than there are elsewhere? Are the consonant palatalization prosody in Consonant Prosody languages and the vowel palatalization prosody in Vowel Prosody languages related? These questions will be addressed in chapters 0 and 0.

It should be noted that the three groups studied here do not form a genetic unit, and so we cannot use these groups directly to reconstruct the phonological features of an immediate ancestor language. We can, however, identify features of these groups that are relevant to the reconstruction of Proto-Central Chadic.

6.6.1 The existence of back-rounded vowels

In the three groups studied in this chapter the evidence has been that, historically at least, there were no back-rounded vowel phonemes, only front and central vowel phonemes. We shall see that in other groups within Central Chadic it is possible to reconstruct back-rounded vowel phonemes, or else to reconstruct a vowel labialization prosody. The question therefore arises of the origin of these back-rounded vowel phonemes, or of their loss in the three groups presented here.

6.6.2 The number of underlying vowels

In all three of the groups studied here it has been possible to reconstruct three underlying vowels, or at least two vowel phonemes and an epenthetic or zero vowel. As we shall see, other Central Chadic languages can be analysed with just two underlying vowels, or even one. The question must be addressed of whether a third vowel has been gained in these groups, or else lost in the other groups, or if there is a link between one or several of the vowels in these groups and the creation of prosodies in other groups.

6.6.3 Labialized labial consonants

Whilst the existence of a set of labialized velar consonants is almost universal amongst Central Chadic languages, the labialized labial consonants are only reconstructed for the Bata and Margi groups. The question arises of whether these consonants are an innovation in the Bata and Margi groups – in which case we need to establish where they originated – or whether they indicate the presence of these phonemes at an earlier stage in the history of Chadic.

6.6.4 Palatalized consonants

Palatalized consonants do not exist in many Central Chadic languages. In the groups studied here it was possible to reconstruct palatalized laminal phonemes for Proto-Higi. For Proto-Bata and Proto-Margi, the presence of palatalized consonants at the phonetic level was analysed as being due to a morpheme-level palatalization prosody acting on consonants.

We need to address the questions of whether any sets of palatalized consonants should be reconstructed for Proto-Central Chadic, and of how the consonant palatalization prosody came into existence in the Bata group. This is done in section 11.2.

7   Mixed Prosody Languages

7.1   Introduction

There are three groups of languages that we shall categorise as exhibiting a Mixed Prosody system, that is to say that they display some of the features of Vowel Prosody languages and some of Consonant Prosody languages. These are the Mandara, Lamang and Sukur groups. They are geographically located between the Consonant Prosody and Vowel Prosody languages, and have had contact with languages from both of these prosody types. We will examine the relationships between the different types of prosody in chapter 11). The following map shows the location of the Mixed Prosody languages, along with the other phonological types.

Map 24 - Phonological Types

In some Mixed Prosody languages, the palatalization prosody may be realised either as vowel harmony, or by the palatalization of consonants, depending on which consonants are present in the word. Other Mixed Prosody languages may favour vowel harmony or consonant palatalization, but for the proto-languages of the groups it is necessary to reconstruct a mixed prosody system.

In this chapter we will take a detailed look at the phonologies of the languages in each of the three Mixed Prosody groups, focussing on the underlying vowels, and labialized and palatalized consonants, and examining whether a palatalization prosody should be reconstructed. (There is no data that would make a labialization prosody something to consider.) For each group, we will present a reconstruction of these aspects of the phonology of the proto-language of the group.

7.2   The Mandara Group

The Mandara Group consists of about eight languages divided into three subgroups:

1) Matal, Podoko (Parkwa)
2) Mandara, Malgwa (a dialect of Mandara), Glavda
3) Dghwede, Gvoko, Guduf, Cineni

The data comes largely from Podoko (Swackhamer 1981; Zagba, Jarvis, and Siddi 1986), Matal (Branger in progress), Mandara (Fluckiger and Whaley n.d.), Malgwa (Löhr 2002; Löhr 2005), Glavda (Rapp and Benzing 1968; Rapp and Muehle 1969; Nghagyiva n.d.; Owens n.d.) and Dghwede (Frick 1977).

The following map shows the locations of the Mandara group languages and the subgroups of Mandara.
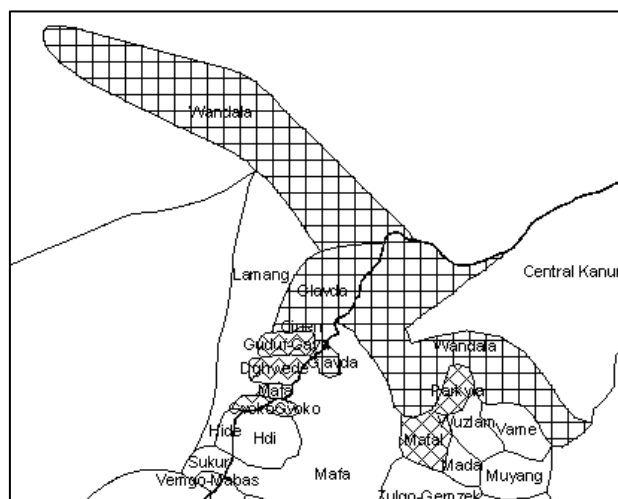
Map 25 - Mandara group

The Mandara group is included here amongst the Mixed Prosody languages, not so much for the behaviour of the individual languages but for the behaviour of the languages in the group as a whole and for the behaviour of the proto-language. We will see that Podoko and Matal are true Mixed Prosody languages, with the palatalization prosody being realised either on consonants or on vowels according to the types of consonant and vowel in the word. For Mandara, Malgwa and Glavda the system is closest to a Consonant Prosody system, though in a more restricted way than for the Consonant Prosody languages we looked at earlier. Dghwede is closer to a Vowel Prosody language, though without possessing a full vowel harmony system.

All the languages have at least three underlying vowel phonemes, which is in keeping with the Consonant Prosody languages rather than the Vowel Prosody languages with their two vowel systems.

The Mandara group is possibly the most important group within Central Chadic for shedding light on the development of the different phonological systems.

7.2.1   Podoko

Podoko (Swackhamer 1981) has a phonological system which includes labialized velars, four underlying vowel phonemes and a palatalization prosody which affects vowels and laminal consonants. There are no other labialized consonants, and there are no phonemic palatalized consonants.

The palatalization prosody in Podoko functions as a mixed prosody.

7.2.1.1 Vowels

Swackhamer identifies four vowel phonemes in Podoko, /a/, /ə/, /i/ and /u/. However, only the three vowels /a/, /ə/ and /i/ play a full role in the phonology and grammar of the language. (Interestingly, a distinction is made in the published lexicon (Zagba, Jarvis, and Siddi 1986) between [ɨ] and [ə], though there is no mention of such a distinction in the phonology.)

Before a pause, all vowels are neutralised to /a/, with the exception of /u/ which is not found in this position. (Pre-pausal neutralisation of vowels to /a/ is a widespread phenomenon within Central Chadic.)

(110)   Class with /a/
          /kəda/   [kᵊda]   'dog'
          /kəda majá/   [kᵊdamajá]   'my dog'

          Class with /ə/
          /zulə́/   [zulá]   'priest'
          /zulə́ majá/   [zul̩majá]   'my priest'

          Class with /i/
          /daⁿgi/   [daŋa]   'cane'
          /daⁿgi majá/   [daŋimajá]   'my cane'

These three vowels also play a role in the verb morphology. In the following examples, the final vowel on the verb root marks the aspect or the direct object.

(111)   /a ɓakə ɓaka/   [aɓak̚ɓaka]   'it is done (unmarked)'
          /a ɓak**a** ɓaka/   [aɓak**a**ɓaka]   'he did it'
          /ɓak**i** məná/   [ɓak**i**m̩ná]   'he's doing'

The phoneme /u/ does not play the same sort of grammatical roles in the language, and is characterised by Swackhammer as being a 'lesser developed' phoneme.

7.2.1.2 Palatalization

According to Swackhammer, there is a word-level palatalization prosody in Podoko, which is realised in different manners according to the types of segments within the word. She distinguishes four categories.

The first category consists of those words containing a laminal consonant and at least one /ə/ vowel. In this case, palatalization primarily affects the laminal consonants, with a slight effect on /ə/.

(112)   /tsətsəma ^{y}/   [tʃⁱtʃᵊma]   'firewood'
         /gətsəka ^{y}/   [gⁱtʃⁱka]   'entrance hut'
         /dzəba ^{y}/   [dʒⁱba]   'species'

The second category covers those words containing a laminal consonant, but no /ə/ vowels. Here palatalization affects both the laminal consonants and the /a/ vowels.

(113)   /dzaɗa ^{y}/   [dʒɛɗɛ]   'ring'
         /katsa ^{y} katsa ^{y}/   [kɛtʃɛkɛtʃɛ]   'rag'
         /badzakʷada ^{y}/   [bedʒɛkʷɛɗɛ]   'tail'

The third category consists of words without laminal consonants, but with at least one /ə/. All the vowels are fronted.

(114)   /bəgəna ^{y}/   [bⁱgⁱnɛ]   'mucous'
         /bəlma ^{y}/   [bⁱlmɛ]   'potash'
         /dəgəla ^{y}/   [dⁱgⁱlɛ]   'dirt'
         /ɬəɬa ^{y}/   [ɬⁱɬɛ]   'egg'

The final category consists of those words without laminal consonants and without /ə/. In this case, the /a/ vowels are fronted, and there may be audible palatalization of alveolar stops and nasals.

(115)   /da ʸ/   [dʲɛ]   'eye'
         /mada ʸ/   [mɛdʲɛ]   'witch'
         /kada ʸ/   [kɛdʲɛ]   'granary'
         /ɮaᵐba ʸ/   [ɮɛᵐbɛ]   'corner'
         /bərnawa ʸ/   [brɲɛwɛ]   'man without beard'
         /ⁿda ʸ/   [ⁿdʲɛ]   'to swallow'

In all except the first case (example (112)), the palatalized words exhibit vowel harmony, and the surface forms are similar to those found in Vowel Prosody languages, such as the languages of the neighbouring Mofu group. However the situation in (112) cannot be explained by a Vowel Prosody analysis, where the prosody affects all vowels.

It should be noted that neither the vowel [ɛ] nor the palatalized consonants (such as [tʃ] and [dʲ]) are phonemic. All of these are due to the presence of the palatalization prosody.

7.2.1.3 Summary
We have seen that Podoko phonology mixes features of both Vowel Prosody and Consonant Prosody systems. The vowel system is closer to the three vowel systems of the Consonant Prosody languages, and may have originated as just such a three vowel system, with /u/ being a more recent innovation. The palatalization prosody behaves in different ways according to the segments in the word. It can act as a vowel prosody, with primary effect being on the vowels, or it can be more like a consonant prosody and be realised primarily on the laminal consonants.

7.2.2   Matal
Data for Matal comes from an unpublished word list and phonology sketch (Branger in progress). The phonological system is similar to that of Podoko. In particular, the palatalization prosody is a Mixed Prosody, sometimes realised by palatalization of consonants, and sometimes by fronting of vowels.

Matal has a set of labialized velar consonants, but no other labialized or palatalized consonants.

The vowel system consists of the vowel /a/, along with an epenthetic vowel. Surface back-rounded vowels are the result of conditioning of these vowels by labialized consonants or /w/. Surface front vowels are due to conditioning by /j/ or are the result of the palatalization prosody. For clarity of representation, the epenthetic vowel is included as /ɨ/ in the underlying forms that are cited.

The vowel system can be described typologically as a two-vowel system, i.e. of the same type as the system found in the Vowel Prosody languages. This differs from the three-vowel system in Podoko.

The palatalization prosody is expressed either on consonants or on vowels, according to the following rules:

- If there is a laminal in the word, the laminal is palatalized
- If there are no laminal consonants, but there are alveolar consonants, the palatalization prosody can be expressed either by the palatalization of an alveolar consonant, or by fronting of the vowels, or by both
- If there are no laminal or alveolar consonants in the word, the vowels are fronted

Where a consonant is palatalized, adjacent vowels may also be fronted. Likewise, labialized velar consonants can also cause adjacent vowels to be rounded.

In the following table, the first three items show the palatalization of laminals. Items 4 and 5 show situations where an alveolar consonant is palatalized, and items 6 and 7 show cases where the alveolar consonant is not palatalized and vowel fronting takes place. The final item shows the situation where there are no laminal or alveolar consonants and vowel fronting takes place (initial /a/ is not affected by vowel fronting.)

Gloss	UF	Intermediate	SF
head louse	atats ʸ	atatʃ	atatʃ
leg	asɨk ʸ	aʃɨk	aʃik
firewood	sabɨjak ʸ	ʃabɨjak	ʃabijak
sibling	dada ʸ	dʲadʲa	dʲadʲa~dʲɛdʲa
camel	ɮɨgʷɨmɨj ʸ	ɮʲɨgʷɨmɨj	ɮʲygumi
fish	kɨlfɨ ʸ	kilfi	kilfi
elbow	vɨlakʷ	vɨlekʷ	vɨlɛkʷ~vɨlœkʷ
hole	afɨk ʸ	afik	afik

Table 75 - Palatalization in Matal

7.2.3   Mandara

Mandara, Malgwa and Glavda form a subgroup within the Mandara group. The three languages have similar phonological systems.

Information on Mandara comes from a lexicon and an orthography statement (Fluckiger and Whaley 1981; Fluckiger and Whaley n.d.). The orthography statement includes good information on the phonology of Mandara.

The vowel system of Mandara comprises three basic phonemes, /a/, /i/ and /ə/, with /aː/ and /u/ occurring in a limited number of words. /ə/ is realised as [e] in the final syllable of a word. Word-final /a/ is realised as [ə] in mid-phrase.

Mandara has a set of labialized velar phonemes, but no other labialized phonemes. There is a set of palatalized laminal consonants and palatalized velar consonants, but very few palatalized alveolar consonants.

The three basic vowel phonemes can follow any unpalatalized consonant. Likewise, there is no restriction on which vowels can follow palatalized consonants. This indicates that the vowels do not condition the preceding consonant

No palatalized velar consonants are found in words containing an unpalatalized laminal. This is consistent with the behaviour of a word-level palatalization

prosody, where the palatalization is primarily realised on laminal consonants, but if none are present it is realised on a velar consonant. As with Glavda (see section 7.2.5), it can be seen from comparative data that the palatalized velars are in fact the realisations of the palatalization on an alveolar consonant (see 'meat' and 'cry' below). The near absence of phonetic palatalized alveolar consonants in Mandara is due to this process.

Gloss	Proto-Mandara	UF	Intermediate	SF
to hatch	tsɨɬa ʸ	tsaɬə ʸ	tsʲaɬə	tʃaɬe
hearth	lɨwtsɨ ʸ	əltsa ʸ	əltsʲa	əltʃa
meat	ɬɨwɨɗ ʸ	ɬəwa ʸ	ɬʲəwa	hʲuwa
to cry	tɨwa ʸ	təwa ʸ	tʲəwa	kʲuwa

Table 76 - Palatalization in Mandara

The phonology of Mandara therefore includes a system of at least three underlying vowels /a/, /i/ and /ə/, along with a word-level palatalization prosody affecting underlying laminal and alveolar consonants, and a set of labialized velar consonants. Since there are no situations where the palatalization prosody takes the form of vowel harmony, Mandara is effectively a Consonant Prosody language.

7.2.4   Malgwa

Malgwa is classified in the Ethnologue (Lewis 2009) as one of the dialects of Mandara. The Mandara data in the previous section comes from the area around Mora in Cameroon, whereas Malgwa is spoken in Nigeria. Information on Malgwa comes from work by Löhr (Löhr 2002; Löhr 2005).

Malgwa has the same restrictions as Mandara on the distribution of palatalized consonants. We can again analyse the palatalization of consonants as coming from a word-level prosody.

As with Mandara, Malgwa also possesses a set of labialized velar consonants.

The most significant difference between Mandara and Malgwa is in the vowel system. Löhr counts six vowel phonemes, /i/, /e/, /a/, /o/, /u/ and /ə/. All except /ə/ are noted as phonetically long vowels. In particular, the vowel [e] is far more widely distributed than in Mandara, where it occurs only in word-final position.

The Malgwa /i/ ([i:]) is equivalent to the Mandara /i/, with Malgwa [i] being either a /ə/ influenced by a neighbouring palatalized consonant, or else the result of borrowing. The following table gives the surface forms for words in Mandara and Malgwa where the Malgwa entry contains [i] or [i:]. The last four show how [i] in Malgwa is the result of conditioning.

Gloss	Mandara	Malgwa
blow	fikʷa	fi:kʷa
eye	itʃa	i:tʃe
five	iʒəɓe	i:ʒəɓe
grasshopper	iwa	i:we
hare	navire	navi:re
head	ira	i:re
porcupine	tʃətʃəhʷe	tʃitʃiha
crocodile	kʲərwe	kirwe
dream	ʃəne	ʃine
shame	ʒərəwe	ʒirwe

Table 77 - /i/ in Mandara and Malgwa

In a number of Malgwa words, [e] has resulted from conditioning of /a/ by an adjacent palatalized consonant.

Gloss	Mandara	Malgwa
bone	hʲahʲe	hʲehʲe
guinea fowl	ʒabəra	ʒebre
sheep	kʲawe	kʲewe
squirrel	jaje	jeje
eye	itʃa	i:tʃe

Table 78 - [e] in Malgwa

This does not account for all the data, but it gives an indication that the Malgwa vowel system may have developed from the simpler Mandara vowel system.

7.2.5   Glavda

There is little published on Glavda, the only available data coming from a published lexicon (Rapp and Benzing 1968; Rapp and Muehle 1969) and two works on morphology (Rapp 1966; Buba and Owens 2007). Buba and Owens include a brief summary of the phonology. There are also two unpublished wordlists (Owens n.d.; Nghagyiva n.d.).

The surface vowel system consists of [a], [ɨ], [i], [ɛ] and [u], along with [o], which may only be confined to loan words. All of these except [ɨ] have both long and short forms. (None of the published works present an analysis of the vowel system.)

The velar consonants phonemes all have labialized counterparts.

There are three categories of palatalized consonant. Firstly, there are the palatalized laminal consonants, realised as post-alveolar consonants, such as [ʃ]. Secondly, there are the phonetically palatalized consonants such as [dʲ]. Thirdly, there are the palatal consonants such as [ç], which can be seen to be the realisations of palatalized velars, e.g. /xʲ/.

There are restrictions on which consonants can be found in the same word, which leads to the possibility of a prosodic analysis for palatalization in Glavda. A phonetically palatalized non-laminal consonant is never found in a word containing unpalatalized laminal consonants. When a phonetically palatalized consonant appears in a word, it is typically the leftmost consonant of the word that is palatalized.

We can propose that there is a consonant palatalization prosody in Glavda which falls on a laminal consonant, where present. If no laminal consonant is present, then the first available consonant in the word is palatalized (labialized consonants and approximants cannot be palatalized).

Gloss	Proto-Mandara	UF	Intermediate form	SF
leg	sɨkɨ ʸ	sɨga ʸ	sʲɨga	ʃɨga
navel	zɨᵐbɨ ʸ	zaᵐba ʸ	zʲaᵐba	ʒaᵐba
hatch	tsɨɬa ʸ	tsaɬ ʸ	tsʲaɬ	tʃaɬ-ga
fly (insect)	ⁿdzɨwɗ ʸ	ⁿdzɨwɗa ʸ	ⁿdzʲɨwɗa	ⁿdʒuja
fish	kɨlɨfɨ ʸ	kɨlfa ʸ	kʲɨlfa	kiːlfa
tail	kʷɨtɨlɨ ʸ	xʷɨtɨla ʸ	xʷɨtʲɨla→xʷɨkʲɨla	xukʲla
ear	ɬɨmɨ ʸ	ɬɨmɨ ʸ	ɬʲɨmi→xʲɨmi	çimi

Table 79 - Palatalization in Glavda

In Glavda, along with Mandara and Malgwa, palatalized alveolar consonants are realised as palatalized velar consonants, as in the entries for 'tail' and 'ear'.

It should be noted that palatalized consonants are not the result of conditioning by adjacent front vowels. In the following examples, palatalized consonants are found adjacent to central vowels.

(116)   ᵐbaːʒa   'to be unripe'
         ʃarːa   'to be thin'
         tʃatʃa   'louse'
         dʒalapa   'mud block'

In most of the data, [ɛ] co-occurs with [ɨ] or [i], but there are rare instances of it co-occurring with [a]. It is possible that there is some form of vowel harmony, though [ɛ] is a rare phone itself, and it is difficult to reach a conclusion without further analysis.

In pre-pausal position, [a] is the only vowel to occur, apart from a very few exceptions in the data. It is possible that the situation is similar to Podoko, where all underlying vowels are neutralised to [a] before a pause (see section 7.2.1.1).

In Glavda palatalization can provisionally be analysed as a prosody which is primarily realised on the laminal consonants, or if no laminal consonants are present on the first available consonant of the root. The vowel system consists of at least the three phonemes /a/, /i/ and /ɨ/, along with /u/ and /ɛ/ which have less definite status. In effect, Glavda is a Consonant Prosody language.

7.2.6   Dghwede

Information on Dghwede comes from work by Frick (1977; 1978).

Frick distinguishes three vowels in word-final position, /a/, /i/ and /ə/. Their surface forms are conditioned by whether they occur mid-phrase or before a pause. The surface forms are as follows:

	Mid-phrase	Pre-pause
/a/	[ə]	[a]
/i/	[i]	[e]
/ə/	[ə] or transition	[e]

Table 80 - Dghwede vowels

There is also a fourth phoneme /u/ which is found in word-medial position. This is probably a vocalisation of *w.

There is a set of labialized velar consonant phonemes, but no other labialized consonants.

There is a set of phonetic palatalized laminal consonants. These are conditioned by a following underlying front vowel /i/ (but not by a following pre-pausal /ə/ realised as [e]).

Frick states that, although it might appear at first sight that there is vowel harmony, there is no vowel harmony in Dghwede. One co-occurrence restriction that she notes is that there are no words where the vowels in the final two syllables are *a-i*, though there are numerous instances of *i-a*.

Thus the phonology of Dghwede has an underlying three-vowel system (extended to include /u/). There is no evidence of any word-level palatalization prosody. Dghwede is not a Consonant Prosody language, as the only palatalized consonants are those conditioned by an adjacent front vowel. Nor is it a Vowel Prosody language. Although there are restrictions on the distribution of the vowels, these restrictions are insufficient to result in vowel harmony.

Dghwede is the only one of the four languages in its subgroup for which we have access to data. Data from Gvoko, Guduf or Cineni would help in clarifying whether the languages in this subgroup have developed from a Mixed Prosody, Consonant Prosody or a Vowel Prosody system.

7.2.7   Reconstruction

In this section we will reconstruct the basic vocalic and prosodic system for Proto-Mandara. We have seen that all the languages in the Mandara group (except Matal) have at least three vowels – two central and one front – and all (except Dghwede) can be analysed as possessing a word-level palatalization prosody that causes the palatalization of laminals and other consonants, and in some cases the fronting of vowels. We will determine if these features can be reconstructed for Proto-Mandara.

7.2.7.1 Palatalization

It is not straightforward to reconstruct the palatalization prosody for Proto-Mandara. There are a number of roots where palatalization occurs in Glavda, Malgwa and Mandara, however it is not easy to find roots where there is also evidence from Podoko and Matal. In Dghwede there is no palatalization prosody, and palatalized laminals are due to the influence of a following front vowel, so there is no direct evidence for the palatalization prosody. However, the presence of front vowels themselves may be an indication of the presence of the palatalization prosody in Proto-Mandara.

In carrying out the reconstructions, we will propose the existence of the palatalization prosody where there is support (from the presence of the prosody or front vowels) from at least two of the subgroups of the Mandara group. In these cases, the loss of the prosody in the other languages is more likely than its sporadic creation in the languages where it is present, though this could have occurred as a result of contact with languages from outside the Mandara group. Further data from languages such as Guduf, Cineni and Gvoko would help clarify the situation.

The following table gives some roots where palatalization can be reconstructed. The underlying form is given, and in the more complex cases an intermediate form is given showing the form after the application of the prosody to the segments.

Gloss	Proto-Mandara	Dghwede	Glavda	Malgwa	Podoko	Matal
ear	ɬɨmɨ [y]	/ɬəmi/	/ɬɨmɨ [y]/ /ɬʲɨmi/	/ɬəma [y]/ /ɬʲəma/	/ɬəmə/	/ɬɨm/
		ɬəme	hʲimi	hʲima	ɬəmə	ɬəm
fish	kɨlɨfɨ [y]	/kələfə/	/kɨlɨf [y]/ /kʲɨlɨf/	/kələfə/	/kələfə/	/kɨlfɨ [y]/
		klfe	kilf	kəlfe	kɨləfə	kilfi
hearth	lɨwtsɨ [y]		/lɨtsa/ ɨltsa	/lətsa [y]/ əltʃa	/ləwtsə [y]/ lutʃə	/lɨts/ ləts
navel	zɨᵐbɨ [y]	/ziᵐbə/ ʒiᵐbe	/zaᵐba [y]/ ʒaᵐba	/zaᵐba [y]/ ʒaᵐba	/zəᵐbə [y]/ ʒɨᵐbə	
sun	fatsɨ [y]	/fitsə/ fitʃe	/fatsɨ [y]/ fatʃi	/vatsəja [y]/ vatʃija	/patsə/ patsə	/afats/ afats

Table 81 - Palatalization in Proto-Mandara

7.2.7.2 Vowels
There is more variation in the reflexes of the vowels in the Mandara group than in other groups, and it is harder to establish the vowels of the Proto-Mandara roots with a high degree of confidence.

For *ɨ the data is largely consistent.

Gloss	Proto-Mandara	Dghwede	Glavda	Malgwa	Mandara	Podoko	Matal
arm	dɨva	dəva	dɨva	ərva	ərva		
belly	hʷɨɗɨ	/xʷəɗə/ xʷɗe	/xʷɨɗa/ xuɗa	/hʷəɗə/ huɗe	/hʷəɗə/ huɗe	/hʷəɗə/ huɗə	/hʷɨɗ/ hʷəɗ
to die	mɨtsa	/mətsa/ mtsa	/ɨmtsɨ/ ɨmtsɨ-ga	/mətsa/ mtsa		/mɨtsa ʸ/ mɨtʃe	/mɨts/ mɨts
hole	vɨgɨ ʸ	/fəkə/ fke	afka	əvəge	əvəge	vɨge	/afɨk ʸ/ afik
to untie	pɨla		pɨl-ga	pəla	pələ	pəla	pɨl

Table 82 - *ɨ in Proto-Mandara

For *a, we must look for occurrences of /a/ that are not in word-final position. In pre-pausal position all the languages in the group neutralise the vowels to some extent, and many of the citation forms in the data are the pre-pausal forms. Good phonemic data from more languages is needed to be able to reconstruct word-final vowels in this group. At present, we can reconstruct *a in word-medial position.

In most of the following examples, the underlying and surface forms are identical. Where this is not the case, the underlying form is given in /.../.

Gloss	Proto-Mandara	Dghwede	Glavda	Mandara	Podoko	Matal
guinea fowl	zabɨra ʸ		/zabɨra ʸ/ ʒabra	/zabəra ʸ/ ʒabəra	/zaᵐbəra/ zaᵐbəra	/zavər/ zavər
left	ɮaɓa	ɮaʔa	ɮaɓa	ɮaɓa	ɮaɓi	
bone	ɬaɬi	ɬaɬa	ɬaɬa	/ɬaɬə ʸ/ hʲahʲe	ɬaɬə	aɬaɬ
thorn	adakɨ		taka	dakə	takə	atak

Table 83 - *a in Proto-Mandara

For *i there is reasonably good evidence for reconstructing the vowel for Proto-Mandara. For Dghwede, it seems that front vowels may be reflexes both of *i and of the palatalization prosody (see also Table 81). In Matal, *i has been lost.

Gloss	Proto-Mandara	Dghwede	Glavda	Malgwa	Mandara	Podoko	Matal
to blow	fikʷa	fəge		fafikʷa	fiːkʷa	fikʷa	fikʷa	
bow	lika		laːɣa	əlke	əlkə	lika	alak
five	ɠidɨm	ɠiɓe	ɠiɓa	iːʒəɓe	iʒəɓe	ɠamə	əʒəw
hare	vida		viːda	naviːra	navirə	vira	

<center>**Table 84 - *i in Proto-Mandara**</center>

Most languages include /u/ in their phonemic inventories, though it is less common than the other vowels and plays less of a functional role in the grammar of the languages. There are a few words where *u can be reconstructed for Proto-Mandara. In all cases *u comes from Proto-Central Chadic *w or a labialized velar.

Gloss	Proto-Central Chadic	Proto-Mandara	Dghwede	Glavda	Mandara	Podoko	Matal
four	wɨfaɗ	ufaɗɨ	fiɗe	ufaɗa		ufaɗə	ufaɗ
to fry	sɨwra	sula		sɨl-ga	səla	sula	
grinding stone	wɨvɨn	uvɨra	vəra	vaːra	uvəra	mavarə	vəl
hedgehog	hʷisɨs	ususa			ususa		

<center>**Table 85 - *u in Proto-Mandara**</center>

Although /e/ exists in some of the languages in contrast with /i/, the data from the group does not give any evidence that this distinction existed in Proto-Mandara.

7.2.7.3 Summary
For this interesting and difficult group, we can propose that the proto-language had a phonological system that included four underlying vowels and a palatalization prosody.

The languages in the group show a diverse range of realisations of the palatalization prosody. It is realised primarily as a consonant prosody in Glavda, Malgwa and Mandara. In Podoko and Matal it is realised either as a consonant prosody or as vowel harmony, according to the segments of the

word. In Dghwede, the palatalization prosody has been fossilized as vowel fronting, approaching vowel harmony.

7.3   The Lamang Group

7.3.1   Overview

The Lamang Group consists of three languages, Lamang, Hdi and Mabas, located around the Cameroon-Nigeria border as shown in the following map.
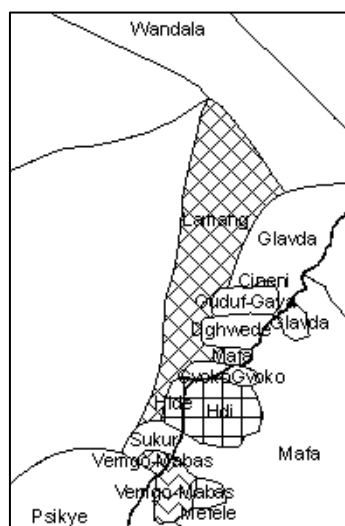
Map 26 - Lamang group

There are reference grammars for Hdi (Frajzyngier and Shay 2002) and Lamang (Wolff 1983b), a phonology of Hdi (Langermann 1994), a comparative phonology (Langermann 1991) and two lexicons for Hdi (Eguchi 1971; Bramlett 1996). Wolff has also published several comparative papers on languages of the Lamang group and its neighbours (and indeed on Central Chadic). One in particular (Wolff 2006) addresses the question of the role of prosodies in Lamang and Hdi. Mabas has not yet been studied, except for a sociolinguistic survey (Hamm 2004).

There is a balance between what can be deduced from the languages by internal analysis, and what can be inferred from historical and comparative studies. Wolff describes the vowel system of Lamang as 'dynamically

developing from one with few underlying vowels to one with a greater number of distinctive vowel segments, as the result of a still on-going process involving the phonologizing of distributional variants as well as the incorporation of [+foreign] segmental units into the Lamang phonological system' (Wolff 1983b, 46–47). The same is true for Hdi. Both languages have vowel systems that exhibit features characteristic of the behaviour of prosodies, but which have developed from this to a point where they are best treated segmentally without recourse to an analysis based on prosodies.

There are a number of reasons for the resulting complex systems. There is evidence of vowel harmony in the history of the languages. In addition, many of the present-day vowels are the reflexes of the approximants /w/ and /j/, or are the result of the vocalisation of the labialization component of labialized consonants. These vowels will not necessarily follow any vowel harmony in the original word. Hdi and Lamang also make extremely sparse use of /ə/, permitting consonant clusters that other Central Chadic languages do not permit. This reduces the number of vowels in a word, and consequentially reduces the potential evidence for vowel harmony.

7.3.2   Vowel systems
A variety of vowel systems have been proposed.

For Hdi, Langermann (1994) gave a two vowel analysis (/a/ and /ə/), with prosodies of palatalization and labialization used to account for the different surface forms. The prosodies are described as acting at the syllable level. It is not immediately apparent what the motivation is for such an analysis. Frajzyngier and Shay (2002) propose six vowels (/a/, /ə/, /i/, /e/, /u/ and /o/), though /o/ only occurs in loan words and /e/ is rare and may possibly also be a loan phenomenon. The analysis is essentially segmental in nature. In the Hdi orthography (Bramlett et al. 2000), five vowels are used (/a/, /ə/, /i/, /e/ and /u/).

For Lamang, Wolff (1983b) gives two possible analyses, one with four vowels (/a/, /u/, /i/ and /ə/) and one with three vowels /a/, /u/, /i/ and a diphthong, notated as /aY/. He describes a complex system of interaction between the vowels in a word, leading to the more varied system of surface vowels. The system involves harmonisation of vowels in some cases, but is not a true vowel prosody system. Vowel harmony is a local feature affecting some neighbouring vowels, and not a morpheme-level feature.

We will now compare the data for Lamang and Hdi, and view this data in the wider context of Central Chadic.

7.3.3   Extended roots

One of the features of the Lamang group is the existence of petrified suffixes on some nouns resulting in extended roots in the present-day languages. These suffixes need to be recognised and ignored when reconstructing roots for Proto-Lamang.

There are numerous examples of identical or near identical forms between the two languages. The forms given are phonemic, at a segmental level.

Gloss	Proto-Lamang	Lamang	Hdi
cow	ɬa	ɬa	ɬa
crocodile	kɨram	kəram	kəram
face	kɨma	kəma	kəma
girl	makʷa	makʷa	makʷa
hunger	maja	maja	maja
hut	hɨga	xga	həga
millet	hɨja	xija	hija
nose	hɨtsiŋ	htsiŋ	hətsiŋ
oil	rɨɗi	rəɗi	rəɗi
scorpion	rɨda	ərda	rəda
tooth	ɬiɗiŋ	ɬidiŋ	ɬiʔiŋ

Table 86 - Shared roots in the Lamang group

Schuh (1983) and Wolff (2006) describe a process whereby historic noun gender markers have become petrified onto the noun root. In many cases, Hdi has retained a petrified noun suffix *–k. This petrified suffix can safely be ignored in reconstructing the roots for Proto-Lamang.

Gloss	Proto-Lamang	Lamang	Hdi
egg	ɬiɬi	ɬiɬi	ɬiɬik
fly (insect)	ziwɗi	ziɗi	ziɗikʷ
hearth	liti	liti	litik
night	rɨviɗi	rviɗi	rəviɗik
sun	fiti	fiti	fitik
tongue	ɣanɨj	ɣene	ɣanik

Table 87 - Petrification of *-k in Hdi

In other roots, Lamang has retained a suffix *-a, which can also be ignored in the reconstructions.

Gloss	Proto-Lamang	Lamang	Hdi
bird	ɗɨjak	ɗijaka	ɗijak
sheep	tɨwak	tuwaka	tuwak
woman	marakʷ	marakʷa	marakʷ

Table 88 - Petrified *-a in Lamang

7.3.4 Back-rounded vowels

There are many instances of [u] in the data. Some originate from the vocalisation of the labialization component of a labialized velar at some point in the history of the languages. Where [u] is attested in both Lamang and Hdi, *u is reconstructed for Proto-Lamang.

Gloss	Proto-Central Chadic	Proto-Lamang	Lamang	Hdi
belly	hʷiɗ	huɗi	xuɗi	huɗi
faeces	ɣʷɨvi	ɣuvi	ɣuvi	ɣuvi
seed	hʷɨrɨp	hulfa	hulfa	hulfa

Table 89 - [u] from consonant labialization in the Lamang group

Other instances of [u] come from the process whereby /ɨw/ or /wɨ/→u. In these cases *u is also reconstructed for Proto-Lamang where [u] is found in both Lamang and Hdi.

Gloss	Proto-Central Chadic	Proto-Lamang	Lamang	Hdi	
grinding stone	wɨvɨn → wɨbɨn	buna	buna	buna	cf. uvəra (Mandara)
horn	dɨrɨm → dɨlɨw	duli	duli	duli	cf. dɨraw (Glavda)
tree	hʷɨp → fwɨ	ufu	ufu	fu	cf. waf (Mafa)
fry	sɨwra → sɨwla	sula	sula	sulaj	cf. sawla (Gemzek)

Table 90 - Vocalisation of *w in the Lamang group

In some cases, this process has only taken place in Lamang. In Hdi the /w/ is retained either as a segment in a CC cluster, or else has transferred onto another consonant as labialization (Bramlett et al. 2000).

In the following examples, the /w/ in the Hdi data can be realised as labialization of the preceding consonant, or as a CC sequence.

Gloss	Proto-Lamang	Lamang	Hdi
child	wɨzaŋ	uzaŋa	zwaŋ
field	wɨvah	uvaha	vwah
four	wɨfaɗ	ufaɗa	fwaɗ

Table 91 - Mixed reflexes of *w in the Lamang group

The vowel [o] is very rare in both languages, especially in Hdi. Where Lamang has [o], Hdi has [u]. In Lamang, [o] occurs primarily in word-final position. It only occurs in non-final position in words where there is a word-final [o]. In word-final position, the [o] results from underlying /aw/ or /Cʷa/. *o is not reconstructed for Proto-Lamang.

Gloss	Proto-Central Chadic	Proto-Lamang	Lamang	Hdi
arm	dzɨvɨ ʸ	dzɨvɨw	/dzəvaw/ dzəvo	/dzəvəw/ dzəvu
beer	ɣʷɨzɨm→ɣʷɨzɨw	ɣuzɨw	/ɣuzaw/ ɣuzo	/ɣuzəw/ ɣuzu
flour	ɣʷɨpa	hʷɨpaw	/hupaw/ hwpo	/hupəw/ hupu
goat	ɗawɨk→akʷɨ	agʷɨ	/agʷa/ ogo	/gʷə/ gu

Table 92 - Creation of [o] in Lamang

7.3.5   Front vowels and palatalization

In Lamang and Hdi, laminals are palatalized by a following front vowel. They are not phonemic, and are not due to the influence of a word-level palatalization prosody. No other palatalized consonants are recorded, except for /ʔʲ/.

The vowel [e] is rare, particularly in Hdi. It cannot be reconstructed for Proto-Lamang, and its origins appear to be diverse.

Gloss	Proto-Central Chadic	Proto-Lamang	Lamang	Hdi
dog	kɨri	kɨri	kəre	kəri
monkey	-	vɨdzi	vdze	vədzi
moon	tira	tila	təre	tili
mouth	maj	waj	ewe	
squirrel	hajaɣ		jaɣe	
bow	rɨgɨɗ ʸ	lɨɣeɗ	leɣe	ləɣeɗ
girl	daɣɨlɨj	daɣali	daɣele	daɣali
path	tsɨvɨɗ ʸ	tɨvɨj	təve	təvi
tongue	ɣanaɗ ʸ	ɣanɨj	ɣene	ɣanik

Table 93 - [e] in the Lamang group

The vowel /i/ can be reconstructed for Proto-Lamang.

Gloss	Proto-Lamang	Lamang	Hdi
belly	huɗi	xuɗi	huɗi
dog	kɨri	kəre	kəri
moon	tila	təre	tili
night	rɨviɗi	rviɗi	rəviɗik
sun	fiti	fiti	fitik
thorn	tiki	tiki	teki

Table 94 - Reconstructing /i/ in the Lamang group

There is some evidence of front vowel harmony, though such evidence needs to be treated with caution. The evidence from internal data is not enough to propose vowel harmony for any language in the group. External evidence is useful in understanding the distribution of vowels in these languages. In the following table we see that the palatalization prosody in Proto-Central Chadic has led to vowel harmony in some cases in Lamang, Hdi and their proto-language, but in other cases has not. The harmonisation of /ə/ is sporadic rather than systematic.

Gloss	Proto-Central Chadic	Proto-Lamang	Lamang	Hdi
broom	sɨmɨt [y]	siʔʷit	siwit	suʔit
fish	kɨrɨp [y]	kɨlɨpi	kəlpi	kəlipi
fly (insect)	dzɨwɨɗ [y]	ziwɗî	zidî	ziɗikʷ
hearth	rɨwɨts [y]	liti	liti	litik
horse	pɨrɨs [y]	pɨlis	pəlisi	pəlis
nose	hʷɨtsɨn [y]	hɨtsiŋ	xtsini	hətsiŋ
tooth	ɬɨɗɨn [y]	ɬɨɗîŋ	ɬidiŋ	ɬiʔiŋ

Table 95 - Vowel harmony in the Lamang group

This apparent vowel harmony has only been found in roots reconstructed for Proto-Central Chadic with the palatalization prosody, and which contain only the vowel *ɨ. Even in these restricted cases, we find instances of /ə/. It is not possible to determine from the data whether there was vowel harmony in Proto-Lamang, or if the palatalization prosody was realised as /i/ in the final syllable, and this vowel has influenced the preceding vowels of the word. This second option, where limited vowel harmony is an innovation in Lamang and Hdi, best fits the data.

7.3.6   Summary

The Lamang group is classed here amongst the Mixed Prosody languages, though the complexities of the phonologies of the individual languages are such that few of the features of either Vowel Prosody languages or Consonant Prosody languages are present. Instead, we have fossilized remnants of the Vowel Prosody, and a retention of the core vowel system typical of Consonant Prosody languages.

There is good evidence that Proto-Lamang had a four vowel system (including the innovation *u), which is an extension of the vowel system of the Consonant Prosody languages. However there is no evidence for a consonant palatalization prosody, and only weak evidence for a possible vowel palatalization prosody.

7.4   The Sukur Group

The Sukur group only has one language, Sukur. Data for Sukur comes from two wordlists (David 1996; Waida and Thomas 2011). With only one language in the group, there is no possibility of doing comparative reconstructions to determine a proto-language for the group. Instead we will identify the key phonological features of Sukur and see how they relate to the different phonological systems so far presented.

Sukur is bordered by languages from four different groups: Margi (Margi), Lamang (Lamang, Hdi and Mabas), Mafa (Mafa) and Higi (Psikye).
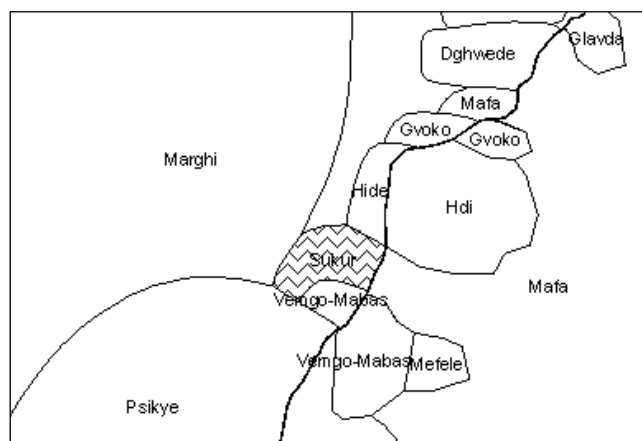
Map 27 - Sukur

7.4.1   Palatalization

Sukur has a palatalization prosody that is a mixed prosody, affecting either consonants or vowels. It functions in a similar way to the palatalization prosody in Podoko and Matal (Mandara group – see sections 7.2.1.2 and 7.2.2).

From the data available it can be seen that consonants from all places of articulation may be palatalized. However, only palatalized laminal consonants appear consistently in the roots that are reconstructed for Proto-Central Chadic. Other consonants may have become palatalized due to reanalysis of the palatalization component of a palatalized consonant, or the influence of a preceding /i/.

(117)   'hare' /vila/ [vilʲa] cf. Proto-Higi *vira   (palatalization transferred
                                                        from the front vowel)

In Consonant Prosody languages, there is a distributional rule where palatalized non-laminal consonants cannot co-occur with unpalatalized laminal consonants. We find the same distributional rule in Sukur.

If we look at the Proto-Central Chadic roots reconstructed with the palatalization prosody, we can see the following processes have taken place in Sukur:

- Any laminal consonants are palatalized, and in most cases *ɗ→j
- If no laminal consonants are present, the vowels in the word are fronted

The first five items in the table below illustrate the palatalization of laminal consonants. Items 4-6 show the palatalization of *ɗ→j. Items 7-10 show the fronting of vowels where the palatalization has not attached to a consonant, including the cases where *ɗ is present, but is not palatalized. Phonetic data is given from both of the sources cited above. The Proto-Sukur form is taken as the Sukur Underlying Form derived from the two data sources.

Gloss	Proto-Central Chadic	Proto-Sukur	Segmental	David	Waida
elephant	dzɨwɨn ^{y}	dzɨwan ^{y}	dʒɨwan	dʒuwan	dʒiwan
nose	hʷɨtsɨn ^{y}	sɨn ^{y}	ʃɨn	ʃin	ʃin
porcupine	dzɨmɨkʷ ^{y}	dzɨmɨk ^{y}	dʒɨmɨk	dʒimək	dʒimək
fly (insect)	dzɨwɨɗ ^{y}	dzɨwɨɗ ^{y}	dʒɨwɨj	dʒuwi	dʒui
string	zɨwɨɗ ^{y}	zɨɓɨ ^{y}	ʒɨɓɨj	ʒiɓi	ʒiɓi
meat	ɬɨwɨɗ ^{y}	ʝɨwɨɗ ^{y}	ʝɨwɨj	ɬuwij	ʝui
tooth	ɬɨɗɨn ^{y}	ʝɨn ^{y}	ʝɨn	ʝjin	ʝin
fish	kɨrɨp ^{y}	kɨrɨf ^{y}	kirif	kirif	kirif
razor	pɨɗakʷ ^{y}	pɨɗɨk'ʷ ^{y}	pɨɗɨk'ʷ	pidœk'	pɨɗɨk'u
wind	hɨmɨɗ ^{y}	mɨɗ ^{y}	mɨɗ	mɨɗ	mɨɗ

Table 96 - Palatalization in Sukur

Note that the /ɓ/ in the entry for 'string' is due to the merging of *ɗ with *w. There is also a regular change *ɬ→ʝ in Sukur (and in all the Central Chadic South groups). /ɨ/ is fronted to [i] following a palatalized laminal or adjacent to /j/. Adjacent to /w/ it is realised as [u]. The differing transcriptions for item 1 come where these two processes are in competition.

This palatalization prosody behaves in a manner similar to that of Podoko (see section 7.2.1.2) and Matal (see section 7.2.2). However the analysis must remain provisional until a full study of the phonology is available.

7.4.2   Labialization

In Sukur, velar and labial consonants may be labialized, along with the laminals and the alveolar plosives. In almost all groups within Central Chadic we find labialized velars, and labialized labials are found in most languages of the Consonant Prosody type. However labialized laminals and alveolars are unusual, and are elsewhere found only in the Kamwe and Kirya languages of the Higi group (see sections 6.5.4 to 6.5.6), which are geographically close, but not direct neighbours.

In some cases the origin of the labialized consonant can be seen from cognates in other languages. In the following table, the Sukur data shows what may either be a CC sequence, or else a labialized consonant. The cognates given contain either /w/ or a labialized velar. Where there was a labialized velar, the velar has been lost in Sukur and the labialization transferred to another consonant. Where there was *w , the *w has merged with another consonant.

(118)   twa   'skin'   cf. Psikye xʷəta
         mɨdwan   'rat'   cf. Podoko madəwanə
         ɗwa   'to swear'   cf. Gude wuɗə
         zwa   'beer'   cf. Lamang ɣuzo (from *ɣʷɨzɨw)

7.4.3   Vowels

We have seen that /i/ in Sukur can be the result of the palatalization prosody (see Table 96). However we cannot attribute all occurrences of /i/ to the palatalization prosody. In the data there are a number of words where /i/ is present in words with an unpalatalized laminal. According to the rules for palatalization described in the previous section, this should not occur. If the word is palatalized then the laminal will be palatalized. The vowels will only be fronted if they follow a palatalized consonant or if there are no laminal consonants in the word. The following words – many of which are well-attested Central Chadic roots – do not obey these rules:

(119)   ɓis   'to laugh'
         gis   'calabash'
         mis   'urine'
         pis   'sun'
         siᵐbut/ʃuᵐbut   'hair'
         misəm   'garden'
         vinzəŋ   'mosquito'
         ᵐbizəm   'owl'

This provides evidence for analysing /i/ as a separate phoneme in Sukur.

The vowel [u] is widely attested in the data. However, the fact that Sukur possesses labialized versions of almost all consonant phonemes permits any sequence [Cu] to be analysed as /Cʷə/. It is therefore not clear if /u/ is a phoneme in Sukur.

7.4.4 Summary

For Sukur we have a phonological system that includes large numbers of labialized and palatalized consonants. However the evidence implies that many of the palatalized and labialized consonants are recent innovations, and that the earlier system only included palatalized laminals, labialized velars, and probably labialized labials.

There is a palatalization prosody that affects laminal consonants in a word, or if none are present, then /ə/ is fronted to [i].

The vowel system comprises /a/, /i/ and /ə/. /u/ may also be a phoneme, or may be the result of /ə/ conditioned by a labialized consonant.

7.5 Conclusion

The languages belonging to the Mixed Prosody groups have diverse ways of expressing the palatalization prosody. In Mandara, Malgwa and Glavda, the system is almost identical to that found in many Consonant Prosody languages, where palatalization is realised as palatalization of a consonant. In Podoko, Matal and Sukur, palatalization is expressed either as consonant palatalization or as vowel harmony, depending on the consonants and vowels in the word. Dghwede, Lamang and Hdi have developed to the point where there is no longer an active palatalization prosody in the language.

8   Kotoko Languages

8.1   Introduction

The Kotoko languages are divided into four groups (Tourneux 2001):

1.   Kotoko South – Zina, Mazera
2.   Kotoko Centre – Lagwan, Mser
3.   Kotoko North – Mpade, Afade, Malgbe, Maltam
4.   Kotoko Island – Buduma (Yedina)

The following map shows the locations of the four Kotoko groups and the languages within each group.
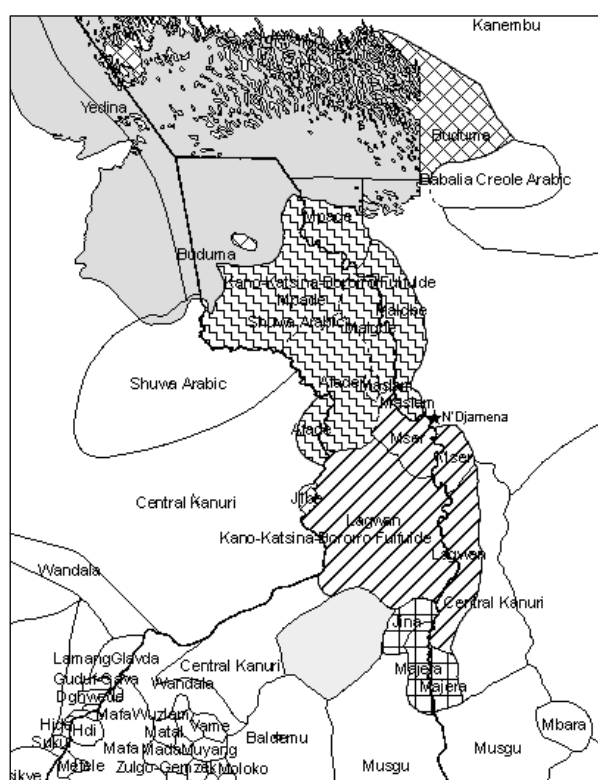
Map 28 - The Kotoko languages

The Kotoko languages have long been considered to form a genetic unit (Newman 1977a; Barreteau 1987a), but this analysis is probably incorrect (Gravina 2011). However they do form both a cultural grouping and also a linguistic area, sharing many phonological, lexical and grammatical features.

The Kotoko vowel system is probably the least 'interesting' of those studied here. There are very few signs of any prosodic activity, and in most cases a simple segmental analysis is adequate.

In this section we will look at the phonologies of the different languages, and for each group deduce as much as is possible about the phonology of the proto-language. Whilst the evidence rules out the reconstruction of any prosodies for any of the groups, we are in some cases able to find evidence for an underlying three-vowel system, and in all cases we can find evidence for the existence of labialized velars.

One of the features of the Kotoko languages is the strong influence from Kanuri. Many Kanuri lexical items have been incorporated into the lexicons of Kotoko languages (Allison 2005a), and this serves to obscure the phonological features inherited from the ancestor languages.

Four of the languages have been the subject of linguistic studies, one from each of the Kotoko groups: Zina from Kotoko South (Schmidt, Odden, and Holmberg 2002; Odden 2005; Odden 2007); Lagwan from Kotoko Centre (Lukas 1966; Ruff 2005); Mpade from Kotoko North (Mahamat 2005; Allison 2005b; Allison 2012); and Buduma from Kotoko Island (Lukas and Nachtigal 1966; McKone 1993; Awagana 2001).

8.2 The Kotoko South Group

The Kotoko South Group consists of two languages, Zina and Mazera. Only Zina has been the subject of linguistic study (Odden 2002a; Odden 2002b; Odden 2005; Odden 2007). This group is the most distinctive of the four Kotoko groups, and shares many cognates with languages from the Mandara, Hurza and Mofu groups, rather than with the other Kotoko groups. These languages are separated from the Kotoko South languages by the Waza National Park, and areas where Kanuri and Fulfulde are spoken. However, the presence of the Kanuri and Fulani only dates back a few centuries and the national park is a recent creation, so it is probable that the Kotoko South languages were direct neighbours of these other Central Chadic languages before these events. The

evidence overall is insufficient to determine whether the Kotoko South languages are more closely related to the other Kotoko groups or to the Mandara, Hurza or Mofu groups.

8.2.1   Zina Vowels

Odden describes Zina as having a six vowel system consisting of the five standard vowels plus schwa.

In verbs, [u] always occurs following a velar or /w/, and so is better analysed as /ə/, with a preceding velar being labialized. Almost all [u] in the data can be accounted for in this way, with most of the remaining examples appearing in loan words. Similarly, the status of the phoneme /o/ is marginal. Most of the occurrences of [o] are in loan words. Other occurrences could be analysed as resulting from the sequences /wa/, /aCʷ/ or /Cʷa/.

(120)   tʃu   /tʃəw/   'two'   cf. Mbuko tʃew
         wunha   /wənha/   'to ripen'
         gula   /gʷəla/   'to scratch (chicken)'
         ⁿguna   /ⁿgʷəna/   'to be big'
         foɗi   /fʷaɗi/   'four'   cf. Vame fuɗaw
         hokʷa   /hakʷa/   'three'   cf. Gidar hoku (/hakə ʷ/)

The vowel /e/ is rare, and appears primarily in loan words. The vowel /i/ is well attested.

There is no indication of any vowel harmony or other prosodic process.

(121)   bisa   'to marry'
         diman   'year'
         ɗaɗin   'smoke'
         gabil   'enemy'
         bəɗa   'not'
         lahə   'to be difficult'
         həni   'girl'
         ləvin   'night'
         lisən   'river'

From this we can propose that the core vowel system of Zina comprised /a/, /ə/ and /i/.

8.2.2   Zina Consonants

There is a set of labialized velar consonants, but post-consonantal /j/ is analysed by Odden as a separate segment and not as a component of a palatalized consonant.

There are both laminals and palatalized laminals in Zina. However, the affricates are always realised as [tʃ] and [dʒ], and the fricatives as [s] and [z]. There is no variation or allophony of any type.

Lateral fricatives have been lost in Zina, with *ɬ→s.

8.2.3   Mazera

For Mazera there is nothing published on the language, and the only data available is a list of 350 words (Allison n.d.).

The data is consistent with the tentative analysis described for Zina.

8.2.4   Reconstructions

There are only a few words in the data where reconstructions are possible, and no general conclusions can be reached from such limited data.

8.3   The Kotoko Centre Group

The Kotoko Centre group consists of the two languages Lagwan and Mser. There is a published phonology of Lagwan (Ruff 2005) but there is nothing published on Mser.

8.3.1   Lagwan

Ruff (2005) gives a very thorough analysis of Lagwan phonology. The consonantal system includes a set of labialized velars, and this labialization spreads optionally to the other velars in the word. There are no palatalized consonants in the core phonological inventory, though a number exist in the language in the large sub-lexicon of loan words.

Ruff analyses Lagwan as possessing one vowel phoneme at the deepest level, namely /a/. However, both /e/ and /o/ have also become phonemicised, though their distribution is very limited. They may have their origins in sequences such as /aj/ and /aw/ or /Cʷa/, but there is evidence that these vowels exist now as phonemes. Ruff describes the phonologisation of /e/ as being more advanced than that of /o/.

Similarly, the vowels /i/ and /u/ have only been phonemicized word-finally. /i/ is more common than /u/.

Some verbal suffixes are 'root vowel integrating', i.e. they cause all the vowels in the verb root (except schwa) to assimilate to the suffix vowel. The suffix /-e/ forms verbal nouns from transitive verbs, /-u/ forms verbal nouns from verbs with extensions, and /-o/ is the ventive suffix.

root	|+e|	|+u|	|+o|	meaning
/kala/	/kele/	/kulu/	/kolo/	'to gather'
/dana/	/dene/	-	/dono/	'to transport'
/gala/	/gele/	-	/golo/	'to hunt'
/pəraka/	/pəreke/	/pəruku/	-	'to separate'

Table 97 - Root vowel integrating suffixes in Lagwan

The vowel [ɨ] is analysed as an epenthetic vowel.

8.3.2   Mser
There is no published work on Mser, but there is a word list of 1,800 words (Allison n.d.).

From the data available, the characteristics appear broadly comparable to Lagwan. There is a set of labialized velar consonants, and no palatalized consonants.

The vowel system is comparable with Lagwan, though the front and back-rounded vowels seem more central to the system than they do in Lagwan. Further research is needed on this language in order to properly establish its phonological characteristics.

8.3.3   Reconstruction
It is possible to reconstruct a good number of items for Proto-Kotoko Centre, though with only two languages to provide evidence, the reconstructions are necessarily tentative, and rely on external data as well as internal data.

In the vowels, *o is absent from the reconstructed forms for native words, though present in a couple of loan words.

*u is also absent, having developed from the influence of /w/ or a labialized velar. Internal evidence would support the reconstruction of *u in certain cases,

but the external evidence, combined with the widespread co-occurrence of /u/ with velar consonants, makes it more natural to analyse /u/ as an innovation in Lagwan and Mser that was not present in Proto-Kotoko Centre. The forms given for Proto-Kotoko Centre take into account external as well as internal evidence.

Gloss	Proto-Kotoko Centre	Lagwan	Mser
child	ɣʷɨl	ɣuli	ulo
mouse	kʷɨsɨm	xsumi	kusum
fly (insect)	zɨwiɗ	zu	ms'əwi

Table 98 - Creation of /u/ in Kotoko Centre

*e is well attested amongst the reconstructions, but most often in word-final position.

Gloss	Proto-Kotoko Centre	Lagwan	Mser
to cry	sɨwe	səwe	swe
dog	kɨle	kle	kle
dream	sɨwane	swane	sware
moon	teɗɨ	teɗɨ	teɗɨ
night	nvaɗe	nvaɗe	nvaɗe

Table 99 - /e/ in Proto-Kotoko Centre

*i is almost exclusively found in word-final position where it results from *ɨj (with *j coming from *ɗ ʸ in some instances), or else is a reflex of the palatalization prosody. Under this analysis, the phoneme *i is an innovation in Proto-Kotoko Centre and not an inherited phoneme. (An alternative analysis could be that the word-final *i is a retention of an archaic vowel that developed into the Proto-Central Chadic palatalization prosody. However, this would not account for data with a final /ɗ/ in other languages.)

Gloss	Proto-Central Chadic	Proto-Kotoko Centre	Lagwan	Mser
tongue	naɬij	enɬi	nɬi	enʃi
nose	hʷɨtsɨn ʸ	hɨsɨni	xsɨni	asɨn
tooth	ɬɨdɨn ʸ	ɬɨni	ɬɨni	sɨr
ear	ɬɨmɨɗ ʸ	ɬɨmi	ɬɨmi	sɨm
fly (insect)	dzɨwɨɗ ʸ	zɨwiɗ	zu	ms'ɨwi

Table 100 – Final *i in Proto-Kotoko Centre

We can tentatively conclude that Proto-Kotoko Centre had at least four vowel phonemes, /a/, /i/, /e/ and /ɨ/, though the vowels in the reconstructed forms for Proto-Kotoko Centre should be considered provisional in many cases.

The consonants include a set of labialized velars.

Gloss	Proto-Kotoko Centre	Lagwan	Mser
urine	kʷɨne	nkune	kure
faeces	ᵑgʷɨ	ᵑgu	eᵑgo
drought	k'ʷala	k'ʷala	k'ʷalo
kidney	hʷɨɗɨs	xuɗusɨ	hɨdɨs
child	ɣʷɨl	ɣuli	ulo

Table 101 - Labialized velars in Kotoko Centre

8.4   The Kotoko North Group

The Kotoko North Group comprises four languages: Mpade, Afade, Malgbe and Maltam. Of these, only Mpade (Mahamat 2005; Allison 2005b) has been the subject of linguistic studies.

8.4.1   Mpade

Allison (2012) analyses the labialized velars in Mpade as being /Cw/ sequences. This is a synchronic analysis based on the Makary dialect. However he gives comparative data from the Bodo dialect, showing that /Cw/ sequences in Makary are equivalent to labio-velars in Bodo. This implies that Proto-Mpade had phonemic labialized velars. Tourneux (2001) includes labialized velars amongst the phonemes in Mpade.

There is also a set of palatalized laminal consonants, but their status is considered marginal, and accounted for largely by borrowings.

Mahamat describes the language with five vowels, plus an epenthetic vowel, with no evidence of vowel harmony or of systematic palatalization of consonants.

Allison concludes that synchronically the language has six vowels (Allison 2012), but argues that, if borrowings from Kanuri and Shuwa Arabic are excluded, the language can be analysed with three vowels /e/, /a/, /o/, plus schwa (Allison 2005b). Allison also provides evidence that the schwa should be analysed as a full phoneme and not as an epenthetic phone (Allison 2012). [i] is

due either to the vocalisation of /j/ or the palatalization of [ə] by a preceding post-alveolar consonant (/ʃ/, /tʃ/, /tʃʼ/ and /dʒ/). [u] is due either to the vocalisation of /w/, the labialization of [ə] by a preceding labialized velar (/kʷ/, /kʼʷ/ and /gʷ/), or else the labialization of a word-final [ə] by a preceding labial consonant.

8.4.2 Afade

There is no published work on Afade, except for the comparative studies by Tourneux (2001; 2003), though there are wordlists collected by Lebeuf (1942), and Allison (n.d.).

From Allison's data, Afade appears to have neither labialized nor palatalized consonants. The surface vowel system consists of the six vowels [i], [e], [a], [o], [u] and [ɨ].

Afade also has the ejective consonants [kʼ], [fʼ], [sʼ] and [ɬʼ]. These are the result of an historic process where there was fusion of the base consonant with the glottal component of an implosive (see section 3.4.7).

8.4.3 Malgbe

Malgbe, also known as Goulfey, has not been the subject of any phonological study, except again for the comparative studies by Tourneux (2001; 2003). There is also a wordlist (Allison n.d.).

As with Afade, Malgbe has neither labialized nor palatalized consonants. However Malgbe includes a set of labial-velar consonants: [k͡p], [g͡b], [g͡ɓ] and [ᵐg͡b]. For [g͡b] and [ᵐg͡b], these can be seen to have developed historically from *kʷ/*gʷ and *ŋgʷ.

Gloss	Proto-Central Chadic	Proto-Kotoko North	Malgbe
faeces	ŋgʷɨ	eŋgʷɨ	eᵐg͡bɨ
cow hump	dzɨgʷɨr	sɨgʷɨre	sɨg͡bɨre
mouse	kʷɨsɨm	kʷɨsɨm	g͡bim

Table 102 - Development of labial-velars in Malgbe

Malgbe also has the ejectives [sʼ], [kʼ] and [ɬʼ], with a history similar to those of Afade.

The surface vowel inventory of Malgbe is the same as Afade.

8.4.4   Maltam

For Maltam, the only available data is a short wordlist (Allison n.d.). The consonant inventory is similar to Afade, including the ejectives [s'], [k'] and [ɬ']. The surface vowels are the same as in Afade and Malgbe.

8.4.5   Reconstructions

With four languages and a good amount of data it is possible to find a reasonable number of reliable reconstructions for the group.

The labialized velars are well-attested in Proto-Kotoko North. In Malgbe they mostly have reflexes that are labial-velar double plosives. Labialized velars have been lost in Afade and Maltam, with many appearing as implosives.

Gloss	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe
mouse	kʷɨsɨm		ɓɨsɨm	kusumu	ɠbim
belly	ᵑgʷɨn	ᵐɓɨn		ᵑgʷɨn	ᵐɠbɨn
faeces	eᵑgʷɨ	eᵐɓo		eᵑgu	eᵐɠbɨ
to vomit	tak'ʷa	doɓa		tak'ʷa	daɠbawun
cough	hʷɨdɨɬa	dɨɬa		k'ʷaʃan	daɬawun

Table 103 - Labialized velars in Proto-Kotoko North

The vowel /a/ is easily reconstructed.

Gloss	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe
claw	nk'an	nk'an	ngare	nk'an	nk'ɨn
four	gaɗe	gaɗe		gaɗe	ganɗe
guinea fowl	tsafan	tsɨfan	safan	safan	safan
honey	mam	mam		mam	mam
night	faɗe	faɗe		faɗe	faɗe

Table 104 - /a/ in Proto-Kotoko North

Likewise, /ɨ/ appears with a good degree of consistency across a number of cognates.

Gloss	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe
to cry	tsɨwe	tsɨwe		sɨwe	sɨwe
dog	kɨlew	gɨlew		kɨlew	gɨlew
ear	ɬɨm	ɬɨm		ʃimu	ɬɨm
hut	fɨn	fɨn		fɨn	fɨn
navel	tsɨmtsɨm	tsɨmtsɨm	sɨmsɨm	sɨmsɨm	sɨmsɨm

Table 105 - /ɨ/ in Proto-Kotoko North

There are several roots reconstructed containing /o/, but only a few which may come from Proto-Central Chadic, and the data is not always consistent. /o/ almost always occurs word-finally.

Gloss	Proto-Central Chadic	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe
head	ɣʷɨ→gʷa	go	go		go, ko	
bird	-	tsaɓo	tsaɓo	sapo		sag͡bɨ
field	sɨka	sko			sko	sko
hut	ɣaj	ho	ho		ho	ha
millet	vɨjaw	fɨjo	feyo		fio	fiyo

Table 106 - /o/ in Proto-Kotoko North

The vowel /u/ exists as the remnant of an historic labialized velar (via vowel assimilation processes), or else in probable loan words. Data from Lagwan (Kotoko Centre) is given for comparison.

Gloss	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe	cf. Lagwan
cow	dum			dumu	dum	/dɨɣʷɨmi/ [duɣumi]
flour	muɓi	muɓi	mɓi		mamɓi	/mɨxʷɓi/ [muxɓi]
porcupine	aᵐbu	aᵐbu		aᵐbu	aᵐbu	
quiver	suru	suru		suru	suru	

Table 107 - /u/ in Proto-Kotoko North

The vowel /i/ is only attested in word-final position. In most of the cases where the Proto-Central Chadic roots are known, the /i/ has come from *ɨj .

Gloss	Proto-Central Chadic	Proto-Kotoko North	Afade	Maltam	Mpade	Malgbe
bone	ɗɨɬ	enɬʼi	enɬʼi		enʃi	enɬɨ
monkey	vɨdɨj→vɨrɨj	fɨli	fɨli		fli	fli
tongue	naɬɨj	enɬi	enɬi		enʃi	enɬɨ
fly (insect)	dzɨwɨɗ ʸ→tsʼɨwɨj	tsʼɨwi	tsɨwi	sʼiwi		

Table 108 - /i/ in Proto-Kotoko North

The vowel /e/ is well-attested.

Gloss	Proto-Kotoko North	Afade	Mpade	Malgbe
to cry	tsɨwe	tsɨwe	swe	suwe
dog	kɨlew	gɨlew	kɨlew	gɨlew
dream	saware		sware	yaware
moon	teɗɨ	deɗi	teɗɨ	teɗɨ
night	faɗe	faɗe	faɗe	faɗe

Table 109 - /e/ in Proto-Kotoko North

We can provisionally conclude that Proto-Kotoko North had at least the vowels /a/, /ɨ/ and /e/, and possibly also /i/ and /u/, though these last two would be innovations.

8.5   The Kotoko Island Group

The Kotoko Island Group consists of the single language Buduma, also known as Yedina. There is a published grammar of Buduma (Awagana 2001), and also a phonological analysis (McKone 1993).

Buduma has undergone a number of sound changes which have severely reduced its consonantal inventory. Voiced fricatives have been devoiced, and *ɬ and *s have both developed into /h/.

McKone includes just one labialized velar phoneme, /kʷ/, but Awagana includes data showing labialization of a number of consonants from all places of articulation. Neither includes underlying palatalized consonants in their analyses, though the laminal affricates are realised as post-alveolar affricates [tʃ] and [dʒ].

The Buduma vowel system is difficult. McKone presented several possible analyses, from a system based on three underlying central vowels, with fronting and back-rounding caused by palatalization and labialization or adjacent semi-vowels, to a system of nine vowel phonemes.

The three central vowels are illustrated by the following examples:

(122)   /ə/   [kəmənɛ]   'this year'   [gəhənni] ~ [kənni]   'you know me'
         /ɜ/   [kəmɜni]   'show me'   [kɜni]   'true'
         /a/   [kəmani]   'master'   [kani]   'goat'

McKone shows that, once the influence of neighbouring consonants and various coalescence phenomena are taken into account, the nine vowel system can be reduced to a six vowel system (/i/, /e/, /ə/, /a/, /u/, /o/). This is the same synchronic vowel system as found in the other Kotoko languages.

8.6   The Question of Proto-Kotoko

The Kotoko languages have long been thought to form a single genetic unit. Newman (1977a) classified the Kotoko languages together in group B.1 of Central Chadic (Biu-Mandara). Barreteau (1987a), using lexico-statistics, classified the Kotoko languages as a separate unit at a higher level, with the Kotoko languages described as Central Chadic North, and the rest of Central Chadic and Masa forming Central Chadic South.

However, whilst the four Kotoko groups are related culturally, the evidence from sound changes argues against considering them being descended from a common linguistic ancestor (see Gravina (2011) and sections 3.2.3, 3.3.16 and 3.3.17). No sound changes have been presented in favour of the genetic unity of the Kotoko groups. In the case of the Kotoko South languages (Zina and Mazera), the lexicostatistical evidence shows a similar degree of similarity between them and the languages of the Mofu and Mandara groups as they have with the other Kotoko languages. Given the high degree of contact between the Kotoko South languages and the other Kotoko languages, and the geographic separation between the Kotoko South languages and the Mandara and Mofu group languages, it is more likely that their genetic relationships are closer to the Mandara and Mofu groups and that their lexical similarity with the other Kotoko groups has come from contact.

We have treated the Kotoko languages as constituting four different groups within Central Chadic. However, the Kotoko languages do form a linguistic area, and it is relevant in that context to attempt to describe the phonologies of the area in terms of variants of a single system.

Tourneux has published a number of comparative papers on the Kotoko languages, including discussions of the vowel system (Tourneux 2003) and the consonantal system (Tourneux 2001).

Tourneux's Proto-Kotoko consonantal system includes a set of labialized velars. There is no contrast between palatalized and unpalatalized laminals. Tourneux does not reconstruct voiced fricatives or pre-nasalized consonants.

For the vowel system, Tourneux reconstructs a two-vowel system, *a and *ə (or absence of a vowel). He ascribes the existence of /i/ to *ə adjacent to /j/, and *e to the combination /aj/. /o/ and /u/ are formed from *a and *ə adjacent to /w/ or a labialized consonant. He states that /e/ and /o/ are phonemicised in the present-day languages, whereas for /i/ and /u/ this process is still under way, and these vowels may not constitute vowel phonemes in the present-day languages.

Whilst I do not consider the Kotoko languages to form a genetic unit (Gravina 2011), their phonologies do form a coherent type. We have seen from the reconstructions in at least two of the groups that the vowel systems may include a third vowel *e alongside *a and *ə. Contrary to Tourneux, there is a voiced-voiceless distinction in fricatives, except where it was lost in Kotoko Island and Kotoko North (see section 3.2.3). In agreement with Tourneux, a set of labialized velars can be reconstructed for the different Kotoko groups.

9   Summary of the Phonologies

In this section we will present a brief summary of the phonological characteristics of each of the languages mentioned in the previous four sections, along with the proto-languages of groups and subgroups.

A question mark denotes situations where the characteristic is unknown or uncertain. When describing the number of vowels, 'two plus one' refers to two phonemic vowels plus an epenthetic vowel, 'three+' refers to three core vowel phonemes, plus one or more marginal vowel phonemes.

Group	Language	Prosodies	Labialized Consonants	Palatalized Consonants	Vowels
Bata	Jimi	Consonant PAL	Velars and Labials		Three, plus long vowels
	Sharwa	Consonant PAL	Velars and Labials		Three
	Gude	Consonant PAL	Velars and Labials		Two, plus long vowels
	Tsuvan	Consonant PAL	Velars and Labials		Three
	Bata, Bachama	Consonant PAL	All?		Three
	Proto-Bata	Consonant PAL	Velars and Labials		Three
Daba	Daba	Vowel PAL and LAB	Velars		Two
	Buwal	Vowel PAL	Velars		Two
	Mbudum	Vowel PAL	Velars		Two
	Mina	Vowel PAL	Velars		Two
	Gavar	None	Velars	Laminals	Four
	Proto-Daba	Vowel PAL	Velars		Two
Mafa	Mafa	Vowel PAL and LAB	Velars		Two
	Cuvok	Vowel PAL	Velars		Two
	Mefele	Vowel PAL and LAB	Velars		Two
	Proto-Mafa	Vowel PAL and LAB (?)	Velars		Two

Group	Language	Prosodies	Labialized Consonants	Palatalized Consonants	Vowels
Tera	Tera	?Vowel PAL and LAB	Velars		?
	Ga'anda	Vowel PAL and LAB	Velars		?
	Proto-Tera	?	?		?
Sukur	Sukur	Mixed PAL	All		Three
Hurza	Mbuko	Vowel PAL and LAB	Velars		Two
	Vame	Vowel PAL	Velars		Two
	Proto-Hurza	Vowel PAL	Velars		Two
Margi	Margi		All	All	Two plus one
	Bura		Velars and Labials	All	Four
	Kilba		Velars and Labials	Laminals and Velars	Two or four
	Proto-Margi	Consonant PAL	Velars and Labials		Three
Mandara	Podoko	Mixed PAL	Velars		Three+
	Matal	Mixed PAL	Velars		Two
	Mandara		Velars	Laminals and Velars	Three
	Malgwa		Velars	Laminals and Velars	Six
	Glavda	Consonant PAL	Velars		Three+
	Dghwede		Velars		Three+
	Proto-Mandara	Mixed PAL	Velars		Three+
Mofu	Ouldeme	Vowel PAL	Velars		Two
	Muyang	Vowel PAL and LAB	Velars		Two
	Moloko	Vowel PAL and LAB	Velars		Two
	Mada	Vowel PAL and LAB	Velars		Two
	Proto-Tokombere	Vowel PAL	Velars		Two
	Zulgo	Vowel PAL and LAB	Velars		Two

Group	Language	Prosodies	Labialized Consonants	Palatalized Consonants	Vowels
	Gemzek	Vowel PAL and LAB	Velars		Two
	Merey	Vowel PAL and LAB	Velars		Two
	Dugwor	Vowel PAL and LAB	Velars		Two
	Proto-Meri	Vowel PAL and LAB	Velars		Two
	Mofu North	Vowel PAL and LAB	Velars		Two
	Mofu-Gudur	Vowel PAL	Velars		Two
	Pre-Mofu	Vowel PAL	Velars		Two
	Proto-Mofu	Vowel PAL	Velars		Two
Maroua	Mbazla	Vowel PAL and LAB	Velars		Two
	Giziga North	Vowel PAL and LAB	Velars		Two
	Giziga South	Vowel PAL and LAB	Velars		Two
	Proto-Maroua	Vowel PAL	Velars		Two
Lamang	Hdi		Velars		Five
	Lamang		Velars		Four
	Proto-Lamang		Velars		Four
Higi	Bana		Velars	All	Three
	Psikye		Velars	Laminals	Three
	Kamwe Nkafa		All	All	Three
	Kamwe Futu		All	All	Three
	Kirya-Konzel		All	Laminals and Velars	Four?
	Proto-Higi		Velars	Laminals	Three
Kotoko Island	Buduma		?		Six
Kotoko North	Mpade		Velars(?)		Four
	Afade				Six
	Malgbe		(Labial-velars)		Six
	Maltam				Six

Group	Language	Prosodies	Labialized Consonants	Palatalized Consonants	Vowels
	Proto-Kotoko North		Velars		Five
Kotoko Centre	Lagwan		Velars		Three
	Mser		Velars		?
	Proto-Kotoko Centre		Velars		Four
Kotoko South	Zina		Velars		Three
	Mazera		Velars		Three
	Proto-Kotoko South		Velars		Three
Musgum	Mbara	Vowel PAL and LAB			Two, plus long vowels
	Muskum	Vowel PAL and LAB			Two, plus long vowels
	Musgu (Mulwi, Munjuk, Vulum)	Vowel PAL and LAB			Two, plus long vowels
	Proto-Musgum	Vowel PAL and LAB			Two
Gidar	Gidar	Vowel PAL and LAB			Two, plus long vowels

Table 110 - Summary of Phonological Characteristics

Section III - PHONOLOGICAL RECONSTRUCTION

In the previous section we looked at the phonological characteristics of each of the Central Chadic languages for which data or an analysis is available. We also reconstructed the key elements of the phonological system for the proto-language of each group – vowels, prosodies and labialized an palatalized consonants – as far as is possible. (No attempt has been made to reconstruct tone or stress.) In this section we will go the next step, and reconstruct the phonological inventory of Proto-Central Chadic.

In chapter 10 we will reconstruct the consonantal inventory, giving evidence for the reconstruction of each phoneme, and a rough history of the phoneme through to the present-day languages. This reconstruction will be compared with Newman's Proto-Chadic reconstruction (Newman 1977a).

In chapter 11 we will look at the status of prosodies in Proto-Central Chadic. We will show that the palatalization prosody can be reconstructed, but that the vowel labialization prosody and non-velar labialized consonants are both innovations.

In chapter 12 we will propose that Proto-Central Chadic had three vowel phonemes, and give evidence for their reconstructions.

Chapter 13 gives a short summary of the phonological system of Proto-Central Chadic, and present a possible scenario for the history of Central Chadic covering people movements, linguistic developments and language contact.

10 Proto-Central Chadic Consonants

10.1 Introduction

This chapter presents the reconstruction of the consonantal system of Proto-Central Chadic. For each phoneme we will give data to justify the reconstruction, along with a description of its distribution in Proto-Central Chadic.

The consonantal system of Proto-Central Chadic is as follows:

	Labial	**Alveolar**	**Laminal**	**Velar**	**Labialized Velar**
Plosive	p	t	ts	k	k^w
	b	d	dz	g	g^w
Implosive	ɓ	ɗ			
Fricative		ɬ	s	h	h^w
	v	ɮ	z	ɣ	$ɣ^w$
Nasal	m	n			
Pre-nasalized	^mb	nd	^ndz	(^ng)	$(^ng^w)$
Liquid		r			
Approximant			j		w

Table 111 - Proto-Central Chadic consonants

The label 'laminal' is used, following Roberts (2001) to denote the set of sibilant-based consonants. These consonants function as a distinct grouping in almost all Central Chadic languages.

The phonemes in parentheses are those which are innovations in Central Chadic, but where it is not clear whether they originated in Proto-Central Chadic or shortly afterwards.

Voiced plosives, including pre-nasalized plosives, are not found in word-final position.

10.1.1 Nasals and Pre-nasalized Plosives

There were only two nasals in Proto-Central Chadic, *m and *n. Indeed, in the majority of the present-day languages, there are only these two nasals. In a number of cases /ŋ/ has been added, and in some of these languages there is

also the labialized equivalent /ŋʷ/. There are no known cases of a truly phonemic palatal nasal, though some languages permit the palatalization of /n/.

For the pre-nasalized consonants, *ᵐb and *ⁿd are well-attested. The phoneme *ⁿdz is present in only one root – *ⁿdzah 'to sit' – though the root is extremely well-attested. The other two potential pre-nasalized consonants *ⁿg and *ⁿgʷ are difficult to establish for Proto-Central Chadic, and may or may not have existed as phonemes. They are included in the table within parentheses.

10.1.2 Implosives

Proto-Central Chadic had two glottalised phonemes, *ɓ and *ɗ. There is no evidence for a glottalised consonant in the laminal set. There are instances of glottalised consonants around the palatal or velar positions in the data, but these are innovations, and there were no palatal or velar implosives in Proto-Central Chadic.

(123)	Malgwa	*hɨkɨn→hɨkiri→kiɗɨ→kɨɗʲɨ→kɨɠʲɨ	'three'
	Tera	*ɗɨɬ→ɠɨɬi→ɠəɬ	'bone'
	Bana	*hʷɨɗɨɬ ʲ→ʔʲɨɬa→ʔʲɨɬa	'to cough'
	Mser	*ɗɨkɨn ʲ→nk'ɨn→nk'ɨr	'claw'

10.2 Labial Consonants

10.2.1 *p

One major issue in reconstructing the Proto-Central Chadic consonant inventory is deciding whether there were two phonemes *f and *p, or whether [f] and [p] were allophones. The position most consistent with the data is that in Proto-Chadic there was only *p, and in Proto-Central Chadic there was still the one phoneme, but the phoneme had two allophones [f] and [p]. In the proto-languages of the groups within Central Chadic, /f/ and /p/ became contrastive, as they are in almost all of the present-day Central Chadic languages.

Proto-Central Chadic *p has two allophones, [p] occurring initially and medially, and [f] occurring finally. There is one major exception to this, the root *wɨpaɗ 'four', where /f/ is attested in all but a few languages.

At the level of the proto-languages of the groups, in most cases it is possible to find examples of contrast between /f/ and /p/, though there is still a strong

tendency towards the distribution described for Proto-Central Chadic. At the level of the individual languages the contrast can be seen clearly.

The split of *p into /p/ and /f/ took place in each group separately, as can be seen from the differences in the distribution of these two phonemes across the groups. However the conditions for the split were already present in Proto-Central Chadic, and the apparent presence of [f] in medial position in the root for 'four', may imply that the sounds were already being phonemicised.

Newman (1977a) analyses *p and *f as being distinct phonemes in Proto-Chadic. He notes that this distinction has been lost in many present-day languages. Whilst outside the scope of this study, it is interesting to note that there is no *p/*f contrast in other branches of Afroasiatic, such as Berber (Kossmann 1999) and Semitic (Weninger 2011). If this lack of contrast in Proto-Central Chadic is also the case in Proto-Chadic, this is an important consideration in the reconstruction of Proto-Afroasiatic.

We will distinguish *p and *f in the reconstructions of the proto-languages of the Central Chadic groups, since these two phonemes can be shown to contrast at this level in most groups, and in order to follow the history of these sounds through to the present day languages.

In the following sections we will give the evidence for the reconstruction of *p in different positions in the word. The evidence is presented in the form of the reconstructed roots for the proto-languages of the groups. These languages are displayed according to their genetic groupings, with the first column covering the North and Hurza sub-branches, and the second and third columns covering the South sub-branch. The full data can be viewed at http://centralchadic.webonary.org/.

So far it has not been possible to identify regular sound laws to determine when individual languages or groups use /p/ or /f/ as reflexes of *p.

10.2.1.1 Word-initial

(124) *pɨra 'to untie'

Group	Root	Group	Root	Group	Root
Bata	pɨrɨ	**Margi**	pili	**Kotoko Island**	felu
Daba	pɨl	**Mandara**	pɨla	**Kotoko North**	fal
Mafa	pɨr	**Mofu**	pɨl	**Kotoko Centre**	vɨl
Tera	pɨri	**Maroua**		**Kotoko South**	
Sukur	pɨr	**Lamang**	pɨl	**Musgum**	
Hurza	para	**Higi**	pɨl	**Gidar**	ɨppɨla

(125) *pitsɨ 'sun'

Group	Root	Group	Root	Group	Root
Bata	fitɨ	**Margi**	pɨtsi	**Kotoko Island**	
Daba	pɨts ʸ	**Mandara**	fatsɨ ʸ	**Kotoko North**	
Mafa	pats	**Mofu**	pats	**Kotoko Centre**	
Tera	fɨɗa	**Maroua**	pas	**Kotoko South**	fatsa
Sukur	pis	**Lamang**	fiti	**Musgum**	futɨj
Hurza	pats	**Higi**	vɨtsi	**Gidar**	

(126) *pɨri 'butterfly'

Group	Root	Group	Root	Group	Root
Bata	pɨri	**Margi**	pir	**Kotoko Island**	
Daba	pula	**Mandara**	pala	**Kotoko North**	
Mafa		**Mofu**	pɨla	**Kotoko Centre**	
Tera	pɨr	**Maroua**	pɨla	**Kotoko South**	
Sukur	pɨr	**Lamang**		**Musgum**	
Hurza	pala ʸ, pɨra	**Higi**	pɨli	**Gidar**	pala ʷ

10.2.1.2 Word-medial

(127) *ɣʷɨpa 'flour'

Group	Root	Group	Root	Group	Root
Bata	hʷɨpɨ	**Margi**	ɨpʷɨ	**Kotoko Island**	
Daba	ŋfa	**Mandara**	kʷɨpɨ	**Kotoko North**	
Mafa	gʷɨfa	**Mofu**	gʷɨpa	**Kotoko Centre**	
Tera		**Maroua**	hapa	**Kotoko South**	
Sukur	pʷa	**Lamang**	hʷɨpaw	**Musgum**	
Hurza	hɨᵐbɨga	**Higi**	ɣʷɨpɨ	**Gidar**	gɨpa

(128) *hɨpaɬ ʸ 'shoulder'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	apaɬa	**Kotoko Island**	
Daba		**Mandara**	aɬapɨ ʸ	**Kotoko North**	
Mafa	paɬpaɬ ʸ	**Mofu**	hɨpaɬ ʸ	**Kotoko Centre**	
Tera		**Maroua**	papaʒ ʸ	**Kotoko South**	
Sukur	tapaɬ	**Lamang**		**Musgum**	
Hurza	paɬpaɬ ʸ	**Higi**	baʒa	**Gidar**	

(129) *wɨpaɗ 'four'

Group	Root	Group	Root	Group	Root
Bata	fʷaɗ	**Margi**	fʷaɗu	**Kotoko Island**	
Daba	faɗ ʷ	**Mandara**	ufaɗɨ	**Kotoko North**	
Mafa	faɗ	**Mofu**	wɨfaɗ	**Kotoko Centre**	
Tera	foɗa	**Maroua**	mufaɗ	**Kotoko South**	foɗi
Sukur	fwaɗ	**Lamang**	wɨfaɗ	**Musgum**	pɨdɨ ʷ
Hurza	fuɗaw	**Higi**	wɨfadɨ	**Gidar**	paɗa ʷ

10.2.1.3 Word-final

(130) *kɨrɨp ʸ 'fish'

Group	Root	Group	Root	Group	Root
Bata	kɨrifɨ ʸ	**Margi**	kɨlfi ʸ	**Kotoko Island**	
Daba	kɨlif ʸ	**Mandara**	kɨlifɨ ʸ	**Kotoko North**	
Mafa	kɨlaf ʸ	**Mofu**	kɨlif ʸ	**Kotoko Centre**	
Tera	yɨrvɨ ʷ	**Maroua**	kɨlif ʸ	**Kotoko South**	kɨlfɨ
Sukur	kɨrif ʸ	**Lamang**	kɨlɨpi	**Musgum**	hɨlif ʸ
Hurza	kɨlaf ʸ	**Higi**	kɨlipɨ	**Gidar**	kɨlfɨ ʸ

(131) *tip 'to spit'

Group	Root	Group	Root	Group	Root
Bata	tif	**Margi**	tifa	**Kotoko Island**	
Daba	tɨf ʸ	**Mandara**	tifa	**Kotoko North**	tafɨ
Mafa	ⁿdzɨf ʸ	**Mofu**	tɨf	**Kotoko Centre**	tɨf
Tera		**Maroua**	tɨf ʷ	**Kotoko South**	
Sukur	tifa	**Lamang**	tɨf	**Musgum**	tɨf ʷ
Hurza	tifa	**Higi**	tifi	**Gidar**	

(132) *ɣʷɨrɨp 'blind'

Group	Root	Group	Root	Group	Root
Bata	wɨrɨfɨ	**Margi**	wɨlɨfu	**Kotoko Island**	
Daba	wɨlɨf	**Mandara**	ɣʷɨlifɨ	**Kotoko North**	
Mafa		**Mofu**	ɣʷɨlɨf	**Kotoko Centre**	nɣʷɨf
Tera		**Maroua**	hɨlɨf ʷ	**Kotoko South**	ɣʷajra
Sukur		**Lamang**	ɣʷɨlpa	**Musgum**	
Hurza	ɣʷɨraf	**Higi**	ɣʷɨlɨfi	**Gidar**	

10.2.2 *b

Newman gives good evidence for Proto-Central Chadic having undergone a change from Proto-Chadic *b→v (Newman 1977a, 16). This being the case, we would not expect to find any roots reconstructed with *b in Proto-Central Chadic, and indeed this is very nearly the case. However there is just one widely-attested root where it appears that *b should be reconstructed.

(133) *bana 'to wash'

Group	Root	Group	Root	Group	Root
Bata	binɨ	**Margi**		**Kotoko Island**	benu
Daba	ban	**Mandara**	bara	**Kotoko North**	ᵐban
Mafa	pana	**Mofu**	bara	**Kotoko Centre**	ban
Tera		**Maroua**	buna	**Kotoko South**	bana
Sukur	ban	**Lamang**		**Musgum**	
Hurza	bana	**Higi**	pi	**Gidar**	

This root is reconstructed by Newman for Proto-Chadic (as *bəna), with data from West Chadic as well as Central Chadic. The presence of *b in this root appears therefore to be a simple exception where the sound change did not take place. For this reason, *b is included in the consonantal inventory for Proto-Central Chadic, but with marginal status.

10.2.3 *v

The phoneme *v is found in initial, medial and final positions. In most groups it has retained its original phonetic form. However it has the reflex /f/ in Proto-Musgum, Proto-Kotoko Centre and Proto-Kotoko Island, and /b/ in Gidar and in the Meri subgroup of the Mofu group.

Only two examples of the phoneme have been found in final position, and these roots are not widely attested across Central Chadic.

10.2.3.1 Word-initial

(134) *vɨn ʸ 'hut'

Group	Root	Group	Root	Group	Root
Bata	vɨni	**Margi**	vi	**Kotoko Island**	
Daba	bɨŋ	**Mandara**	bɨrɨ, vɨj	**Kotoko North**	fɨn
Mafa	van ʸ	**Mofu**	vɨr ʸ	**Kotoko Centre**	vɨni
Tera		**Maroua**	vɨn ʸ	**Kotoko South**	
Sukur	va	**Lamang**	ivɨŋ	**Musgum**	funɨj
Hurza		**Higi**	vi	**Gidar**	biina

(135) *vɨnah 'to vomit'

Group	Root	Group	Root	Group	Root
Bata	vɨna	**Margi**		**Kotoko Island**	
Daba	vɨna	**Mandara**	vɨraha	**Kotoko North**	
Mafa	vɨnaha ʸ	**Mofu**	vɨnaha	**Kotoko Centre**	vɨnahɨ
Tera	vɨnah	**Maroua**		**Kotoko South**	vɨnaha
Sukur	vɨnah	**Lamang**	vɨnah	**Musgum**	fɨna ʸ
Hurza	vɨnah ʸ	**Higi**	vɨnɨhʷɨ	**Gidar**	

(136) *vɨja 'rainy season'

Group	Root	Group	Root	Group	Root
Bata	va ʸ	**Margi**	vɨja	**Kotoko Island**	
Daba	vɨja	**Mandara**	vɨja	**Kotoko North**	
Mafa	vɨja	**Mofu**	vɨja	**Kotoko Centre**	
Tera		**Maroua**	vɨja	**Kotoko South**	
Sukur	vi	**Lamang**	vɨja	**Musgum**	pɨja
Hurza	vɨja	**Higi**	vɨja	**Gidar**	

10.2.3.2 Word-medial

(137) *dzavɨn 'guinea fowl'

Group	Root	Group	Root	Group	Root
Bata	zavʷɨn	**Margi**	tsɨvɨr	**Kotoko Island**	
Daba	zavɨn	**Mandara**	zabɨra ʸ	**Kotoko North**	tsafan
Mafa	zapan	**Mofu**	dzavɨr	**Kotoko Centre**	zavan
Tera	tsivan	**Maroua**	tsɨvɨn ʷ	**Kotoko South**	dzavaŋ
Sukur	zabɨn	**Lamang**	zivɨn	**Musgum**	tsaavan ʸ
Hurza	zavɨn	**Higi**	zivɨn	**Gidar**	zamvɨna

(138) *ɣʷɨvɨn ʸ 'charcoal'

Group	Root	Group	Root	Group	Root
Bata	ivɨnɨ ʸ	**Margi**	vʷɨni	**Kotoko Island**	
Daba	ᵑgʷɨvan ʷ	**Mandara**	ɣʷɨvɨrɨ	**Kotoko North**	f'anf'an
Mafa	vaŋ	**Mofu**	ɣʷavar ʸ	**Kotoko Centre**	wɨvan
Tera		**Maroua**	avɨn ʷ	**Kotoko South**	
Sukur	vin	**Lamang**	ɣʷɨvani	**Musgum**	avaŋ ʸ
Hurza	hʷɨvan	**Higi**	vɨʔʲɨn	**Gidar**	

10.2.3.3 Word-final

(139) *hʷaⁿdav 'hare'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	maⁿdavan	**Mandara**		**Kotoko North**	
Mafa	waⁿdav	**Mofu**	hʷaⁿdav	**Kotoko Centre**	
Tera		**Maroua**	maⁿdaf	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	mudivaj
Hurza	ⁿdɨvan ʸ	**Higi**		**Gidar**	maⁿdava

(140) *hɨrɨgʷɨv 'baboon'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	lahav ʷ	**Mandara**	lɨkʷɨva	**Kotoko North**	
Mafa		**Mofu**	hɨlɨgʷɨv	**Kotoko Centre**	
Tera	ruf	**Maroua**	liʔɨf ʷ	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	hɨrgav ʷ	**Higi**		**Gidar**	lava ʷ

*10.2.4 *ɓ*

*ɓ is rare in Proto-Central Chadic, with only two widely-attested roots in the data.

(141) *ɣʷɨɓis 'to laugh'

Group	Root	Group	Root	Group	Root
Bata	mʷɨs	**Margi**	mʷisa	**Kotoko Island**	
Daba	ɓas	**Mandara**	ɣʷɨɓasa	**Kotoko North**	
Mafa	ᵑgʷas	**Mofu**	ɣʷɨᵐbasa	**Kotoko Centre**	
Tera	mɨs	**Maroua**		**Kotoko South**	
Sukur	ɓis	**Lamang**	ɣʷɨɓas	**Musgum**	
Hurza	ᵐbɨsɨj	**Higi**	ɓʷɨsi	**Gidar**	ɨmasa

(142) *sɨwiɓ ʸ 'to suck'

Group	Root	Group	Root	Group	Root
Bata	siɓ ʸ	**Margi**	siɓɨ ʸ	**Kotoko Island**	tsetsabu
Daba	saɓ ʸ	**Mandara**	ɓusa ʸ	**Kotoko North**	s'afu
Mafa	sasɨɓ ʷ	**Mofu**	sɨwiɓ	**Kotoko Centre**	s'afɨ
Tera		**Maroua**	suɓi	**Kotoko South**	
Sukur		**Lamang**	ɓisaj	**Musgum**	susuɓɨ ʸ
Hurza	susaɓ ʸ	**Higi**	ɓisɨ, sʲiɓɨ	**Gidar**	ɨssɨɓa ʷ

*10.2.5 *m*

*m is one of the most common phonemes in Proto-Central Chadic. It has remained very stable through time, with the only exception being the regular change to /w/ in word-final position in the Mandara group, with a similar change in word-initial position in the Wandala and Dghwede subgroups of the Mandara group. This change has spread into some words of neighbouring groups.

10.2.5.1 Word-initial

(143) *mɨts 'to die'

Group	Root	Group	Root	Group	Root
Bata	mɨt	**Margi**	mɨta	**Kotoko Island**	matɨ
Daba	mɨts	**Mandara**	mɨtsa	**Kotoko North**	madɨ
Mafa	mɨtsa	**Mofu**	mɨt	**Kotoko Centre**	mɨt
Tera	mɨt	**Maroua**	muts	**Kotoko South**	mara
Sukur	ŋʷɨs	**Lamang**	mɨta	**Musgum**	mɨdɨ ʸ
Hurza	mɨts	**Higi**	mɨtɨ	**Gidar**	ɨmta

(144) *maj 'mouth'

Group	Root	Group	Root	Group	Root
Bata	ma	**Margi**	mja	**Kotoko Island**	
Daba	ma	**Mandara**	wa	**Kotoko North**	
Mafa	ma	**Mofu**	maj	**Kotoko Centre**	
Tera	me	**Maroua**	ma ʸ	**Kotoko South**	me
Sukur	ŋʷɨ	**Lamang**	waj	**Musgum**	maj
Hurza	ma ʸ, ʔam	**Higi**	mi	**Gidar**	ma

(145) *mar 'oil'

Group	Root	Group	Root	Group	Root
Bata	marɨ	**Margi**	mal	**Kotoko Island**	
Daba	mal ʸ	**Mandara**	malɨ	**Kotoko North**	
Mafa	mar	**Mofu**	amal	**Kotoko Centre**	
Tera	mar	**Maroua**	mal	**Kotoko South**	amɨl
Sukur	mir	**Lamang**		**Musgum**	mal
Hurza	amar	**Higi**		**Gidar**	malɨ ʸ

10.2.5.2 Word-medial

(146) *ɬɨmɨɗ ʸ 'ear'

Group	Root	Group	Root	Group	Root
Bata	ʤɨmi ʸ	**Margi**	ɬɨmi ʸ	**Kotoko Island**	hɨmu
Daba	ʤɨmiʔ ʸ	**Mandara**	ɬɨmi ʸ	**Kotoko North**	ɬɨm
Mafa	ʤɨmaɗ	**Mofu**	ɬɨmaj	**Kotoko Centre**	ɬɨmi
Tera	ʤim	**Maroua**	ɬɨmɨɗ ʸ	**Kotoko South**	sime
Sukur	ʤɨmaj	**Lamang**	ɬɨmɨŋ	**Musgum**	ɬɨma ʷ
Hurza	ɬɨmaj	**Higi**	ɬɨmɨ	**Gidar**	ɬɨma

(147) *hɨmɨɗ ʸ 'wind'

Group	Root	Group	Root	Group	Root
Bata	midɨ	**Margi**	samaɗ ʸ	**Kotoko Island**	haᵐbadɨ
Daba	mɨɗ ʸ	**Mandara**		**Kotoko North**	samaɗe
Mafa	mamaɗ ʸ	**Mofu**	hɨmɨɗ ʸ	**Kotoko Centre**	sɨmadɨ
Tera		**Maroua**	hɨmɨɗ ʸ	**Kotoko South**	sɨmaɗe
Sukur	mɨɗ ʸ	**Lamang**		**Musgum**	sɨmaɗ ʸ
Hurza	hɨmaɗe	**Higi**		**Gidar**	sɨmja

In this root, and in the root *kʷɨhɨm 'mouse', there are instances of /s/ where we would expect /h/. There was no regular change *s→h or *h→s in these groups (except Kotoko Island which has *s→h). These cases may be due to the borrowing of a cognate, possibly from the Masa group.

10.2.5.3 Word-final

(148) *ɗɨjɨm 'water'

Group	Root	Group	Root	Group	Root
Bata	maʔi	**Margi**	jimi	**Kotoko Island**	amaj
Daba	jɨm	**Mandara**	jɨwɨ	**Kotoko North**	ame
Mafa	jam	**Mofu**	jam	**Kotoko Centre**	am
Tera	ɗʲɨm	**Maroua**	jam	**Kotoko South**	aʔɨm
Sukur	jam	**Lamang**	imi	**Musgum**	ʔɨjam
Hurza	aʔam	**Higi**	jame	**Gidar**	

(149) *ɗawɨm 'honey'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	wɨmɨ	**Kotoko Island**	
Daba	ɓaɓam ʷ	**Mandara**	ɗama	**Kotoko North**	mam
Mafa	ᵐgbam	**Mofu**	awɨm	**Kotoko Centre**	imam
Tera		**Maroua**	amam	**Kotoko South**	amama
Sukur	mam	**Lamang**	omo	**Musgum**	wamaj
Hurza	wɨmam	**Higi**		**Gidar**	amɨma

(150) *zɨm 'to eat'

Group	Root	Group	Root	Group	Root
Bata	zɨm	**Margi**	sim	**Kotoko Island**	hɨm
Daba	zɨm	**Mandara**	zɨwa	**Kotoko North**	sɨm
Mafa		**Mofu**	zɨm	**Kotoko Centre**	zɨm
Tera	zɨm	**Maroua**	zuma, zimi	**Kotoko South**	hʷɨma
Sukur		**Lamang**	za	**Musgum**	simi, zum
Hurza		**Higi**	zɨmɨ	**Gidar**	ɨzɨma

10.2.6 *ᵐb

*ᵐb appears in a number of well-attested roots. It occurs in initial and medial position, but not in final position. It is stable, with no known consistent changes. It is by far the best-attested pre-nasalized phoneme.

In the root for 'navel', *ᵐbʷ is reconstructed, even though no other labialized labials are reconstructed for Proto-Central Chadic (see section 11.3.3). It may be that this root was borrowed from outside of Central Chadic and originally had a form like e.g. *zɨᵐbuɗ, which was reanalysed with either a back-rounded vowel or a labialized labial consonant according to the preferences of the language. It may also be that there was a *w somewhere in the root which transferred to the *ᵐb (see section 11.3). Or the root could be a reduced form of a compound such as *zɨᵐbɨ hʷɨɗ, where *hʷɨɗ is the reconstructed root for 'belly'. Until there is an answer, *ᵐbʷ will be retained in the reconstruction.

10.2.6.1 Word-initial

(151) *ᵐbɨwran 'tamarind'

Group	Root	Group	Root	Group	Root
Bata	ᵐbɨwran	Margi	ᵐbɨwla	Kotoko Island	
Daba		Mandara	amɨrɨ	Kotoko North	
Mafa	ᵐbɨwram	Mofu	ᵐbɨwlar	Kotoko Centre	
Tera	ᵐbɨrɨn	Maroua	ᵐbɨwlam	Kotoko South	
Sukur	ᵐbɨlɨm	Lamang	ᵐbɨlam	Musgum	
Hurza		Higi	ᵐbɨwlaŋ	Gidar	

(152) *ᵐbɨɗa 'to change'

Group	Root	Group	Root	Group	Root
Bata		Margi		Kotoko Island	
Daba	ᵐbaɗ	Mandara	ᵐbɨɗa	Kotoko North	
Mafa		Mofu	ᵐbɨɗ	Kotoko Centre	
Tera		Maroua	ᵐbɨɗa ʸ	Kotoko South	
Sukur	ᵐbɨɗa	Lamang	ᵐbɨɗa	Musgum	
Hurza	ᵐbɨɗa	Higi	ᵐbɨɗɨ	Gidar	

(153) *ᵐba 'to be able'

Group	Root	Group	Root	Group	Root
Bata	ᵐba	Margi		Kotoko Island	
Daba	ᵐbaj	Mandara	ᵐba	Kotoko North	
Mafa		Mofu	ᵐba	Kotoko Centre	
Tera		Maroua		Kotoko South	
Sukur		Lamang		Musgum	
Hurza	ᵐba	Higi	ᵐba	Gidar	ᵐba

10.2.6.2 Word-medial

(154) *haᵐbɨz ʸ 'blood'

Group	Root	Group	Root	Group	Root
Bata	zaᵐbe	Margi	masi ʸ	Kotoko Island	
Daba	haᵐbɨz	Mandara	mɨzɨ ʸ	Kotoko North	
Mafa	baᵐbaz ʸ	Mofu	haᵐbɨz ʸ	Kotoko Centre	
Tera		Maroua	hɨᵐbɨs ʷ	Kotoko South	
Sukur	muᵐbus	Lamang		Musgum	
Hurza	mɨza ʸ	Higi	mimi	Gidar	

(155) *zɨᵐbʷiɗ 'navel'

Group	Root	Group	Root	Group	Root
Bata	zɨᵐbʷiɗɨ ʸ	**Margi**	sɨᵐbʷiɗiwʸ	**Kotoko Island**	
Daba		**Mandara**	zɨᵐbɨ ʸ	**Kotoko North**	saᵐbu
Mafa	zɨmal ʸ	**Mofu**	zɨᵐbal ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**	ziᵐbiɗ	**Musgum**	
Hurza		**Higi**	zʲɨᵐbʷiɗ	**Gidar**	

(156) *hɨᵐbɨw 'armpit'

Group	Root	Group	Root	Group	Root
Bata	mʷamʷa	**Margi**	hʷɨᵐbɨ	**Kotoko Island**	
Daba	haᵐbɨwa	**Mandara**		**Kotoko North**	
Mafa	ᵐbɨhaw	**Mofu**	hʷɨᵐbajak ʸ, hiᵐbɨɗ ʸ, ᵐbɨwa	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	aᵐbajakʷ ʸ	**Higi**	haᵐbɨwɨ	**Gidar**	

10.3 Alveolar Consonants

10.3.1 *t

*t is found in word-initial, word-medial and word-final position, though there are only two roots reconstructed with *t in medial position, and only one in word-final position.

*t is stable, with its reflexes being /t/ consistently through its history in Central Chadic, with only a few sporadic variations.

10.3.1.1 Word-initial

(157) *tip 'to spit'

Group	Root	Group	Root	Group	Root
Bata	tif	**Margi**	tifa	**Kotoko Island**	
Daba	tɨf ʸ	**Mandara**	tifa	**Kotoko North**	tafɨ
Mafa	ⁿdzɨf ʸ	**Mofu**	tɨf	**Kotoko Centre**	tɨf
Tera		**Maroua**	tɨf ʷ	**Kotoko South**	
Sukur	tifa	**Lamang**	tɨf	**Musgum**	tɨf ʷ
Hurza	tifa	**Higi**	tifi	**Gidar**	

(158) *tɨra 'moon'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	tɨra	**Mandara**	tila	**Kotoko North**	tedɨ
Mafa		**Mofu**		**Kotoko Centre**	tedɨ
Tera	tera	**Maroua**		**Kotoko South**	
Sukur	tja	**Lamang**	tila	**Musgum**	tɨla [y]
Hurza		**Higi**	tɨri	**Gidar**	tɨla

(159) *tɨma 'sheep'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	tɨmɨk	**Mandara**	tɨwa	**Kotoko North**	
Mafa	tamak	**Mofu**	tɨma	**Kotoko Centre**	
Tera	ⁿdɨɓaŋ	**Maroua**	tɨma	**Kotoko South**	
Sukur		**Lamang**	tɨwak	**Musgum**	tɨma
Hurza	tɨma	**Higi**	tɨmɨ	**Gidar**	tɨma [y]

10.3.1.2 Word-medial

(160) *kʷɨtɨr [y] 'tail'

Group	Root	Group	Root	Group	Root
Bata	hʷɨtɨrɨ	**Margi**		**Kotoko Island**	
Daba	kʷɨtal [y]	**Mandara**	kʷɨtɨlɨ [y]	**Kotoko North**	
Mafa	hʷadar, fɨtar [w]	**Mofu**	hʷɨtɨl [y]	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	tur	**Lamang**	hʷɨtɨl	**Musgum**	
Hurza	kʷɨtar [y]	**Higi**		**Gidar**	kɨtɨr [w]

10.3.1.3 Word-final

There is only one root with *t in word-final position, and that root is not reconstructed with a high degree of confidence.

(161) *sɨmɨt [y] 'broom'

Group	Root	Group	Root	Group	Root
Bata	sɨmtɨ [y]	**Margi**	simtu [y]	**Kotoko Island**	
Daba		**Mandara**	samatɨ	**Kotoko North**	
Mafa	saᵐbak	**Mofu**		**Kotoko Centre**	msisi
Tera	siseeti	**Maroua**		**Kotoko South**	
Sukur	sɨɓɨk	**Lamang**	siʔʷit	**Musgum**	
Hurza		**Higi**	sʲɨmɨ	**Gidar**	

10.3.2 *d

*d is found in word-initial and word-medial positions. There is a change *d→t in initial position in the Higi and Margi groups.

10.3.2.1 Word-initial

(162) *d 'to cook'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	ta	**Kotoko Island**	
Daba	da	**Mandara**	da	**Kotoko North**	da
Mafa		**Mofu**	da	**Kotoko Centre**	
Tera		**Maroua**	di	**Kotoko South**	udo
Sukur	dɨ	**Lamang**	da	**Musgum**	di
Hurza	da	**Higi**	ta	**Gidar**	ɨda

(163) *daɣɨlɨj 'girl'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	dahalaj	**Mandara**	dahɨlɨ ʸ	**Kotoko North**	
Mafa	dahla	**Mofu**	dahɨlaj	**Kotoko Centre**	
Tera		**Maroua**	dɨlɨ ʸ	**Kotoko South**	
Sukur	dɨgɨli	**Lamang**	daɣali	**Musgum**	
Hurza	dalaj	**Higi**	diɣɨlʲi	**Gidar**	

(164) *dɨrɨm 'horn'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	tɨlɨm	**Kotoko Island**	
Daba		**Mandara**	dɨrɨma	**Kotoko North**	
Mafa	dɨram ʷ	**Mofu**	dɨram	**Kotoko Centre**	
Tera		**Maroua**	dɨrɨm ʷ	**Kotoko South**	
Sukur	twam	**Lamang**	duli	**Musgum**	
Hurza		**Higi**	tɨlimʷɨ	**Gidar**	

10.3.2.2 Word-medial

(165) *hadik 'thorn'

Group	Root	Group	Root	Group	Root
Bata	dihɨ	**Margi**		**Kotoko Island**	
Daba		**Mandara**	adakɨ	**Kotoko North**	
Mafa	hɨtak	**Mofu**	hadak	**Kotoko Centre**	
Tera	ⁿdeki	**Maroua**		**Kotoko South**	
Sukur	dzɨk ʸ	**Lamang**	tiki	**Musgum**	hadak ʸ
Hurza	adak	**Higi**	tikɨ	**Gidar**	

(166) *madɨwan 'rat'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	maⁿdɨwan	**Mandara**	madɨwanɨ	**Kotoko North**	
Mafa	madɨwan	**Mofu**	madɨwan	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	mɨdwan	**Lamang**		**Musgum**	
Hurza	mɨdɨdɨwan	**Higi**		**Gidar**	

10.3.3 *ɬ

*ɬ is a very well-attested phoneme in Proto-Central Chadic. It has the reflex /ɮ/ in the Mafa, Daba and Sukur groups. It also has the reflex /ɮ/ in a few languages of the Bata group, with its reflex in the rest of the Bata group being /l/. In Kotoko South it has the reflex /s/, as it is in many of the languages of the Kotoko Centre and North groups. In Kotoko Island it has the reflex /h/.

10.3.3.1 Word-initial

(167) *ɬɨɗɨn ^{y} 'tooth'

Group	Root	Group	Root	Group	Root
Bata	ɮɨnɨ ^{y}	**Margi**	ɬɨr ^{y}	**Kotoko Island**	hɨnaj
Daba	ɮɨɗaŋ ^{y}	**Mandara**	ɬɨrɨ ^{y}	**Kotoko North**	ɬɨr
Mafa	ɮan ^{y}	**Mofu**	ɬɨr ^{y}	**Kotoko Centre**	ɬɨni
Tera	ɮin	**Maroua**	ɬɨn ^{y}	**Kotoko South**	sin
Sukur	ɮɨn ^{y}	**Lamang**	ɬɨɗɨŋ	**Musgum**	ɬɨŋ
Hurza	ɬahan	**Higi**	ɬɨnɨ	**Gidar**	ɬaja

(168) *ɬɨmɨɗ ^{y} 'ear'

Group	Root	Group	Root	Group	Root
Bata	ɮɨmi ^{y}	**Margi**	ɬɨmi ^{y}	**Kotoko Island**	hɨmu
Daba	ɮɨmiʔ ^{y}	**Mandara**	ɬɨmi ^{y}	**Kotoko North**	ɬɨm
Mafa	ɮɨmaɗ	**Mofu**	ɬɨmaj	**Kotoko Centre**	ɬɨmi
Tera	ɮim	**Maroua**	ɬɨmɨɗ ^{y}	**Kotoko South**	sime
Sukur	ɮɨmaj	**Lamang**	ɬɨmɨŋ	**Musgum**	ɬɨma ^{w}
Hurza	ɬɨmaj	**Higi**	ɬɨmɨ	**Gidar**	ɬɨma

(169) *ɬa 'cow'

Group	Root	Group	Root	Group	Root
Bata	ɮa	**Margi**	ɬa	**Kotoko Island**	ha
Daba	ɮa	**Mandara**	iɬa	**Kotoko North**	ɬa
Mafa	ɮa	**Mofu**	ɬa	**Kotoko Centre**	ɬa
Tera	ɮa	**Maroua**	ɬa	**Kotoko South**	sa
Sukur	ɮɨ	**Lamang**	ɬa	**Musgum**	ɬaj
Hurza	ɬa	**Higi**	ɬa	**Gidar**	waɬija

10.3.3.2 Word-medial

(170) *ɗɨɬij 'egg'

Group	Root	Group	Root	Group	Root
Bata	ɗaɮi	**Margi**	hʲɨhʲɨ	**Kotoko Island**	
Daba	naɮɨɗ ʸ	**Mandara**	ɬija	**Kotoko North**	enɬɨ
Mafa	ɬaɬaj	**Mofu**	ɗɨɬij	**Kotoko Centre**	enɬɨ
Tera		**Maroua**	ataɬ ʸ	**Kotoko South**	nsi
Sukur	ɗaⁿgaɮaj	**Lamang**	ɬiɬi	**Musgum**	ɮat ʸ
Hurza	ɮaj	**Higi**	jɨɬɨ	**Gidar**	ɗaⁿgɮa ʸ

(171) *ɗiɬ 'bone'

Group	Root	Group	Root	Group	Root
Bata	iɮɨ	**Margi**	ɗaɬɨ ʸ	**Kotoko Island**	ahaj
Daba		**Mandara**	ɬaɬi	**Kotoko North**	enɬ'i
Mafa	taɬ	**Mofu**	itaɬ	**Kotoko Centre**	eɬi
Tera	ɗiɬi	**Maroua**	ataɬ	**Kotoko South**	asis'ɨ
Sukur	taɬ	**Lamang**		**Musgum**	
Hurza		**Higi**	ʔʲiɬɨ	**Gidar**	ɬaŋɬaŋ ʸ

(172) *hʷɨɗɬ ʸ 'cough'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	wɨɗɬa	**Kotoko Island**	
Daba		**Mandara**	hʷɨɬah ʸ	**Kotoko North**	hʷɨɗɬa
Mafa	wɨɬa	**Mofu**	hʷɨɗɬ ʸ	**Kotoko Centre**	wɨɗɬa
Tera	kʷɨɮa	**Maroua**	hɨrɬa ʸ	**Kotoko South**	wasja
Sukur	ɮar ʸ	**Lamang**		**Musgum**	hʷaɬ
Hurza	ɮɨɮah ʸ	**Higi**	ʔʲiɬa	**Gidar**	wɨrɬa

10.3.3.3 Word-final

(173) *tsɨɫ ʸ 'to hatch'

Group	Root	Group	Root	Group	Root
Bata	tsatsaɫɨ ʸ	**Margi**		**Kotoko Island**	
Daba		**Mandara**	tsɨɫa ʸ	**Kotoko North**	
Mafa		**Mofu**	tsaɫ ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	tsɨɫ ʸ	**Lamang**	tsɨɫ	**Musgum**	
Hurza	tsaɫ ʸ	**Higi**		**Gidar**	

(174) *taɫ 'cold'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	mɨtaɫ	**Kotoko Island**	
Daba		**Mandara**	mɨtaɫɨ	**Kotoko North**	
Mafa	mɨtaɫ	**Mofu**	taɫ	**Kotoko Centre**	taɫɨ
Tera		**Maroua**	muteɫaŋ	**Kotoko South**	
Sukur		**Lamang**	mɨtaɫ	**Musgum**	
Hurza		**Higi**	taɫi	**Gidar**	

(175) *hɨpaɫ ʸ 'shoulder'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	apaɫa	**Kotoko Island**	
Daba		**Mandara**	aɫapɨ ʸ	**Kotoko North**	
Mafa	paɫpaɫ ʸ	**Mofu**	hɨpaɫ ʸ	**Kotoko Centre**	
Tera		**Maroua**	papaɮ ʸ	**Kotoko South**	
Sukur	tapaɫ	**Lamang**		**Musgum**	
Hurza	paɫpaɫ ʸ	**Higi**	baɮa	**Gidar**	

*10.3.4 *ɮ*

There are only eight roots reconstructed containing *ɮ. However the roots are reasonably well-attested, and provide sufficient evidence for reconstructing *ɮ for Proto-Central Chadic. Interestingly, in the root for camel, which comes from Berber alɣʷəm (Skinner 1977), the [l] was adapted to become a voiced lateral fricative. This would be natural if the root was introduced at a very early stage, since there was no *l in Proto-Central Chadic. However, wider evidence suggests a later time for the introduction of the root (Kossmann 2005), in which case we must look elsewhere for a motivation for this change. There was a regular change *ɮ→ɫ in Proto-Gidar.

10.3.4.1 Word-initial

(176) *ɮɨgʷamɨ ʸ 'camel'

Group	Root	Group	Root	Group	Root
Bata	ɮɨgʷamɨ ʸ	**Margi**	ɮɨgʷam	**Kotoko Island**	logʷɨme
Daba	ɮakama ʷ	**Mandara**	ɮɨgʷamɨ	**Kotoko North**	logome
Mafa		**Mofu**	ɮɨgʷama ʸ	**Kotoko Centre**	
Tera	ɮimox	**Maroua**		**Kotoko South**	
Sukur	ɮɨgʷam	**Lamang**		**Musgum**	lukma
Hurza	ɮɨgʷama ʸ	**Higi**	ɬɨgʷami	**Gidar**	ɬagama ʷ

(177) *ɮɨdɨm 'five'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	ɮidɨm	**Kotoko North**	
Mafa	ɮam	**Mofu**	ɮɨm	**Kotoko Centre**	
Tera		**Maroua**	ɮiⁿdam	**Kotoko South**	
Sukur	ɮam	**Lamang**		**Musgum**	ʔɨɬɨm ʸ
Hurza		**Higi**		**Gidar**	ɬaʔ ʸ

(178) *ɮɨwɨn 'fear'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	ɮiɮɨwi	**Kotoko North**	
Mafa	ɮaw	**Mofu**	ɮiwɨr ʸ	**Kotoko Centre**	
Tera		**Maroua**	ɮiwɨn	**Kotoko South**	
Sukur		**Lamang**	ɮiwiŋ	**Musgum**	
Hurza	ɮɨwan	**Higi**		**Gidar**	

10.3.4.2 Word-medial

(179) *ᵐbaɮa 'beer'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	ᵐbaɮa	**Mandara**	ᵐbaɮa	**Kotoko North**	
Mafa		**Mofu**	ᵐbaɮa	**Kotoko Centre**	
Tera		**Maroua**	ᵐbaɮa	**Kotoko South**	
Sukur	mɨpaɮɨ	**Lamang**		**Musgum**	
Hurza		**Higi**	ᵐbaɮɨ	**Gidar**	ᵐbaɮa

10.3.4.3 Word-final

(180) *gʷɨdɨʒ 'to belch'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	ʒagʷi	**Kotoko Island**	
Daba	gɨdɨʒ	**Mandara**	gɨʒa	**Kotoko North**	ɬ'a
Mafa	gʷɨdɨʒa	**Mofu**	gɨdɨʒ	**Kotoko Centre**	iɬi
Tera		**Maroua**	ʔirʒiʔɨ ʸ	**Kotoko South**	
Sukur		**Lamang**	ŋɨʒu	**Musgum**	
Hurza	dɨzla	**Higi**	ʒi	**Gidar**	

10.3.5 *ɗ

*ɗ is widely attested in the Proto-Central Chadic reconstructions, being by far the most common of the implosive phonemes. It is frequently reduced to /ʔ/ or lost altogether in present-day languages, particularly in palatalized words where it often has the reflex /j/. In certain cases the glottal component fuses with *w and creates the reflex /ɓ/. In some languages it has the reflex /r/.

10.3.5.1 Word-initial

(181) *ɗɨwah 'breast, milk'

Group	Root	Group	Root	Group	Root
Bata	ʔʷa	**Margi**	ʔɨwa	**Kotoko Island**	
Daba	ʔʷa	**Mandara**	wɨɓa	**Kotoko North**	eʔʷi
Mafa	wa	**Mofu**	ɗɨwah	**Kotoko Centre**	iwi
Tera	ɓiɓi	**Maroua**	ɗɨwa	**Kotoko South**	
Sukur	ʔʷa	**Lamang**	ɗɨwa	**Musgum**	
Hurza		**Higi**	ʔʷa	**Gidar**	

(182) *ɗap 'food (millet boule)'

Group	Root	Group	Root	Group	Root
Bata	ɗafa	**Margi**	ɗɨfɨ	**Kotoko Island**	
Daba		**Mandara**	ɗafɨ	**Kotoko North**	
Mafa	ɗaf	**Mofu**	ɗaf	**Kotoko Centre**	
Tera		**Maroua**	ɗaf	**Kotoko South**	
Sukur	ɗaf	**Lamang**	ɗafa	**Musgum**	
Hurza	ɗaf	**Higi**	ɗafa	**Gidar**	

(183) *ɗɨjɨkʷ 'bird'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	ɗɨjakʷ	**Kotoko Island**	
Daba		**Mandara**	ɗɨjak	**Kotoko North**	
Mafa	ɗɨjak	**Mofu**	ɗɨjɨŋʷ	**Kotoko Centre**	
Tera	ɗiki	**Maroua**	ɗɨjɨw	**Kotoko South**	
Sukur	ʔʲak	**Lamang**	ɗɨjak	**Musgum**	
Hurza		**Higi**	ɗɨjɨkʷɨ	**Gidar**	

10.3.5.2 Word-medial

(184) *pɨɗakʷ ʸ 'razor'

Group	Root	Group	Root	Group	Root
Bata	pɨɗɨkʷa ʸ	**Margi**	parkʷɨ ʸ	**Kotoko Island**	
Daba	pɨɗakʷ ʸ	**Mandara**	pɨɗakʷ ʸ	**Kotoko North**	
Mafa	pɨɗakʷ ʸ	**Mofu**	pɨɗakʷ ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	pɨɗakʼʷ ʸ	**Lamang**		**Musgum**	
Hurza		**Higi**	pɨɗikʷ	**Gidar**	

(185) *kʷaɗah 'to boil'

Group	Root	Group	Root	Group	Root
Bata	kʷaɗasa ʸ	**Margi**	kʷɨdu	**Kotoko Island**	
Daba	kʷɨɗah ʸ	**Mandara**	kʷaɗah	**Kotoko North**	
Mafa	kʷɨɗaha	**Mofu**	kʷaɗah	**Kotoko Centre**	
Tera	kʷɨɗah	**Maroua**		**Kotoko South**	
Sukur		**Lamang**	kʷaɗah	**Musgum**	
Hurza	kʷaɗah	**Higi**		**Gidar**	

(186) *ɮ̢ɨɗɨm 'five'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	ɮ̢iɗɨm	**Kotoko North**	
Mafa	ɮ̢am	**Mofu**	ɮ̢ɨm	**Kotoko Centre**	
Tera		**Maroua**	ɮ̢iⁿdam	**Kotoko South**	
Sukur	ɮ̢am	**Lamang**		**Musgum**	ʔɨɬɨm ʸ
Hurza		**Higi**		**Gidar**	ɬaʔ ʸ

10.3.5.3 Word-final

(187) *ɬɨwɨɗ ʸ 'meat'

Group	Root	Group	Root	Group	Root
Bata	ɮɨwɨ ʸ	**Margi**		**Kotoko Island**	hu
Daba	ɮɨj ʸ	**Mandara**	ɬɨwɨɗ ʸ	**Kotoko North**	ɬɨw
Mafa	ɮɨwaɗ ʸ	**Mofu**	ɬɨw	**Kotoko Centre**	ɬɨw
Tera	ɮu	**Maroua**		**Kotoko South**	asu
Sukur	ɬɨwɨɗ ʸ	**Lamang**	ɬiʔʷi	**Musgum**	ɬɨwɨt
Hurza	ɬɨwaɗ ʸ	**Higi**	ɬɨj	**Gidar**	ɬɨwɨ

(188) *wɨpaɗ 'four'

Group	Root	Group	Root	Group	Root
Bata	fʷaɗ	**Margi**	fʷaɗu	**Kotoko Island**	
Daba	faɗ ʷ	**Mandara**	ufadɨ	**Kotoko North**	
Mafa	faɗ	**Mofu**	wɨfaɗ	**Kotoko Centre**	
Tera	foɗa	**Maroua**	mufaɗ	**Kotoko South**	foɗi
Sukur	fwaɗ	**Lamang**	wɨfaɗ	**Musgum**	pɨdɨ ʷ
Hurza	fuɗaw	**Higi**	wɨfadɨ	**Gidar**	paɗa ʷ

(189) *dzɨwɨɗ ʸ 'fly (insect)'

Group	Root	Group	Root	Group	Root
Bata	dzɨʔɨ ʸ	**Margi**	tsɨdɨ ʸ	**Kotoko Island**	hadzu
Daba	dzɨwɨɗ ʸ	**Mandara**	ⁿdzɨwɨɗ ʸ	**Kotoko North**	ts'ɨwi
Mafa	dzɨwaj	**Mofu**	dzɨwaj	**Kotoko Centre**	zɨwɨɗ
Tera		**Maroua**	dzɨdzɨwɨɗ ʸ	**Kotoko South**	dzadzwi
Sukur	dʒɨwɨɗ ʸ	**Lamang**	ziwɗi	**Musgum**	dɨwaj
Hurza	dzɨwaj	**Higi**	zʲɨwiɗ	**Gidar**	zɨkɗa ʸ

10.3.6 *n

*n is found in initial, medial and final positions, though it is surprisingly rare in initial position. It is the most common phoneme in final position. Word-finally, *n→r in the Mofu, Mandara and Margi groups. In many other groups *n has the reflex [ŋ] word-finally, and in some cases this has led to the phonemicisation of /ŋ/. In the Mandara group there was also a change *n→r word-medially.

10.3.6.1 Word-initial

Only two roots have been reconstructed with initial *n.

(190) *nɨɣ 'to see'

Group	Root	Group	Root	Group	Root
Bata	nɨɣ	**Margi**		**Kotoko Island**	
Daba		**Mandara**	nɨya	**Kotoko North**	
Mafa		**Mofu**	nɨk	**Kotoko Centre**	
Tera	na	**Maroua**	nahi	**Kotoko South**	
Sukur		**Lamang**	nɨya	**Musgum**	
Hurza		**Higi**	nɨɣɨ	**Gidar**	

(191) *nɨh 'to ripen'

Group	Root	Group	Root	Group	Root
Bata	na	**Margi**	nɨya	**Kotoko Island**	
Daba	na	**Mandara**	na	**Kotoko North**	na
Mafa	nɨh	**Mofu**	nɨh^w	**Kotoko Centre**	naha
Tera		**Maroua**	nɨh ^y	**Kotoko South**	wɨnha
Sukur		**Lamang**		**Musgum**	niyi
Hurza	nah	**Higi**	naka	**Gidar**	

10.3.6.2 Word-medial

(192) *vɨnah 'to vomit'

Group	Root	Group	Root	Group	Root
Bata	vɨna	**Margi**		**Kotoko Island**	
Daba	vɨna	**Mandara**	vɨraha	**Kotoko North**	
Mafa	vɨnaha ^y	**Mofu**	vɨnaha	**Kotoko Centre**	vɨnahɨ
Tera	vɨnah	**Maroua**		**Kotoko South**	vɨnaha
Sukur	vɨnah	**Lamang**	vɨnih	**Musgum**	fɨna ^y
Hurza	vɨnah ^y	**Higi**	vɨnɨh^wɨ	**Gidar**	

(193) *bana 'to wash'

Group	Root	Group	Root	Group	Root
Bata	binɨ	**Margi**		**Kotoko Island**	benu
Daba	ban	**Mandara**	bara	**Kotoko North**	^mban
Mafa	pana	**Mofu**	bara	**Kotoko Centre**	ban
Tera		**Maroua**	buna	**Kotoko South**	bana
Sukur	ban	**Lamang**		**Musgum**	
Hurza	bana	**Higi**	pi	**Gidar**	

(194) *kʷɨnɨj 'urine'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	kʷɨni	**Kotoko Island**	kʷaraj
Daba		**Mandara**	kʷɨrɨj	**Kotoko North**	kʷɨre
Mafa	kʷɨraj	**Mofu**	kʷɨnaj	**Kotoko Centre**	kʷɨne
Tera		**Maroua**	kʷɨnaj	**Kotoko South**	kɨmaɗe
Sukur	kʷɨr ʸ	**Lamang**	kʷani	**Musgum**	
Hurza	mɨkaɗaj	**Higi**		**Gidar**	kɨna ʸ

10.3.6.3 Word-final

(195) *ɬɨɗɨn ʸ 'tooth'

Group	Root	Group	Root	Group	Root
Bata	ɟinɨ ʸ	**Margi**	ɬɨr ʸ	**Kotoko Island**	hɨnaj
Daba	ɟɨɗaŋ ʸ	**Mandara**	ɬɨrɨ ʸ	**Kotoko North**	ɬɨr
Mafa	ɟan ʸ	**Mofu**	ɬɨr ʸ	**Kotoko Centre**	ɬɨni
Tera	ɟin	**Maroua**	ɬɨn ʸ	**Kotoko South**	sin
Sukur	ɟɨn ʸ	**Lamang**	ɬɨɗîŋ	**Musgum**	ɬɨŋ
Hurza	ɬahan	**Higi**	ɬɨnɨ	**Gidar**	ɬaja

(196) *sɨn 'to know'

Group	Root	Group	Root	Group	Root
Bata	sɨna	**Margi**	sin	**Kotoko Island**	hɨn
Daba	sɨn	**Mandara**	sɨr	**Kotoko North**	sɨn
Mafa	sɨna	**Mofu**	sɨr	**Kotoko Centre**	sɨn
Tera	zɨni	**Maroua**	sɨn	**Kotoko South**	sɨŋ
Sukur	sɨ	**Lamang**	sɨna	**Musgum**	
Hurza	sɨna	**Higi**	sɨna	**Gidar**	ɨsɨna

(197) *dzavɨn 'guinea-fowl'

Group	Root	Group	Root	Group	Root
Bata	zavʷɨn	**Margi**	tsɨvɨr	**Kotoko Island**	
Daba	zavɨn	**Mandara**	zabɨra ʸ	**Kotoko North**	tsafan
Mafa	zapan	**Mofu**	dzavɨr	**Kotoko Centre**	zavan
Tera	tsivan	**Maroua**	tsɨvɨn ʷ	**Kotoko South**	dzavaŋ
Sukur	zabɨn	**Lamang**	zivɨn	**Musgum**	tsaavan ʸ
Hurza	zavɨn	**Higi**	zivɨn	**Gidar**	zamvɨna

10.3.7 ^{n}d

The phoneme *^{n}d is found in initial and medial positions. Only three roots have been constructed for this phoneme.

10.3.7.1 Word-initial

(198) *^{n}dɨw 'person'

Group	Root	Group	Root	Group	Root
Bata	ɨ^{n}dɨw	**Margi**	^{n}du	**Kotoko Island**	
Daba		**Mandara**	wɨ^{n}dɨ	**Kotoko North**	
Mafa	^{n}da ^{w}	**Mofu**	^{n}daw	**Kotoko Centre**	
Tera	^{n}dɨk^{w}ɨ	**Maroua**		**Kotoko South**	
Sukur	^{n}dɨw	**Lamang**	mɨ^{n}du	**Musgum**	
Hurza		**Higi**	wɨ^{n}dɨ	**Gidar**	

(199) *^{n}da 'to swallow'

Group	Root	Group	Root	Group	Root
Bata	^{n}da	**Margi**		**Kotoko Island**	
Daba		**Mandara**	^{n}dɨ	**Kotoko North**	
Mafa		**Mofu**	^{n}da	**Kotoko Centre**	
Tera		**Maroua**	^{n}di	**Kotoko South**	
Sukur	^{n}dam	**Lamang**	^{n}da	**Musgum**	
Hurza		**Higi**	^{n}da	**Gidar**	

10.3.7.2 Word-medial

(200) *h^{w}a^{n}dav 'hare'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	ma^{n}davan	**Mandara**		**Kotoko North**	
Mafa	wa^{n}dav	**Mofu**	h^{w}a^{n}dav	**Kotoko Centre**	
Tera		**Maroua**	ma^{n}daf	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	mudivaj
Hurza	^{n}dɨvan ^{y}	**Higi**		**Gidar**	ma^{n}dava

This root may be cognate with *vida 'hare', in which case the root given here does not contribute evidence for Proto-Central Chadic *^{n}d, but shows a later prenasalization of *d.

10.3.8 *r

The phoneme *r is extremely well-attested, and occurs in all positions. In many of the groups it has undergone *r→l, with only the Bata, Sukur, Mafa, Hurza, Tera and Daba groups retaining *r.

There was no *l phoneme in Proto-Central Chadic.

10.3.8.1 Word-initial

(201) *rɨgɨɗ ʸ 'bow (weapon)'

Group	Root	Group	Root	Group	Root
Bata	ragɨ	**Margi**	laga	**Kotoko Island**	
Daba		**Mandara**	lika	**Kotoko North**	
Mafa	lakaɗ ʸ, lalaŋ	**Mofu**	hɨlɨgɨɗ ʸ	**Kotoko Centre**	
Tera	ri	**Maroua**	halak ʸ	**Kotoko South**	
Sukur	raj	**Lamang**	lɨɣeɗ	**Musgum**	gɨⁿdɨlɨŋ ʸ
Hurza	lɨga ʸ	**Higi**	lɨgɨj	**Gidar**	

(202) *ra 'to dig'

Group	Root	Group	Root	Group	Root
Bata	ra	**Margi**	la	**Kotoko Island**	la
Daba	ra	**Mandara**	la	**Kotoko North**	
Mafa		**Mofu**	la	**Kotoko Centre**	
Tera	ra	**Maroua**	li	**Kotoko South**	
Sukur	rɨ	**Lamang**	la	**Musgum**	
Hurza	ra	**Higi**	la	**Gidar**	

(203) *rɨwɨts ʸ 'hearth'

Group	Root	Group	Root	Group	Root
Bata	rɨtɨ ʸ	**Margi**		**Kotoko Island**	
Daba	lɨwɨts ʸ	**Mandara**	lɨwtsɨ ʸ	**Kotoko North**	
Mafa	rɨwats ʸ	**Mofu**	lɨwɨt ʸ	**Kotoko Centre**	
Tera		**Maroua**	lɨwɨts ʸ	**Kotoko South**	
Sukur	ruts	**Lamang**	liti	**Musgum**	lɨwɨt ʸ
Hurza	rɨwats ʸ	**Higi**	lɨtwɨ	**Gidar**	

10.3.8.2 Word-medial

(204) *sɨwra 'to fry'

Group	Root	Group	Root	Group	Root
Bata	sɨrɨ	**Margi**	sula	**Kotoko Island**	
Daba	sar	**Mandara**	sula	**Kotoko North**	sɨl
Mafa	sara	**Mofu**	sawla	**Kotoko Centre**	
Tera	zur	**Maroua**	sula	**Kotoko South**	
Sukur	sɨwra	**Lamang**	sula	**Musgum**	sisal
Hurza	sɨwla	**Higi**	sɨlɨ	**Gidar**	

(205) *kɨrɨp ^{y} 'fish'

Group	Root	Group	Root	Group	Root
Bata	kɨrɨfɨ ^{y}	**Margi**	kɨlfi ^{y}	**Kotoko Island**	
Daba	kɨlif ^{y}	**Mandara**	kɨlɨfɨ ^{y}	**Kotoko North**	
Mafa	kɨlaf ^{y}	**Mofu**	kɨlɨf ^{y}	**Kotoko Centre**	
Tera	yɨrvɨ ^{w}	**Maroua**	kɨlɨf ^{y}	**Kotoko South**	kɨlfɨ
Sukur	kɨrif ^{y}	**Lamang**	kɨlɨpi	**Musgum**	hɨlif ^{y}
Hurza	kɨlaf ^{y}	**Higi**	kɨlipɨ	**Gidar**	kɨlfɨ ^{y}

(206) *sɨraj 'leg'

Group	Root	Group	Root	Group	Root
Bata	sɨɗɨ	**Margi**	sil	**Kotoko Island**	
Daba	sasalaj	**Mandara**	sɨra	**Kotoko North**	sali
Mafa	sasalaj	**Mofu**	salaj	**Kotoko Centre**	
Tera	sara	**Maroua**	sir, sar	**Kotoko South**	
Sukur		**Lamang**	sɨla	**Musgum**	
Hurza	sɨraj	**Higi**	sɨra	**Gidar**	

10.3.8.3 Word-final

(207) *pɨr 'to untie'

Group	Root	Group	Root	Group	Root
Bata	pɨrɨ	**Margi**	pili	**Kotoko Island**	felu
Daba	pɨl	**Mandara**	pɨla	**Kotoko North**	fal
Mafa	pɨr	**Mofu**	pɨl	**Kotoko Centre**	vɨl
Tera	pɨri	**Maroua**		**Kotoko South**	
Sukur	pɨr	**Lamang**	pɨl	**Musgum**	
Hurza	para	**Higi**	pɨl	**Gidar**	ɨppɨla

(208) *mar 'oil'

Group	Root	Group	Root	Group	Root
Bata	marɨ	**Margi**	mal	**Kotoko Island**	
Daba	mal ʸ	**Mandara**	malɨ	**Kotoko North**	
Mafa	mar	**Mofu**	amal	**Kotoko Centre**	
Tera	mar	**Maroua**	mal	**Kotoko South**	amɨl
Sukur	mir	**Lamang**		**Musgum**	mal
Hurza	amar	**Higi**		**Gidar**	malɨ ʸ

(209) *kɨr 'to steal'

Group	Root	Group	Root	Group	Root
Bata	hɨr	**Margi**	hila	**Kotoko Island**	
Daba	hɨl	**Mandara**	ɣɨl	**Kotoko North**	hir
Mafa	kɨr	**Mofu**	kɨl	**Kotoko Centre**	ɣʷɨj
Tera		**Maroua**	hʷɨl	**Kotoko South**	hɨla
Sukur	kɨr	**Lamang**	ɣila	**Musgum**	hɨl
Hurza	kɨra	**Higi**	ɣɨli	**Gidar**	ɨhala

10.4 Laminal Consonants

The laminal consonants have, in many present-day languages, two realisations, one alveolar and one post-alveolar. The post-alveolar realisation is conditioned by the presence of the palatalization prosody, or sometimes by the presence of a front vowel.

10.4.1 *ts

The phoneme *ts is found in initial, medial and final positions. In many cases there has been a change from *ts→t, but this change does not fit nicely within a particular genetic grouping or geographical area, and the changes are not predictable.

The irregular overlapping of the reflexes of *t and *ts may be evidence for these two proto-phonemes sharing a common origin. It is possible that there was a conditioning environment that determined which form was present, but that the conditioning environment has now been lost. Further research outside of Central Chadic is needed to establish this. Newman (1977a) does not reconstruct a separate *ts phoneme for Proto-Chadic. In favour of the inclusion of *ts is the pattern of the consonantal system, where *ts functions as the voiceless laminal stop. There is also a clear distinction between *t and *ts in many of the languages and groups within Central Chadic. Against distinguishing the two is the lack of support from other branches of Chadic, and the absence of

a corresponding phoneme in reconstructions for other branches of Afroasiatic (Kossmann 1999; Weninger 2011). However, Ehret (1995) includes *ts in the inventory for Proto-Afroasiatic.

Here we are treating *ts and *t as distinct phonemes at the level of Proto-Central Chadic and for its descendants.

10.4.1.1 Word-initial

(210) *tsɨvɨɗ ^{y} 'path'

Group	Root	Group	Root	Group	Root
Bata	tɨvɨ	**Margi**		**Kotoko Island**	
Daba	tɨf	**Mandara**	tɨvi	**Kotoko North**	
Mafa	tsɨvaɗ ^{y}	**Mofu**	tɨvɨ ^{y}, tsɨvaɗ ^{y}	**Kotoko Centre**	
Tera	ⁿdzɨva	**Maroua**	dzɨvɨɗ ^{y}	**Kotoko South**	
Sukur	tsivi	**Lamang**	tɨvɨj	**Musgum**	tɨfɨj
Hurza	tsɨvaɗ ^{y}	**Higi**		**Gidar**	tɨva ^{y}

(211) *tsɨwɨ 'to cry'

Group	Root	Group	Root	Group	Root
Bata	tɨwɨ	**Margi**	tiwi, tɨwa	**Kotoko Island**	tsuj
Daba		**Mandara**	tɨwa ^{y}	**Kotoko North**	tsɨwe
Mafa		**Mofu**	tɨwɨ	**Kotoko Centre**	sɨwe
Tera		**Maroua**	tɨwa	**Kotoko South**	tsɨwja
Sukur		**Lamang**	tawa	**Musgum**	tɨwa
Hurza		**Higi**		**Gidar**	

(212) *tsɨkʷɨr 'chicken'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	gʷɨtsɨkɨ	**Kotoko North**	
Mafa	watsak	**Mofu**	wɨtsɨkar ^{y}, maⁿdzɨkʷɨr ^{y}	**Kotoko Centre**	
Tera		**Maroua**	tsɨkʷar	**Kotoko South**	tsakar
Sukur	takʷɨr	**Lamang**	ɣatakʷala	**Musgum**	mɨskɨr
Hurza	ⁿdzɨkʷɨr	**Higi**		**Gidar**	

10.4.1.2 Word-medial

(213) *hʷɨtsɨn ʸ 'nose'

Group	Root	Group	Root	Group	Root
Bata	tsɨnɨ ʸ	**Margi**	hʷɨtsɨr ʸ	**Kotoko Island**	tsɨnaj
Daba	mɨtsɨn ʸ	**Mandara**	hɨtɨrɨ ʸ	**Kotoko North**	tsɨhɨn
Mafa	hɨtsan	**Mofu**	hʷɨtɨr ʸ	**Kotoko Centre**	hɨsɨni
Tera		**Maroua**	hɨtɨn ʷ, kɨtɨŋ ʸ	**Kotoko South**	hɨtsɨne
Sukur	sɨn ʸ	**Lamang**	hɨtsɨŋ	**Musgum**	
Hurza	hʷɨtsan ʸ	**Higi**	hɨtsʲɨn	**Gidar**	

(214) *pitsɨ 'sun'

Group	Root	Group	Root	Group	Root
Bata	fitɨ	**Margi**	pɨtsi	**Kotoko Island**	
Daba	pɨts ʸ	**Mandara**	fatsɨ ʸ	**Kotoko North**	
Mafa	pats	**Mofu**	pats	**Kotoko Centre**	
Tera	fɨɗa	**Maroua**	pas	**Kotoko South**	fatsa
Sukur	pis	**Lamang**	fiti	**Musgum**	futɨj
Hurza	pats	**Higi**	vɨtsi	**Gidar**	

10.4.1.3 Word-final

(215) *mɨts 'to die'

Group	Root	Group	Root	Group	Root
Bata	mɨt	**Margi**	mɨta	**Kotoko Island**	matɨ
Daba	mɨts	**Mandara**	mɨtsa	**Kotoko North**	madɨ
Mafa	mɨtsa	**Mofu**	mɨt	**Kotoko Centre**	mɨt
Tera	mɨt	**Maroua**	muts	**Kotoko South**	mara
Sukur	ŋʷɨs	**Lamang**	mɨta	**Musgum**	mɨdɨ ʸ
Hurza	mɨts	**Higi**	mɨtɨ	**Gidar**	ɨmta

(216) *rɨwɨts ʸ 'hearth'

Group	Root	Group	Root	Group	Root
Bata	rɨtɨ ʸ	**Margi**		**Kotoko Island**	
Daba	lɨwɨts ʸ	**Mandara**	lɨwtsɨ ʸ	**Kotoko North**	
Mafa	rɨwats ʸ	**Mofu**	lɨwɨt ʸ	**Kotoko Centre**	
Tera		**Maroua**	lɨwɨts ʸ	**Kotoko South**	
Sukur	ruts	**Lamang**	liti	**Musgum**	lɨwɨt ʸ
Hurza	rɨwats ʸ	**Higi**	lɨtwɨ	**Gidar**	

10.4.2 *dz

The phoneme *dz is found in initial and medial positions. Reflexes of *dz include /z/, /ts/ and occasionally /d/. The behaviour of *dz does not parallel the behaviour of *ts with respect to its reflexes. There were regular changes *dz→d in Proto-Musgum and *dz→z in Proto-Kotoko Centre and Proto-Gidar. No rules have been established for the other changes affecting *dz.

10.4.2.1 Word-initial

(217) *dzavɨn 'guinea-fowl'

Group	Root	Group	Root	Group	Root
Bata	zavʷɨn	**Margi**	tsɨvɨr	**Kotoko Island**	
Daba	zavɨn	**Mandara**	zabɨrɨ ʸ	**Kotoko North**	tsafan
Mafa	zapan	**Mofu**	dzavɨr	**Kotoko Centre**	zavan
Tera	tsivan	**Maroua**	tsɨvɨn ʷ	**Kotoko South**	dzavaŋ
Sukur	zabɨn	**Lamang**	zɨvɨn	**Musgum**	tsaavan ʸ
Hurza	zavɨn	**Higi**	zivɨn	**Gidar**	zamvɨna

(218) *dzɨwɨɗ ʸ 'fly (insect)'

Group	Root	Group	Root	Group	Root
Bata	dzɨʔɨ ʸ	**Margi**	tsɨɗɨ ʸ	**Kotoko Island**	hadzu
Daba	dzɨwɨɗ ʸ	**Mandara**	ⁿdzɨwɨɗ ʸ	**Kotoko North**	ts'ɨwi
Mafa	dzɨwaj	**Mofu**	dzɨwaj	**Kotoko Centre**	zɨwɨɗ
Tera		**Maroua**	dzɨdzɨwɨɗ ʸ	**Kotoko South**	dzadzwi
Sukur	dʒɨwɨɗ ʸ	**Lamang**	zɨwɗi	**Musgum**	dɨwaj
Hurza	dzɨwaj	**Higi**	zʲɨwɨɗ	**Gidar**	zɨkɗa ʸ

(219) *dzaraj 'locust'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	dzara ʸ	**Mandara**		**Kotoko North**	
Mafa	dzaraj	**Mofu**	dzaraj	**Kotoko Centre**	
Tera	ⁿdzere	**Maroua**	dzaraj	**Kotoko South**	
Sukur	dzalaj	**Lamang**		**Musgum**	
Hurza	dzaraj	**Higi**	dzalaj	**Gidar**	zaraj

10.4.2.2 Word-medial

(220) *hɨrɨdz ʸ 'scorpion'

Group	Root	Group	Root	Group	Root
Bata	hɨradzɨ ʸ	**Margi**	hɨda ʸ	**Kotoko Island**	
Daba	rɨdzɨ ʸ	**Mandara**	radzɨ ʸ	**Kotoko North**	
Mafa	haradz	**Mofu**	hɨrɨda ʸ	**Kotoko Centre**	
Tera		**Maroua**	arats ʸ	**Kotoko South**	
Sukur	ᵐbɨrdaj	**Lamang**	rɨda	**Musgum**	hɨrɨdɨw
Hurza	rɨdza ʸ	**Higi**		**Gidar**	hɨrzɨja

(221) *hɨdzɨn ʸ 'mortar'

Group	Root	Group	Root	Group	Root
Bata	ⁿdzɨrɨ ʸ	**Margi**	ⁿdzɨr ʸ	**Kotoko Island**	adzin
Daba	ⁿdzar ʸ, dzɨdzaŋ ʸ	**Mandara**	dzɨrɨ	**Kotoko North**	
Mafa		**Mofu**	dzɨra, dzɨdzaŋ ʸ	**Kotoko Centre**	zɨn
Tera		**Maroua**	dzɨdzɨŋ ʸ	**Kotoko South**	
Sukur	dzɨmdzɨr ʸ	**Lamang**		**Musgum**	dɨŋ
Hurza	dzɨra ʸ, dzɨⁿdzan ʸ	**Higi**	ⁿdzir	**Gidar**	

(222) *ɣʷadzi 'quiver'

Group	Root	Group	Root	Group	Root
Bata	kʷadza	**Margi**	kʷadza ʸ	**Kotoko Island**	
Daba		**Mandara**		**Kotoko North**	
Mafa		**Mofu**		**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	wadzi	**Lamang**	ɣʷadzi	**Musgum**	
Hurza		**Higi**	gʷɨtsi	**Gidar**	

10.4.3 *s

The phoneme *s is attested in all positions, though it is very rare in word-medial position.

10.4.3.1 Word-initial

In initial position *s has changed to /h/ in Kotoko Island and to /z/ in Tera.

(223) *sa 'to drink'

Group	Root	Group	Root	Group	Root
Bata	sa	**Margi**	sa	**Kotoko Island**	hi
Daba	sa	**Mandara**	sa	**Kotoko North**	se
Mafa	sɨ	**Mofu**	sa	**Kotoko Centre**	sa
Tera	za	**Maroua**	si	**Kotoko South**	sja
Sukur	sɨ	**Lamang**	sa	**Musgum**	si
Hurza	sa	**Higi**	sa	**Gidar**	ɨsa

(224) *sɨn 'to know'

Group	Root	Group	Root	Group	Root
Bata	sɨna	**Margi**	sin	**Kotoko Island**	hɨn
Daba	sɨn	**Mandara**	sɨr	**Kotoko North**	sɨn
Mafa	sɨna	**Mofu**	sɨr	**Kotoko Centre**	sɨn
Tera	zɨni	**Maroua**	sɨn	**Kotoko South**	sɨŋ
Sukur	sɨ	**Lamang**	sɨna	**Musgum**	
Hurza	sɨna	**Higi**	sɨna	**Gidar**	ɨsɨna

(225) *sɨwra 'to fry'

Group	Root	Group	Root	Group	Root
Bata	sɨrɨ	**Margi**	sula	**Kotoko Island**	
Daba	sar	**Mandara**	sula	**Kotoko North**	sɨl
Mafa	sara	**Mofu**	sawla	**Kotoko Centre**	
Tera	zur	**Maroua**	sula	**Kotoko South**	
Sukur	sɨwra	**Lamang**	sula	**Musgum**	sisal
Hurza	sɨwla	**Higi**	sɨlɨ	**Gidar**	

10.4.3.2 Word-medial

*s is almost unattested word-medially. In the data it is only reconstructed in this position for two roots, both of which have limited distribution. This might suggest that *s was in most cases lost in this position. For the root *kʷisɨm we also have the more widely reconstructed root *kʷihɨm, with the same sense (see item (253) or the online data). This implies that there may have been a change *s→h word-medially at a point early in the history of Central Chadic.

(226) *kʷɨsɨm 'mouse'

Group	Root	Group	Root	Group	Root
Bata		Margi		Kotoko Island	
Daba		Mandara		Kotoko North	kʷɨsim
Mafa		Mofu	(?)gʷamso	Kotoko Centre	kʷɨsim
Tera		Maroua		Kotoko South	kʷɨsɨm
Sukur		Lamang		Musgum	kɨsɨm ʷ
Hurza		Higi		Gidar	

(227) *tasɨraɗ 'seven'

Group	Root	Group	Root	Group	Root
Bata		Margi		Kotoko Island	
Daba	tsasaraɗ ʸ	Mandara		Kotoko North	
Mafa	tsaraɗ	Mofu	tasɨla	Kotoko Centre	
Tera		Maroua		Kotoko South	
Sukur		Lamang		Musgum	
Hurza		Higi		Gidar	

10.4.3.3 Word-final

(228) *ɣʷɨɓis 'to laugh'

Group	Root	Group	Root	Group	Root
Bata	mʷɨs	Margi	mʷisa	Kotoko Island	
Daba	ɓas	Mandara	ɣʷɨɓasa	Kotoko North	
Mafa	ᵑgʷas	Mofu	ɣʷɨᵐbasa	Kotoko Centre	
Tera	mɨs	Maroua		Kotoko South	
Sukur	ɓis	Lamang	ɣʷɨɓas	Musgum	
Hurza	ᵐbɨsɨj	Higi	ɓʷɨsi	Gidar	ɨmasa

(229) *ɣʷɨrɨs 'kidney'

Group	Root	Group	Root	Group	Root
Bata		Margi	kʷɨlsi ʸ	Kotoko Island	
Daba	wɨlɨs ʸ	Mandara	kʷɨlɨsɨ ʸ	Kotoko North	
Mafa		Mofu	wɨlas ʸ	Kotoko Centre	hʷɨɗɨs
Tera		Maroua		Kotoko South	dɨgʷɨse
Sukur	ɣʷɨlɨsisi	Lamang	ɣʷɨlɨsisi	Musgum	
Hurza	hʷɨlasase	Higi	ɣʷɨlɨsʲi	Gidar	

(230) *hʷisɨs 'hedgehog'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	hʷisɨ	**Kotoko Island**	
Daba	hʷasasaɓ	**Mandara**	ususa	**Kotoko North**	
Mafa		**Mofu**	hʷasɨs	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	wɨsa	**Higi**	hasɨsɨ	**Gidar**	

*10.4.4 *z*

The phoneme *z is found in all positions, though it is most commonly found in word-initial position. There has been a change *z→s in the Margi group (see section 3.3.7), and in the ancestor language of the Musgum, Kotoko North and Kotoko Island groups (see section 3.2.3). In Kotoko Island there was a subsequent change *s→h.

10.4.4.1 Word-initial

(231) *zɨwɨɗ ʸ 'string'

Group	Root	Group	Root	Group	Root
Bata	zaʔʷɨ	**Margi**	sɨwiɗ	**Kotoko Island**	
Daba		**Mandara**	zawaɗ	**Kotoko North**	sɨre
Mafa		**Mofu**	zɨwaɗ ʸ	**Kotoko Centre**	sadɨ
Tera	zoo	**Maroua**	zɨwɨɗ ʸ	**Kotoko South**	
Sukur	zɨɓɨ ʸ	**Lamang**	zɨʔʷi	**Musgum**	
Hurza	zawaj	**Higi**	ziʔʷɨ	**Gidar**	

(232) *zɨᵐbʷiɗ 'navel'

Group	Root	Group	Root	Group	Root
Bata	zɨᵐbʷɨɗɨ ʸ	**Margi**	sɨᵐbʷɨɗɨw ʸ	**Kotoko Island**	
Daba		**Mandara**	zɨᵐbɨ ʸ	**Kotoko North**	saᵐbu
Mafa	zɨmal ʸ	**Mofu**	zɨᵐbal ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**	ziᵐbiɗ	**Musgum**	
Hurza		**Higi**	zʲɨᵐbʷiɗ	**Gidar**	

(233) *ziⁿgʷa 'donkey'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	zaⁿga ʷ	**Mandara**	ziⁿgʷa	**Kotoko North**	
Mafa	zaⁿgʷa	**Mofu**	aziⁿgʷa	**Kotoko Centre**	
Tera		**Maroua**	ziⁿgɨ ʷ	**Kotoko South**	
Sukur	zɨⁿgʷa	**Lamang**	zuŋa	**Musgum**	
Hurza	zɨⁿgʷa	**Higi**		**Gidar**	

10.4.4.2 Word-medial

(234) *zɨm 'to eat'

Group	Root	Group	Root	Group	Root
Bata	zɨm	**Margi**	sim	**Kotoko Island**	hɨm
Daba	zɨm	**Mandara**	zɨwa	**Kotoko North**	sɨm
Mafa		**Mofu**	zɨm	**Kotoko Centre**	zɨm
Tera	zɨm	**Maroua**	zuma, zimi	**Kotoko South**	hʷɨma
Sukur		**Lamang**	za	**Musgum**	simi, zum
Hurza		**Higi**	zɨmɨ	**Gidar**	ɨzɨma

(235) *kʷɨzɨn ʸ 'grass'

Group	Root	Group	Root	Group	Root
Bata	kʷɨzinɨ	**Margi**	kʷɨsar	**Kotoko Island**	
Daba		**Mandara**	kʷɨzirɨ ʸ	**Kotoko North**	
Mafa	kɨzan ʸ	**Mofu**	kʷɨzir ʸ	**Kotoko Centre**	
Tera	wɨzɨn	**Maroua**	gɨzɨŋ ʸ	**Kotoko South**	
Sukur		**Lamang**	kʷɨzɨŋ	**Musgum**	
Hurza	gʷɨdzaɗ ʸ	**Higi**	gʷɨzɨn	**Gidar**	

10.4.4.3 Word-final

(236) *haᵐbɨz ʸ 'blood'

Group	Root	Group	Root	Group	Root
Bata	zaᵐbe	**Margi**	masi ʸ	**Kotoko Island**	
Daba	haᵐbɨz	**Mandara**	mɨzɨ ʸ	**Kotoko North**	
Mafa	baᵐbaz ʸ	**Mofu**	haᵐbɨz ʸ	**Kotoko Centre**	
Tera		**Maroua**	hɨᵐbɨs ʷ	**Kotoko South**	
Sukur	muᵐbus	**Lamang**		**Musgum**	
Hurza	mɨza ʸ	**Higi**	mimi	**Gidar**	

10.4.5 *^{n}dz

There is only one root that has been reconstructed containing *^{n}dz, but it is well-attested. *^{n}dz is found in a few roots in the proto-languages of eleven of the eighteen groups within Central Chadic.

(237) *^{n}dzah 'to sit'

Group	Root	Group	Root	Group	Root
Bata	^{n}dza	**Margi**	^{n}zi	**Kotoko Island**	
Daba	^{n}dza	**Mandara**	^{n}dza	**Kotoko North**	
Mafa	^{n}dzaha	**Mofu**	^{n}dza	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	^{n}za	**Lamang**	^{n}zak^w	**Musgum**	
Hurza	^{n}dzahaj	**Higi**	^{n}dza	**Gidar**	

10.4.6 *j

The phoneme *j is found in all positions, though there are no roots reconstructed with it in word-initial position. It is very common in word-final position, which may be due to it originating as a determiner which later petrified as /j/ (Wolff 2006).

It is common for *j to become desegmentalised, and to be reanalysed as either the palatalization of a consonant (as in the Proto-Sukur entry for 'bird' 0) or else as a word-level prosody (as in the Proto-Bata entry for 'rainy season' (238)). Even when it remains as a segment, *j can easily metathesize with other consonants in the root (e.g. Proto-Higi 'egg' (239)).

10.4.6.1 Word-initial

There are no roots reconstructed with initial *j.

10.4.6.2 Word-medial

(238) *vɨja 'rainy season'

Group	Root	Group	Root	Group	Root
Bata	va ^{y}	**Margi**	vɨja	**Kotoko Island**	
Daba	vɨja	**Mandara**	vɨja	**Kotoko North**	
Mafa	vɨja	**Mofu**	vɨja	**Kotoko Centre**	
Tera		**Maroua**	vɨja	**Kotoko South**	
Sukur	vi	**Lamang**	vɨja	**Musgum**	pɨja
Hurza	vɨja	**Higi**	vɨja	**Gidar**	

*ɗɨjɨkʷ 'bird'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	ɗɨjakʷ	**Kotoko Island**	
Daba		**Mandara**	ɗɨjak	**Kotoko North**	
Mafa	ɗɨjak	**Mofu**	ɗɨjɨŋʷ	**Kotoko Centre**	
Tera	ɗiki	**Maroua**	ɗɨjɨw	**Kotoko South**	
Sukur	ʔʲak	**Lamang**	ɗɨjak	**Musgum**	
Hurza		**Higi**	ɗɨjɨkʷɨ	**Gidar**	

10.4.6.3 Word-final

(239) *ɗɨɬɨj 'egg'

Group	Root	Group	Root	Group	Root
Bata	ɗaʒi	**Margi**	ɬɨɬɨ ʸ	**Kotoko Island**	
Daba	naʒɨɗ ʸ	**Mandara**	ɗɨɬija	**Kotoko North**	enɬɨ
Mafa	ɬaɬaj	**Mofu**	ɗɨɬɨj	**Kotoko Centre**	enɬɨ
Tera		**Maroua**	ataɬ ʸ	**Kotoko South**	nsi
Sukur	ɗaⁿgaʒaj	**Lamang**	ɬɨɬi	**Musgum**	ʒat ʸ
Hurza	ɬaj	**Higi**	jɨɬɨ	**Gidar**	ɗaⁿgʒa ʸ

(240) *maj 'mouth'

Group	Root	Group	Root	Group	Root
Bata	ma	**Margi**	mja	**Kotoko Island**	
Daba	ma	**Mandara**	wa	**Kotoko North**	
Mafa	ma	**Mofu**	maj	**Kotoko Centre**	
Tera	me	**Maroua**	ma ʸ	**Kotoko South**	me
Sukur	ŋʷɨ	**Lamang**	waj	**Musgum**	maj
Hurza	ma ʸ, ʔam	**Higi**	mi	**Gidar**	ma

10.5 Velar Consonants

10.5.1 *k

The phoneme *k is found in all positions. It has undergone few regular sound changes, but there are widespread sporadic changes to *k→h.

10.5.1.1 Word-initial

(241) *kɨrɨp ʸ 'fish'

Group	Root	Group	Root	Group	Root
Bata	kɨrifɨ ʸ	**Margi**	kɨlfɨ ʸ	**Kotoko Island**	
Daba	kɨlɨf ʸ	**Mandara**	kɨlifɨ ʸ	**Kotoko North**	
Mafa	kɨlaf ʸ	**Mofu**	kɨlɨf ʸ	**Kotoko Centre**	
Tera	ɣɨrvɨ ʷ	**Maroua**	kɨlɨf ʸ	**Kotoko South**	kɨlfɨ
Sukur	kɨrif ʸ	**Lamang**	kɨlɨpi	**Musgum**	hɨlif ʸ
Hurza	kɨlaf ʸ	**Higi**	kɨlipɨ	**Gidar**	kɨlfɨ ʸ

(242) *kɨr 'to steal'

Group	Root	Group	Root	Group	Root
Bata	hɨr	**Margi**	hila	**Kotoko Island**	
Daba	hɨl	**Mandara**	ɣɨl	**Kotoko North**	hir
Mafa	kɨr	**Mofu**	kɨl	**Kotoko Centre**	ɣʷɨj
Tera		**Maroua**	hʷɨl	**Kotoko South**	hɨla
Sukur	kɨr	**Lamang**	ɣila	**Musgum**	hɨl
Hurza	kɨra	**Higi**	ɣɨli	**Gidar**	ɨhala

(243) *kɨdɨm 'crocodile'

Group	Root	Group	Root	Group	Root
Bata	kɨrɨm	**Margi**	karam, hɨm	**Kotoko Island**	
Daba		**Mandara**	kɨrwɨ ʸ	**Kotoko North**	
Mafa	kɨrdam, gɨdam	**Mofu**	kɨrɨm, gɨdam	**Kotoko Centre**	
Tera		**Maroua**	hɨrɨm ʷ	**Kotoko South**	
Sukur	kɨlɨm	**Lamang**	kɨram	**Musgum**	hɨrɨm ʷ
Hurza	gɨdam	**Higi**	kɨlɨm	**Gidar**	

10.5.1.2 Word-medial

(244) *hɨkin 'three'

Group	Root	Group	Root	Group	Root
Bata	mahɨkɨn	**Margi**	maakir	**Kotoko Island**	
Daba	mahkaɗ	**Mandara**	hɨkirɨ	**Kotoko North**	
Mafa	mahkar	**Mofu**	mahkɨr	**Kotoko Centre**	
Tera	mahkan	**Maroua**	maakaŋ	**Kotoko South**	
Sukur	maakɨn	**Lamang**	hɨkɨna	**Musgum**	
Hurza	maakan	**Higi**	maxkɨn	**Gidar**	

In many of the proto-languages of the groups, there is a prefix ma- attached to this root. A similar prefix occurs with the reflexes of several other numerals. The origin of the prefix is not known.

10.5.1.3 Word-final

(245) *ɗawɨk 'goat'

Group	Root	Group	Root	Group	Root
Bata	ɨhʷɨ	**Margi**	kʷi	**Kotoko Island**	
Daba	ŋhʷa	**Mandara**	ɗawak	**Kotoko North**	
Mafa	ɗawɨk	**Mofu**	ɗawak	**Kotoko Centre**	nɣʷa
Tera		**Maroua**	ʔawɨ	**Kotoko South**	awa
Sukur	ʔɨjɨkʷ	**Lamang**	agʷɨ	**Musgum**	jawak
Hurza	awak	**Higi**	kʷɨ	**Gidar**	hawa

(246) *sɨrɨkʸ 'jealousy'

Group	Root	Group	Root	Group	Root
Bata	sɨrɨh	**Margi**	silka	**Kotoko Island**	
Daba	sɨrahʸ	**Mandara**	sɨlɨ	**Kotoko North**	
Mafa	sɨrakʸ	**Mofu**	sɨlɨkʸ	**Kotoko Centre**	
Tera	ziri	**Maroua**	sɨlanʷ	**Kotoko South**	
Sukur	sɨrɨh	**Lamang**		**Musgum**	
Hurza	sɨrak	**Higi**	sɨlkɨ	**Gidar**	

(247) *hadik 'thorn'

Group	Root	Group	Root	Group	Root
Bata	dihɨ	**Margi**		**Kotoko Island**	
Daba		**Mandara**	adakɨ	**Kotoko North**	
Mafa	hɨtak	**Mofu**	hadak	**Kotoko Centre**	
Tera	ⁿdeki	**Maroua**		**Kotoko South**	
Sukur	dzɨkʸ	**Lamang**	tiki	**Musgum**	hadakʸ
Hurza	adak	**Higi**	tikɨ	**Gidar**	

10.5.2 *g

The phoneme *g is rare, with only five examples found amongst the reconstructions. It occurs in word-initial and word-medial positions. There are few regular changes, though it commonly has as reflexes *k or *ɣ.

10.5.2.1 Word-initial

(248) *gɨr 'to grow'

Group	Root	Group	Root	Group	Root
Bata	gɨr	Margi	kila	Kotoko Island	
Daba	gɨl	Mandara	gɨla	Kotoko North	
Mafa	gɨla	Mofu	gɨl	Kotoko Centre	
Tera	gor	Maroua	gɨl	Kotoko South	
Sukur	gɨr	Lamang	gɨla	Musgum	
Hurza	ɣɨra	Higi	kɨl	Gidar	

10.5.2.2 Word-medial

(249) *rɨgɨɗ ʸ 'bow (weapon)'

Group	Root	Group	Root	Group	Root
Bata	ragɨ	Margi	laga	Kotoko Island	
Daba		Mandara	lika	Kotoko North	
Mafa	lakaɗ ʸ, lalaŋ	Mofu	hɨlɨgɨɗ ʸ	Kotoko Centre	
Tera	ri	Maroua	halak ʸ	Kotoko South	
Sukur	raj	Lamang	lɨɣeɗ	Musgum	gɨⁿdɨlɨŋ ʸ
Hurza	lɨga ʸ	Higi	lɨgɨj	Gidar	

(250) *vɨgɨɗ ʸ 'hole'

Group	Root	Group	Root	Group	Root
Bata		Margi		Kotoko Island	
Daba		Mandara	vɨgɨ ʸ	Kotoko North	
Mafa	vavaɗ ʸ	Mofu	vɨɗ ʸ	Kotoko Centre	
Tera		Maroua	vɨgɨɗ ʸ	Kotoko South	
Sukur	vuɗ	Lamang		Musgum	
Hurza		Higi		Gidar	vɨva ʷ

10.5.3 *h

The phoneme *h is one of the best-attested phonemes in Proto-Central Chadic, and is found in all positions.

It is very common for *h to be lost in present-day languages. When this happens, the loss may be compensated for using one of two strategies. The first is the reduplication of the first syllable, and the second is the replacement of *h

with another consonant, typically /m/, though Mafa, for example, uses /v/ and Mandara /n/ (see section 3.4.5).

The label *h is used, as this is the default realisation in most of the present-day languages. However the phoneme patterns as part of the velar series with respect to labialization, and so may have been realised as [x] in Proto-Central Chadic.

10.5.3.1 Word-initial

Where *h occurs in word-initial position before a full vowel, the *h has been lost in many languages (see for example *hadik 'thorn', given in section 10.3.2.2).

(251) *hɨmɨɗ ʸ 'wind'

Group	Root	Group	Root	Group	Root
Bata	miɗɨ	Margi	samaɗ ʸ	Kotoko Island	haᵐbaɗɨ
Daba	mɨɗ ʸ	Mandara		Kotoko North	samaɗe
Mafa	mamaɗ ʸ	Mofu	hɨmɨɗ ʸ	Kotoko Centre	sɨmaɗɨ
Tera		Maroua	hɨmɨɗ ʸ	Kotoko South	sɨmaɗe
Sukur	mɨɗ ʸ	Lamang		Musgum	sɨmaɗ ʸ
Hurza	hɨmaɗe	Higi		Gidar	sɨmja

(252) *hɨrɨdz ʸ 'scorpion'

Group	Root	Group	Root	Group	Root
Bata	hɨradzɨ ʸ	Margi	hɨda ʸ	Kotoko Island	
Daba	rɨdzɨ ʸ	Mandara	radzɨ ʸ	Kotoko North	
Mafa	haradz	Mofu	hɨrɨda ʸ	Kotoko Centre	
Tera		Maroua	arats ʸ	Kotoko South	
Sukur	ᵐbɨrdaj	Lamang	rɨda	Musgum	hɨrɨdɨw
Hurza	rɨdza ʸ	Higi		Gidar	hɨrzɨja

10.5.3.2 Word-medial

(253) *kʷɨhɨm 'mouse' (cf. (226) *kʷɨsɨm)

Group	Root	Group	Root	Group	Root
Bata	hʲɨmɨ	Margi		Kotoko Island	
Daba		Mandara	kʷɨhɨm	Kotoko North	
Mafa	kʷama	Mofu	kʷɨhɨm	Kotoko Centre	
Tera	ɣʷɨm	Maroua		Kotoko South	
Sukur	kʷɨm	Lamang		Musgum	
Hurza	kʷɨham	Higi	kʷɨm	Gidar	

10.5.3.3 Word-final

(254) *nɨh 'to ripen'

Group	Root	Group	Root	Group	Root
Bata	na	**Margi**	nɨɣa	**Kotoko Island**	
Daba	na	**Mandara**	na	**Kotoko North**	na
Mafa	nɨh	**Mofu**	nɨhʷ	**Kotoko Centre**	naha
Tera		**Maroua**	nɨh ʸ	**Kotoko South**	wɨnha
Sukur		**Lamang**		**Musgum**	niyi
Hurza	nah	**Higi**	naka	**Gidar**	

(255) *hʷɨɗɨɬ ʸ 'cough'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	wɨɗɨɬa	**Kotoko Island**	
Daba		**Mandara**	hʷɨɬah ʸ	**Kotoko North**	hʷɨɗɨɬa
Mafa	wɨɬa	**Mofu**	hʷɨɗɨɬ ʸ	**Kotoko Centre**	wɨɗɨɬa
Tera	kʷɨɮa	**Maroua**	hɨrɬa ʸ	**Kotoko South**	wasja
Sukur	ɮar ʸ	**Lamang**		**Musgum**	hʷaɬ
Hurza	ɮɨɮah ʸ	**Higi**	ʔʲɨɬa	**Gidar**	wɨrɬa

(256) *vɨnah 'to vomit'

Group	Root	Group	Root	Group	Root
Bata	vɨna	**Margi**		**Kotoko Island**	
Daba	vɨna	**Mandara**	vɨraha	**Kotoko North**	
Mafa	vɨnaha ʸ	**Mofu**	vɨnaha	**Kotoko Centre**	vɨnahɨ
Tera	vɨnah	**Maroua**		**Kotoko South**	vɨnaha
Sukur	vɨnah	**Lamang**	vɨnah	**Musgum**	fɨna ʸ
Hurza	vɨnah ʸ	**Higi**	vɨnɨhʷɨ	**Gidar**	

10.5.4 *ɣ

The phoneme *ɣ is found in all positions. Only six instances have been reconstructed.

In many present-day languages this phoneme has been lost altogether, having merged with either *h or *g. Merger with *h has occurred in Mandara and Malgwa of the Mandara group, Muyang and Moloko of the Mofu group, and possibly in Proto-North Kotoko-Musgum. Merger with *g occurred in Dghwede in the Mandara group and Proto-Meri in the Mofu group. *ɣ was lost in Proto-Mofu subgroup within the Mofu group.

10.5.4.1 Word-initial

(257) *ɣaj 'hut'

Group	Root	Group	Root	Group	Root
Bata	hajɨ	Margi		Kotoko Island	
Daba	ga ʸ	Mandara	ɣaj	Kotoko North	ho
Mafa	gaj	Mofu	ɣaj	Kotoko Centre	ɣaa
Tera		Maroua	gaj	Kotoko South	ɣe
Sukur	ɣi	Lamang		Musgum	
Hurza	aga	Higi	ɣaj	Gidar	

(258) *ɣɨn 'head'

Group	Root	Group	Root	Group	Root
Bata	ɣɨnɨ	Margi	kir	Kotoko Island	
Daba		Mandara	ɣɨra	Kotoko North	
Mafa	jaŋ, gɨɗ	Mofu	ɣɨr	Kotoko Centre	
Tera		Maroua	jɨŋ, hɨr	Kotoko South	
Sukur		Lamang	ɣɨŋ	Musgum	
Hurza		Higi	ɣɨn	Gidar	

(259) *ɣanaɗ ʸ 'tongue'

Group	Root	Group	Root	Group	Root
Bata	gana ʸ	Margi	gar ʸ	Kotoko Island	
Daba	ganaɗ	Mandara		Kotoko North	
Mafa		Mofu		Kotoko Centre	
Tera	ɣina	Maroua		Kotoko South	
Sukur	ɣanaj	Lamang	ɣanɨj	Musgum	
Hurza		Higi	ɣanɨj	Gidar	

10.5.4.2 Word-medial

(260) *daɣɨlɨj 'girl'

Group	Root	Group	Root	Group	Root
Bata		Margi		Kotoko Island	
Daba	dahalaj	Mandara	dahɨlɨ ʸ	Kotoko North	
Mafa	dahla	Mofu	dahɨlaj	Kotoko Centre	
Tera		Maroua	dɨlɨ ʸ	Kotoko South	
Sukur	dɨgɨli	Lamang	daɣali	Musgum	
Hurza	dalaj	Higi	diɣɨlʲi	Gidar	

10.5.4.3 Word-final

(261) *hajaɣ 'squirrel'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	ajaɣ	**Kotoko North**	jaga
Mafa		**Mofu**	hajaŋ	**Kotoko Centre**	
Tera		**Maroua**	ajaw	**Kotoko South**	ajahe
Sukur		**Lamang**	jaɣe	**Musgum**	jaja
Hurza	ajah	**Higi**		**Gidar**	

(262) *nɨɣ 'to see'

Group	Root	Group	Root	Group	Root
Bata	nɨɣ	**Margi**		**Kotoko Island**	
Daba		**Mandara**	nɨɣa	**Kotoko North**	
Mafa		**Mofu**	nɨk	**Kotoko Centre**	
Tera	na	**Maroua**	nahi	**Kotoko South**	
Sukur		**Lamang**	nɨɣa	**Musgum**	
Hurza		**Higi**	nɨɣɨ	**Gidar**	

10.5.5 *$^{\eta}$g

Although /ŋg/ is a phoneme in many present-day Central Chadic languages, there are no reliable roots reconstructed for Proto-Central Chadic containing *$^{\eta}$g. Its status must be considered doubtful. The following example is illustrative of the problems in reconstructing this phoneme.

(263) *ra$^{\eta}$gaɬ ^{y} 'brain'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**		**Kotoko North**	erƛ'i
Mafa		**Mofu**	a^{n}dɨɬ ^{y}, araʑ ^{y}, ɗa$^{\eta}$gaɬ ^{y}	**Kotoko Centre**	meres'ɨ
Tera		**Maroua**	alaɬ ^{y}	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	mɨkɨla$^{\eta}$gaɬ ^{y}	**Higi**		**Gidar**	

10.6 Labialized Velar Consonants

The Proto-Central Chadic labialized velar consonants play an important role in Central Chadic, as, along with *w, they are the source of all the labialization and back-rounded vowels that occur in the present-day languages. In many of the reflexes in vowel prosody languages, the labialization component is realised as a word-level labialization prosody which backs and rounds the vowels. In the

consonant prosody languages, in some cases the labialization component has transferred from the velar onto a labial consonant.

In almost all cases, the labialized consonants are better attested than the equivalent non-labialized consonants.

Labialized velars have been lost completely in the Musgum group, with the labialization component being transferred to the vowels in the form of labialization prosody.

10.6.1 *kʷ

The phoneme *kʷ is well-attested in all positions. In some cases it may have the reflexes /gʷ/ or /hʷ/, and the labialization component is sometimes lost. These changes appear to be unsystematic, with the exceptions of the regular change *kʷ→g͡b in Malgbe (Kotoko North) and possibly *kʷ→gʷ in Proto-Higi.

10.6.1.1 Word-initial

(264) *kʷɨnɨj 'urine'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	kʷɨni	**Kotoko Island**	kʷaraj
Daba		**Mandara**	kʷɨrɨj	**Kotoko North**	kʷɨre
Mafa	kʷɨraj	**Mofu**	kʷɨnaj	**Kotoko Centre**	kʷɨne
Tera		**Maroua**	kʷɨnaj	**Kotoko South**	kɨmaɗe
Sukur	kʷɨr ʸ	**Lamang**	kʷani	**Musgum**	
Hurza	mɨkaɗaj	**Higi**		**Gidar**	kɨna ʸ

(265) *kʷɨzin 'grass'

Group	Root	Group	Root	Group	Root
Bata	kʷɨzinɨ	**Margi**	kʷɨsar	**Kotoko Island**	
Daba		**Mandara**	kʷɨzɨrɨ ʸ	**Kotoko North**	
Mafa	kɨzan ʸ	**Mofu**	kʷɨzɨr ʸ	**Kotoko Centre**	
Tera	wɨzɨn	**Maroua**	gɨzɨŋ ʸ	**Kotoko South**	
Sukur		**Lamang**	kʷɨzɨŋ	**Musgum**	
Hurza	gʷɨdzaɗ ʸ	**Higi**	gʷɨzɨn	**Gidar**	

The Proto-Hurza root results from a number of sound changes, including a word-final *n→r and a subsequent *r→ɗ. However it should be noted that the word-final *n→r change did not include Proto-Hurza, so this root may have been transmitted via Proto-Mofu or Proto-Mandara.

(266) *kʷɨtɨrʸ 'tail'

Group	Root	Group	Root	Group	Root
Bata	hʷɨtɨrɨ	**Margi**		**Kotoko Island**	
Daba	kʷɨtalʸ	**Mandara**	kʷɨtɨlɨʸ	**Kotoko North**	
Mafa	hʷadar, fɨtarʷ	**Mofu**	hʷɨtɨlʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	tur	**Lamang**	hʷɨtɨl	**Musgum**	
Hurza	kʷɨtarʸ	**Higi**		**Gidar**	kɨtɨrʷ

10.6.1.2 Word-medial

(267) *tsɨkʷɨr 'chicken'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	gʷɨtsɨkɨ	**Kotoko North**	
Mafa	watsak	**Mofu**	wɨtsɨkarʸ, maⁿdzɨkʷɨrʸ	**Kotoko Centre**	
Tera		**Maroua**	tsɨkʷar	**Kotoko South**	tsakar
Sukur	takʷɨr	**Lamang**	ɣatakʷala	**Musgum**	mɨskɨr
Hurza	ⁿdzɨkʷɨr	**Higi**		**Gidar**	

(268) *ɗakʷɨr 'grey hair'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	hɨhɨlʷ	**Mandara**	kʷɨlɨ	**Kotoko North**	
Mafa	kʷaraj	**Mofu**	ɗakʷɨl	**Kotoko Centre**	
Tera		**Maroua**	halʷ	**Kotoko South**	
Sukur	kʷir	**Lamang**		**Musgum**	
Hurza	ɗakʷar	**Higi**		**Gidar**	

(269) *ɗakʷaʸ 'white'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	kʷɨkʷɨɗakʸ	**Mandara**	maɗakʷɨ	**Kotoko North**	
Mafa	kʷaɗʸ	**Mofu**	kʷaɗakʸ	**Kotoko Centre**	
Tera		**Maroua**	kʷaɗakʸ	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	mɨɗɨkʷɨj
Hurza	kʷaɗakʸ, maɗakʷaʸ	**Higi**		**Gidar**	

10.6.1.3 Word-final

(270) *hakʷ 'fire'

Group	Root	Group	Root	Group	Root
Bata	gʷɨ	**Margi**	hɨʔʷɨ	**Kotoko Island**	aw
Daba	kʷahʷɨ	**Mandara**		**Kotoko North**	hɨw
Mafa	hakʷa	**Mofu**	akʷɨ	**Kotoko Centre**	awɨ
Tera		**Maroua**	awɨ	**Kotoko South**	agʷa
Sukur	kʷɨ	**Lamang**		**Musgum**	huu, akʷɨ
Hurza	akʷa	**Higi**	ɣʷi	**Gidar**	

(271) *ɗɨjɨkʷ 'bird'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	ɗɨjakʷ	**Kotoko Island**	
Daba		**Mandara**	ɗɨjak	**Kotoko North**	
Mafa	ɗɨjak	**Mofu**	ɗɨjɨŋʷ	**Kotoko Centre**	
Tera	ɗiki	**Maroua**	ɗɨjɨw	**Kotoko South**	
Sukur	ʔʲak	**Lamang**	ɗɨjak	**Musgum**	
Hurza		**Higi**	ɗɨjɨkʷɨ	**Gidar**	

(272) *pɨɗakʷ ʸ 'razor'

Group	Root	Group	Root	Group	Root
Bata	pɨɗɨkʷa ʸ	**Margi**	parkʷɨ ʸ	**Kotoko Island**	
Daba	pɨɗakʷ ʸ	**Mandara**	pɨɗakʷ ʸ	**Kotoko North**	
Mafa	pɨɗakʷ ʸ	**Mofu**	pɨɗakʷ ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	pɨɗak'ʷ ʸ	**Lamang**		**Musgum**	
Hurza		**Higi**	pɨɗɨkʷ	**Gidar**	

10.6.2 *gʷ

The phoneme *gʷ is found in initial and medial positions. In Malgbe of the Kotoko North group it has the reflex /g͡b/.

10.6.2.1 Word-initial

(273) *gʷavan 'cobra'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	gavan ʷ	**Mandara**		**Kotoko North**	
Mafa	gʷɨvan	**Mofu**	gʷavaŋ	**Kotoko Centre**	
Tera		**Maroua**	gavan ʷ	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	gʷavan	**Higi**	gʷavaŋ	**Gidar**	

(274) *gʷɨla 'left'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	gʷɨla	**Mandara**		**Kotoko North**	geli
Mafa	gʷɨla	**Mofu**	gʷɨla	**Kotoko Centre**	ɣɨlan
Tera		**Maroua**	gʷɨla	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	gʷɨla	**Higi**	gʷɨla	**Gidar**	

(275) *gʷɨvɨh 'field'

Group	Root	Group	Root	Group	Root
Bata	vʷɨ	**Margi**	fakʷ	**Kotoko Island**	
Daba		**Mandara**	gʷɨvɨh	**Kotoko North**	
Mafa		**Mofu**	gʷɨvɨh	**Kotoko Centre**	
Tera		**Maroua**	gʷɨva	**Kotoko South**	
Sukur		**Lamang**	wɨvah	**Musgum**	
Hurza	gʷɨvɨh	**Higi**	wɨvɨhɨ	**Gidar**	

10.6.2.2 Word-medial

(276) *ɮɨgʷamɨ ʸ 'camel'

Group	Root	Group	Root	Group	Root
Bata	ɮɨgʷamɨ ʸ	**Margi**	ɮɨgʷam	**Kotoko Island**	logʷɨme
Daba	ɮakama ʷ	**Mandara**	ɮɨgʷamɨ	**Kotoko North**	logome
Mafa		**Mofu**	ɮɨgʷama ʸ	**Kotoko Centre**	
Tera	ɮimox	**Maroua**		**Kotoko South**	
Sukur	ɮɨgʷam	**Lamang**		**Musgum**	lukma
Hurza	ɮɨgʷama ʸ	**Higi**	ɬɨgʷami	**Gidar**	ɬagama ʷ

(277) *dzagʷa 'hat'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	dzakʷa	**Kotoko Island**	ⁿdzakʷa
Daba		**Mandara**	dzakʷɨ	**Kotoko North**	sagʷa
Mafa		**Mofu**	dzagʷɨ	**Kotoko Centre**	
Tera		**Maroua**	dzakʷɨ	**Kotoko South**	dzakʷɨ
Sukur		**Lamang**	dzɨgʷa	**Musgum**	zagaw
Hurza	dzɨgʷa	**Higi**		**Gidar**	

(278) *dzɨgʷɨr 'hump'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	dzikʷɨr ʸ, madagara	**Kotoko Island**	
Daba	ɗɨgʷɨr ʸ	**Mandara**		**Kotoko North**	sɨgʷɨre
Mafa		**Mofu**	madzɨgɨr, mɨtakʷar	**Kotoko Centre**	zɨrkʼʷa
Tera	ɗɨgʷɨl	**Maroua**		**Kotoko South**	dzaŋkʷara
Sukur	dzigʷɨɗ	**Lamang**		**Musgum**	zɨgʷɨrij
Hurza	dzɨgʷar	**Higi**		**Gidar**	

10.6.3 *hʷ

The phoneme *hʷ occurs almost entirely in initial position. The fricative component is frequently lost, and the labialization component may then be reanalysed as /w/, a word-level prosody, or else appear on a different consonant. This is a widespread sporadic process, rather than a regular predictable process. The examples given are those where *hʷ has been widely retained.

10.6.3.1 Word-initial

(279) *hʷɨrɨp 'seed'

Group	Root	Group	Root	Group	Root
Bata	hʷɨrɨfɨ	**Margi**	hʷɨlfɨ	**Kotoko Island**	
Daba		**Mandara**	hʷɨlfɨdɨ	**Kotoko North**	gʷɨlfan
Mafa	hʷalfej	**Mofu**	hʷɨlfaɗ ʸ	**Kotoko Centre**	
Tera		**Maroua**	hʷɨlfa	**Kotoko South**	
Sukur		**Lamang**	hʷɨlfa	**Musgum**	
Hurza		**Higi**	hʷɨlɨfɨ	**Gidar**	

(280) *hʷiɗ 'belly'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	hʷɨdɨ	**Kotoko North**	
Mafa	hʷaɗ	**Mofu**	hʷɨɗ	**Kotoko Centre**	
Tera	hʷira	**Maroua**	wuru	**Kotoko South**	
Sukur	hʷɨɗ	**Lamang**	huɗi	**Musgum**	war
Hurza		**Higi**	hʷiɗ	**Gidar**	

10.6.3.2 Word-medial

(281) *sɨhʷaniʸ 'dream'

Group	Root	Group	Root	Group	Root
Bata	sɨniʸ	**Margi**	sɨʔʷɨniʸ	**Kotoko Island**	
Daba	sɨnɨʸ	**Mandara**	sɨhʷaniʸ	**Kotoko North**	saware
Mafa	sɨwɨnaʸ	**Mofu**	sɨwnaʸ	**Kotoko Centre**	sɨwane
Tera	zine	**Maroua**	mɨsɨnʸ	**Kotoko South**	
Sukur		**Lamang**	sɨwani	**Musgum**	hɨjnɨʸ
Hurza	sɨwnaʸ	**Higi**	sʲɨwɨn	**Gidar**	ɨssɨnaʸ

10.6.4 *ɣʷ

The phoneme *ɣʷ is found almost always in initial position. The phoneme no longer exists in many of the present-day languages. Its reflexes include /w/ in Mandara and Malgwa of the Mandara group and the Mofu subgroup of the Mofu group, /g/ in Dghwede of the Mandara group, /hʷ/ in Muyang and Moloko of the Mofu group and /gʷ/ in Proto-Meri of the Mofu group.

10.6.4.1 Word-initial

(282) *ɣʷɨpa 'flour'

Group	Root	Group	Root	Group	Root
Bata	hʷɨpɨ	**Margi**	ɨpʷɨ	**Kotoko Island**	
Daba	ŋfa	**Mandara**	kʷɨpɨ	**Kotoko North**	
Mafa	gʷɨfa	**Mofu**	gʷɨpa	**Kotoko Centre**	
Tera		**Maroua**	hapa	**Kotoko South**	
Sukur	pʷa	**Lamang**	hʷɨpaw	**Musgum**	
Hurza	hɨᵐbɨga	**Higi**	ɣʷɨpɨ	**Gidar**	gɨpa

(283) *ɣʷɨɓis 'to laugh'

Group	Root	Group	Root	Group	Root
Bata	mʷɨs	**Margi**	mʷisa	**Kotoko Island**	
Daba	ɓas	**Mandara**	ɣʷɨɓasa	**Kotoko North**	
Mafa	ŋgʷas	**Mofu**	ɣʷɨᵐbasa	**Kotoko Centre**	
Tera	mɨs	**Maroua**		**Kotoko South**	
Sukur	ɓis	**Lamang**	ɣʷɨɓas	**Musgum**	
Hurza	ᵐbɨsɨj	**Higi**	ɓʷɨsi	**Gidar**	ɨmasa

(284) *ɣʷɨrɨp 'blind'

Group	Root	Group	Root	Group	Root
Bata	wɨrɨfɨ	**Margi**	wɨlɨfu	**Kotoko Island**	
Daba	wɨlɨf	**Mandara**	ɣʷɨlɨfɨ	**Kotoko North**	
Mafa		**Mofu**	ɣʷɨlɨf	**Kotoko Centre**	nyʷɨf
Tera		**Maroua**	hɨlɨf ʷ	**Kotoko South**	ɣʷajra
Sukur		**Lamang**	ɣʷɨlpa	**Musgum**	
Hurza	ɣʷɨraf	**Higi**	ɣʷɨlɨfi	**Gidar**	

10.6.4.2 Word-medial

(285) *dɨɣʷɨvan 'leopard'

Group	Root	Group	Root	Group	Root
Bata	dɨgɨvʷa	**Margi**		**Kotoko Island**	
Daba		**Mandara**		**Kotoko North**	
Mafa		**Mofu**	dɨvar	**Kotoko Centre**	
Tera		**Maroua**	dɨvaŋ	**Kotoko South**	
Sukur	dɨgʷavak	**Lamang**		**Musgum**	
Hurza		**Higi**	dɨɣʷava	**Gidar**	

10.6.5 *ᵑgʷ

The phoneme *ᵑgʷ is rare and cannot be reconstructed with full confidence. The following three items are ones where there is some support from the data.

10.6.5.1 Word-initial

(286) *ᵑgʷɨs 'woman'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	kʷɨsɨ	**Kotoko North**	
Mafa	ᵑgʷaz	**Mofu**	ᵑgʷas, mɨkɨs	**Kotoko Centre**	
Tera	nuʃu	**Maroua**	ᵑgʷas	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza		**Higi**		**Gidar**	

10.6.5.2 Word-medial

(287) *zi$^{\eta}$g^{w}a 'donkey'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba	za$^{\eta}$ga ^{w}	**Mandara**	zi$^{\eta}$g^{w}a	**Kotoko North**	
Mafa	za$^{\eta}$g^{w}a	**Mofu**	azɨ$^{\eta}$g^{w}a	**Kotoko Centre**	
Tera		**Maroua**	zɨ$^{\eta}$gɨ ^{w}	**Kotoko South**	
Sukur	zɨ$^{\eta}$g^{w}a	**Lamang**	zuŋa	**Musgum**	
Hurza	zɨ$^{\eta}$g^{w}a	**Higi**		**Gidar**	

(288) *$^{\eta}$g^{w}ɨts 'hair'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	g^{w}ɨdzɨ ^{y}	**Kotoko North**	
Mafa	$^{\eta}$g^{w}atsɨ	**Mofu**	a$^{\eta}$g^{w}ɨts ^{y}	**Kotoko Centre**	
Tera	ɣ^{w}asi	**Maroua**	$^{\eta}$g^{w}ɨtsɨ ^{y}	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza		**Higi**		**Gidar**	

10.6.6 *w

The phoneme *w is very well-attested in all positions. *w may combine with another consonant to form a labialized consonant, or may be desegmentalised and be reanalysed as the labialization prosody (see section 11.3).

10.6.6.1 Word-initial

(289) *wɨpaɗ 'four'

Group	Root	Group	Root	Group	Root
Bata	f^{w}aɗ	**Margi**	f^{w}aɗu	**Kotoko Island**	
Daba	faɗ ^{w}	**Mandara**	ufaɗɨ	**Kotoko North**	
Mafa	faɗ	**Mofu**	wɨfaɗ	**Kotoko Centre**	
Tera	foɗa	**Maroua**	mufaɗ	**Kotoko South**	foɗi
Sukur	fwaɗ	**Lamang**	wɨfaɗ	**Musgum**	pɨɗɨ ^{w}
Hurza	fuɗaw	**Higi**	wɨfaɗɨ	**Gidar**	paɗa ^{w}

(290) *zɨm 'to eat'

Group	Root	Group	Root	Group	Root
Bata	zɨm	**Margi**	sim	**Kotoko Island**	hɨm
Daba	zɨm	**Mandara**	zɨwa	**Kotoko North**	sɨm
Mafa		**Mofu**	zɨm	**Kotoko Centre**	zɨm
Tera	zɨm	**Maroua**	zuma, zimi	**Kotoko South**	hʷɨma
Sukur		**Lamang**	za	**Musgum**	simi, zum
Hurza		**Higi**	zɨmɨ	**Gidar**	ɨzɨma

(291) *wɨvɨn 'grinding stone'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	bura	**Kotoko Island**	
Daba	ŋvɨn	**Mandara**	uvɨra	**Kotoko North**	
Mafa		**Mofu**	var ʸ	**Kotoko Centre**	vɨn
Tera	vɨna	**Maroua**	van	**Kotoko South**	vuna
Sukur	ban	**Lamang**	buna	**Musgum**	funay
Hurza	van	**Higi**	vɨna	**Gidar**	bwɨn

10.6.6.2 Word-medial

(292) *ɬɨwɗ ʸ 'meat'

Group	Root	Group	Root	Group	Root
Bata	ɮɨwɨ ʸ	**Margi**		**Kotoko Island**	hu
Daba	ɮij ʸ	**Mandara**	ɬɨwɨɗ ʸ	**Kotoko North**	ɬɨw
Mafa	ɮɨwaɗ ʸ	**Mofu**	ɬɨw	**Kotoko Centre**	ɬɨw
Tera	ɮu	**Maroua**		**Kotoko South**	asu
Sukur	ɬɨwɨɗ ʸ	**Lamang**	ɬiʔʷi	**Musgum**	ɬɨwɨt
Hurza	ɬɨwaɗ ʸ	**Higi**	ɬɨj	**Gidar**	ɬɨwɨ

(293) *sɨwra 'to fry'

Group	Root	Group	Root	Group	Root
Bata	sɨrɨ	**Margi**	sula	**Kotoko Island**	
Daba	sar	**Mandara**	sula	**Kotoko North**	sɨl
Mafa	sara	**Mofu**	sawla	**Kotoko Centre**	
Tera	zur	**Maroua**	sula	**Kotoko South**	
Sukur	sɨwra	**Lamang**	sula	**Musgum**	sisal
Hurza	sɨwla	**Higi**	sɨlɨ	**Gidar**	

(294) *ɗawɨm 'honey'

Group	Root	Group	Root	Group	Root
Bata		**Margi**	wɨmɨ	**Kotoko Island**	
Daba	ɓaɓam ʷ	**Mandara**	ɗama	**Kotoko North**	mam
Mafa	ᵐgbam	**Mofu**	awɨm	**Kotoko Centre**	imam
Tera		**Maroua**	amam	**Kotoko South**	amama
Sukur	mam	**Lamang**	omo	**Musgum**	wamaj
Hurza	wɨmam	**Higi**		**Gidar**	amɨma

10.6.6.3 Word-final

(295) *kɨrɨw 'ten'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	kɨlawa	**Kotoko North**	
Mafa	kʷɨraw	**Mofu**	kɨraw	**Kotoko Centre**	
Tera		**Maroua**	kɨrɨ ʷ	**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	kɨra ʷ	**Higi**		**Gidar**	

(296) *haɗikʷ 'grasshopper'

Group	Root	Group	Root	Group	Root
Bata	aɗikʷ	**Margi**	haɗiw	**Kotoko Island**	
Daba	wajak	**Mandara**	hɨjɨwɨ	**Kotoko North**	hajaw
Mafa	jakʷ	**Mofu**	hajakʷ	**Kotoko Centre**	
Tera		**Maroua**	hajak ʷ	**Kotoko South**	
Sukur		**Lamang**	hiʔi	**Musgum**	
Hurza		**Higi**	haɗik	**Gidar**	hajɗaŋ ʸ

(297) *ⁿdɨw 'person'

Group	Root	Group	Root	Group	Root
Bata	iⁿdɨw	**Margi**	ⁿdu	**Kotoko Island**	
Daba		**Mandara**	wɨⁿdɨ	**Kotoko North**	
Mafa	ⁿda ʷ	**Mofu**	ⁿdaw	**Kotoko Centre**	
Tera	ⁿdɨkʷɨ	**Maroua**		**Kotoko South**	
Sukur	ⁿdɨw	**Lamang**	mɨⁿdu	**Musgum**	
Hurza		**Higi**	wɨⁿdɨ	**Gidar**	

10.7 A Comparison with Newman's Consonantal Inventory

Newman's reconstruction for the consonant inventory of Proto-Chadic was as follows (rearranged):

	Labial	Alveolar	Laminal	Velar	Palatalized Velar	Labialized-Velar
Plosive	p	t	ts	k	k^j	k^w
	b	d	dz	g	g^j	g^w
Implosive	ɓ	ɗ		ɠ		
Fricative	f	ɬ	s, ʂ (i.e. ʃ)	x	x^j	x^w
			z			
Nasal	m	n				
Liquid		r				
Approximant			j			w

Table 112 - Proto-Chadic consonants

The Proto-Central Chadic consonant inventory is repeated here. Phonemes in parentheses are considered marginal.

	Labial	Alveolar	Laminal	Velar	Labialized-Velar
Plosive	p	t	ts	k	k^w
	b	d	dz	g	g^w
Implosive	ɓ	ɗ			
Fricative		ɬ	s	h	h^w
	v	ɮ	z	ɣ	$ɣ^w$
Nasal	m	n			
	^{m}b	^{n}d	^{n}dz	(^{ŋ}g)	($^ŋ g^w$)
Liquid		r			
Approximant			j		w

Table 113 - Proto-Central Chadic consonants

There are a number of important differences. Firstly, Newman reconstructs a set of palatalized velar consonants for Proto-Chadic, though only *g^j appears in his reconstructed roots.

Secondly, Newman does not reconstruct any pre-nasalized phonemes, though he does bring out the issue. It is entirely possible that pre-nasalized consonants did not exist in Proto-Chadic, but developed in Proto-Central Chadic.

Thirdly, and most significantly, there are large differences in how the fricatives have been reconstructed. Newman includes a phoneme *ʂ, with unclear phonetic form, possibly [ʃ]. According to Newman, this phoneme developed into a voiceless lateral fricative in Proto-Central Chadic, merging with *ɬ. It is not possible to distinguish this phoneme from *ɬ in Central Chadic. A possibility that Newman does not give is that this phoneme was realised as a voiced lateral fricative in Proto-Chadic.

Newman only has one voiced fricative *z, whereas in Proto-Central Chadic there is a voiced/voiceless contrast at all places of articulation. For the velar fricatives, this may reflect an historical change where a voicing distinction came into existence early in the history of Central Chadic. This is a plausible scenario, given the variation in voicing between some of the reflexes of the velar fricatives, and the lack of clear patterning. For the alveolar fricatives, the voiced lateral fricative is fairly rare in Proto-Central Chadic, and could indeed be an innovation.

Newman includes a third glottalised consonant *'J, with a variety of reflexes and no clear point of articulation. For Proto-Central Chadic, no equivalent phoneme has been reconstructed. Where there is a glottalized palatal or velar consonant, this is shown to be the result of the fusion of two phonemes (see section 10.1.2).

Amongst the labial phonemes, Newman reconstructs *p and *f as separate phonemes, whereas for Proto-Central Chadic they are reconstructed as a single phoneme. In neither case is the situation clear (see section 10.2.1). The change from Proto-Chadic *b to Proto-Central Chadic *v accounts for the other difference amongst the labial phonemes.

10.8 Statistics

The following statistics are based on 171 reconstructed roots where there are reflexes in at least six of the groups within Central Chadic and data from more than ten languages. Figures are given for the occurrences of each phoneme in different positions in the word, ordered by place and point of articulation, and by overall frequency in the data. Summary statistics are given for each place of articulation, and each manner of articulation. If the same phoneme appears twice in a root, this is counted as two occurrences.

10.8.1 *Phonemes ordered by place and point of articulation*

	Initial	Medial	Final	Total	Overall percentage
p	7	4	7	18	4%
b	2	0	0	2	0%
v	11	11	2	24	6%
ɓ	0	1	1	2	0%
m	9	10	8	27	6%
ᵐb	5	4	0	9	2%
t	3	2	2	7	2%
d	3	3	0	6	1%
ɬ	10	3	3	16	4%
ɮ	3	1	1	5	1%
ɗ	12	7	18	37	9%
n	2	8	20	30	7%
ⁿd	2	1	0	3	1%
r	4	30	12	46	11%
ts	5	4	3	12	3%
dz	7	3	0	10	2%
s	9	2	4	15	4%
z	5	2	1	8	2%
ⁿdz	1	0	0	1	0%
j	1	6	13	20	5%
k	7	2	4	13	3%
g	2	3	0	5	1%
h	16	2	11	29	7%
ɣ	3	1	2	6	1%
ⁿg	1	1	0	2	0%
kʷ	8	5	5	18	4%
gʷ	3	6	0	9	2%
hʷ	8	1	0	9	2%
ɣʷ	9	1	0	10	2%
ⁿgʷ	0	1	0	1	0%
w	6	12	4	22	5%

10.8.2 Phonemes ordered by total number of instances

	Initial	Medial	Final	Total	Overall percentage
r	4	30	12	46	11%
ɗ	12	7	18	37	9%
n	2	8	20	30	7%
h	16	2	11	29	7%
m	9	10	8	27	7%
v	11	11	2	24	6%
w	6	12	4	22	9%
j	1	6	13	20	5%
kʷ	8	5	5	18	4%
p	7	4	7	18	4%
ɬ	10	3	3	16	4%
s	9	2	4	15	4%
k	7	2	4	13	3%
ts	5	4	3	12	3%
dz	7	3	0	10	2%
ɣʷ	9	1	0	10	2%
ᵐb	5	4	0	9	2%
gʷ	3	6	0	9	2%
hʷ	8	1	0	9	2%
z	5	2	1	8	2%
t	3	2	2	7	2%
d	3	3	0	6	1%
ɣ	3	1	2	6	1%
ɮ	3	1	1	5	1%
g	2	3	0	5	1%
ⁿd	2	1	0	3	1%
b	2	0	0	2	0%
ɓ	0	1	1	2	0%
ᵑg	1	1	0	2	0%
ⁿdz	1	0	0	1	0%
ᵑgʷ	0	1	0	1	0%

10.8.3 Statistics by place of articulation

The alveolar phonemes are the most common in the reconstructed roots. All the other points of articulation are more or less equally common. Labialized velars are uncommon in word-final position.

	Initial	Medial	Final	Total	Percentage
Labial	34	30	18	82	19%
Alveolar	39	55	56	150	35%
Laminal	28	17	21	66	15%
Velar	30	11	17	58	14%
Labialized velar	36	26	9	71	17%

10.8.4 Statistics by manner of articulation

Voiceless plosives and fricatives are more common than voiced plosives and fricatives. Implosives and nasals are also more common than voiced plosives. Overall, fricatives are much more common than plosives.

	Initial	Medial	Final	Total	Percentage
Voiceless plosive	29	15	14	58	14%
Voiced plosive	17	15	0	32	7%
Voiceless fricative	44	10	25	79	19%
Voiced fricative	31	16	6	53	12%
Implosive	15	10	19	44	10%
Nasal	11	18	28	57	13%
Pre-nasalized plosive	9	7	0	16	4%
Liquid/approximant	11	48	29	88	21%

11 Proto-Central Chadic Prosodies

11.1 Introduction

In this chapter we shall be looking at the origins of prosodies in Central Chadic languages. We will first reconstruct a palatalization prosody for Proto-Central Chadic. In some languages this is realised as front vowel harmony, and in others it is realised through the palatalization of consonants. We will then show that a labialization prosody need not be reconstructed for Proto-Central Chadic, and that the labialization prosody in Vowel Prosody languages, and labialized labials in Consonant Prosody languages all come from the reanalysis of the labialization component of labialized velars.

We will be reconstructing the vowel system of Proto-Central Chadic in chapter 12. This vowel system consisted of just three vowels: *a, *i and *ɨ. However it is important to note that the prosodies and labialized consonants play possibly a greater role than the underlying vowels in determining the surface vowels in the present-day Central Chadic languages.

11.2 The Palatalization Prosody

We have seen that in both the Vowel Prosody languages (see section 5.4) and the Consonant Prosody languages (see section 6.6.4) there is a word-level prosodic palatalization feature. In the Consonant Prosody languages, palatalization is primarily realised on consonants, whereas in the Vowel Prosody languages it is primarily realised in the form of vowel harmony. In the Mixed Prosody groups the prosody may affect vowels or consonants (see sections 7.2.7.1 and 7.4.1).

In this section we shall show that the two types of palatalization prosody are reflexes of a single palatalization prosody that existed in Proto-Central Chadic. We shall also take a detailed look at how the prosody is realised in the different groups within Central Chadic. We will conclude by proposing a description of the realisation of the palatalization prosody in Proto-Central Chadic and describing how it developed in different ways to produce the systems that exist today.

11.2.1 Reconstructing the Palatalization Prosody for Proto-Central Chadic

In this section we will reconstruct an abstract palatalization feature, denoted PAL, for Proto-Central Chadic. In order to show the presence of PAL in roots reconstructed for Proto-Central Chadic, we will show that the palatalization prosody is present in the roots reconstructed for a range of the proto-languages of the groups within Central Chadic. For the Vowel Prosody proto-languages, PAL is realised as front vowel harmony, and for the Consonant Prosody proto-languages it is realised as palatalization of individual consonants. In the Mixed Prosody languages the realisation may follow either of these two patterns according to the rules of the individual languages. For the Kotoko languages there is no palatalization prosody, with the prosody appearing to simply have been lost at a point after the Kotoko proto-languages split from Proto-Central Chadic North.

In order to demonstrate that the palatalization prosody can be reconstructed for Proto-Central Chadic, we will present full data on four widely attested roots. We will later give summary data justifying the reconstruction of palatalization in a further sixteen roots.

Palatalized roots account for around 20% of the reconstructed lexicon of Proto-Central Chadic. This compares with around 14% of roots containing *j, around 14% containing *i and around 23% containing *r, the most common consonant phoneme.

In order to be considered as Proto-Central Chadic roots, reflexes have to appear in at least five of the groups within Central Chadic, and should include groups from both the North and South sub-branches. To eliminate *wanderwörter*, the consonantal sound changes need to be consistent with the regular sound changes established for the groups within Central Chadic.

In the data, the palatalization prosody will be represented by a superscript 'ʸ' placed after the word. All reconstructions are my own. The full data used in the reconstructions can be found at http://centralchadic.webonary.org/.

The following map shows the geographical distribution of the phonological types.
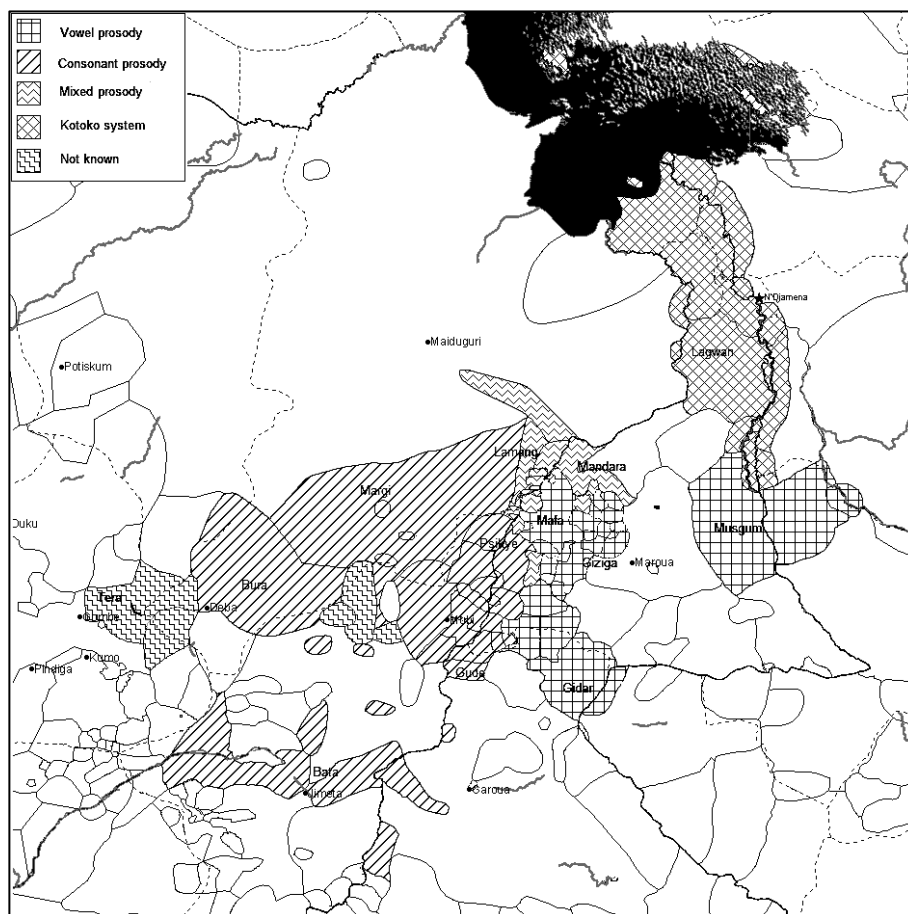
Map 29 - Phonological types

11.2.1.1 *hʷɨtsɨn ʸ 'nose'

In the three Consonant Prosody groups the palatalization prosody affects the laminal consonant *ts, resulting in a voiceless post-alveolar affricate.

The Proto-Bata root is reconstructed as *tsɨnɨ ʸ. In three of the languages *ts has the reflex /s/. Under palatalization, /ts/ and /s/ are realised as [tʃ] and [ʃ].

In most cases, these palatalized consonants cause the fronting of the following *ɨ to [i]. In Tsuvan, the final /a/ is the pre-pausal form of *ɨ.

Language	UF	Intermediate	SF
Tsuvan	mətsəna ʸ	məts^jəna	mətʃine
Sharwa	tsɨnə ʸ	ts^jɨnə	tʃinə
Gude	sənə ʸ	s^jənə	ʃinə
Jimi	sənə ʸ	s^jənə	ʃənə-n
Bata	səna ʸ	s^jəna	ʃine

Table 114 – Reflexes of Proto-Bata 'nose'

The Proto-Higi root is reconstructed as *hɨts^jɨn. The palatalization prosody isn't reconstructed for Proto-Higi, though the presence of the palatalized laminal in the reconstructed form indicates that the prosody was present an earlier point in the language's history. In most cases, the vowel following the palatalized laminal has been fronted.

The initial *h has been lost in three languages and compensated for by the prefixed /n/. In Bana it has the reflex /k/. The final *n has been lost in the Kamwe dialects due to the common process of final consonant deletion (see section 3.3.12).

Language	UF	SF
Kamwe Nkafa	nts^jɨ	ntʃi
Kamwe Futu	nts^jɨ	ntʃi
Kirya	ns^jɨn	nʃin
Bana	ks^jən	kʃən

Table 115 - Reflexes of Proto-Higi 'nose'

The Proto-Margi root is reconstructed as *hʷɨtsɨr ʸ. Note that in Proto-Margi, word-final *n→r. The palatalization prosody is realised in the form of palatalization of the laminal consonant. This palatalized consonant fronts the following vowel. The initial *hʷ has been lost in all languages except Bura. In Margi the loss is compensated for by the addition of /m/. In Bura *hʷ has the reflex /kʷ/, with the labialization being realised as [u].

Language	UF	Intermediate	SF
Bura	kʷətsər ʸ	kʷəts.ʲər	kutʃir
Margi	mɨtsər ʸ	mɨts.ʲər	mtʃir
Kilba	tsər ʸ	ts.ʲər	tʃir
Margi South	tsər ʸ	ts.ʲər	tʃir

Table 116 - Reflexes of Proto-Margi 'nose'

In the Vowel Prosody groups, the primary realisation of PAL is the fronting of the vowels in the word. In many of these languages the fronting does not apply to /ə/, but only to /a/. However in some languages – including most of the languages of the Mofu and Mafa groups – there is pre-pausal lowering of the final vowel from /ə/ to /a/, which feeds the application of the prosody, resulting in [e] in the surface form.

In almost all of the languages of these groups, the palatalization prosody also palatalizes the laminal consonants in the word. See the description of this phenomenon in Moloko in section 5.2.4 for an example.

The Proto-Mofu root is reconstructed as *hʷɨtɨr ʸ. Final *n has become *r.

Language	UF	SF
Ouldeme	hʷəⁿdar	huⁿdar
Mada	hʷəⁿdar ʸ	hⁿdœr
Muyang	həⁿdar ʸ	hiⁿdir
Moloko	həⁿdar ʸ	həⁿder
Merey	hətar ʸ	həter
Gemzek	hətar ʸ	həter
Zulgo	hətər ʸ	hitir
Dugwor	mətar ʸ	məter
Mofu North	hatar	hatar
Mofu-Gudur	hatar ʸ	heter

Table 117 - Reflexes of Proto-Mofu 'nose'

Note that in Muyang the vowel in the final syllable is raised before a pause. In all the other languages except for Ouldeme, Zulgo, Gemzek and Merey this vowel is lowered. In Muyang and Zulgo /ə/ is fronted by the palatalization prosody, whereas it is unaffected in the other languages. The [œ] in Mada is due to the back-rounding effect from /hʷ/ combining with the fronting effect of the palatalization prosody to produce a front-rounded vowel. There has been a non-systematic change t→ⁿd in the languages of the Tokombere subgroup (Ouldeme, Muyang, Mada and Moloko).

The Proto-Hurza root is reconstructed as *hʷɨtsan ʸ. (Note that final /n/→ŋ.) The palatalization prosody has resulted in the fronting of vowels and in the palatalization of the laminal consonant. In Vame *hʷ has lost its labialization, but in Mbuko *hʷ has lost the *h component and retained the labialization as /w/, which has then metathesized with /ts/.

Language	UF	SF
Vame	hətsan ʸ	hətʃeŋ
Mbuko	tsəwan ʸ	tʃœŋ

Table 118 - Reflexes of Proto-Hurza 'nose'

The Proto-Daba root is not easy to reconstruct. The final *n→r change in three of the reflexes is not a feature of the Daba group, and may be evidence of borrowing from a language such as Mofu-Gudur, though the form does not resemble any neighbouring language. The Daba and Mbudum reflexes display the evidence of the palatalization prosody that we would expect, however there is no evidence for palatalization in this root from the other languages. For the Proto-Daba form we will take the Daba entry *mɨtsɨn ʸ as being the least likely to have been influenced by borrowing. (The apostrophe in the data is taken as a misprint, rather than as a glottal stop.)

Language	UF	SF
Daba	mətsən ʸ	mitʃi'n
Mbudum	ntsur ʸ	ntʃur
Buwal	mtsər	mtsar
Gavar	mtsər	mtsər

Table 119 - Reflexes of Proto-Daba 'nose'

The Proto-Maroua root is also difficult to reconstruct from the internal evidence. The two Giziga reflexes exhibit labialization, whilst the Mbazla reflex exhibits palatalization. This is understandable if the entries are compared to the Proto-Central Chadic root *hʷɨtsɨn ʸ, but implies that the languages in this group did not inherit the root from the same source. It is not immediately obvious what the sources for the different reflexes might be. The Proto-Maroua root is listed as *hɨtɨn ʷ/*kɨtɨŋ ʸ to reflect this uncertainty.

Language	UF	SF
Giziga South	hətən ᵂ	hutuŋ
Giziga North	hətan ᵂ	huton
Mbazla	kətən ʸ	kitiŋ

Table 120 - 'nose' in the Maroua group

The Proto-Mafa root is reconstructed as *hɨtsan. The palatalization prosody has been lost in this root.

Language	UF	SF
Cuvok	hətan	hətaŋ
Mafa	hətsan	hətsan

Table 121 - Reflexes of Proto-Mafa 'nose'

There is a Proto-Tera root, tentatively reconstructed as *hɨn, though it is not clear if this is a reflex of Proto-Central Chadic *hʷɨtsɨn ʸ.

Language	UF	SF
Tera	xən	xən
Ga'anda	həraja	həraja

Table 122 - Reflexes of Proto-Tera 'nose'

The Gidar entry is /əŋkən/, which does not carry the palatalization prosody, and is unlikely to be cognate.

There is no reflex of this root in the Musgum group.

The three groups of Mixed Prosody languages express palatalization in different ways. In the Mandara and Sukur groups, palatalization is expressed through palatalization of laminals or in some cases through vowel harmony. It is not possible to reconstruct palatalization within the Lamang group.

The Proto-Mandara root is reconstructed as *hɨtɨrɨ ʸ. Without a laminal consonant in the root, likely evidence for palatalization is hard to locate. The Matal form and the front vowels in Dghwede may be the only signs of possible palatalization in Proto-Mandara. Note that the initial *h has the reflexes zero, /f/, /k/ and /x/.

Language	UF	SF
Matal	tɨr ʸ	tir
Podoko	fətərə	fətərə
Mandara	kətarə	əktare
Malgwa	kətare	əktare
Glavda	xɨtɨr	xɨtɨr
Dghwede	xətirə	xtire

Table 123 - Reflexes of Proto-Mandara 'nose'

The Sukur root is palatalized. As the only language of the group, this is taken as the form for Proto-Sukur. Palatalization is realised as the palatalization of the laminal consonant.

(298) /sən ʸ/   [ʃən]   'nose'

The Proto-Lamang root is reconstructed as *hɨtsiŋ. The *i in Proto-Lamang may a reflex of palatalization.

Language	UF	SF
Lamang	hətsiŋ	htsiŋ
Hdi	hətsiŋ	hətsiŋ

Table 124 - Reflexes of Proto-Lamang 'nose'

The Kotoko groups have not retained the palatalization prosody. It is possible that a final front vowel may be an indication of the effect of palatalization in the history of the languages (see section 8.3.3).

The Proto-Kotoko South root is reconstructed as *hɨtsɨne.

Language	SF
Mazera	hɨtʃɨne
Zina	hiskini

Table 125 - Reflexes of Proto-Kotoko South 'nose'

The Proto-Kotoko Centre root is reconstructed as *hɨsɨni.

Language	SF
Lagwan	xsɨni
Mser	asɨn

Table 126 - Reflexes of Proto-Kotoko Centre 'nose'

The Proto-Kotoko North root is reconstructed as *tsɨhɨn. The /k/ in Malgbe is a reflex of *h. In Mpade the *h and *ts have metathesized.

Language	SF
Afade	tsɨn
Maltam	sɨn
Malgbe	skɨn
Mpade	hasan

Table 127 - Reflexes of Proto-Kotoko North 'nose'

The Kotoko Island group consists of the single language Buduma. The word for 'nose' is /tsənaj/.

Putting together the roots constructed for the proto-languages of each group, we have the following evidence for the reconstruction of Proto-Central Chadic 'nose' hʷɨtsɨn ʸ.

Group	Root	Group	Root	Group	Root
Bata	tsɨni ʸ	**Margi**	hʷɨtsɨr ʸ	**Kotoko Island**	tsɨnaj
Daba	mɨtsɨn ʸ	**Mandara**	hɨtɨrɨ ʸ	**Kotoko North**	tsɨhɨn
Mafa	hɨtsan	**Mofu**	hʷɨtɨr ʸ	**Kotoko Centre**	hɨsɨni
Tera		**Maroua**	hɨtɨn ʷ, kɨtɨŋ ʸ	**Kotoko South**	hɨtsɨne
Sukur	sɨn ʸ	**Lamang**	hɨtsiŋ	**Musgum**	
Hurza	hʷɨtsan ʸ	**Higi**	hɨtsʲɨn	**Gidar**	

Table 128 - Reflexes of Proto-Central Chadic 'nose'

11.2.1.2 *sɨhʷani ʸ 'dream'

In the Consonant Prosody languages, the palatalization is realised primarily on the laminal *s in the root.

The Proto-Bata root is reconstructed as sɨni ʸ. Palatalization has been lost in this root in Gude and Jimi.

Language	UF	Intermediate	SF
Bata	səri ʸ	sʲəri	ʃiri
Sharwa	sɨnəʔə ʸ	sʲɨnəʔə	ʃinəʔə
Gude	sənij	sənij	səniː
Jimi	sini	sini	sini-n

Table 129 - Reflexes of Proto-Bata 'dream'

The Proto-Higi root is reconstructed as *sʲɨwɨn. Note that loss of final consonants is a feature of Bana and Kamwe-Futu. The palatalization prosody is not reconstructed for Proto-Higi, but the presence of *sʲ in the root is indicative of palatalization earlier in the history of the word.

Language	UF	SF
Kamwe-Futu	səwa	səwo
Bana	sʲəw	ʃiw
Kirya (verb)	sʲəwə	ʃiwu
Kirya (noun)	sʲən	ʃin

Table 130 - Reflexes of Proto-Higi 'dream'

The Proto-Margi root is reconstructed as *sɨʔʷini ʸ. The Kilba entry displays palatalization, but there is no palatalization in the Bura entry.

Language	UF	Intermediate	SF
Bura	səwəni	səwəni	suni
Kilba	səʔʷəni ʸ	sʲəʔʷəni	ʃiʔuni

Table 131 - Reflexes of Proto-Margi 'dream'

In the Vowel Prosody languages the primary realisation of palatalization is as fronting of the vowels. In many languages, laminal consonants are also palatalized.

The Proto-Daba root is reconstructed as *sɨnɨ ʸ. In all the languages except for Daba there is partial or total reduplication.

Language	UF	SF
Daba	sənə ʸ	sini
Mbudum	səsən ʸ	səsin
Buwal	saŋsaŋ ʸ	seŋseŋ
Gavar	ʃiŋʃiŋ	ʃiŋʃiŋ

Table 132 - Reflexes of Proto-Daba 'dream'

Note that palatalization has been lost in Gavar (see section 5.3.2.2), and therefore the underlying form is given in terms of the segments of the language. The palatalized laminals are a clear sign that the palatalization prosody existed in this root at an earlier point in its history.

The Proto-Mafa root is reconstructed as *sɨwɨna ʸ. Only the Mafa entry is palatalized in this case.

Language	UF	SF
Mafa	nsəwəna ʸ	nʃuwine
Cuvok	səwana	suwana

Table 133 - Reflexes of Proto-Mafa 'dream'

The Proto-Mofu root is reconstructed as *sɨwna ʸ. Three of the languages have a prefix /m/, which is possibly a nominaliser.

Language	UF	SF
Mofu North	masənay ʸ	mesənej
Dugwor	məsna ʸ	məʃne
Merey	məsuna ʸ	məsune
Gemzek	suna ʸ	ʃyne
Zulgo	suna	suna

Table 134 - Reflexes of Proto-Mofu 'dream'

For the Maroua, Hurza, Tera, Musgum and Gidar groups, data is only available for one language in each group. In each case the root carries the palatalization prosody (in Tera it is not known if the palatalization prosody exists or if the front vowels are the result of an historic process). These forms are taken as the forms of the proto-languages until further data becomes available.

Group	Language	UF	SF
Maroua	Giziga N	məsən [y]	məsin
Hurza	Mbuko	səwna [y]	syne
Tera	Tera	zine	ʒine
Musgum	Mulwi	hɨjnɨ [y]	hiːni
Gidar	Gidar	ɨsːɨna [y]	isːine

Table 135 - 'dream' in further Vowel Prosody languages

In the Mixed Prosody languages, we expect to see palatalization realised in most cases by palatalization of *s as /ʃ/. This is the case with this root for most of the Mandara group languages, but the root is absent in Sukur and palatalization has been completely lost in this root in the Lamang group.

The Proto-Mandara root is reconstructed as sɨhʷani [y]. Palatalization has only been retained in Mandara and Malgwa.

Language	UF	SF
Podoko	səhʷani	səhʷani
Mandara	sənə [y]	ʃəne
Malgwa	səne [y]	ʃine
Glavda	sɨⁿga	sɨⁿga

Table 136 - Reflexes of Proto-Mandara 'dream'

There is no cognate in the Sukur data.

The Lamang group data does not show evidence of the effect of palatalization. The Proto-Lamang root is reconstructed as *sɨwani.

Language	UF	SF
Lamang	səwaŋa	suwaŋa
Hdi	suni	suni

Table 137 - Reflexes of Proto-Lamang 'dream'

This root has reflexes in two of the Kotoko groups. There is no palatalization prosody in the Kotoko groups.

The Proto-Kotoko Centre root is reconstructed as *sɨwane.

Language	SF
Lagwan	swane
Mser	sware

Table 138 - Reflexes of Proto-Kotoko Centre 'dream'

The Proto-Kotoko North root is reconstructed as *saware.

Language	SF
Mpade	sware
Malgbe	yaware

Table 139 - Reflexes of Proto-Kotoko North 'dream'

We can reconstruct the Proto-Central Chadic root 'dream' as *sɨhʷani ^{y}.

Group	Root	Group	Root	Group	Root
Bata	sɨni ^{y}	**Margi**	sɨʔʷɨni ^{y}	**Kotoko Island**	
Daba	sɨnɨ ^{y}	**Mandara**	sɨhʷani ^{y}	**Kotoko North**	saware
Mafa	sɨwɨna ^{y}	**Mofu**	sɨwna ^{y}	**Kotoko Centre**	sɨwane
Tera	zine	**Maroua**	mɨsɨn ^{y}	**Kotoko South**	
Sukur		**Lamang**	sɨwani	**Musgum**	hɨjnɨ ^{y}
Hurza	sɨwna ^{y}	**Higi**	sʲɨwɨn	**Gidar**	ɨssɨna ^{y}

Table 140 - Reflexes of Proto-Central Chadic 'dream'

11.2.1.3 *kɨrɨp ^{y} 'fish'

In this root there are no laminal phonemes, so the realisation of the palatalization prosody in the consonant prosody languages is more varied. In Proto-Bata the prosody is realised on one of the consonants of the word according to the prioritisation rules of the language (see section 6.3.4.3). In Proto-Higi, palatalization is realised only on laminal consonants, though in this and some other cases the Proto-Higi *i is the reflex of the prosody. In Proto-Margi, the palatalization prosody exists, and is realised on laminals or velars. With this root we would expect to see the velar *k palatalized.

The Proto-Bata root is reconstructed as *kɨrɨfɨ ^{y}. In this group the palatalization prosody is realised primarily as palatalization of one or more of the consonants. For this item, either the /f/ or the /r/ is palatalized depending on the language. Note that for Tsuvan the initial /w/ affects the following vowel, and for Sharwa

the initial /kʷ/ transfers the labialization component onto the following /ɨ/ as [u]. In Tsuvan there was a consistent *r→l change.

Language	UF	Intermediate	SF
Tsuvan	wəlfə ʸ	wəlfʲə	wulfi-n
Sharwa	kʷɨrəfɨ ʸ	kʷɨrʲəfʲɨ	kurʲəfi
Gude	hərəfə ʸ	hərəfʲə	hərəfi-nə
Jimi	hərəfə ʸ	hərʲəfə	hərʲəfə-n
Bata	qərfaː ʸ	qərfʲaː	qərfʲeː

Table 141 - Reflexes of Proto-Bata 'fish'

Several languages in the Bata group have nominal suffixes that are either obligatory for all nouns or just for feminine nouns. These are not included in the underlying forms and are separated by a hyphen in the surface form.

The Proto-Higi root is reconstructed as *kɨlipɨ. We have not reconstructed the palatalization prosody for Proto-Higi. Instead, the *i in the reconstructed root may be evidence of the influence of palatalization at an earlier stage of the word's history, possibly created by the palatalization of the preceding *l by the palatalization prosody.

Language	UF	SF
Bana	kəlipə	k(ə)lipə
Psikye	kələpə	kələpə
Kirya	kəripə	kəɽipə
Kamwe-Futu	kələpə	kələpə

Table 142 - Reflexes of Proto-Higi 'fish'

The /ɽ/ in Kirya is described as being 'not a true retroflex but pronounced with the tongue towards the alveolar ridge' (Blench and Ndamsai 2009b, 79) As such it may be the reflex of *rʲ.

The Proto-Margi root is reconstructed as *kɨlfi ʸ. In this group the palatalization prosody is realised primarily on laminal consonants, or if not, then on another consonant of the word. With this root we expect the *k to be palatalized, which is the case in two of the languages. In the other languages palatalization may have been lost, or the *f may have been palatalized, though the palatalization is inaudible due to the final *i.

Language	UF	SF
Bura	kʲɨlfa	kilfa
Margi	kʲɨfi	kyifi
Margi S	kalfi	kalfi
Kilba	kalfi	kalfi

Table 143 - Reflexes of Proto-Margi 'fish'

As we have seen in the previous sub-sections, in the Vowel Prosody languages the primary realisation of the palatalization prosody is the fronting of the vowels in the root. In the absence of laminal consonants, there is no palatalization of consonants in this root. Note that the reconstructed high vowel for group proto-languages is always notated as *ɨ.

The Proto-Daba root is reconstructed as *kɨlɨf ʸ. Note that Gavar no longer has an active palatalization prosody.

Language	UF	SF
Daba	kələf ʸ	kilif
Mbudum	kələf ʸ	kəlːif
Buwal	ŋkəlaf ʸ	ŋkəlef
Gavar	ŋkilif	ŋkilif

Table 144 - Reflexes of Proto-Daba 'fish'

The Proto-Mafa root is reconstructed as *kɨlaf ʸ.

Language	UF	SF
Mafa	kəlaf ʸ	kilef
Cuvok	kəlaf ʸ	kəlef

Table 145 - Reflexes of Proto-Mafa 'fish'

The Proto-Maroua root is reconstructed as *kɨlɨf ʸ.

Language	UF	SF
Mbazla	kələf ʸ	kilif
Giziga North	kəlaf ʸ	kilef
Giziga South	kələf ʸ	kilif

Table 146 - Reflexes of Proto-Maroua 'fish'

The Proto-Mofu root is reconstructed as *kɨlɨf ʸ.

Language	UF	SF
Zulgo	kələf ʸ	kilif
Ouldeme	kələf ʸ	kəlif
Gemzek	kəlaf ʸ	kəlef
Mofu North	kəlaf ʸ	kəlef
Moloko	kəlaf ʸ	kəlef
Merey	kəlaf ʸ	kəlef
Dugwor	kəlaf ʸ	kəlef

Table 147 - Reflexes of Proto-Mofu 'fish'

For the Hurza, Tera, Musgum and Gidar groups, a reflex of this root is only available in one language in each group. In all of these languages except Tera the word carries the palatalization prosody.

Group	Language	UF	SF
Hurza	Mbuko	kɨlaf ʸ	kəlef
Tera	Tera	jɨrvɨ ʷ	jurvu
Musgum	Vulum	hɨlɨf ʸ	hilif
Gidar	Gidar	kɨlfɨ ʸ	kilfi

Table 148 - 'fish' in other Vowel Prosody languages

In the Mixed Prosody languages, the palatalization prosody may be realised as palatalization of one of the consonants, or else by fronting of vowels.

The Proto-Mandara root is reconstructed as *kɨlɨfɨ ʸ. The palatalization prosody is evident only in the Glavda entry, where it is realised on /k/. (See section 7.2.5 for a description of the behaviour of the palatalization prosody in Glavda.) The underlying form given is the segmental form after the effect of the prosody.

Language	UF	SF
Podoko	kələfə	kɨləfə
Mandara	kələfə	kəlfe
Malgwa	kələfə	kəlfe
Glavda	kʲɨlɨf	kilf
Dghwede	kələfə	klfe

Table 149 - Reflexes of Proto-Mandara 'fish'

The Proto-Lamang root is reconstructed as *kɨlɨpi. There is no palatalization prosody in Proto-Lamang, but the final *i is support for its presence earlier in the history of the word.

Language	UF	SF
Lamang	kələpi	kəlpi
Hdi	kəlipi	kəlipi

Table 150 - Reflexes of Proto-Lamang 'fish'

In Sukur the root is [kirif] /kɨrɨf ʸ/.

Amongst the Kotoko groups, the root is only found in Kotoko South, where the Proto-Kotoko South form is reconstructed as *kɨlfɨ.

Language	SF
Mazera	kɨlfa
Zina	həlfə

Table 151 - Reflexes of Proto-Kotoko South 'fish'

From these we can reconstruct Proto-Central Chadic 'fish' as *kɨrɨp ʸ.

Group	Root	Group	Root	Group	Root
Bata	kɨrifɨ ʸ	**Margi**	kɨlfi ʸ	**Kotoko Island**	
Daba	kɨlif ʸ	**Mandara**	kɨlifɨ ʸ	**Kotoko North**	
Mafa	kɨlaf ʸ	**Mofu**	kɨlif ʸ	**Kotoko Centre**	
Tera	jɨrvɨ ʷ	**Maroua**	kɨlif ʸ	**Kotoko South**	kɨlfɨ
Sukur	kɨrɨf ʸ	**Lamang**	kɨlɨpi	**Musgum**	hɨlif ʸ
Hurza	kɨlaf ʸ	**Higi**	kɨlipɨ	**Gidar**	kɨlfɨ ʸ

Table 152 - Reflexes of Proto-Central Chadic 'fish'

11.2.1.4 *ɬiɗin ʸ 'tooth'

In the Consonant Prosody languages, the palatalization prosody is realised on one of the consonants of the root. In most cases it is realised on *ɗ, often resulting in /j/.

The Proto-Bata root is reconstructed as *ʒini ʸ. Proto-Central Chadic *ɬ→ʒ in Proto-Bata, and in most languages of the Bata group, Proto-Bata *ʒ→l. In The palatalization prosody is realised on the /n/, except in Bata where it is realised on the /l/.

Language	UF	Intermediate	SF
Tsuvan	ʒəna ʸ	ʒənʲa	ʒine
Sharwa	linə ʸ	linʲə	linʲə
Gude	lini ʸ	linʲi	linʲi-nə
Jimi	linə ʸ	linʲə	linʲə-n
Bata	lin ʸ	lʲin	lin-to

Table 153 - Reflexes of Proto-Bata 'tooth'

The Proto-Higi root is reconstructed as *ɬini. There are no active prosodies in Proto-Higi. The *i in the reconstructed root may originate in an earlier application of the palatalization prosody to *ɗ, as *ɗʲ→j, followed by *iji→i.

Language	SF
Kamwe-Futu	ɬino
Kirya	ɬaj
Bana	ɬini
Psikye	ɬənə

Table 154 - Reflexes of Proto-Higi 'tooth'

The Proto-Margi root is reconstructed as *ɬir ʸ. The palatalization prosody is realised on the *ɬ. Note that in Proto-Margi, word-final *n→r. In the Margi group there is a common, but not universal, change *ɬʲ→hʲ.

Language	UF	SF
Bura	ɬər ʸ	hʲir/ɬir
Margi	ɬər ʸ	hʲir
Kilba	ɬər ʸ	hʲir
Margi S	ɬər ʸ	hʲir

Table 155 - Reflexes of Proto-Margi 'tooth'

In the Vowel Prosody groups, the primary realisation is the fronting of the vowels in the word.

The Proto-Mofu root is reconstructed as *ɬɨr ^{y}. Note that in the Tokombere subgroup (Ouldeme, Mada, Moloko and Muyang), palatalization has been lost. In the Meri subgroup (Merey, Gemzek, Zulgo and Dugwor) *ɬ→ɮ in this and several other roots.

Language	UF	SF
Ouldeme	aɬar	aɬar
Mada	aɬar	aɬar
Moloko	aɬar	aɬar
Muyang	aɬər	aɬər
Merey	ɮar ^{y}	ɮer
Gemzek	ɮar ^{y}	ɮer
Zulgo	ɮər ^{y}	ɮir
Dugwor	ɮar ^{y}	ɮer
Mofu North	ɬar ^{y}	ɬer
Mofu-Gudur	ɬar ^{y}	ɬer

Table 156 - Reflexes of Proto-Mofu 'tooth'

The Proto-Hurza root is reconstructed as *ɬahan. Note that word-final /n/→[ŋ] in Mbuko. Palatalization has been lost in this group.

Language	UF	SF
Vame	ɬahan	ɬahan
Mbuko	ɬan	ɬaŋ

Table 157 - Reflexes of Proto-Hurza 'tooth'

The Proto-Daba root is reconstructed as *ɮɨɗaŋ ^{y}. This is one of the few groups where the *ɗ has not been lost.

Language	UF	SF
Buwal	ɮəɗaŋ ^{y}	ɮəɗeŋ
Gavar	ɮəɗaŋ ^{y}	ɮiɗeŋ

Table 158 - Reflexes of Proto-Daba 'tooth'

The Proto-Maroua root is reconstructed as *ɬɨn ʸ. In this group, final /n/ is realised as [ŋ] consistently in Mbazla, and sporadically in the Giziga dialects.

Language	UF	SF
Giziga South	ɬən ʸ	ɬiŋ
Giziga North	ɬən ʸ	ɬin
Mbazla	ɬən ʸ	ɬiŋ

Table 159 - Reflexes of Proto-Maroua 'tooth'

The Proto-Mafa root is reconstructed as *ʒan ʸ.

Language	UF	SF
Cuvok	ʒan ʸ	ʒeŋ
Mafa	ʒana ʸ	ʒene

Table 160 - Reflexes of Proto-Mafa 'tooth'

For the Musgum, Gidar and Tera groups, data is only available from individual languages. Tera is the only language showing evidence of palatalization, though it is not known if the palatalization prosody exists in Tera.

Group	Language	UF	SF
Musgum	Vulum	ɬiŋɬiŋ	ɬiŋɬiŋ
Gidar	Gidar	ɬaja	ɬaja
Tera	Tera	ʒin	ʒin

Table 161 - 'tooth' in other Vowel Prosody groups

In the Mixed Prosody groups, the Proto-Mandara root is reconstructed as *ɬɨrɨ ʸ. As with Proto-Higi, the *i could be taken as evidence for an earlier palatalization prosody. Note that final *n→r in Proto-Mandara. Glavda has added /-ɗa/ to the root, but no explanation is apparent.

Language	UF	SF
Podoko	ɬirə	ɬirə
Mandara	ɬarə	ɬarə
Malgwa	ɬare	ɬaːre
Glavda	ɬɨrɨɗa	ɬrɗa
Dghwede	ɬirə	ɬire

Table 162 - Reflexes of Proto-Mandara 'tooth'

The Sukur entry is [ʒʲin] /ʒɨn ʸ/. Here the palatalization prosody is still present.

The Proto-Lamang root is reconstructed as *ɬiɗiŋ. The Lamang group is the second of the two groups that give evidence for reconstructing *ɗ in the root. Proto-Lamang did not have a palatalization prosody, but the *i vowels in the reconstructed form are the reflexes of the palatalization prosody in an earlier form of the word (see section 7.3.5).

Group	SF
Lamang	ɬidiŋ
Hdi	ɬiʔiŋ

Table 163 - 'tooth' in Proto-Lamang

In the Kotoko groups, there is a front vowel in Proto-Kotoko South and Proto-Kotoko Centre, consistent with the presence of the palatalization prosody at an earlier point in the history of the word.

The Proto-Kotoko South root is reconstructed as *sin. In this group, *ɬ→s.

Group	SF
Zina	sin
Mazera	sine

Table 164 - 'tooth' in Proto-Kotoko South

The Proto-Kotoko Centre root is reconstructed as *ɬɨni.

Group	SF
Lagwan	ɬɨni
Mser	sɨr

Table 165 - 'tooth' in Proto-Kotoko Centre

The Proto-Kotoko North root is reconstructed as *ɬɨr.

Group	SF
Afade	ɬɨr
Malgbe	ɬɨr
Mpade	ʃan

Table 166 - 'tooth' in Proto-Kotoko North

In Buduma, the only language of the Kotoko Island group, the word is *hənaj*. In Buduma *ɬ→s→h.

Putting together the roots constructed for the proto-languages of each group, we have the following evidence for the reconstruction of Proto-Central Chadic

'tooth' *ɬiɗin ʸ. Direct support for the palatalization prosody comes from nine of the groups, and indirect support from a further four groups.

Group	Root	Group	Root	Group	Root
Bata	ɟini ʸ	**Margi**	ɬir ʸ	**Kotoko Island**	hɨnaj
Daba	ɟɨɗaŋ ʸ	**Mandara**	ɬiri ʸ	**Kotoko North**	ɬɨr
Mafa	ʒan ʸ	**Mofu**	ɬir ʸ	**Kotoko Centre**	ɬini
Tera	ɟin	**Maroua**	ɬin ʸ	**Kotoko South**	sin
Sukur	ɟin ʸ	**Lamang**	ɬiɗiŋ	**Musgum**	ɬiŋ
Hurza	ɬahan	**Higi**	ɬini	**Gidar**	ɬaja

Table 167 - Reflexes of Proto-Central Chadic 'tooth'

11.2.2 Further Data for the Palatalization Prosody

This section presents data for the reconstruction of the palatalization prosody in a further sixteen Proto-Central Chadic roots. Here the proto-forms are given for each of the groups where the root is attested.

In order to reconstruct the palatalization prosody for a given root, we need the palatalization prosody to be present in most of the proto-languages of the groups within Central Chadic where the palatalization prosody exists, within representation from the different sub-branches and different phonological types. There are some groups where the palatalization prosody is not reconstructed for the group's proto-language, namely the Higi and Lamang groups, and the four Kotoko groups. In these cases we look for evidence of the palatalization prosody in other ways. So in Proto-Higi we expect to see palatalization of laminal consonants, where present. In Proto-Lamang we expect to find *i in the final syllable for roots where the only vowels in the root are *ɨ. In Proto-Kotoko South and Centre, there may also be front vowels, but in Kotoko North and Island the palatalization prosody has been lost and there may be no trace.

For the groups where palatalization is reconstructed for the proto-language, in roots containing *ɗ there may have been a change *ɗ→j, but no other evidence of the palatalization prosody. And there are always exceptions where the palatalization prosody has been lost for a particular root in a particular language.

(299) 'hearth' *rɨwɨts ʸ

Group	Root	Group	Root	Group	Root
Bata	rɨtɨ ʸ	**Margi**		**Kotoko Island**	
Daba	lɨwɨts ʸ	**Mandara**	lɨwtsɨ ʸ	**Kotoko North**	
Mafa	rɨwats ʸ	**Mofu**	lɨwɨt ʸ	**Kotoko Centre**	
Tera		**Maroua**	lɨwɨts ʸ	**Kotoko South**	
Sukur	ruts	**Lamang**	liti	**Musgum**	lɨwɨt ʸ
Hurza	rɨwats ʸ	**Higi**	lɨtwɨ	**Gidar**	

(300) 'meat' *ɬɨwɨɗ ʸ

Group	Root	Group	Root	Group	Root
Bata	ʒɨwɨ ʸ	**Margi**		**Kotoko Island**	hu
Daba	ʒɨj ʸ	**Mandara**	ɬɨwɨɗ ʸ	**Kotoko North**	ɬɨw
Mafa	ʒɨwaɗ ʸ	**Mofu**	ɬɨw	**Kotoko Centre**	ɬɨw
Tera	ʒu	**Maroua**		**Kotoko South**	asu
Sukur	ɬɨwɨɗ ʸ	**Lamang**	ɬiʔʷi	**Musgum**	ɬɨwɨt
Hurza	ɬɨwaɗ ʸ	**Higi**	ɬɨj	**Gidar**	ɬɨwɨ

(301) 'pus' *wɨrɨɗ ʸ

Group	Root	Group	Root	Group	Root
Bata	rɨwɨɗ ʸ	**Margi**	liʔʷɨ	**Kotoko Island**	
Daba	wɨlaɗ ʸ	**Mandara**	lɨwɨɗ	**Kotoko North**	
Mafa	wɨrɨɗ ʸ	**Mofu**	walɨɗ ʸ	**Kotoko Centre**	
Tera	ra	**Maroua**	lɨlɨɓ ʷ	**Kotoko South**	
Sukur	mɨru	**Lamang**		**Musgum**	alu
Hurza	ɗɨrɨw ʸ	**Higi**	liʔʷɨ	**Gidar**	wɨlɨ ʸ

(302) 'fly (insect)' *dzɨwɨɗ ʸ

Group	Root	Group	Root	Group	Root
Bata	dzɨʔɨ ʸ	**Margi**	tsɨɗɨ ʸ	**Kotoko Island**	hadzu
Daba	dzɨwɨɗ ʸ	**Mandara**	ⁿdzɨwɨɗ ʸ	**Kotoko North**	ts'ɨwi
Mafa	dzɨwaj	**Mofu**	dzɨwaj	**Kotoko Centre**	zɨwɨɗ
Tera		**Maroua**	dzɨdzɨwɨɗ ʸ	**Kotoko South**	dzadzwi
Sukur	dʒɨwɨɗ ʸ	**Lamang**	ziwɗi	**Musgum**	dɨwaj
Hurza	dzɨwaj	**Higi**	zʲɨwɨɗ	**Gidar**	zɨkɗa ʸ

(303) 'to suck' *sɨwɨɓ ʸ

Group	Root	Group	Root	Group	Root
Bata	sɨɓ ʸ	**Margi**	sɨɓɨ ʸ	**Kotoko Island**	tsetsabu
Daba	saɓ ʸ	**Mandara**	ɓusa ʸ	**Kotoko North**	s'afu
Mafa	sasɨɓ ʷ	**Mofu**	sɨwɨɓ	**Kotoko Centre**	s'afɨ
Tera		**Maroua**	suɓi	**Kotoko South**	
Sukur		**Lamang**	ɓisaj	**Musgum**	susuɓɨ ʸ
Hurza	susaɓ ʸ	**Higi**	ɓisɨ, sʲiɓɨ	**Gidar**	ɨssɨɓa ʷ

(304) 'scorpion' *hɨrɨdz ʸ

Group	Root	Group	Root	Group	Root
Bata	hɨradzɨ ʸ	**Margi**	hɨda ʸ	**Kotoko Island**	
Daba	rɨdzɨ ʸ	**Mandara**	radzɨ ʸ	**Kotoko North**	
Mafa	haradz	**Mofu**	hɨrɨda ʸ	**Kotoko Centre**	
Tera		**Maroua**	arats ʸ	**Kotoko South**	
Sukur	ᵐbɨrdaj	**Lamang**	rɨda	**Musgum**	hɨrɨdɨw
Hurza	rɨdza ʸ	**Higi**		**Gidar**	hɨrzɨja

(305) 'mortar' *hɨdzɨn ʸ

Group	Root	Group	Root	Group	Root
Bata	ⁿdzɨrɨ ʸ	**Margi**	ⁿdzɨr ʸ	**Kotoko Island**	adzin
Daba	ⁿdzar ʸ, dzɨdzaŋ ʸ	**Mandara**	dzɨrɨ	**Kotoko North**	
Mafa		**Mofu**	dzɨra, dzɨdzaŋ ʸ	**Kotoko Centre**	zɨn
Tera		**Maroua**	dzɨdzɨŋ ʸ	**Kotoko South**	
Sukur	dzɨmdzɨr ʸ	**Lamang**		**Musgum**	dɨŋ
Hurza	dzɨra ʸ, dzɨⁿdzan ʸ	**Higi**	ⁿdzir	**Gidar**	

(306) 'string' *zɨwɗ ʸ

Group	Root	Group	Root	Group	Root
Bata	zaʔʷɨ	**Margi**	sɨwiɗ	**Kotoko Island**	
Daba		**Mandara**	zawaɗ	**Kotoko North**	sɨre
Mafa		**Mofu**	zɨwaɗ ʸ	**Kotoko Centre**	saɗɨ
Tera	zoo	**Maroua**	zɨwɨɗ ʸ	**Kotoko South**	
Sukur	zɨɓɨ ʸ	**Lamang**	ziʔʷi	**Musgum**	
Hurza	zawaj	**Higi**	ziʔʷɨ	**Gidar**	

(307)   'leg' *sɨraj

Group	Root	Group	Root	Group	Root
Bata	sɨɗɨ	**Margi**	sil	**Kotoko Island**	
Daba	sasalaj	**Mandara**	sɨra	**Kotoko North**	sali
Mafa	sasalaj	**Mofu**	salaj	**Kotoko Centre**	
Tera	sara	**Maroua**	sir, sar	**Kotoko South**	
Sukur		**Lamang**	sɨla	**Musgum**	
Hurza	sɨraj	**Higi**	sɨra	**Gidar**	

(308) 'tail' *kʷɨtɨr ʸ

Group	Root	Group	Root	Group	Root
Bata	hʷɨtɨrɨ	**Margi**		**Kotoko Island**	
Daba	kʷɨtal ʸ	**Mandara**	kʷɨtɨlɨ ʸ	**Kotoko North**	
Mafa	hʷadar, fɨtar ʷ	**Mofu**	hʷɨtil ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	tur	**Lamang**	hʷɨtɨl	**Musgum**	
Hurza	kʷɨtar ʸ	**Higi**		**Gidar**	kɨtɨr ʷ

(309) 'navel' *zɨᵐbʷidɗ

Group	Root	Group	Root	Group	Root
Bata	zɨᵐbʷɨdɨ ʸ	**Margi**	sɨᵐbʷɨdɨw ʸ	**Kotoko Island**	
Daba		**Mandara**	zɨᵐbɨ ʸ	**Kotoko North**	saᵐbu
Mafa	zɨmal ʸ	**Mofu**	zɨᵐbal ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**	ziᵐbiɗ	**Musgum**	
Hurza		**Higi**	zʲɨᵐbʷiɗ	**Gidar**	

(310) 'eye' *tsɨ ʸ

Group	Root	Group	Root	Group	Root
Bata	dzɨ ʸ	**Margi**	ntsa ʸ	**Kotoko Island**	
Daba	ⁿdza ʸ	**Mandara**	jɨtsa ʸ	**Kotoko North**	tsɨ
Mafa		**Mofu**		**Kotoko Centre**	sɨ
Tera		**Maroua**		**Kotoko South**	
Sukur	is	**Lamang**		**Musgum**	
Hurza		**Higi**	ntsʲɨ	**Gidar**	

(311) 'hole' *vɨgɨɗ ʸ

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	vɨgɨ ʸ	**Kotoko North**	
Mafa	vavaɗ ʸ	**Mofu**	vɨɗ ʸ	**Kotoko Centre**	
Tera		**Maroua**	vɨgɨɗ ʸ	**Kotoko South**	
Sukur	vuɗ	**Lamang**		**Musgum**	
Hurza		**Higi**		**Gidar**	vɨva ʷ

(312) 'tongue' *ɣanaɗ ʸ

Group	Root	Group	Root	Group	Root
Bata	gana ʸ	**Margi**	gar ʸ	**Kotoko Island**	
Daba	ganaɗ	**Mandara**		**Kotoko North**	
Mafa		**Mofu**		**Kotoko Centre**	
Tera	ɣina	**Maroua**		**Kotoko South**	
Sukur	ɣanaj	**Lamang**	ɣanɨj	**Musgum**	
Hurza		**Higi**	ɣanɨj	**Gidar**	

(313) 'porcupine' *dzɨmɨkʷ ʸ

Group	Root	Group	Root	Group	Root
Bata	dɨmaʔa ʸ	**Margi**		**Kotoko Island**	
Daba	zɨmɨn ʸ	**Mandara**	dɨᵐbɨkɨ	**Kotoko North**	
Mafa	dɨᵐbakʷ ʸ	**Mofu**	damdzakʷ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur	dzɨmɨk ʸ	**Lamang**	diᵐbikʷ	**Musgum**	
Hurza		**Higi**	tsʲɨmɨkʷ	**Gidar**	

(314) 'porcupine' *tsɨhʷɨɗ ʸ

Group	Root	Group	Root	Group	Root
Bata		**Margi**	mɨtsa	**Kotoko Island**	
Daba		**Mandara**	tsɨtsɨhʷa ʸ	**Kotoko North**	
Mafa		**Mofu**	tsɨhaɗ ʸ	**Kotoko Centre**	
Tera		**Maroua**		**Kotoko South**	
Sukur		**Lamang**		**Musgum**	
Hurza	mɨtsah	**Higi**		**Gidar**	

11.2.3 The Realisation of the Palatalization Prosody in Proto-Central Chadic

Having reconstructed the palatalization prosody as a phonological category for Proto-Central Chadic, we need to consider what phonetic form it may have taken in Proto-Central Chadic. A solution is proposed here, but other options are also likely. The possibilities include vowel harmony, consonant palatalization, a mixed prosody, or simply a segment, such as a /j/ or /i/ which became reanalysed as a word-level feature. The option we will propose is that the palatalization prosody originated as a final /j/, and developed into a mixed prosody.

The phonological reanalysis of a suffix such as *j may have been triggered by a situation such as exists in Mafa, a Vowel Prosody language from the Mafa group (Barreteau and le Bléis 1990). Here, the imperfective is marked by the suffix /-j/ for verb stems that end in a vowel, but when the verb stem ends in a consonant, this suffix is reanalysed as a palatalization prosody. This prosody fronts the vowels of the word, and palatalizes any laminal consonants in the word, if present.

Gloss	Stem	Imperfective
to tremble	gudza	gudzaj
to divide	kəɮa	kəɮaj
to wash	pan	pan-j→pan ʸ→pen
to climb	təv	təv-j→təv ʸ→tiv

Table 168 - /j/reanalysis in Mafa

This sort of situation may provide an explanation for the origin of palatalization, as resulting from the reanalysis of an underlying final *j. This reanalysis could apply to any suffix *j, or to any word-final *j not preceded by a full vowel.

The presence of numerous reconstructed roots with final *i makes it unlikely that final *i was the source of the palatalization prosody.

It remains to give a hypothesis for its realisation. It would make sense for the Proto-Central Chadic realisation to combine an effect on the vowels of the word with an effect on the consonants, making it natural for the prosody to have developed along different paths in different groups.

Amongst the present-day systems, there are two where the palatalization affects both vowels and consonants, making them good candidates for the Proto-Central Chadic palatalization prosody. Firstly there is the system used in many of the Vowel Prosody languages where palatalization affects the vowels and the laminal consonants, as in Moloko (see section 5.2) or Mafa (see section 5.3.5.2). The second possibility is the system found in three of the Mixed Prosody languages, where palatalization is realised (broadly speaking) either on laminal consonants, or else on vowels if there are no laminal consonants. This system occurs in Podoko (see section 7.2.1.2), Matal (see section 7.2.2) and Sukur (see section 7.4.1).

This second system is the preferred option, as it seems most likely to lend itself to developing into both Consonant Prosody and Vowel Prosody types. In the Consonant Prosody languages, the vowel harmony realisations would have been lost, and replaced in some languages by extending the consonant palatalization system. In the Vowel Prosody languages, the palatalization of laminals has been largely retained, but vowel harmony takes place whether or not laminal consonants are present.

11.2.4 Reflexes of the Palatalization Prosody

In this section we shall look at the reflexes of the palatalization prosody in the different groups in Central Chadic. So far we have broken down the Central Chadic languages and proto-languages into four phonological types: Consonant Prosody, Vowel Prosody, Mixed Prosody and Kotoko. In this section we will look at further sub-types, and give a hypothesis as to the developmental stages that led to each sub-type. The following diagram shows the development of the different forms of the palatalization prosody.
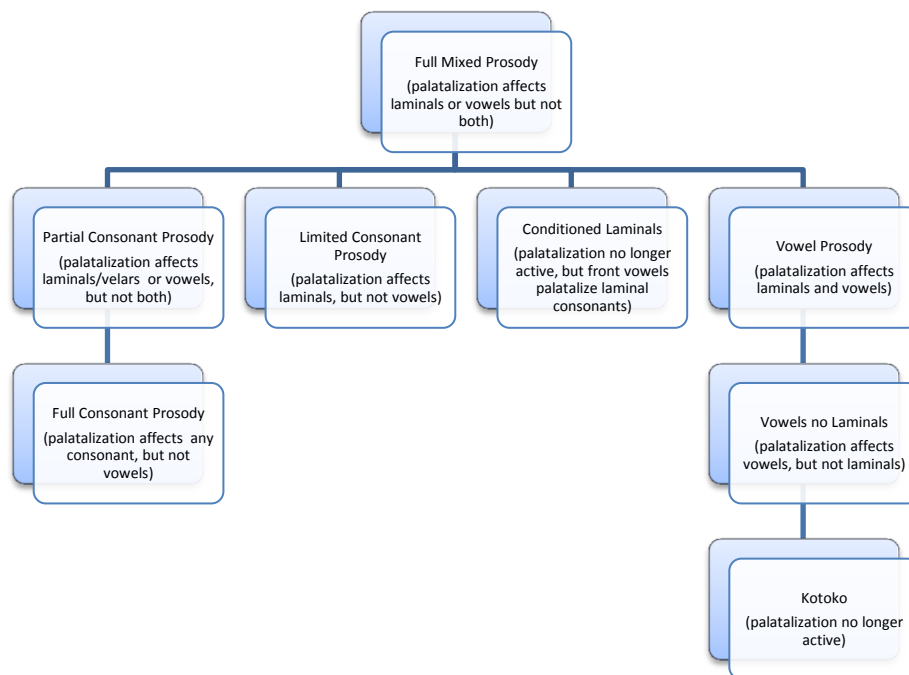
Figure 1 - Development of reflexes of the palatalization prosody

Our hypothesis is that the palatalization prosody started as a Mixed Prosody, affecting laminal consonants, or fronting vowels where no laminal consonants were present.

11.2.4.1 The development of phonological sub-types

Three Mixed Prosody languages – Sukur (Sukur group) and Podoko and Matal (Mandara group) – kept this system, which we shall name the Full Mixed Prosody system.

In a few languages, the palatalization of laminals was lost as an effect of the palatalization prosody, but retained as a conditioning effect of front vowels on adjacent laminal consonants. This Conditioned Laminals system is the system of the Lamang group, and also of Dghwede in the Mandara group.

From the original Mixed Prosody system, three types of Consonant Prosody system developed. Some languages kept the palatalization of laminals, but lost

the vowel-fronting effect of the palatalization prosody. This system, which we shall name the Limited Consonant Prosody system, was the system of Proto-Higi and is preserved in Psikye within that group.

In other languages the palatalization prosody developed to affect non-laminal consonants in words where there was no laminal. This was perhaps to compensate for the loss of vowel harmony by finding an alternate method for realising palatalization. The first stage may have been to extend palatalization to allow the palatalization of alveolars or velars - the Partial Consonant Prosody system – which is used in three subgroups: Margi and Kilba in the East subgroup of the Margi group; Mandara, Malgwa and Glavda in the Mandara subgroup of the Mandara group, and Bana and Kirya within the Bana group.

The next stage in development was to extend the palatalization prosody to allow it to affect any consonant, the Full Consonant Prosody system. This is the system of the Bata group languages, and also of Bura in the Margi group and the Kamwe languages (Higi, Kamwe Futu and Kamwe Nkafa) in the Higi group.

Each stage of development may have limited the conditions under which vowel harmony was applied. In the Full Mixed Prosody system, vowel harmony applies where there are no laminal consonants. In the Partial Consonant Prosody system, palatalization could be applied to velars, and so vowel harmony may only have applied when there were neither laminals nor velars in the word, though this type of prosody is unattested amongst present-day languages. Once the Full Consonant Prosody had developed and palatalization could be applied to any consonant, there were no environments where vowel harmony was needed to show the presence of the palatalization prosody.

In all three of these sub-types, the Consonant Prosody system had to develop before vowel harmony was lost. If this were not the case, and vowel harmony was lost first, there would only be an indication of the presence of the palatalization prosody on words containing laminals, and therefore no reason for the languages to need to apply palatalization elsewhere.

Moving in a different direction, the original Mixed System developed to produce the Vowel Prosody system, with two sub-types. Initially, the palatalization prosody developed to affect the vowels in the word, even when a laminal was present. This resulted in simultaneous vowel harmony and palatalization of laminals – the Vowels and Laminals System. This is the system used in the Mafa

group, Mofu group and Maroua group, and in Mina, Mbudum and Buwal in the Daba group, Muskum in the Musgum group and Ga'anda in the Tera group.

In some languages, the palatalization of laminals was lost, resulting either in no palatalization of laminals or else fixed palatalization of, for example, the laminal affricates. This Vowels, no Laminals system is used in Musgum and Mbara in the Musgum group, Gidar in the Gidar group, Daba (and possibly Mazagway Hidi) in the Daba group and Mbuko in the Hurza group. This differs from the situation in Lamang and Dghwede where the laminals are conditioned by adjacent front vowels.

The following map shows the distribution of the different prosody sub-types.
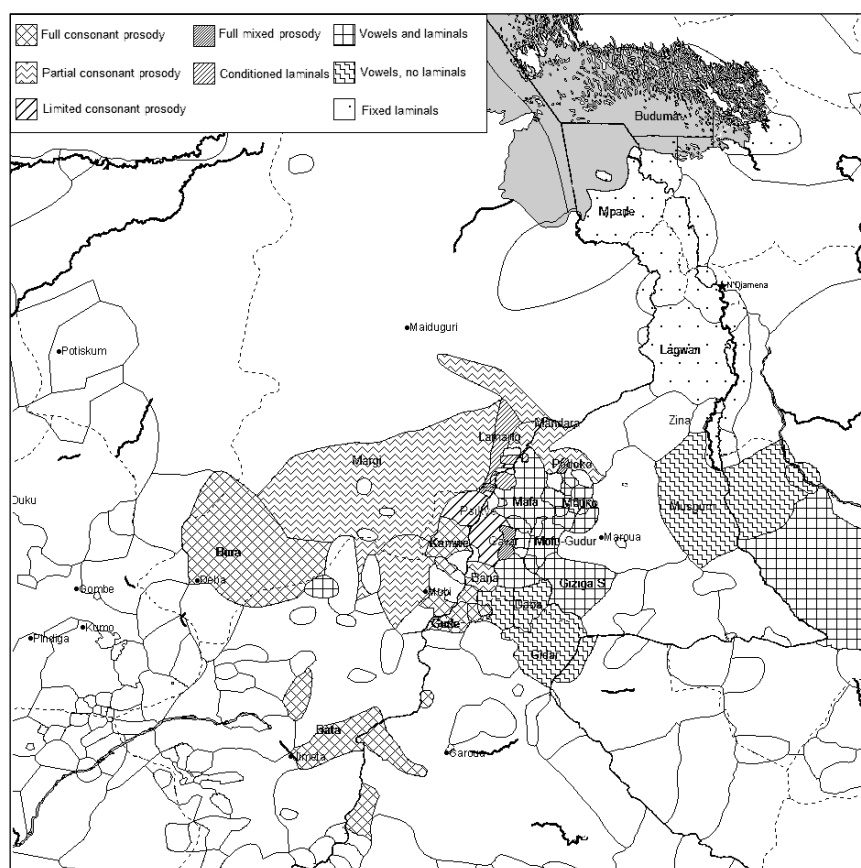
Map 30 - Phonological sub-types

In the Vowel Prosody languages, vowel harmony initially affected only underlying /a/, but in some languages from both sub-types it developed to also affect /ə/. This was the case in the languages of the south-east of Central Chadic: Gidar in the Gidar group, Muskum and Mbara in the Musgum group, the Maroua group, and in all of the Daba group except Buwal and Gavar, as well as in Zulgo and Ouldeme in the Mofu group. The following map shows the geographical distribution of the harmonisation of /ə/.
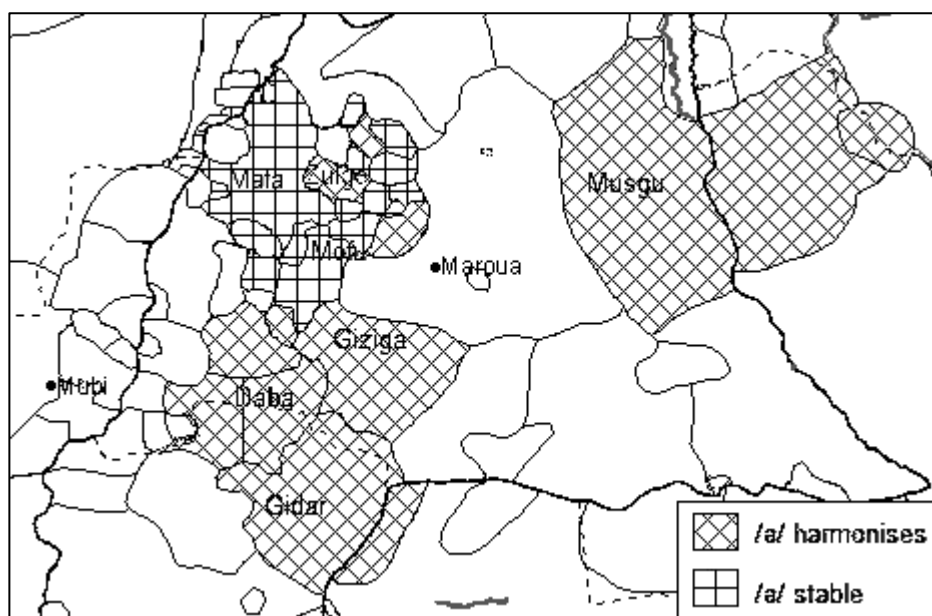
Map 31 - Harmonisation of /ə/

This covers all of the Central Chadic languages except for the Kotoko languages, where there is no active palatalization prosody. There are two possibilities. Either the palatalization prosody was lost in the Kotoko languages, or else it never developed. If the palatalization prosody never developed, this implies that the Kotoko languages were a genetically distinct unit at an early time, which goes against the genetic evidence from the regular changes affecting consonants.

The best explanation is to propose that the Kotoko groups originally followed the Vowel Prosody system, in particular the Vowels, no Laminals system, but that vowel harmony was lost in an areal process affecting the Kotoko groups.

We can see a few indications of possible reflexes of the palatalization prosody in the vowels of some Kotoko languages. From this system, vowel harmony was lost. The loss may have been motivated by the influence of the Kanuri six vowel system, and the borrowing of many Kanuri words which had no vowel harmony.

11.2.4.2 The origins of the phonological types

The original mixed prosodic system of Proto-Central Chadic was probably still in place comparatively recently, at a time shortly before the formation of the proto-languages of the groups. In other words, at this time all the languages had a palatalization prosody that palatalized laminal consonants and caused vowel harmony. There is great consistency in the phonological type within each group, allowing for the phonological type of the proto-language of each group to be established. However, it is not possible to establish the phonological type of the ancestor languages of the group proto-languages, since the phonological type of the group proto-languages corresponds to geography more than genetics.

The Vowel Prosody system appears oldest in the south-east of the Central Chadic area. In Proto-Musgum and Proto-Gidar it has developed to the point where the palatalization and labialization prosodies can both be reconstructed for the proto-language of each group, and labialized velars and palatalized laminals have been lost completely. If the Vowel Prosody system originated there, it would then have spread into Proto-Maroua, Proto-Mofu, Proto-Mafa and Proto-Daba.

The Consonant Prosody system appears oldest in Proto-Bata, where it has developed the most. It may have originated there, spreading into Proto-Higi and Proto-Margi.

The remaining Mixed Prosody group proto-languages retained the original system, and the Consonant Prosody and Vowel Prosody systems didn't begin to take hold until the group proto-languages had split into their subgroup proto-languages or even the present-day languages. For this reason, the languages in the Mandara group do not consistently follow the same phonological type, but have developed more or less independently.

This situation is illustrated by the Mofu, Mandara and Margi group proto-languages, which share a common ancestor, Proto-Margi-Mandara-Mofu (which

we shall abbreviate to Proto-MMM) but are of three different types. Proto-Mofu was a Vowel Prosody language, Proto-Margi was a Consonant Prosody language, and Proto-Mandara was a Mixed Prosody language.

Proto-MMM would have retained the original Mixed Prosody system. After it had split into Proto-Mofu, Proto-Mandara and Proto-Margi, Proto-Mofu adopted the Vowel Prosody system, which was inherited by its descendants. Proto-Margi split into two languages, Proto-Margi West and Proto-Margi East. The Consonant Prosody system developed in both of these subgroup proto-languages, though it only developed into the Full Consonant Prosody in Proto-Margi West or its descendants (e.g. Bura). In the Mandara group – which is distant from the origins of the Vowel Prosody and Consonant Prosody systems – the Vowel Prosody and Consonant Prosody systems arrived after the proto-language of the group had split into sub-groups and individual languages, and the systems have only had an effect in individual languages, if at all. Most of the Mandara group languages have retained a Mixed Prosody system.

With this scenario, there is a problem in understanding how the Vowel Prosody system reached Ga'anda, which is well to the east of the other Vowel Prosody languages. The Vowel Prosody system may have been a separate innovation in Ga'anda.

It is interesting to note that the Vowel Prosody system is also present in the West Chadic language Miya and may also have affected other West Chadic A languages (Schuh 2002). Miya is spoken in an area well to the West of any Central Chadic language, so contact is unlikely to explain the presence of a vowel harmony system there. This could be an indication that the palatalization prosody existed as far back as Proto-Chadic and developed independently as a Vowel Prosody system in parts of West Chadic, but was lost elsewhere.

There is also a vowel harmony system in the East Chadic language Kera (Pearce 2003), though with somewhat different characteristics. Amongst the languages of the Masa branch of Chadic vowel harmony has not been reported, at least for Lame (Sachnine 1982) and Musey (Shryock n.d.).

11.3 The Emergence of Labialization in Central Chadic

11.3.1 Overview

The only labialized elements in Proto-Central Chadic were the set of labialized velar consonants. Proto-Central Chadic did not have either a labialization prosody or a set of labialized labial consonants. However, the labialization prosody is now present in some of the Vowel Prosody languages, and labialized labials are present in some of the Consonant Prosody languages. In this section we will show that both of these features originate in the reanalysis of the labialization component of a lost Proto-Central Chadic labialized velar phoneme.

11.3.2 Labialized Velar Phonemes

Proto-Central Chadic had a series of labialized velar phonemes. These are present in almost all Central Chadic languages, and can be easily reconstructed (Gravina 2007a). Some examples are given here, and more can be found in section 10.6. Full data can be found at http://centralchadic.webonary.org/.

(315) *k^{w}ɨzin 'grass'

Group	Root	Group	Root	Group	Root
Bata	k^{w}ɨzinɨ	**Margi**	k^{w}ɨsar	**Kotoko Island**	
Daba		**Mandara**	k^{w}ɨzɨrɨ ^{y}	**Kotoko North**	
Mafa	kɨzan ^{y}	**Mofu**	k^{w}ɨzɨr ^{y}	**Kotoko Centre**	
Tera	wɨzɨn	**Maroua**	gɨzɨŋ ^{y}	**Kotoko South**	
Sukur		**Lamang**	k^{w}ɨzɨŋ	**Musgum**	
Hurza	g^{w}ɨdzaɗ ^{y}	**Higi**	g^{w}ɨzɨn	**Gidar**	

(316) *g^{w}ɨvɨh 'field'

Group	Root	Group	Root	Group	Root
Bata	v^{w}ɨ	**Margi**	fak^w	**Kotoko Island**	
Daba		**Mandara**	g^{w}ɨvɨh	**Kotoko North**	
Mafa		**Mofu**	g^{w}ɨvɨh	**Kotoko Centre**	
Tera		**Maroua**	g^{w}ɨva	**Kotoko South**	
Sukur		**Lamang**	wɨvah	**Musgum**	
Hurza	g^{w}ɨvɨh	**Higi**	wɨvɨhɨ	**Gidar**	

(317) *hʷiɗ 'belly'

Group	Root	Group	Root	Group	Root
Bata		**Margi**		**Kotoko Island**	
Daba		**Mandara**	hʷɨdɨ	**Kotoko North**	
Mafa	hʷaɗ	**Mofu**	hʷɨɗ	**Kotoko Centre**	
Tera	hʷira	**Maroua**	wuru	**Kotoko South**	
Sukur	hʷɨɗ	**Lamang**	hudî	**Musgum**	war
Hurza		**Higi**	hʷiɗ	**Gidar**	

*ɣʷ is a rare phoneme, and has been completely lost in a number of languages.

(318) *ɣʷɨpa 'flour'

Group	Root	Group	Root	Group	Root
Bata	hʷɨpɨ	**Margi**	ɨpʷɨ	**Kotoko Island**	
Daba	ŋfa	**Mandara**	kʷɨpɨ	**Kotoko North**	
Mafa	gʷɨfa	**Mofu**	gʷɨpa	**Kotoko Centre**	
Tera		**Maroua**	hapa	**Kotoko South**	
Sukur	pʷa	**Lamang**	hʷɨpaw	**Musgum**	
Hurza	hɨᵐbɨga	**Higi**	ɣʷɨpɨ	**Gidar**	gɨpa

11.3.3 Labialized Labial Phonemes

Labialized labial phonemes developed in many Consonant Prosody languages. However these did not exist in Proto-Central Chadic, but developed through the transfer of labialization from a lost labialized velar or from *w.

Gloss	PCC	Language	Word	Language	Word
charcoal	ɣʷɨvɨnʸ	Vame	huvan /hʷəvan/	Hdi	vʷani
faeces	ɣʷɨvi	Hdi	ɣuvi	Kirya	vʷi
five	hʷɨtif	Lamang	xʷtafa	Jimi	tefʷə
flour	ɣʷɨpa	Podoko	pəhʷa	Sharwa	pʷə
four	wɨpaɗ	Psikye	wufaɗə /wɨfaɗə/	Gude	ənfʷaɗa
tree	hʷɨp	Dugwor	hʷaf	Bura	nfʷa

Table 169 - Development of labialized labials

The table shows a number of Proto-Central Chadic roots containing either a labialized velar or *w. The languages in the middle section have retained the Proto-Central Chadic labialized velar. In the languages in the right hand section, the velar has been lost, but the labialization component has been retained, and has transferred to a labial consonant. This process has resulted in the creation of labialized labial phonemes in many Consonant Prosody languages.

For example, in the second item the Proto-Central Chadic voiced velar fricative has been lost in Kirya: *ɣʷɨvi→ʷɨvi. The labialization then moves onto the labial consonant and the initial *ɨ is lost: *ʷɨvi→vʷi.

In the majority of cases where labialization has moved to a labial, the original labialized velar or *w was in word-initial position.

This process only took place in languages where the palatalization Consonant Prosody was already in existence and had resulted in the creation of palatalized consonants. The extension in the set of labialized consonants was an analogous process.

11.3.4 The Labialization Prosody
The same process that resulted in the creation of labialized labials in Consonant Prosody languages also resulted in the creation of the labialization prosody in Vowel Prosody languages. The labialization prosody is the phonological element present in many Vowel Prosody languages which is realised by the back-rounding of the vowels in a morpheme or word. In most cases the velar consonants in the word are also labialized. (There are a few known instances of labialization acting solely as a consonant prosody without affecting the vowels, and these are restricted to particular morphemes in Mbuko from the Hurza group (T. Smith and Gravina 2010) and Merey from the Mofu group (Gravina 2007b)).

The labialization prosody in Vowel Prosody languages developed in a similar way to the labialized labial phonemes in Consonant Prosody languages. In this case, the labialization component from a labialized velar or *w was reanalysed as a prosody, resulting in the back-rounding of the vowels in the word. The labialization prosody developed quite recently. There are many cases where there are two closely related languages, one of which has the labialization prosody whilst the other does not.

The following table shows the development of the labialization prosody from labialized velars in Mbuko. Under labialization /a/ is realised as [u] in non-final syllables.

Gloss	PCC	Vame		Mbuko	
		UF	SF	UF	SF
fire	*hakʷ	akʷa	akʷa	aka ʷ	ukɔ
charcoal	*ɣʷivin ʸ	hʷəvaŋ	huvaŋ	avan ʷ	uvɔŋ
field	*gʷivɨh	kʷəvak	kuvak	gəva ʷ	guvɔ•
blind	*ɣʷɨrɨp	ɣʷəlaf	ɣulaf	həraf ʷ	hurɔf

Table 170 - Development of the labialization prosody in Mbuko

The following table shows the development of the labialization prosody in some words in Merey.

Gloss	PCC	Mofu N		Merey	
		UF	SF	UF	SF
meat	*łiwɨɗ ʸ	ław	ław	ła ʷ	łɔ
person	*ⁿdɨw	ⁿdaw	ⁿdaw	ⁿda ʷ	ⁿdɔ
ten	*kɨrɨw	kʷəraw	kuraw	kəra ʷ	kurɔ
rock	-	hʷatakʷam	hʷatakʷam	hatakam ʷ	hɔtɔkɔm
hyrax	-	hʷətsam	hutsam	hətsam ʷ	hutsɔm

Table 171 - Development of the labialization prosody in Merey

The labialization prosody only developed in the Vowel Prosody languages where the palatalization prosody was already present. Whilst there are many Vowel Prosody languages which have the palatalization prosody but no labialization prosody, there are no languages that have the labialization prosody but no palatalization prosody. The explanation is that the palatalization prosody existed first, and the labialization prosody developed by analogy. Where the labialization prosody exists, most languages do not allow morphemes to carry both the prosodies at the same time. However there are at least three languages – Mofu North and Mada from the Mofu group, and Mafa from the Mafa group – where morphemes can carry both prosodies.

The following map shows the distribution of these vowel prosody types.
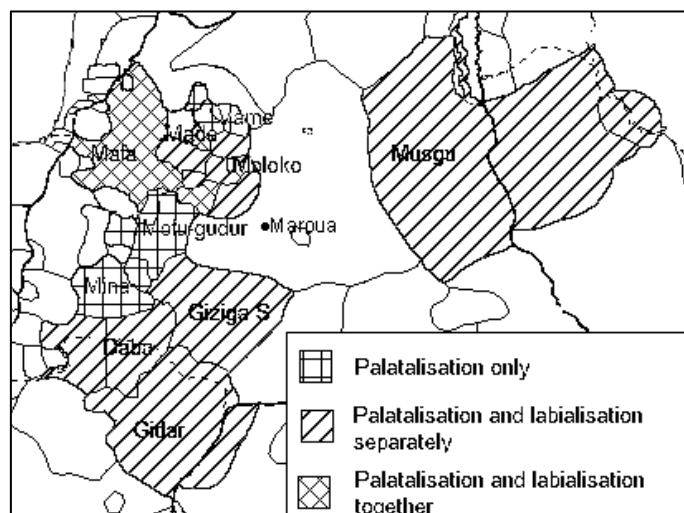
Map 32 - Distribution of vowel prosodies

11.3.5 Summary

Proto-Central Chadic had a set of labialized velar phonemes. In many cases, a word-initial labialized velar fricative was lost, though the labialization component remained. This labialization component was reanalysed in two different ways, according to whether the palatalization prosody was following a Vowel Prosody or a Consonant Prosody system. In Vowel Prosody languages, the labialization was reanalysed as a labialization prosody, and back-rounded the vowels in the word. In Consonant Prosody languages, the labialization was transferred to a labial consonant, where one was present, creating a set of contrastive labialized labial consonants.

These labialization processes took place after the processes that led to the palatalization prosody developing into Vowel Prosody and Consonant Prosody types (see section . As with front vowel harmony (see section 11.2.3), back-rounding vowel harmony most probably originated in the south-east of the Central Chadic area, where it is reconstructable for Proto-Musgum (see section 5.3.3.1), and labialized labials originated in the south-west in Proto-Bata (see section 6.3.4.2). Proto-Musgum, Proto-Bata and Proto-Margi

(labialized labials) are the only three groups where labialization features can be reconstructed to the group's proto-language.

12 Proto-Central Chadic Vowels

Three vowel phonemes are proposed here for Proto-Central Chadic: *a, *i and *ɨ. This is a significant departure from previous analyses of Proto-Central Chadic vowels (Barreteau 1987b; Wolff 1983a), which reconstruct a system based on two central vowels.

The vowel *ɨ is often considered to be epenthetic in individual languages, i.e. as not existing in the underlying form of a word. Here it will be treated as a vowel phoneme, largely for pragmatic reasons. It plays an important role in many phonological processes, and these can be described with greater clarity by considering *ɨ as a phoneme. Establishing the status of this vowel is difficult with living languages, and with reconstructed languages it is not possible to reach a reliable conclusion. For further discussion see section 12.4. The notation *ɨ is used for Proto-Central Chadic and for all the reconstructed proto-languages within Central Chadic, though in some languages the realisation may have been [ə].

At this stage, reconstructions are fairly tentative, since very little is known about sound changes affecting vowels that have taken place in the history of Central Chadic.

The phonemes *a and *ɨ are relatively stable, though in some groups changes in vocalisation patterns have resulted in a change in the placement of the vowels. In a number of groups, vowels are lowered in the final syllable before a pause, and it is often this pre-pausal or isolation form that is cited in dictionaries and word lists. This can lead to masking of the contrast between these two vowels in word-final position. However, in some languages the underlying form can be found in non-phrase-final forms.

The phoneme *i is more varied in its reflexes. In some languages it has the reflex /ə/, in others it is /i/, and in many cases it has merged with either *ɨ or *a.

There is no evidence in the data for the existence of a back-rounded vowel such as *u in Proto-Central Chadic.

In the following sections we will first look at the different underlying vowel systems found in Central Chadic, and then give evidence for reconstructing each

of the three Proto-Central Chadic vowel phonemes. The full data used in the reconstructions can be found at http://centralchadic.webonary.org/.

12.1 Vowel Systems

There are two basic vowel systems that form the basis for the phonemic vowel systems in today's Central Chadic languages. The first is the two vowel system (*a and *ɨ), which is found primarily in the Vowel Prosody languages. The second is the three vowel system (*a, *ɨ and *i), which is found in Consonant Prosody languages and Mixed Prosody languages.

In Vowel Prosody languages Proto-Central Chadic *i has merged with one of the two other vowels. The *i was not reanalysed as the palatalization prosody, except in the Musgum group. The merger may have been triggered by the widespread presence of front vowel harmony, which resulted in underlying /ɨ/ being realised as [i]. This would have reduced the contrastive environments of the *i/*ɨ distinction, leading to the contrast being lost in all environments.

The three vowel system is found in three subtypes. These subtypes are defined by the reflexes of *i, which may be /i/, /e/ or /ə/. There can be added a fourth subtype where *i has merged with *ɨ, creating a two-vowel system, though without the vowel harmony associated with the two-vowel system found in the Vowel Prosody languages.

The two-vowel system is found almost exclusively in the Vowel Prosody languages. All other languages are based on a three-vowel system. Amongst the three-vowel systems, the system where *i has the reflex /i/ is the most common, with the systems with *i having the reflex /e/ or merging with /ɨ/ being less common.

Map 33 below shows the distribution of the different vowel systems.

12.2 Reconstructing *i

We will show that a Proto-Central Chadic vowel *i can be reconstructed by presenting detailed reconstructions of four roots, and summary reconstructions for a further eleven roots. In the Vowel Prosody languages *i has merged with one of the other two vowels, and so these languages do not assist with reconstructing *i. Instead we must focus on the Consonant Prosody and Mixed Prosody languages, which use a three-vowel system.
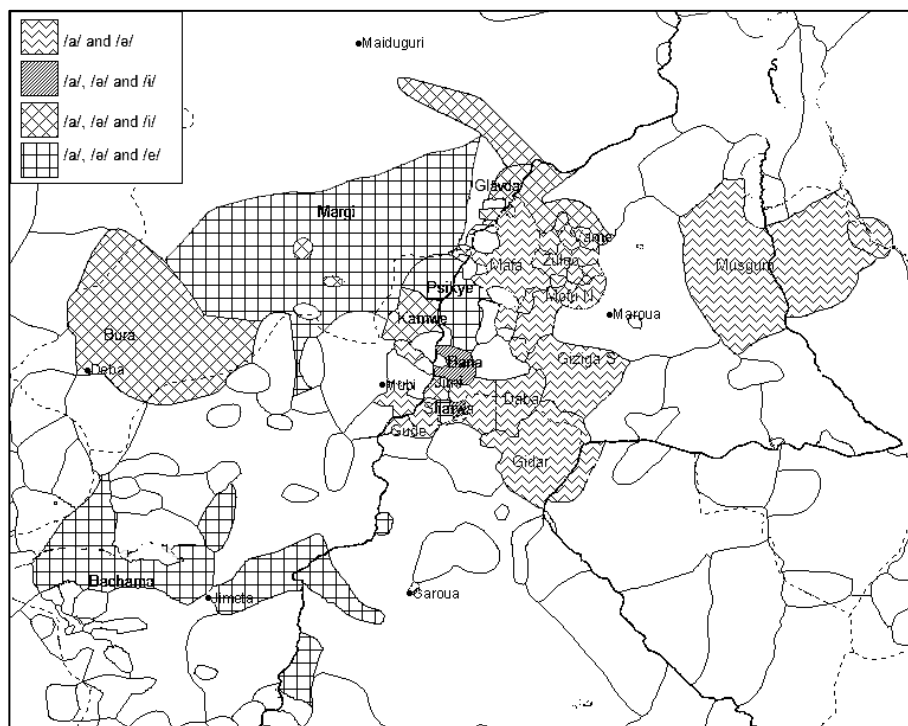
Map 33 - Vowel systems

It should also be emphasised that front vowel harmony in Vowel Prosody languages is not a reflex of *i, except in a few isolated cases. This gives us a basis for deciding whether to reconstruct a root with *i or with the palatalization prosody in cases where the evidence from Consonant Prosody and Mixed Prosody languages is ambiguous. If there is no widespread vowel harmony in the word in the Vowel Prosody languages, then we should reconstruct *i. If there is widespread vowel harmony in these languages, then we should reconstruct the palatalization prosody.

For example, the root *łinɨ 'work' is not palatalized in Vowel Prosody languages, except for some languages of the Mofu group. However, there is a front vowel reconstructed in three of the Consonant Prosody groups and one of the Mixed Prosody groups. Therefore the root is reconstructed with *i, and not the palatalization prosody. In this section we will present the reconstructed forms for each group, arranged according to their phonological types.

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata	ɬinɨ	**Lamang**	ɬɨna	**Mofu**	ɬɨr	**Daba**	ɡ̊ɨn	**K. South**	-
Higi	ɬinɨ	**Sukur**	ɡ̊ɨn	**Maroua**	ɬɨra	**Mafa**	-	**K. Centre**	-
Margi	ɬir	**Mandara**	ɬɨri	**Hurza**	ɬɨna	**Musgum**	-	**K. North**	-
				Tera	ɬɨna	**Gidar**	-	**K. Island**	-

Table 172 - Reflexes of Proto-Central Chadic *ɬinɨ 'work'

By way of contrast, the root *ɬɨmɨɗ ʸ 'ear' carries the palatalization prosody in many groups, both in Vowel Prosody languages, Mixed Prosody languages and Consonant Prosody languages. For this reason, the palatalization prosody is reconstructed, and not a front vowel.

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata	ɡ̊imi ʸ	**Lamang**	ɬɨmɨŋ	**Mofu**	ɬɨmaj	**Daba**	ɡ̊imɨʔ ʸ	**K. South**	sime
Higi	ɬɨmɨ	**Sukur**	ɡ̊ɨmaj	**Maroua**	ɬɨmɨɗ ʸ	**Mafa**	ɡ̊imaɗ	**K. Centre**	ɬɨmi
Margi	ɬɨmi ʸ	**Mandara**	ɬɨmɨ ʸ	**Hurza**	ɬɨmaj	**Musgum**	ɬɨma ʷ	**K. North**	ɬɨm
				Tera	ɡ̊im	**Gidar**	ɬɨma	**K. Island**	hɨmu

Table 173 - Reflexes of Proto-Central Chadic *ɬɨmɨɗ ʸ 'ear'

We will begin by reconstructing four widely-attested individual roots containing *i. In each case we will provide data for the reconstructed form for the proto-language of each group before combining the proto-forms to establish the Proto-Central Chadic form. We will then present a number of other roots containing *i, supported by the reconstructions of the group proto-languages.

12.2.1 *pitsɨ 'sun'

The Proto-Bata root is reconstructed as *fitɨ. Note that *i has the reflex /ə/ in Sharwa, /i/ in Jimi and /e/ in Tsuvan. Proto-Central Chadic *ts→t in Proto-Bata.

(319)   Tsuvan   fete
          Sharwa   fətə
          Jimi   fitə-n

The Proto-Higi root is reconstructed as *vɨtsi. The post-alveolar laminals in the data are due to the following /i/. The initial *v is the reflex of Proto-Central Chadic *p. The *i has moved to word-final position. This phenomenon is found sporadically in several languages, and affects *a as well as *i.

(320)   Bana   v(ə)tʃi
          Kamwe-Futu   vitʃi
          Kamwe-Nkafa   vetʃi
          Kirya   vətʃi
          Psikye   vətʃi

The Proto-Margi root is reconstructed as *pɨtsi. As with the Proto-Higi root, the *i has moved to word-final position.

(321)   Bura   ptʃi
          Kilba   pətʃi
          Margi S   pətʃi

The Proto-Mandara root is reconstructed as *fatsɨ ʸ. The Podoko entry is surprising. It should have initial /f/ and final /i/. This may be a local borrowing from Mafa or the Hurza group.

(322)   Podoko   patsə
          Glavda   fatʃi
          Dghwede   fitʃe
          Malgwa   vatʃija

The Proto-Lamang root is reconstructed as *fiti.

(323)   Lamang   fiti
          Hdi   fitik

In Sukur, the sole language of its group, the word for sun is pis.

There is therefore evidence from all of the Consonant Prosody and Mixed Prosody languages for the presence of *i in the Proto-Central Chadic root.

The only Kotoko group where this root is attested is the Kotoko South Group. In this group there is no evidence of *i. The Proto-Kotoko South root is reconstructed as *fatsa. In this group, *ts always has the reflex /tʃ/.

(324)   Mazera   fatʃa
          Zina   avatʃa

In the Vowel Prosody languages, we do not expect to find palatalization of the root. However the palatalization prosody is reconstructed for the Daba group. The Proto-Daba root is reconstructed as *pɨts ʸ. With roots containing *i, there

is often sporadic reinterpretation of the front vowel as the palatalization prosody. Since the root is consistently non palatalized in the other Vowel Prosody groups, we can consider the palatalization in the Daba group to be the exceptional case.

(325)   Daba   /pɨts ʸ/   [pitʃ]
         Buwal   /pas ʸ/   [peʃ]
         Gavar   /piʃ/   [piʃ]
         Mbudum   /pɨs ʸ/   [piʃ]

In the other Vowel Prosody languages, the palatalization prosody is not reconstructed. The Proto-Hurza root is reconstructed as *pats.

(326)   Mbuko   pats
         Vame   apas

The Proto-Mafa root is reconstructed as *pats.

(327)   Mafa   pats
         Cuvok   pas

The Proto-Maroua root is reconstructed as *pas.

(328)   Giziga N   pas
         Mbazla   pas

The Proto-Mofu root is reconstructed as *pats.

(329)   Ouldeme   fat
         Muyang   fat
         Moloko   fat
         Zulgo   pat
         Gemzek   pat
         Merey   həpat
         Dugwor   pat
         Mofu N   pas
         Mofu Gudur   pas

The Proto-Musgum root is reconstructed is *futɨj.

(330)   Vulum   futi:
         Mulwi   futi:
         Mbara   futaj
         Muskum   fasa

The three Consonant Prosody groups and the three Mixed Prosody groups provide evidence for reconstructing *i. The palatalization prosody is absent from all except one of the Vowel Prosody groups, which is consistent with a reconstruction containing *i, and argues against reconstructing the palatalization prosody.   The Proto-Central Chadic root is therefore reconstructed as *pitsɨ.

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata	fitɨ	**Lamang**	fiti	**Mofu**	pats	**Daba**	pɨts [y]	**K. South**	fatsa
Higi	vɨtsi	**Sukur**	pis	**Maroua**	pas	**Mafa**	pats	**K. Centre**	
Margi	pɨtsi	**Mandara**	fatsɨ [y]	**Hurza**	pats	**Musgum**	futɨj	**K. North**	
				Tera	fɨɗa	**Gidar**		**K. Island**	

Table 174 - Reflexes of Proto-Central Chadic 'sun'

12.2.2 *tira 'moon'

This root was reconstructed for Proto-Chadic as *təra (Newman 1977a). It is reconstructed for Proto-Central Chadic with *i as the first vowel. It is only present in about half of the groups of Central Chadic, but these groups cover both the North and South sub-branches.

In the Mixed Prosody and Consonant Prosody languages we expect to find a reflex of the front vowel *i in the data. This is indeed the case for Proto-Lamang, Proto-Mandara and Proto-Higi, though the Sukur data is difficult to interpret.

The Proto-Lamang root is reconstructed as *tila.

(331)   Lamang   təre
         Hdi   tili

The Proto-Mandara root is reconstructed as *tila.

(332)   Dghwede   tile   /tili/
         Glavda   kʲla   /tɨla ʸ/   (tʲ→kʲ)
         Malgwa   təre   /tərə/
         Mandara   təre   /tərə/
         Podoko   təra   /təra/

The Proto-Higi root is tentatively reconstructed as *tɨri. (The lack of published phonologies for many languages in this difficult group makes understanding the vowel correspondences difficult.)

(333)   Psikye   trə
         Kamwe Nkafa   tərə
         Kamwe-Futu   təro
         Kirya   təri
         Bana   tir

The Sukur word is /tja/.

The root is present in two Kotoko groups. In both cases the front vowel /e/ is present in the reconstructed root.

The Proto-Kotoko Centre root is reconstructed as *teɗɨ. The change *r→ɗ here and in Kotoko North is irregular. /l/ is expected.

(334)   Lagwan   teɗi
         Mser   teɗɨ

The Proto-Kotoko North root is reconstructed as *teɗɨ.

(335)   Mpade   teɗɨ
         Malgbe   teɗɨ
         Afade   deɗi

In the Vowel Prosody languages, we expect *i to have merged with one of the other vowels. We do not normally expect to find the palatalization prosody. With this root, the palatalization prosody is only present in the Musgum group.

The Proto-Musgum root is reconstructed as *tɨla ^{y}.

(336)   Mbara   /tɨla ^{y}/   tile
         Vulum   /tɨla ^{y}/   tle
         Muskum   /kɨla ^{y}/   kile

The Proto-Daba root is reconstructed as *tɨra.

(337)   Gavar   ŋtra
         Buwal   ŋtəra
         Mbudum   ntəra
         Daba   təra
         Mazagway Hidi   təra

The Gidar word is tɨla.

The Proto-Tera root is reconstructed as *tera.

(338)   Tera   tera
         Nyimatli tʃera
         Hwana   ⁿdəre

From these groups, we can reconstruct the Proto-Central Chadic root as *tira, though the location of the *i in the root is not clear. *i appears in word-final position in Proto-Higi, probably as a result of a vocalisation change triggered by the loss of the final /a/. The absence of the palatalization prosody in most of the Vowel Prosody groups supports the reconstruction of *i rather than the palatalization prosody. The following table summarises the forms for the group proto-languages.

Consonant Prosody	Mixed Prosody		Vowel Prosody			Kotoko	
Bata	**Lamang**	tila	**Mofu**	**Daba**	tɨra	**K. South**	
Higi tɨri	**Sukur**	tja	**Maroua**	**Mafa**		**K. Centre**	tedɨ
Margi	**Mandara**	tila	**Hurza**	**Musgum**	tɨla ^{y}	**K. North**	tedɨ
			Tera tera	**Gidar**	tɨla	**K. Island**	

Table 175 - Reflexes of Proto-Central Chadic 'moon'

12.2.3 *vida 'hare'

The Proto-Bata root is reconstructed as *vidɨ.

(339)   Tsuvan   viti-kən
          Jimi   vidə-n

The Proto-Higi root is reconstructed as *vira.

(340)   Kirya   pitə (possibly borrowed from Margi)
          Kamwe-Futu   vira
          Bana   vəle

The Proto-Margi root is reconstructed as *pita.

(341)   Kilba   pita
          Margi S   pitu
          Margi   pitə
          Bura   pti

The Proto-Mandara root is reconstructed as *vida.

(342)   Glavda   vi:da
          Podoko   vira
          Malgwa   navi:re
          Mandara   navire

For the Lamang group we only have the root vilakʷ for Hdi. The final /kʷ/ is a petrified suffix in Lamang.

For Sukur we have the word [vilʲa] /vila/.

This root is not attested in the Vowel Prosody languages or the Kotoko languages.

This gives the Proto-Central Chadic root *vida.

Consonant Prosody		Mixed Prosody		Vowel Prosody		Kotoko
Bata	vidɨ	**Lamang**	vila	**Mofu**	**Daba**	**K. South**
Higi	vira	**Sukur**	vila	**Maroua**	**Mafa**	**K.**
						Centre
Margi	pita	**Mandara**	vida	**Hurza**	**Musgum**	**K. North**
				Tera	**Gidar**	**K.**
						Island

Table 176 - Reflexes of Proto-Central Chadic 'hare'

12.2.4 *ɬinɨ 'work'

The Proto-Bata root is reconstructed as *ɬinɨ.

(343)   Bata   len-to
         Gude   ɬənə
         Tsuvan   ɬini-kən
         Jimi   ɬinə-n
         Sharwa   ɬən

The Proto-Higi root is reconstructed as *ɬɨni. As with the other Proto-Higi roots, it is difficult to determine the position of the vowel *i in the reconstruction.

(344)   Psikye   ɬənə
         Bana   ɬəni
         Kirya   ɬənə
         Kamwe-Nkafa   ɬənə
         Kamwe-Futu   ɬinə

The Proto-Margi root is reconstructed as *ɬir. The proto-language of the Margi, Mandara and Mofu groups underwent *n→r in word-final position, though changes in the placement of the vowels has resulted in *r appearing in medial position at later points in the history of the word.

(345)   Margi   ɬər
         Kilba   ɬəra
         Bura   ki-ɬir

The Proto-Mandara root is reconstructed as *ɬɨri.

(346)   Glavda   ɬəra
         Malgwa   ɬəra
         Dghwede   ɬəra
         Podoko   ɬəri

In the Lamang group we only have the Hdi ɬəna. For Sukur we have ɮən. For Tera we have ɬəna.

In the Vowel Prosody languages we do not normally expect to find a reflex of *i, either as a front vowel or as front vowel harmony. This is the case with the Daba group, but unusually there is a front vowel in Giziga Marva in the Maroua group. In the Mofu group there is evidence of the palatalization prosody, but with most languages the form given is a nominalisation of the verb 'to work' and the palatalization prosody is part of the nominalisation morpheme. For this reason, the palatalization prosody is not reconstructed for Proto-Mofu.

The Proto-Daba root is reconstructed as *ɮɨn. The low vowel in Buwal is a pre-pausal form of /ə/ (see section 5.3.2).

(347)   Buwal   ɮan
         Gavar   ɮən

The Proto-Maroua root is reconstructed as *ɬɨra. The Giziga Marva root is unusual in that we expect to find vowel harmony in the Maroua group languages. In both roots we would expect the final *n to be preserved. The /r/ indicates that the root is likely to have been borrowed from the Mofu group.

(348)   Giziga Marva   ɬira
         Giziga Moutourwa   ɬra

The Proto-Mofu root is *ɬɨr.

(349)   Ouldeme   /aɬər/   aɬər
         Moloko   /ɬərala ^{y}/   ɬərele
         Gemzek   /mə-ɬar -^{y}/   məɬer
         Merey   /mə-ɬar -^{y}/   məɬer
         Dugwor   /mə-ɬar -^{y}/   məɬer
         Mofu-Gudur   /ɬəra/   ɬəra

The Proto-Central Chadic root is reconstructed as *ɬinɨ.

Consonant Prosody	Mixed Prosody	Vowel Prosody				Kotoko
Bata ɬinɨ	**Lamang** ɬɨna	**Mofu** ɬɨr	**Daba** ɮɨn			K. South
Higi ɬɨni	**Sukur** ɮɨn	**Maroua** ɬɨra	**Mafa**			K. Centre
Margi ɬir	**Mandara** ɬɨri	**Hurza** ɬɨna	**Musgum**			K. North
		Tera ɬɨna	**Gidar**			K. Island

Table 177 - Reflexes of Proto-Central Chadic 'work'

Evidence for reconstructing *i in this root is found in five of the six Consonant Prosody and Mixed Prosody groups. As expected, it is absent from the Vowel Prosody groups and there is no vowel harmony.

12.2.5 Other roots

Here we present summary data for the reconstruction of a number of other roots containing *i. To establish the presence of *i we are looking for the appropriate vowel (mostly front vowels) in the three-vowel languages (the Consonant Prosody and Mixed Prosody languages), and for the absence of the palatalization prosody in the Vowel Prosody languages.

(350) *viɗ 'night'

Consonant Prosody	Mixed Prosody	Vowel Prosody				Kotoko
Bata vɨɗɨ	**Lamang** rɨvidɨ	**Mofu** hɨvɨɗ	**Daba** vɨɗiʔ ʷ			K. South lɨvin
Higi viɗ	**Sukur** vɨɗ	**Maroua** avɨɗ ʷ	**Mafa** vaɗ, lɨvaŋ			K. Centre nvaɗe
Margi vʷɨɗɨ	**Mandara** vɨɗɨ	**Hurza** luvaɗ	**Musgum** dɨvɨɗ ʸ			K. North faɗe
		Tera viɗki	**Gidar** dɨfɗɨ			K. Island

Newman's Proto-Chadic reconstruction for 'night' is *bəɗi. There was a regular change *b→v in Proto-Central Chadic.

(351) *hɨkin 'three'

Consonant Prosody		Mixed Prosody		Vowel Prosody			
Bata	mahɨkɨn	**Lamang**	hɨkɨna	**Mofu**	mahkɨr	**Daba**	mahkaɗ
Higi	maxkɨn	**Sukur**	maakɨn	**Maroua**	makir, maakaŋ	**Mafa**	mahkar
Margi	maakir	**Mandara**	hkɨɗe	**Hurza**	maakan	**Musgum**	
				Tera	mahkan	**Gidar**	

This root is absent in the Kotoko languages. Most languages have prefixed /ma-/ to the root. In many languages the initial *h has been lost, often resulting in compensatory lengthening of the preceding /a/. Newman's Proto-Chadic reconstruction is *k(ʷ)ən.

(352) *sɨwiɓ ʸ 'to suck'

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata	siɓ ʸ	**Lamang**	ɓisaj	**Mofu**	sɨwɨɓ	**Daba**	saɓ ʸ	**K. South**	
Higi	ɓisɨ, sʲiɓɨ	**Sukur**		**Maroua**	suɓi	**Mafa**	sasɨɓ ʷ	**K. Centre**	s'afɨ
Margi	siɓɨ ʸ	**Mandara**	ɓusa ʸ	**Hurza**	susaɓ ʸ	**Musgum**	susuɓɨ ʸ	**K. North**	s'afu
				Tera		**Gidar**	ɨssɨɓa ʷ	**K. Island**	tsetsabu

This root is reconstructed with both *i and the palatalization prosody.

Evidence for the palatalization prosody comes from its reconstruction in the Vowel Prosody groups Daba, Hurza and Musgum, and in the Bata, Margi and Mandara groups. Evidence for *i comes from the Bata, Higi, Margi and Lamang groups, and possibly from the Maroua group, though *i is unexpected here.

(353) *sɨhʷani ʸ 'a dream'

Consonant Prosody		Mixed Prosody	
Bata	sɨni ʸ	**Lamang**	sɨwani
Higi	sʲɨwɨn	**Sukur**	
Margi	sɨʔʷɨni ʸ	**Mandara**	sɨhʷani ʸ

Vowel Prosody				Kotoko	
Mofu	sɨwna ʸ	**Daba**	sɨni ʸ	**K. South**	
Maroua	mɨsɨn ʸ	**Mafa**	sɨwɨna ʸ	**K. Centre**	sɨwane
Hurza	sɨwna ʸ	**Musgum**	hɨjnɨ ʸ	**K. North**	saware
Tera	zine	**Gidar**	ɨssɨna ʸ	**K. Island**	

This root is complex, in that it contains *i, the palatalization prosody, and a labialized consonant. The evolution of the forms can be seen in the genetic tree in Figure 2 below.

The first changes to the root take place at the Major Group level. In Proto-Higi-Lamang, the palatalization prosody is realised as palatalization on the *s. In Proto-Mafa-Daba, which does not have *i in its inventory, the *i has merged with *a. The same process has taken place at the group level in Proto-Mofu, and *i has merged with *ɨ in Proto-Musgum.

In many major groups, *hʷ has the reflex *w, and in others it has the reflex *h. In some groups the phoneme has been lost completely.
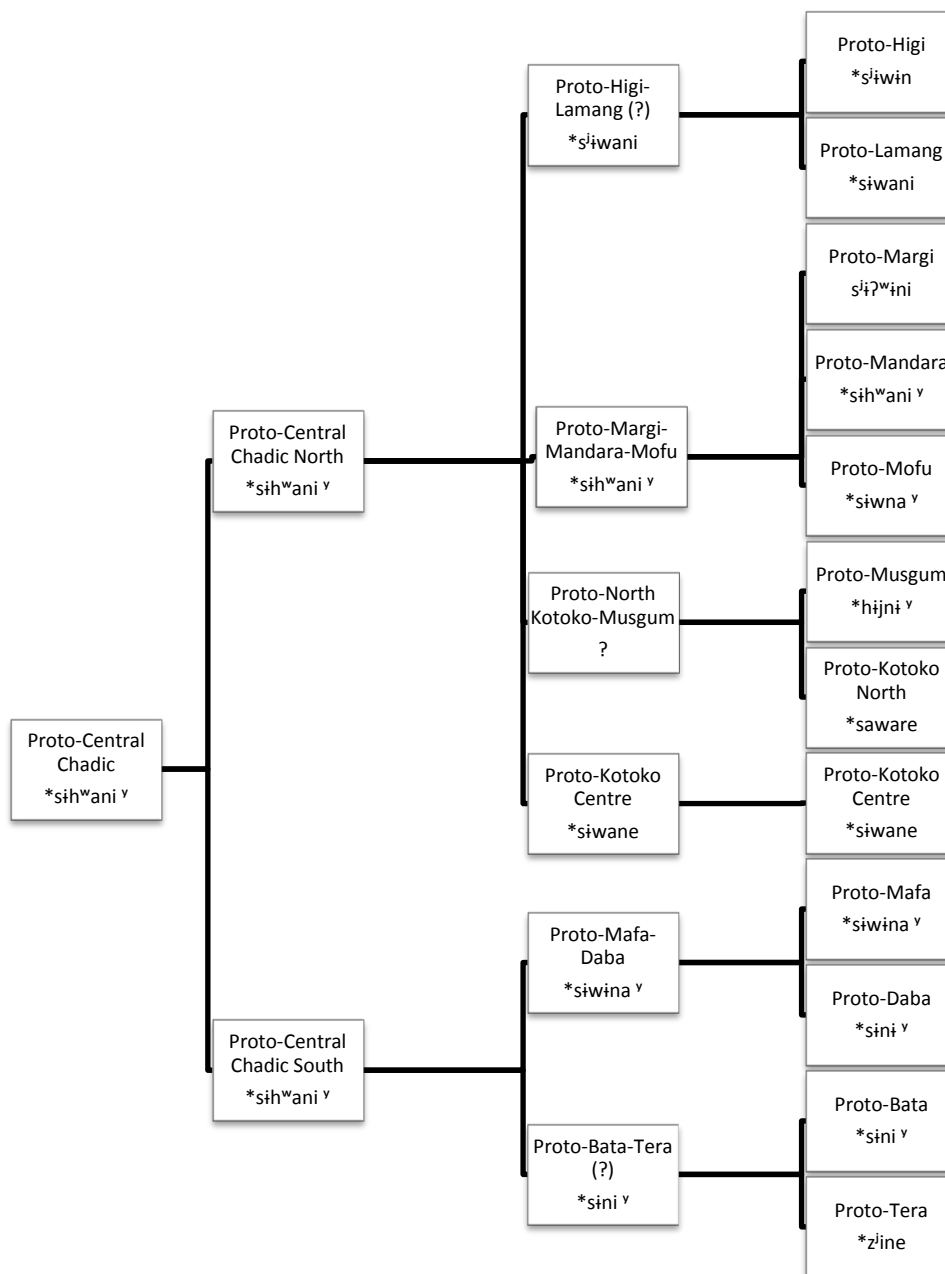
Figure 2 - Evolution of 'dream'

(354) *kɨri 'dog'

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata		**Lamang**	kɨri	**Mofu**	kɨra	**Daba**		**K. South**	
Higi	kɨli	**Sukur**	kɨra	**Maroua**	kɨrɨ ʸ	**Mafa**	kɨda	**K. Centre**	kɨle
Margi	kila	**Mandara**	kɨda	**Hurza**	kɨla	**Musgum**		**K. North**	kɨlew
				Tera		**Gidar**	kɨra	**K. Island**	kɨli

The root for 'dog' has probably come into most Central Chadic languages from Kanuri *kəri*, or from an earlier Nilo-Saharan source. It is instructive to note how the /i/ has been incorporated as *i, showing that this phoneme was in existence at the time of borrowing.

(355) *tip 'to spit'

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko	
Bata	tif	**Lamang**	tɨf	**Mofu**	tɨf	**Daba**	tɨf ʸ	**K. South**	
Higi	tifi	**Sukur**	tifa	**Maroua**	tɨf ʷ	**Mafa**	ⁿdzɨf ʸ	**K. Centre**	tɨf
Margi	tifa	**Mandara**	tifa	**Hurza**	tifa	**Musgum**	tɨf ʷ	**K. North**	tafɨ
				Tera		**Gidar**		**K. Island**	

The front vowel in this root is supported by evidence from the Bata, Higi, Margi, Sukur and Mandara groups. The palatalization prosody is present in the Mafa and Daba group reconstructions, which is not to be expected.

(356) *hʷiɗ 'stomach'

Consonant Prosody		Mixed Prosody		Vowel Prosody			
Bata		**Lamang**	hʷɨɗi	**Mofu**	hʷɨɗ	**Daba**	
Higi	hʷir	**Sukur**	hʷɨɗ	**Maroua**	wɨrɨ ʷ	**Mafa**	hʷaɗ
Margi		**Mandara**	hʷɨɗe	**Hurza**		**Musgum**	war
				Tera	hʷira	**Gidar**	

Here support for *i comes from Proto-Higi in the Consonant Prosody languages, and from the final vowel in Proto-Lamang and Proto-Mandara. The

reconstruction for Proto-Tera comes from a single language, but supports this reconstruction. As expected, the palatalization prosody has not been reconstructed for any of the Vowel Prosody languages. The root is absent from the Kotoko languages.

(357) *hadik 'thorn'

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko
Bata	dihɨ	**Lamang**	tiki	**Mofu**	hadak	**Daba**		K. South
Higi	tikɨ	**Sukur**	dzɨk ʸ	**Maroua**		**Mafa**	hɨtak	K. Centre
Margi		**Mandara**	adakɨ	**Hurza**	adak	**Musgum**	hadak ʸ	K. North
				Tera	ⁿdeki	**Gidar**		K. Island

Evidence for *i comes from the Bata, Higi, Lamang and Mandara groups, and possibly from the Tera and Sukur groups. Only one of the Vowel Prosody languages has the palatalization prosody.

(358) *pɨri 'butterfly'

Consonant Prosody		Mixed Prosody		Vowel Prosody				Kotoko
Bata	pɨri	**Lamang**		**Mofu**	pɨla	**Daba**	pula	K. South
Higi	pɨli	**Sukur**	pɨr	**Maroua**	pɨla	**Mafa**		K. Centre
Margi	pir	**Mandara**	pala	**Hurza**	pala ʸ, pɨra	**Musgum**		K. North
				Tera	pɨr	**Gidar**	pala ʷ	K. Island

12.3 Reconstructing *a

*a is largely stable and has /a/ as its reflex in most groups. Reconstruction of *a is justified where most group proto-languages have /a/ in the relevant position, with representation from both the North and South sub-branches.

(359) *dzavɨn 'guinea fowl'

Group	Root	Group	Root	Group	Root
Bata	zavʷɨn	**Margi**	tsɨvɨr	**Kotoko Island**	
Daba	zavɨn	**Mandara**	zabɨra ʸ	**Kotoko North**	tsafan
Mafa	zapan	**Mofu**	dzavɨr	**Kotoko Centre**	zavan
Tera	tsivan	**Maroua**	tsɨvɨn ʷ	**Kotoko South**	dzavaŋ
Sukur	zabɨn	**Lamang**	zɨvɨn	**Musgum**	tsaavan ʸ
Hurza	zavɨn	**Higi**	zivɨn	**Gidar**	zamvɨna

For this root, twelve of the eighteen groups have /a/ as the first vowel.

(360) *ɗɨwah 'breast, milk'

Group	Root	Group	Root	Group	Root
Bata	ʔʷa	**Margi**	ʔɨwa	**Kotoko Island**	
Daba	ʔʷa	**Mandara**	wɨɓa	**Kotoko North**	eʔʷi
Mafa	wa	**Mofu**	ɗɨwah	**Kotoko Centre**	iwi
Tera	ɓiɓi	**Maroua**	ɗɨwa	**Kotoko South**	
Sukur	ʔʷa	**Lamang**	ɗɨwa	**Musgum**	
Hurza		**Higi**	ʔʷa	**Gidar**	

In this root the initial *ɗ has been lost in many groups, often becoming /ʔ/. This has combined with the *w, forming either /ʔʷ/ or fusing to become /ɓ/. All groups except for Kotoko North and Centre have /a/ as the final vowel.

(361) *vɨja 'rainy season'

Group	Root	Group	Root	Group	Root
Bata	va ʸ	**Margi**	vɨja	**Kotoko Island**	
Daba	vɨja	**Mandara**	vɨja	**Kotoko North**	
Mafa	vɨja	**Mofu**	vɨja	**Kotoko Centre**	
Tera		**Maroua**	vɨja	**Kotoko South**	
Sukur	vi	**Lamang**	vɨja	**Musgum**	pɨja
Hurza	vɨja	**Higi**	vɨja	**Gidar**	

In this extremely stable root with mostly regular reflexes, the final vowel is almost consistently /a/.

(362) *sɨwra 'to fry'

Group	Root	Group	Root	Group	Root
Bata	sɨrɨ	**Margi**	sula	**Kotoko Island**	
Daba	sar	**Mandara**	sula	**Kotoko North**	sɨl
Mafa	sara	**Mofu**	sawla	**Kotoko Centre**	
Tera	zur	**Maroua**	sula	**Kotoko South**	
Sukur	sɨwra	**Lamang**	sula	**Musgum**	sisal
Hurza	sɨwla	**Higi**	sɨlɨ	**Gidar**	

In several groups the *w has been reanalysed as a vowel, or lost completely. In the groups of Central Chadic North there was a consistent change *r→l.

12.4 Reconstructing *ɨ

*ɨ is the most common of the three vowels. *ɨ is chosen for the proto-phoneme, rather than *ə, for two reasons. Firstly, [ɨ] is the most common realisation of the vowel in the different languages. Secondly, there are some languages where [ə] is the reflex of *i, and to use *ə would risk being confusing.

In many individual languages this vowel is analysed as being epenthetic, and not having phonemic status. This is primarily due to the fact that its presence is predictable in these languages, in other words, that it doesn't contrast with its absence. However, for Proto-Central Chadic we analyse *ɨ as a full vowel phoneme, based on the following arguments.

For Proto-Central Chadic, from the reconstructed roots we can see that words are made up almost entirely of CV syllables. Words do not begin with a vowel, so there is no possibility of establishing a contrast between the presence and absence of *ɨ in this environment. Word-medially there are only six CC sequences recorded – *markɨɗ ʸ 'six', *ᵐbɨwran 'tamarind', *ᵑgʷɨrhak 'crow', *sɨwra 'to fry', *sɨwra 'two', *zɨrwa ʸ 'shame' – all either /wr/ or /rC/, which are natural environments for *ɨ-deletion. There is no contrast between *ɨ and zero in this environment either. Only in word-final position is there a possibility of finding such a contrast. Many of the reconstructed words end with a consonant, but there are also a small number of words that have been reconstructed with a final vowel and in some cases that vowel is most probably *ɨ. This presents the possibility of contrast between *ɨ and zero, though it may equally turn out that these final *ɨ vowels disappear as the quality of the data improves. With things as they stand, it is more consistent with the data to analyse *ɨ as a phoneme rather than as an epenthetic vowel.

However *ɨ is treated, the essentially CV nature of Proto-Central Chadic syllables indicates that there is a vowel slot following each consonant in the underlying form. The structural requirement for these slots to be filled has resulted in a strong tendency for Central Chadic vowels to move between slots diachronically, or for these vowel slots to be filled from sources such as the labialization of consonants. It is rare for a vowel slot to be left unfilled. It is also noticeable that it is rare for the approximants *w and *j to be vocalised, both historically and also in the morphophonemics of present-day languages. This is indicative of the strength of the CV structure.

This gives two viable analyses. The first is to reconstruct *ɨ as a phoneme. The second is to reconstruct vowel slots following each consonant, some of which may be empty at an underlying level and are filled by [ɨ]. The two analyses are essentially equivalent. Whether *ɨ is analysed as a phoneme or as an epenthetic vowel, the existence of these vowel slots must be maintained in the reconstructed forms.

The following examples are given as evidence for the reconstruction of *ɨ for Proto-Central Chadic. There are, of course, many instances of *ɨ in the reconstructions given in the evidence for *a and *i.

(363) *kɨr 'to steal'

Group	Root	Group	Root	Group	Root
Bata	hɨr	**Margi**	hila	**Kotoko Island**	
Daba	hɨl	**Mandara**	ɣɨl	**Kotoko North**	hir
Mafa	kɨr	**Mofu**	kɨl	**Kotoko Centre**	ɣʷɨj
Tera		**Maroua**	hʷɨl	**Kotoko South**	hila
Sukur	kɨr	**Lamang**	ɣila	**Musgum**	hɨl
Hurza	kɨra	**Higi**	ɣɨli	**Gidar**	ɨhala

(364) *mɨts 'to die'

Group	Root	Group	Root	Group	Root
Bata	mɨt	**Margi**	mɨta	**Kotoko Island**	matɨ
Daba	mɨts	**Mandara**	mɨtsa	**Kotoko North**	madɨ
Mafa	mɨtsa	**Mofu**	mɨt	**Kotoko Centre**	mɨt
Tera	mɨt	**Maroua**	muts	**Kotoko South**	mara
Sukur	ŋʷɨs	**Lamang**	mɨta	**Musgum**	mɨɗɨ ʸ
Hurza	mɨts	**Higi**	mɨtɨ	**Gidar**	ɨmta

(365) *kɨdɨm 'crocodile'

Group	Root	Group	Root	Group	Root
Bata	kɨrɨm	**Margi**	karam, hɨm	**Kotoko Island**	
Daba		**Mandara**	kɨrwɨ ʸ	**Kotoko North**	
Mafa	kɨrdam, gɨdam	**Mofu**	kɨrɨm, gɨdam	**Kotoko Centre**	
Tera		**Maroua**	hɨrɨm ʷ	**Kotoko South**	
Sukur	kɨlɨm	**Lamang**	kɨram	**Musgum**	hɨrɨm ʷ
Hurza	gɨdam	**Higi**	kɨlɨm	**Gidar**	

(366) *ɣɨn 'head'

Group	Root	Group	Root	Group	Root
Bata	ɣɨnɨ	**Margi**	kir	**Kotoko Island**	
Daba		**Mandara**	ɣɨra	**Kotoko North**	
Mafa	jaŋ, gɨɗ	**Mofu**	ɣɨr	**Kotoko Centre**	
Tera		**Maroua**	jɨŋ, hɨr	**Kotoko South**	
Sukur		**Lamang**	ɣɨŋ	**Musgum**	
Hurza		**Higi**	ɣɨn	**Gidar**	

12.5 Distribution

There are no roots reconstructed with word-initial vowels, and word-final vowels are rare. *a occurs in word-final position in a number of roots. *i and *ɨ also occur in word-final position, but less frequently. All vowels are found word-medially.

*ɨ is the most common of the vowels (64%), followed by *a (27%) and *i (9%).

12.6 Conclusion

One of the key conclusions of this study is that the vowel system is made up of three vowels *a, *i and *ɨ. There is no contrast in length. This is in contrast with the two vowel system (/a/ and /ə/) proposed for many Central Chadic languages and for Proto-Central Chadic (Barreteau 1987b; Wolff 1983a), and the four vowel system (/i/, /a/, /u/ and /ə/) proposed for Proto-Chadic (Newman 1977b).

13 Summary

We have shown that the phonology of Proto-Central Chadic included three vowel phonemes, the palatalization prosody, and a set of consonant phonemes including labialized velar consonants. The reconstructions of a three-vowel system, and of the palatalization prosody, are both new to Chadic studies.

In addition we have seen that Proto-Central Chadic did not have a labialization prosody, or any other labialized consonants apart from the set of labialized velars. Any non-velar labialized consonants and any labialization prosodies came into present day languages through the transfer of labialization from a lost labialized velar.

We can summarise the segmental phonemic inventory of Proto-Central Chadic as follows:

Consonants

	Labial	**Alveolar**	**Laminal**	**Velar**	**Labialized Velar**
Plosive	p	t	ts	k	k^w
	(b)	d	dz	g	g^w
Implosive	ɓ	ɗ			
Fricative		ɬ	s	x	x^w
	v	ɮ	z	ɣ	$ɣ^w$
Nasal	m	n			
Pre-nasalized	^{m}b	^{n}d	^{n}dz	(^{ŋ}g)	($^ŋg^w$)
Liquid		r			
Approximant			j		w

Vowels

	Front	**Central**
High	i	ɨ
Low		a

Prosody

PAL (Palatalization) – realised as the palatalization of the laminal consonants in a word, or if no laminal consonants are present, the fronting of the vowels in the word.

13.1 Summary of sound changes

The following is a summary of the sound changes that have been identified. The full description is in chapter 3. Where no sound changes have been identified for the proto-language of a group (e.g. Proto-Mafa), the proto-language is still listed so that the genetic affiliation of daughter languages is clear.

- *ɬ→ʓ (Proto-Central Chadic South)
    - *ts→t (Proto-Bata)
        - *ʓ→l (Proto-Bata Proper)
        - *r→l (Tsuvan)
    - *r→l (Proto-Daba)
        - *n→ŋ word-final (Mbudum)
    - (Proto-Mafa)
        - *r→l, *n→ŋ word-final (Cuvok)
    - *ɗ→∅ word-final (Proto-Tera)
        - Devoicing of obstruents (Proto-East Tera)
        - Voicing of fricatives word-initial (Proto-West Tera)
    - *ts→s (Sukur)
- (Proto-Hurza)
- *r→l, *d→r word medial (Proto-Central Chadic North)
    - *n→r word-final (Proto-Margi-Mandara-Mofu)
        - *d→t word-initial, *z→s, *ɬʲ→hʲ (Proto-Margi)
            - *ɗ→r (Bura)
        - *n→r word-medial, *m→w word-final (Proto-Mandara)
            - *m→w word-initial before a vowel (Proto-Wandala-Dghwede)
                - palatalized alveolar → palatalized velar (Proto-Wandala)
                    - *ɣ→h, *ɣʷ→w (Mandara, Malgwa)
                - *ɣ,*ɣʷ→g (Dghwede)

- *r→l (Matal)
  - (Proto-Mofu)
    - *v→b, *ɬ→ʓ in palatalized words, *ɣ→g, *ɣʷ→gʷ (Proto-Meri)
    - *ɣ→∅, *ɣʷ→w (Proto-Mofu subgroup)
    - (Proto-Tokombere)
      - *ɣ→h, *ɣʷ→hʷ (Muyang, Moloko)
        - *l→r word-finally (Moloko)
      - *r→l word-finally (Mada)
  - (Proto-Maroua)
    - *n→ŋ word-final (Mbazla, and sporadically in Giziga)
  - *ts→t, n→ŋ word-final (Proto-Lamang)
  - *d→t word-initial, possible *kʷ→gʷ (Proto-Higi)
    - *ɗ→r word-final, *l→r (Kamwe, Kirya, Bana)
  - *v→f, *z→s (and possible *ɣ→h) (Proto-North Kotoko-Musgum)
    - *s→h, *ɬ→h (Proto-Kotoko Island)
    - (Proto-Kotoko North)
      - *s→j, *ts→s, *gʷ/*kʷ→ɡ͡b (Malgbe)
      - *ts→s (Maltam)
      - *ts→s, *ɬ→ʃ (Mpade)
    - *dz→d, *ts→t (Proto-Musgum)
  - *dz→z, *ts→s (Proto-Kotoko Centre)
    - *ɬ→s, widespread *n→r (Mser)
  - *ɬ→s (Proto-Kotoko South)
    - *k→h (Zina)
  - *v→b word-initial, *dz→z, *ʓ→ɬ, *ts→t (Gidar)

13.2 Lexical Isoglosses

In this section we will examine the cases where more than one root has been reconstructed for a concept. We will look at the distribution of the isoglosses, and discuss what this tells us about the history of the roots and the history of the Central Chadic languages and peoples.

There are a number of concepts where two or more roots are widely attested amongst the Central Chadic languages. These situations show potential relationships between the languages that share the same root. There are a number of possible scenarios for the development of multiple roots.

The first is with core vocabulary items, where there may well have been a Proto-Chadic or Proto-Central Chadic root, but certain languages replaced this with a different root. In these circumstances we can deduce either an areal or a genetic relationship between the languages that took on the new root, but we cannot deduce any specific relationship between those languages that retained the Proto-Central Chadic root.

The second scenario is with the introduction of words for new concepts. For instance, the numerals between five and ten are unlikely to have existed in Proto-Chadic or Proto-Central Chadic, but were introduced at a time after Proto-Central Chadic has split into different daughter languages when words became required for these concepts. In these cases, we can deduce a relationship between the languages that share each root, but again the link could be areal or genetic.

A third scenario is where a new 'technology' is introduced. This could cover anything from growing millet or keeping sheep to the use of hoes or terracing. In these cases, the words are often borrowed in from the language of the people that introduced the technology. The languages that share the same roots for these technologies are ones that are culturally linked to the point where ideas can be shared.

In all cases, the relative time depth of the adoption of new words can be partly assessed by the completeness of the adoption within groups of languages (in cases where there are competing roots), and by whether the sound changes relevant to each group have taken place in the new words. The proto-forms given for roots that have been introduced into Central Chadic are intended to reflect the likely form at the time of introduction.

We will look at three semantic categories of words where multiple roots exist – body parts, numerals and animals – as well as a miscellaneous category covering other roots. In each case, we will list the groups where the root is attested. Where it is not clear that the root can be attributed to the group as a whole (e.g. where the root is attested in just one language in the group), the group will be listed in parentheses. We will also attempt to identify the proto-language or area in which the root was introduced, though this is often difficult to establish.

Full data for all the roots cited here can be found at http://centralchadic.webonary.org/.

In the maps in this section, languages where no evidence for the root is available are left unshaded, even when the form for the proto-language of the group can be confidently established. Sample language names are indicated on the maps.

13.2.1 Body parts
The following basic body parts could reasonably be expected to have formed part of the vocabulary of Proto-Central Chadic. In the words given here there are multiple roots.

'Arm'

Newman (1977a) does not reconstruct a Proto-Chadic root for 'arm'. There are two well-attested roots in Central Chadic:
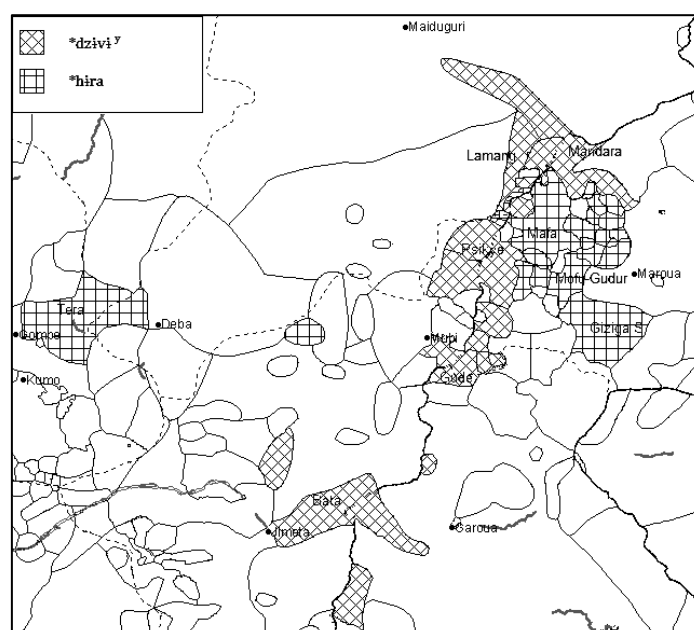
Map 34 – Isoglosses for 'arm'

*hɨra – Mofu, Daba, Maroua, Hurza, Tera, Sukur groups (and Podoko from the Mandara group). With the exception of the Tera group, all these groups are found on or around the Mandara Mountains. The fact that the root also exists in Tera argues for this to be the Proto-Central Chadic root, if indeed there was only one Proto-Central Chadic root.

*dzɨvɨ ʸ – Bata, Higi, Lamang, Mandara groups. This root is a feature of the Nigerian Plains area.

The Kotoko groups (Lake Chad area) have different roots which distinguish between arm and hand. The Musgum and Gidar languages (Eastern Plains) do not use either of these two roots.

 'Eye'
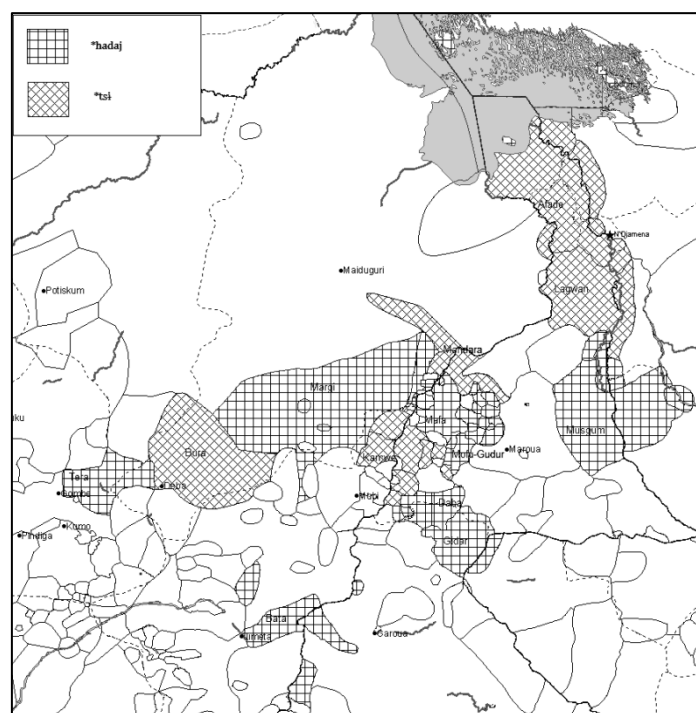
Map 35 - Isoglosses for 'eye

*hadaj – Margi, Mofu, Bata, Daba, Hurza, Kotoko South, Lamang, Mafa, Mandara, Maroua, Musgum, Tera, Gidar, Kotoko Island groups. This root is reconstructed

by Newman for Proto-Chadic, with the form * $idə$, giving evidence from all four branches of Chadic.

*tsɨ – Higi, Daba, Bata, Sukur, Kotoko Centre, Kotoko North, Mandara groups. The presence of this root in four separate geographical locations makes it hard to pin down the root's origins.

'Head'
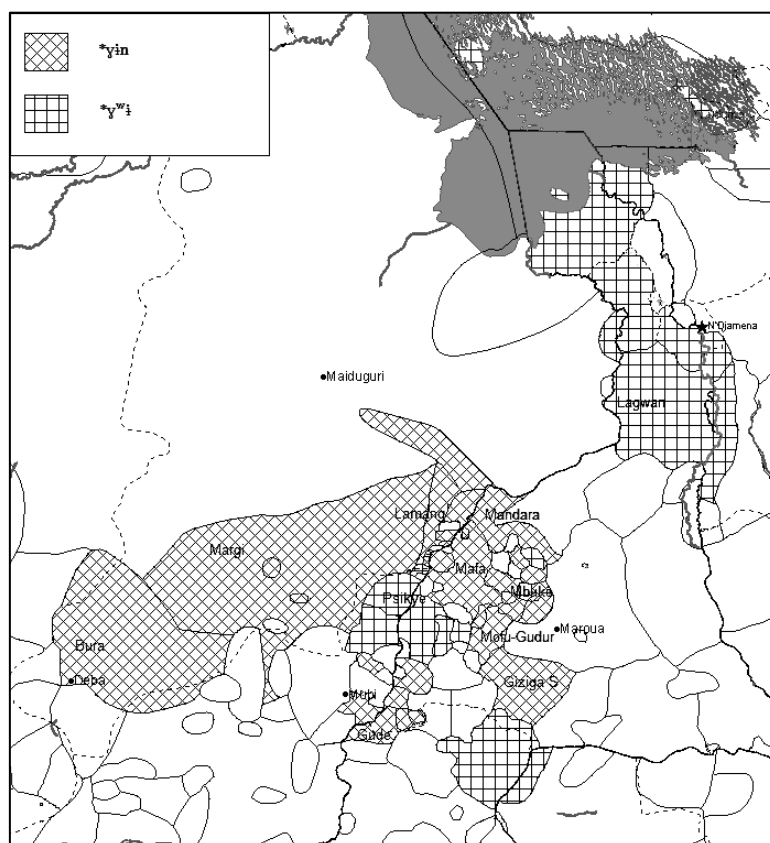
Map 36 - Isoglosses for 'head'

*ɣʷɨ – Higi, Hurza, Kotoko Centre, Kotoko North, Daba, Sukur, Kotoko Island, Gidar groups. This root corresponds to Newman's Proto-Chadic *ka.

*ɣɨn – Mandara, Margi, Mofu, Bata, Higi, Lamang, Mafa groups. This root may be related to the Proto-Chadic root *ka. The final *n→r change in the Mandara, Margi and Mofu groups indicates that the root has significant age. The root probably originated in the Northern Mandara Mountains and was adopted at an early time by the languages of the Nigerian Plains.

'Leg'

Newman reconstructs *asə for Proto-Chadic, and notes the existence of *s-r- in Central Chadic.
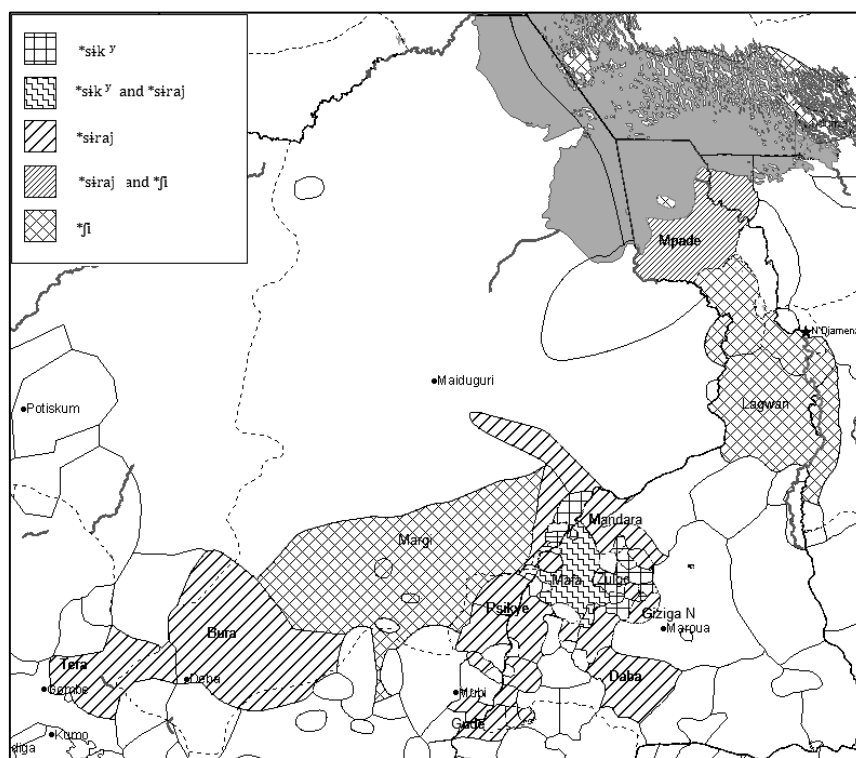
Map 37 - Isoglosses for 'leg'

*sɨraj - Higi, Lamang, Maroua, Hurza, (Kotoko North), (Daba), Mafa, Bata, Tera groups. This root should be considered the most likely root for Proto-Central Chadic.

*sɨk ^{y} – Mandara, Mofu, (Mafa) groups. This root appears to be an innovation in the Mandara-Mofu-Margi major group.

*ʃi – Margi, Kotoko North, Centre and Island groups. This is a borrowing from Kanuri *ʃi*.
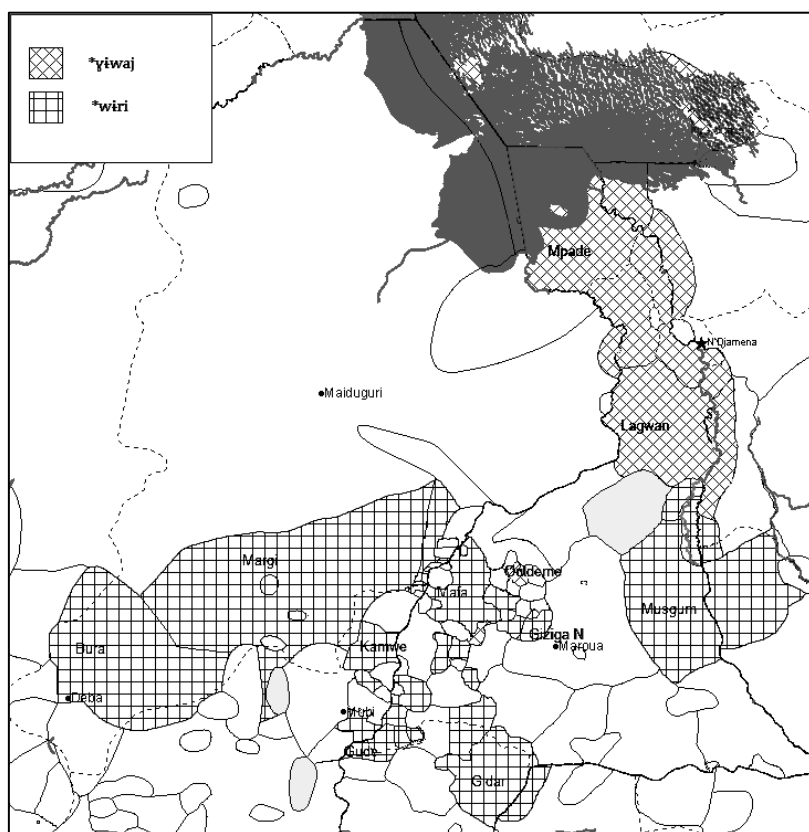
'Neck'

Map 38 - Isoglosses for 'neck'

*wɨraj – Margi, Higi, Sukur, Mafa, Mofu, Maroua, Musgum, Kotoko South, Daba, Bata, Lamang, Gidar groups. This root is reconstructed by Newman for Proto-Chadic as *wəra*.

*ɣɨwaj – Kotoko Centre, North, Island, (Mafa), (Mofu) groups. This is probably a Lake Chad area innovation. The instance in individual languages of the Mafa and Mofu groups may be due to chance similarity, since there are no known paths of transmission between these languages, or may reflect an older root that has been replaced in other languages.

13.2.2 Numerals

The numerals 'three' and 'four' have well attested roots that have been reconstructed to Proto-Chadic. The only exceptions are the various Kotoko groups and the Musgum and Gidar groups which have different roots for 'three'. The Kotoko Centre, North and Island groups also have different roots for 'four'.

'Two'

There are four widely-attested roots for 'two'.

*sɨwra – Various languages in the Mofu, Mandara, Margi, Tera, Daba, Musgum and Gidar groups. This root is reconstructed by Newman for Proto-Chadic.

*tsɨjɨw – Mofu, Maroua, Hurza, Mafa, Kotoko South groups. This root probably originated in the Mafa group, or in the area at the eastern edge of the Northern Mandara Mountains.

*ɓɨwak – Higi, Daba, Sukur, Bata, Mandara groups. This root is attested in a reasonably diverse set of languages, and so may be reasonably old, though it would not have been the Proto-Central Chadic root.

*kasi – Kotoko North, Centre and Island groups. This is an innovation in the Lake Chad area.
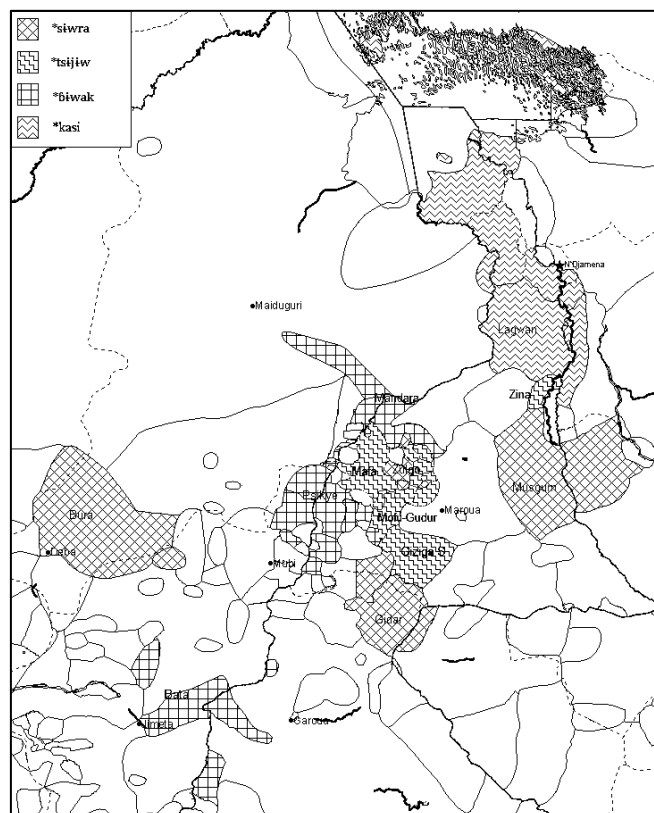
Map 39 - Isoglosses for 'two'

'Five'

Newman reconstructs **badə* for Proto-Chadic, but this root is not attested in Central Chadic. There are five roots that are well-attested.

*ɮɨɗɨm – Mafa, Mandara, Maroua, Mofu, Musgum, Sukur, Gidar groups. This root is the most widely attested root, and is the most likely root for Proto-Central Chadic.

*hʷɨtif – Higi, Lamang, Bata, Margi groups. This root is an innovation in the Nigerian Plains area.

*ɬensi – Kotoko Centre, North and Island groups. This root, which is not reconstructed with confidence, is an innovation in the Lake Chad area.

*ɗɨrman – Tera, Hurza and Kotoko South groups. These languages are geographically extremely distant, and the similar words may not all be cognate. Here, and in similar cases, the map treats the occurrences as reflexes of the same root, though we cannot claim with confidence that this is the case.

*dzaɓɨn – Daba group.
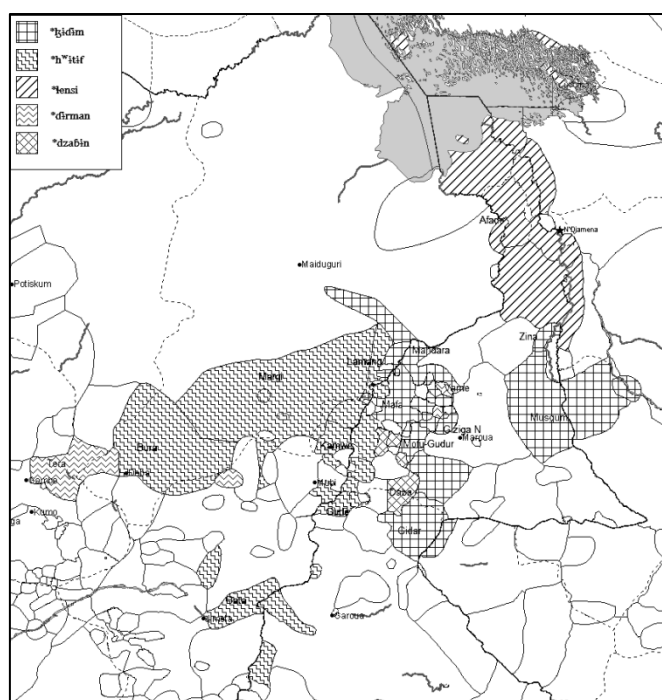
Map 40 - Isoglosses for 'five'

'Six'

Newman does not reconstruct a Proto-Chadic root for 'six'. There are four widely-attested roots.

Map 41 - Isoglosses for 'six'

*kɨwah – Mandara, Margi, Mofu, Higi, Bata, Sukur, Daba, Lamang, Mafa groups. This is the most probable root for Proto-Central Chadic, given its wide geographical distribution and its presence in ten different groups and both the North and South sub-branches.

*vɨnahkɨr – Kotoko Centre and North groups. This is an innovation in the Lake Chad area. Kotoko Island has borrowed a Kanuri word for 'six'.

*markɨɗ ʸ - Hurza, Maroua groups.

*ɬira – Musgum, Gidar groups.

 'Seven'

*mɨɗɨp – Mandara, Margi, Bata, Higi, Tera, Sukur groups. This root is a feature of the Nigerian plains.

*tasɨraɗ - Mafa, Daba, Mofu groups. This root may have originated in the Mandara Mountains.

*kʷatal – Kotoko South and Centre. The other Kotoko groups have borrowed from Kanuri.

The Maroua and Hurza groups each have separate roots for 'seven'.
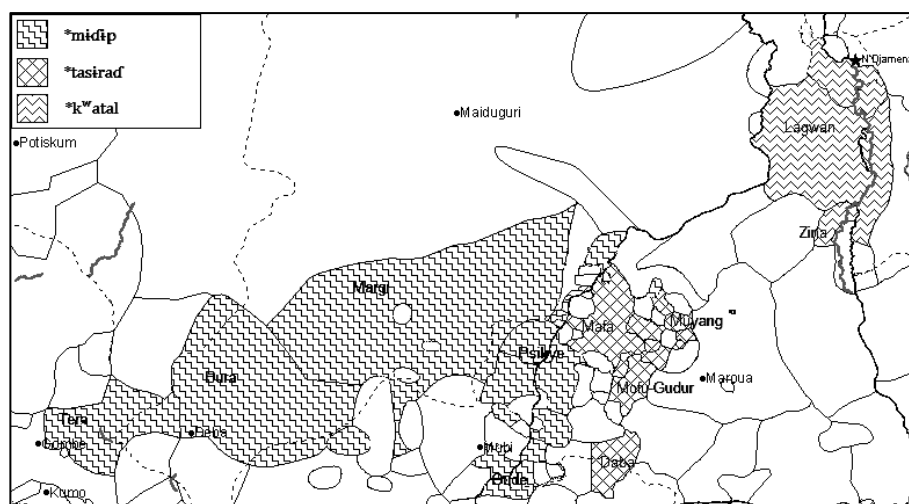
Map 42 - Isoglosses for 'seven'

'Ten'

*kʷɨm – Higi, Lamang, Margi, Tera, Sukur groups. This root may be a reflex of Newman's Proto-Chadic *gʷam- 'ten'. It is a feature of the Nigerian plains area.

*kɨrɨw – Mandara, Mofu, Hurza, Mafa, Maroua groups. This root is found around the Mandara Mountains.

*hɨkan – Kotoko Centre, North and Island groups. This root is a feature of the Lake Chad area.

The root *ɣaru* is found in several diverse languages, namely Ga'anda (Tera group), Bura and Margi South (Margi group), Kamwe-Nkafa (Higi), Mbara (Musgum), Buduma (Kotoko Island) and Malgbe (Kotoko North).
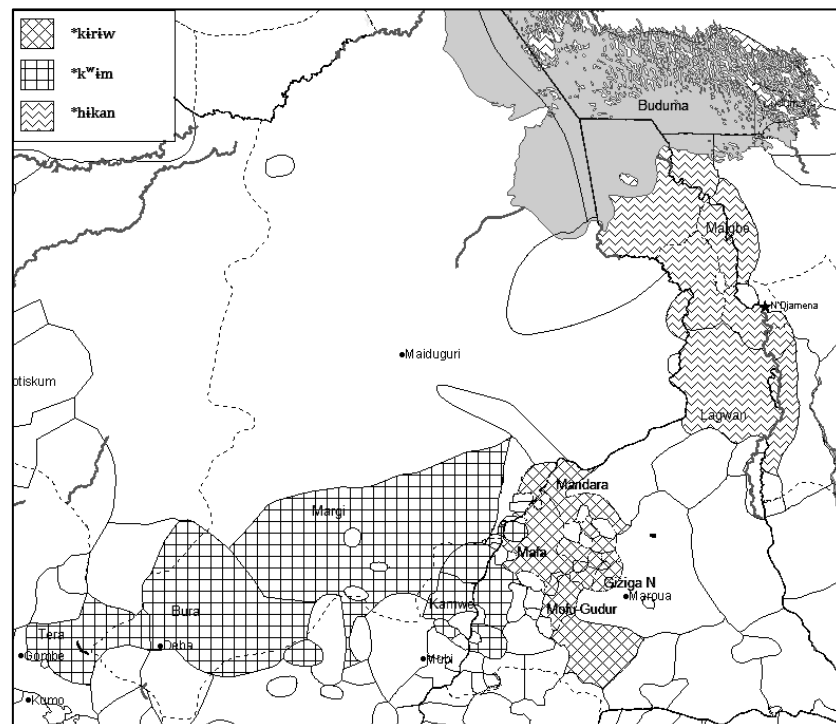
Map 43 - Isoglosses for 'ten'

13.2.3 Animals

Some of the words here were borrowed into Central Chadic from non-Chadic languages such as Kanuri, Kanembu, Dazaga or their Nilo-Saharan ancestors.

'Donkey'
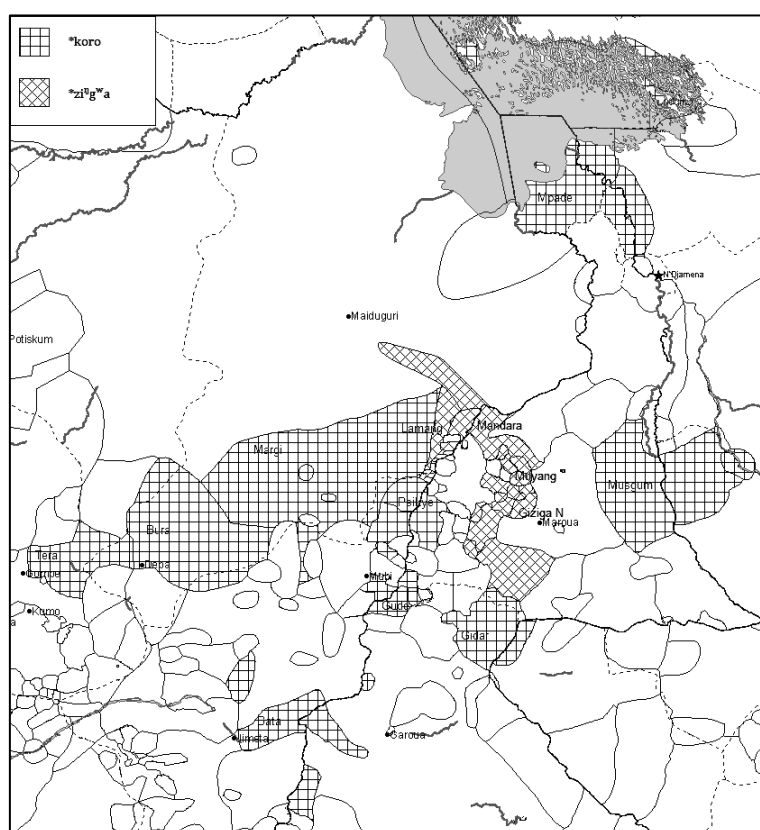
Map 44 - Isoglosses for 'donkey'

*koro – Margi, Gidar, Musgum, Maroua, Higi, Bata, Tera, Kotoko North and Island groups. This is a widely-attested African *wanderwort* (Blench 2000). The reconstruction given includes *o, which did not exist in Proto-Central Chadic. In present-day languages, the root has been adapted to their phonologies, being interpreted as carrying a vowel labialization prosody in Gidar, or as /kʷara/ in many other languages.

*ziᵑgʷa – Daba, Mafa, Maroua, Mandara, Mofu, Hurza, Lamang, Sukur groups. This root appears to have its origins in the Mandara mountains area. The /ᵑgʷ/, unattested in the most reliable Central Chadic roots, may be an indication that this word was borrowed into Central Chadic, though its origins are unknown.

'Crocodile'

The Kotoko groups have the root *rigɨ, whilst the root *kɨdɨm is used elsewhere.

'Elephant'

*dzɨwɨn ʸ - Margi, Higi, Bata, Tera, Sukur groups. This root is a feature of the Nigerian plains area. Newman (1977a) treats this as a reflex of Proto-Chadic *gʲəwan.

*gɨwɨn – Mandara, Kotoko South groups. This root is probably also a reflex of Newman's Proto-Chadic *gʲəwan.

*nɨvi – Kotoko Centre and North. This root is a feature of the Lake Chad area.

*ᵐbɨlele – Mofu, Hurza, (Bata) groups.
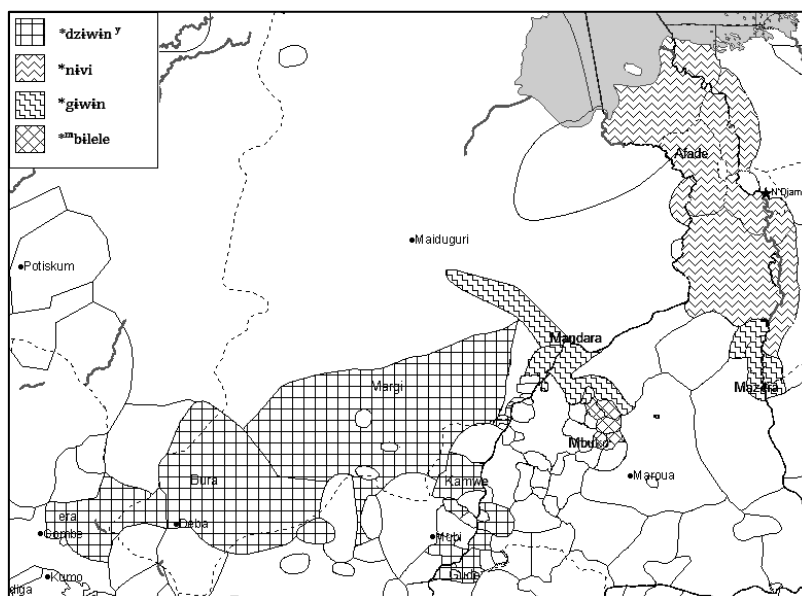
Map 45 - Isoglosses for 'elephant'

'Hare'

*hʷaⁿdav – Mofu, Daba, Hurza, Mafa, Maroua, Musgum, Gidar groups. This root is a feature of the Mandara Mountains and Eastern Plains areas.

*vida - Bata, Higi, Lamang, Mandara, Margi, Sukur groups. This root is a feature of the Nigerian Plains area.

It is possible that these two roots are cognate.

There are a number of roots found amongst the Kotoko languages.
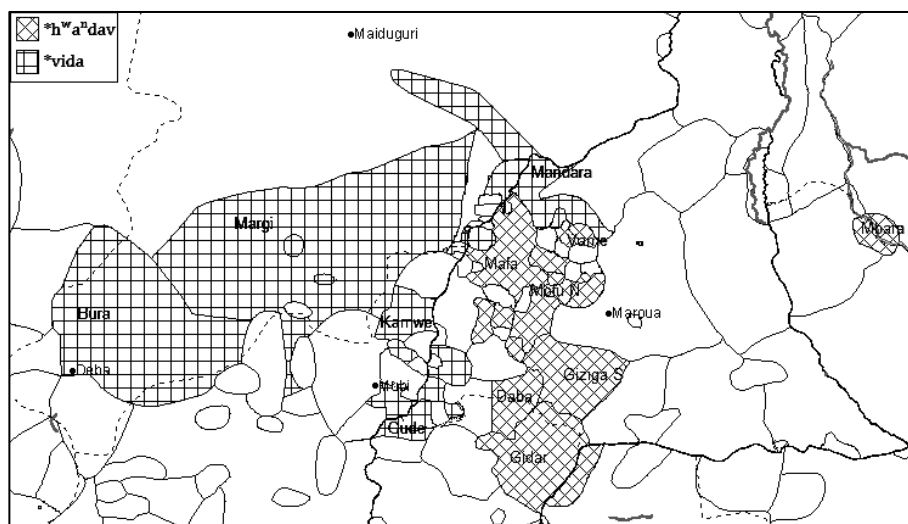
Map 46 - Isoglosses for 'hare'

'Horse'

*piris ʸ - Mandara, Mofu, Tera, Mafa, Daba, Lamang, Hurza, Musgum, Maroua, Gidar groups. This is the most widespread Central Chadic root, and comes from the Arabic root *furs*.

*takʷ - Margi, Daba, Bata, Higi, Sukur groups. This root is a feature of the Nigerian Plains area.

*bɨskʷan – Kotoko South, Centre and North groups. This root is a feature of the Lake Chad area.
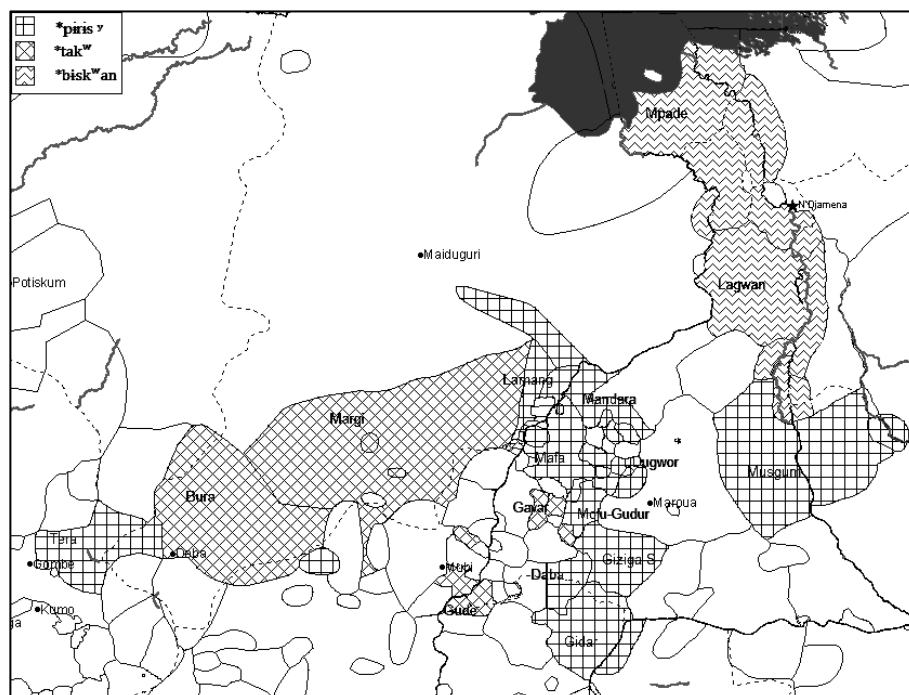
Map 47 - Isoglosses for 'horse'

'Camel'

The main Central Chadic root is *ʒɨgʷamɨ ʸ, which comes through Berber, e.g. Kabyle *alyʷəm* (Dallet 1982), but note that in Tuareg the reflex is less close to the Central Chadic root, e.g. Tamasheq *aɣlam* 'young adult camel' (Heath 2006).

*ⁿgʲaluba – This root is found in a few languages in the Nigerian plains area, namely Ga'anda (Tera group), Bana and Kirya (Higi group), Hdi (Lamang group) and Sharwa (Bata group). It is a recent borrowing from the Fulfulde *ⁿgeelooba*.

*kaligimo – Kotoko South, Centre and North groups. This root is borrowed from Kanuri into the Lake Chad area. The Kanuri word *kàlìgímò* is an historic form, which has developed into the present-day form *kalímo* (Allison n.d.).
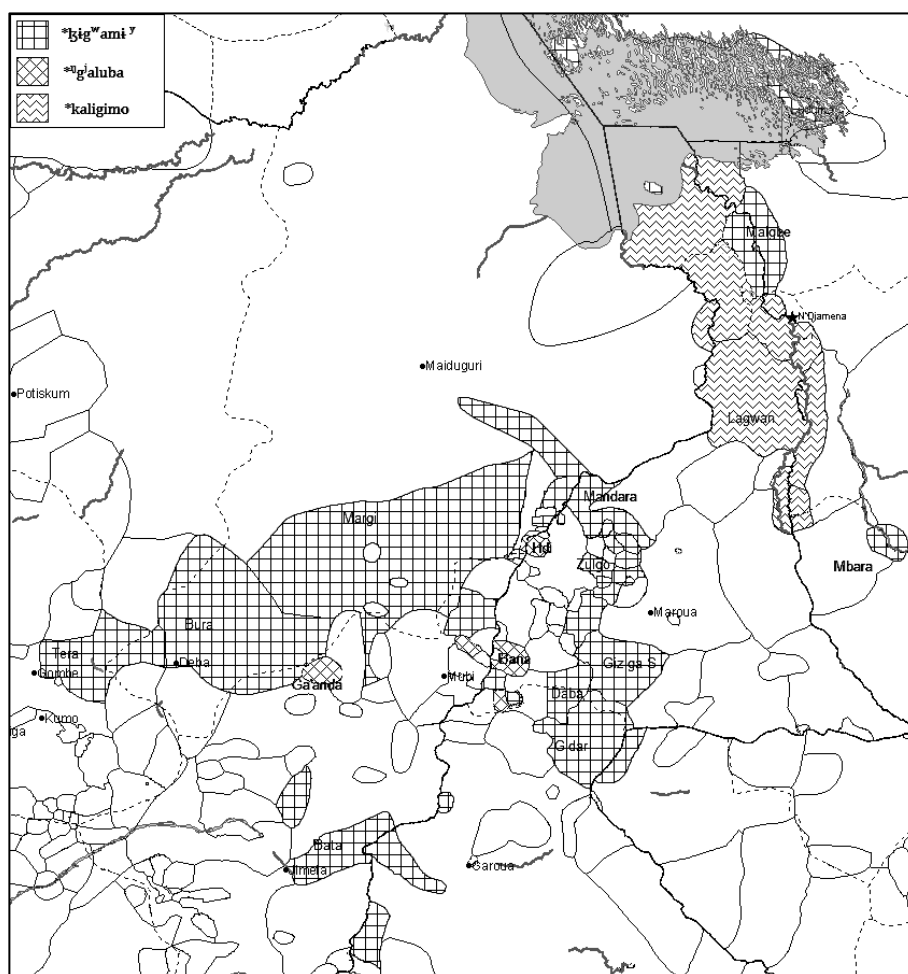
Map 48 - Isoglosses for 'camel'

'Lion'

*lɨvari – Bata, Daba, Higi, Hurza, Mandara, Margi, Musgum, Sukur groups. This is a widely-attested root. The Musgum root *divaŋ* may well not be cognate. All the other languages are found broadly in the Nigerian Plains area.

*mabor – Hurza, Mofu, Daba, Maroua, Mafa groups. All of these groups are found on or near the Eastern Plains.

*zɨjɨl - Mofu, Hurza, Higi, Mafa groups. This root is mostly found in the languages around Méri (principally Mofu group languages). The presence of this root in Mafa and in Bana in the Higi group may be indicative of a wider use of the root, in the Mandara Mountains area.
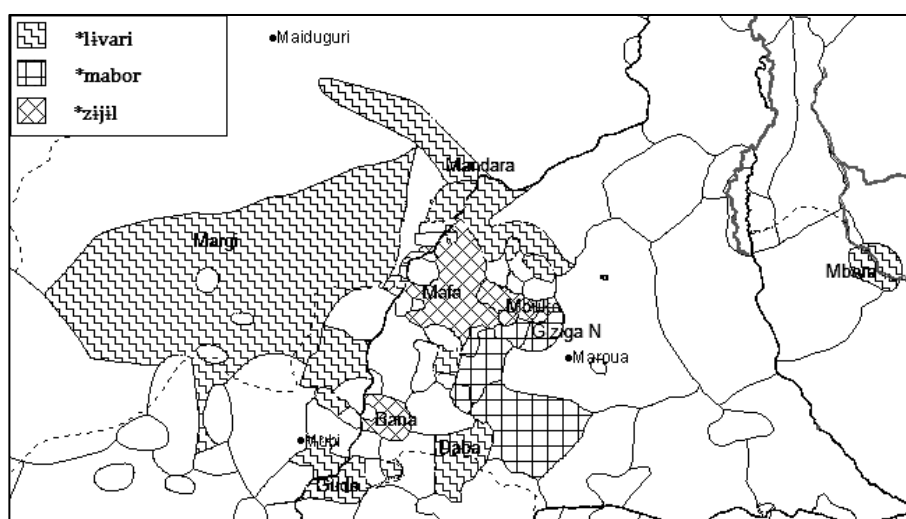
Map 49 - Isoglosses for 'lion'

'Mouse'

*kʷɨhɨm – Mandara, Mofu, Bata, Higi, Hurza, Mafa, Tera, Sukur groups. This root is the most widely attested, and may be the Proto-Central Chadic root.

*kʷɨsɨm – Kotoko Centre, South and North, Musgum groups. This root is undoubtedly cognate with the previous root. Newman has this as the Proto-Chadic form.

In these roots, the medial *s is found in West Chadic, but medial *h is found in East Chadic. *s is almost unattested in word-medial position in the Proto-Central Chadic reconstructions, and this may be due to a sound change *s→h change that affected Proto-Central Chadic at an early point in its history. If this is the case, then the instances of *kʷɨsɨm would have to be due to contact with

West Chadic languages, and given the geography, this too is problematic. There is similar patterning with the root *hɨmɨɗ ʸ/*sɨmɨɗ ʸ 'wind'.

*katakam – Maroua, Gidar, Daba groups. This root is a feature of the Eastern Plains area.
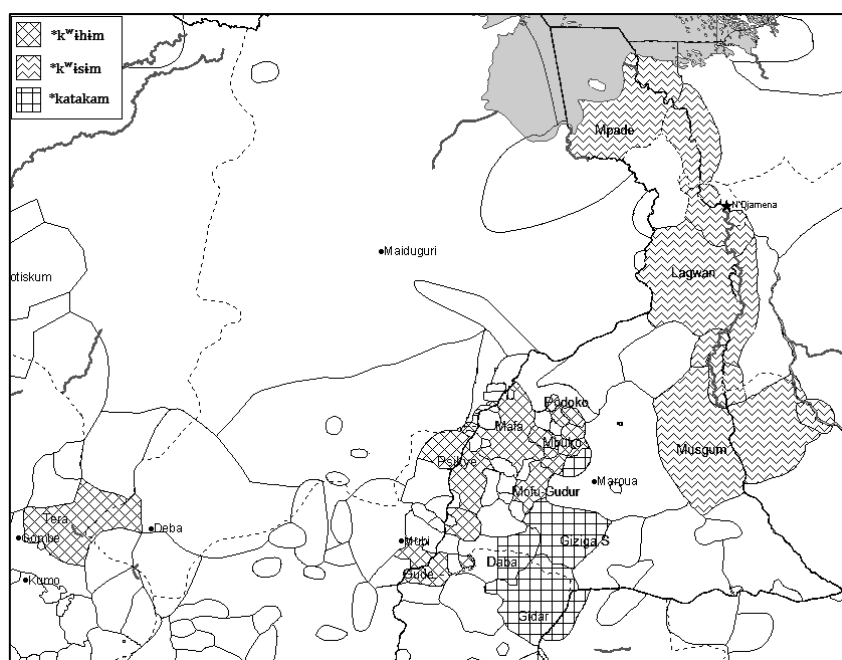
Map 50 - Isoglosses for 'mouse'

'Porcupine'

*dzɨmɨkʷ ʸ - Higi, Lamang, Daba, Mafa, Bata, Sukur, (Mofu, Mandara) groups. This may be the Proto-Central Chadic root, or may be an innovation in the South sub-branch.

*tsɨhʷɨɗʸ - Mandara, Margi, Mofu, Hurza groups. This root is an innovation in the Margi-Mandara-Mofu major group, and has spread from there into the Hurza group.
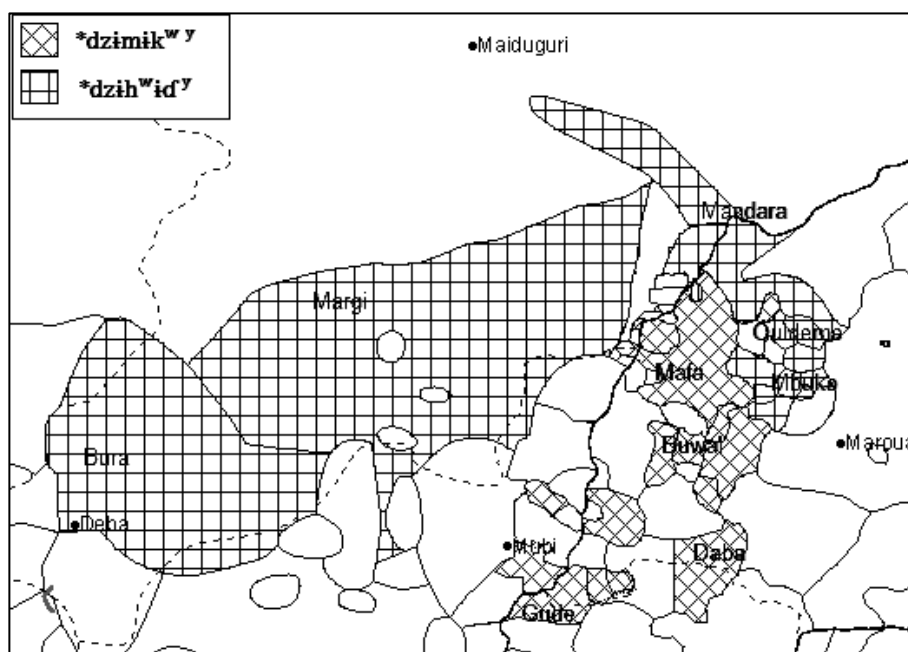
Map 51 - Isoglosses for 'porcupine'

'Horn'

*dɨrɨm – Mandara, Margi, Mofu, Higi, Lamang, Mafa, Maroua, Sukur groups. This is the most widely-attested root and may be the Proto-Central Chadic form, though there are a surprising number of other roots attested.

*ᵐbɨkʷɨm – Mofu, Musgum, Tera, Hurza. The various reflexes of this root are fairly divergent and may not in fact be reflexes of a single root.

*mahʷa – Kotoko South, Musgum, Gidar. This root is a feature of the Eastern Plains area.

*lagan – Kotoko North and Centre, Hurza groups.

*faram – Daba group.
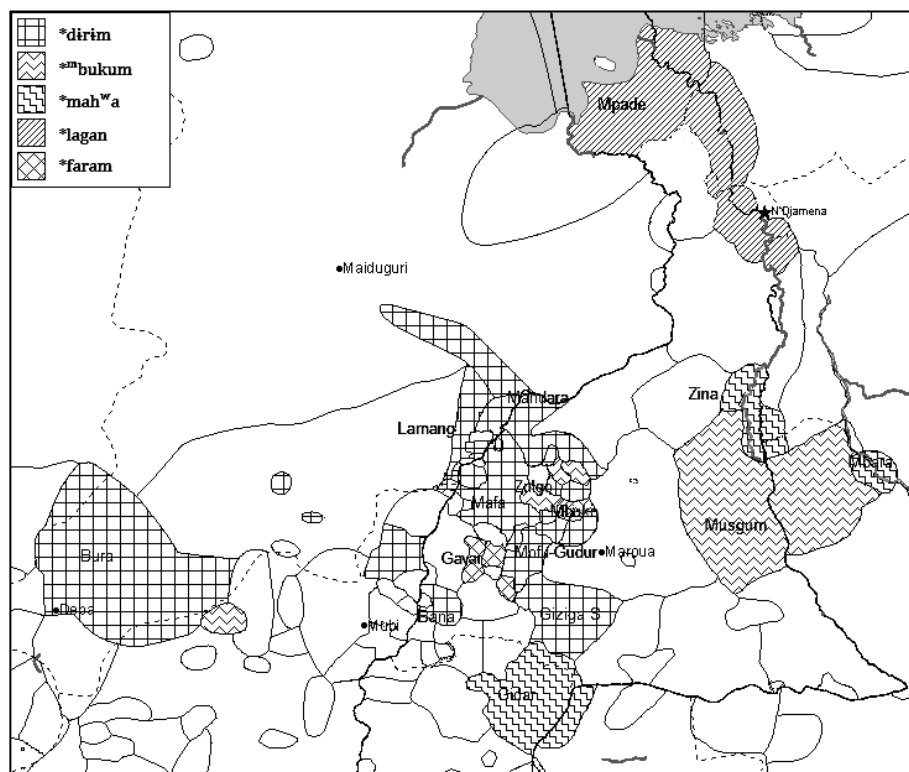
Map 52 - Isoglosses for 'horn'

13.2.4 Other
'Baobab'

*kʷɨkaɗ – Mandara, Margi, Mofu, Bata, Higi, Hurza, Kotoko Centre and North, Lamang, Tera groups. This root was reconstructed by Newman for Proto-Chadic as *kuka*. He considered this to be a native Chadic word that was borrowed into Kanuri, though the opposite direction of borrowing also has support (Blench 2007). The patterns of the reflexes, and the limited evidence for a glottal component, are more consistent with this being a native Chadic word.

*ᵐbatuɓ - Daba, Mafa, Sukur, (Mofu) groups. This root appears to be an innovation in the Mandara mountains area.
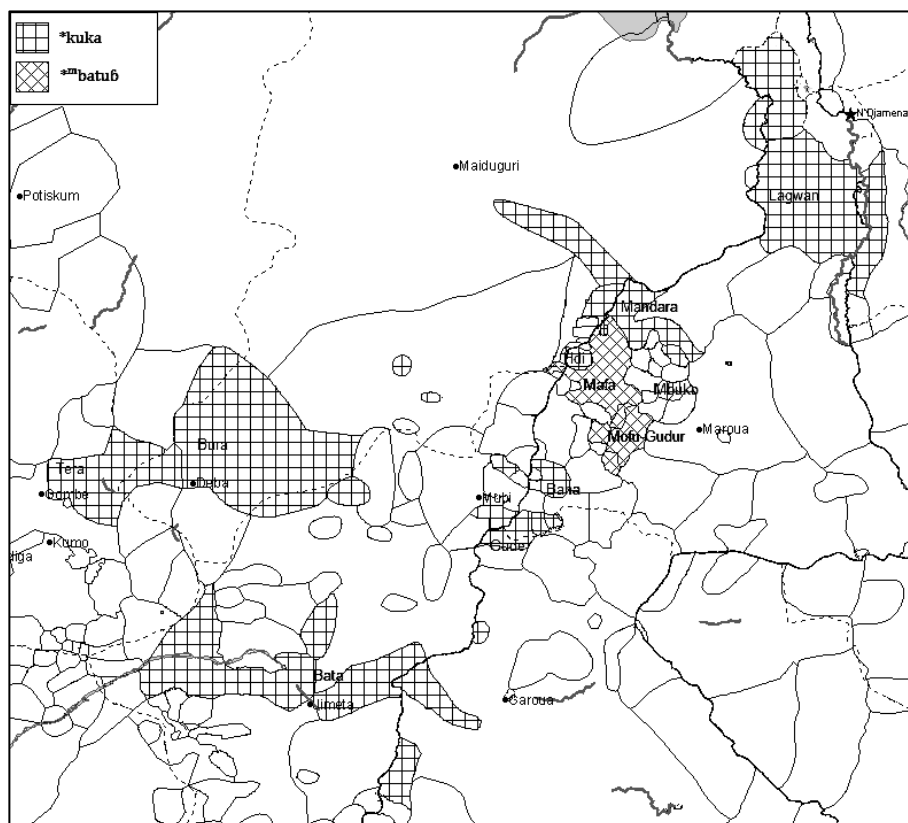
Map 53 - Isoglosses for 'baobab'

'Beer'

*ᵐbaɮa – Mandara, Mofu, Daba, Higi, Maroua, Sukur groups. This could be an early borrowing into Central Chadic of the Kanuri *ᵐbal* (Cyffer and Hutchinson 1990). (Proto-Central Chadic had no *l. As with the root for 'camel' *l was incorporated into Central Chadic as *ɮ.)

*vɨhʷ – Bata, Daba, (Hurza), (Mandara) groups.

*ɣʷɨzɨm – Mofu, Mafa, Lamang, Maroua groups. This root is a feature of the Mandara Mountains area.
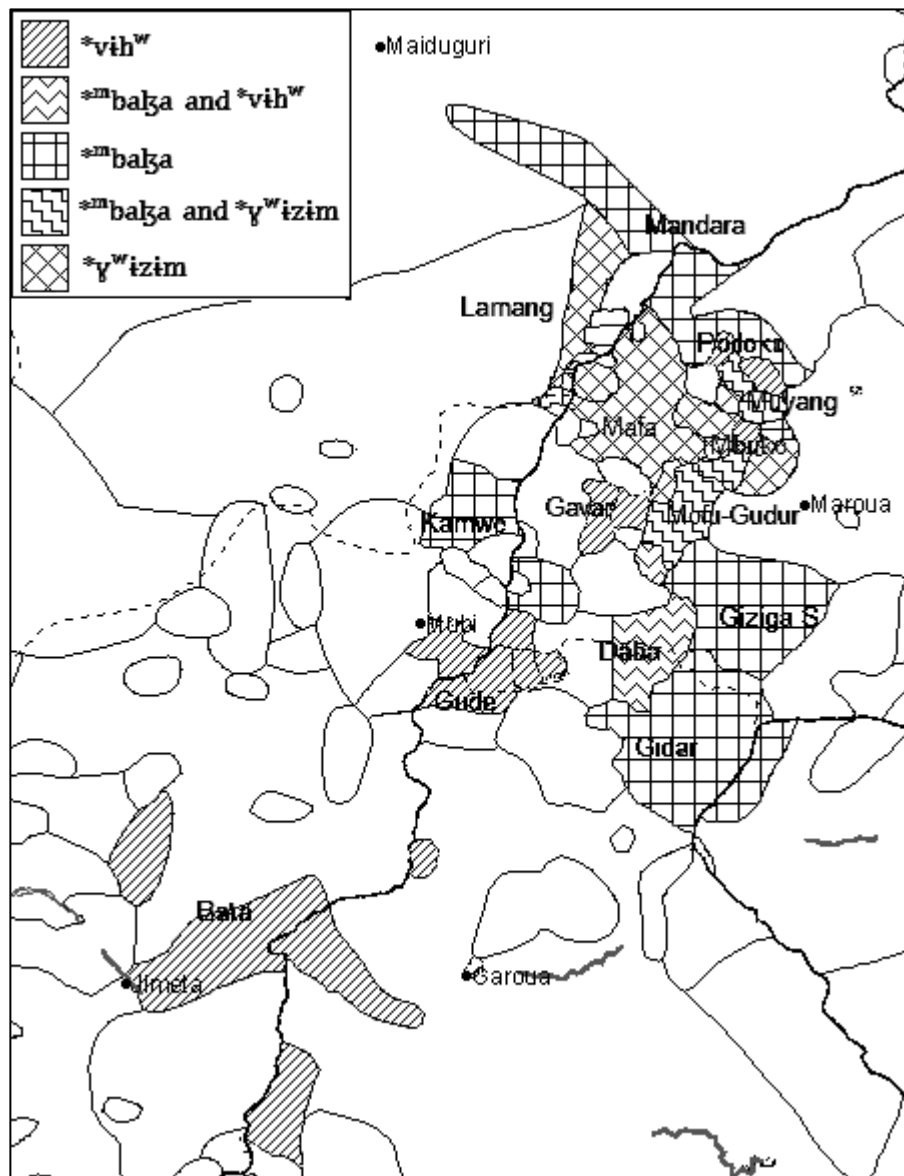
Map 54 - Isoglosses for 'beer'

'To give birth'

*wahaj - This may be the Proto-Central Chadic form.

*ᵐbɨw – Daba, Bata, Musgum groups. This root may have originated in the Daba group and spread from there.
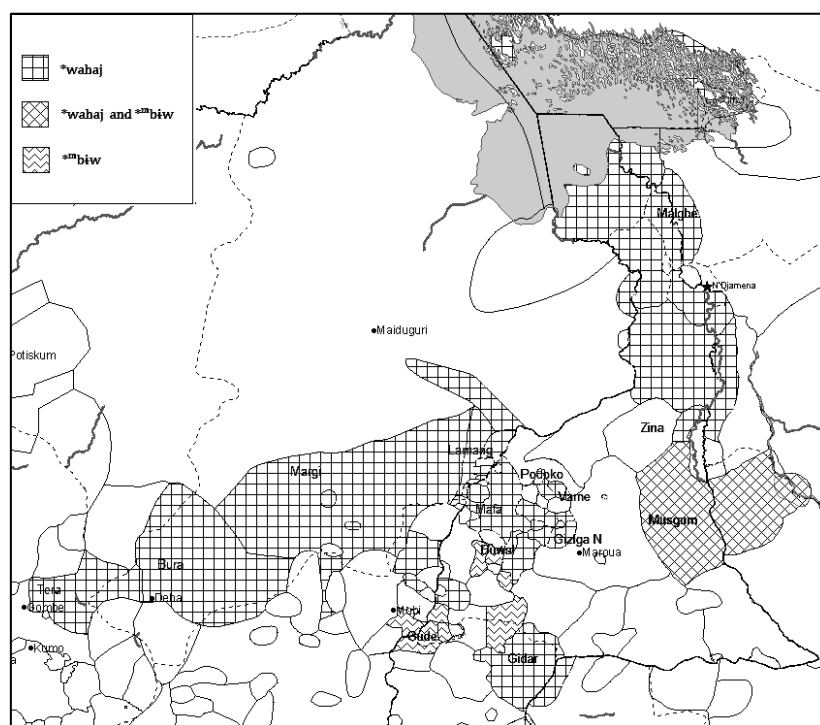
Map 55 - Isoglosses for 'to give birth'

'Broom'

*sɨmɨt ʸ - Higi, Bata, Kotoko Centre, Lamang, Sukur, (Mandara, Margi, Mafa, Tera) groups. This root is primarily a feature of the Nigerian Plains area.

*sɨrɨkʷ - Mofu, Musgum, Gidar, (Hurza, Maroua) groups. This root is a feature of the Eastern Plains area.

*kɨɬiɗ - Daba, Kotoko North, (Musgum, Margi) groups.
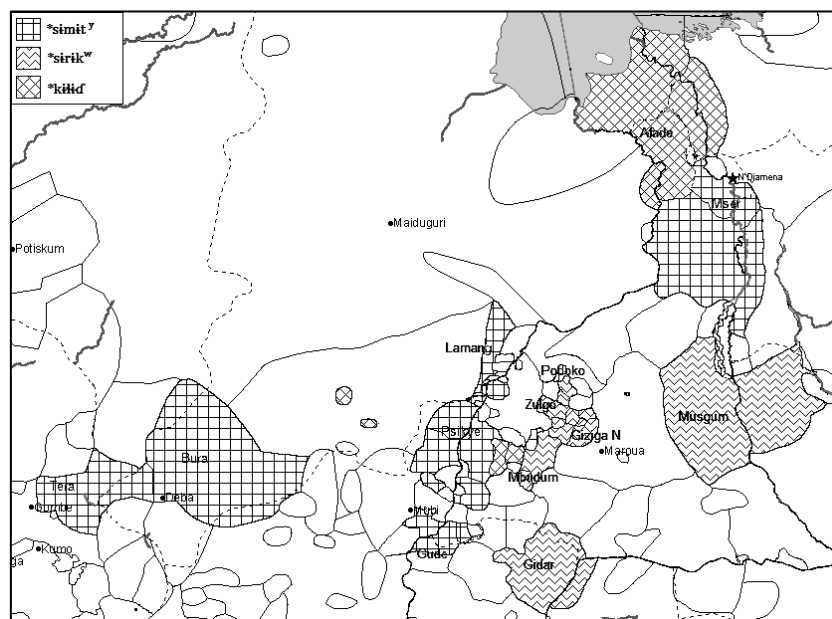
Map 56 - Isoglosses of 'broom'

'Field'

The roots for 'field' are hard to identify with particular areas or genetic groupings. There may be confusion between roots for 'field' and for 'uninhabited land (the bush)', with semantic shift between the two taking place. The lack of a consistent widespread root indicates that agriculture was not practiced by the early Proto-Central Chadic-speaking peoples.

*gʷɨvɨh – Margi, Mandara, Mofu, Higi, Hurza, Lamang, Maroua, (Bata) groups.

*raj – Kotoko North, Bata, Daba, Mafa, Mofu.

*sɨka – Kotoko North and Centre, Bata groups.
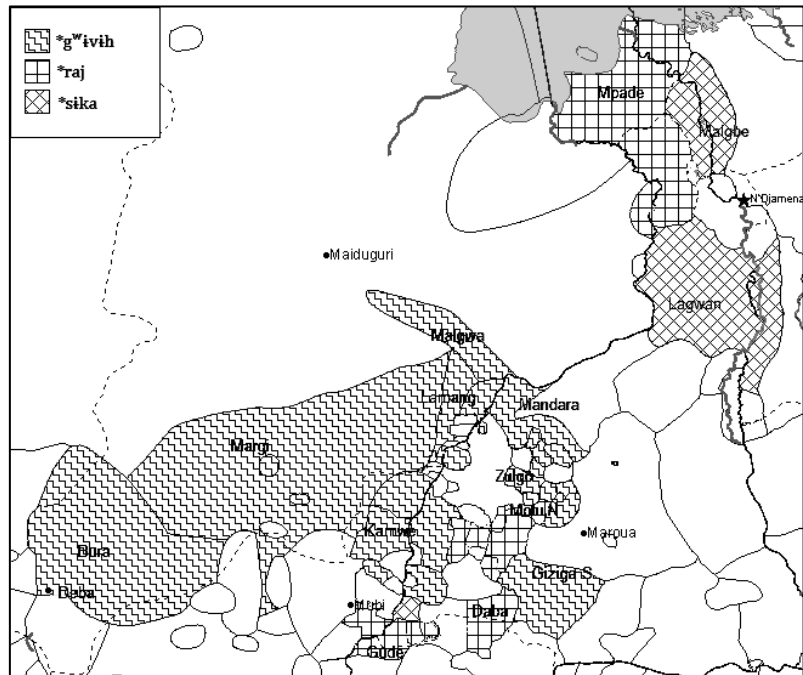
Map 57 - Isoglosses for 'field'

'Left'

*ɮaɓaj – Mandara, Sukur, Gidar, (Daba, Higi, Lamang) groups. This root is attested in a diverse collection of groups, which may indicate that this was the Proto-Central Chadic root and that *gʷɨla was adopted at a later stage.

*gʷɨla – Mofu, Daba, Mafa, Maroua, (Higi, Hurza, Kotoko Centre and North) groups. This is the most widespread root within Central Chadic, but the presence of /l/, which did not exist in Proto-Central Chadic, indicates that this may not be the Proto-Central Chadic root. If the root was in fact *gʷɨra, we would expect to find the *r retained in the Daba and Mafa groups, which is not the case.
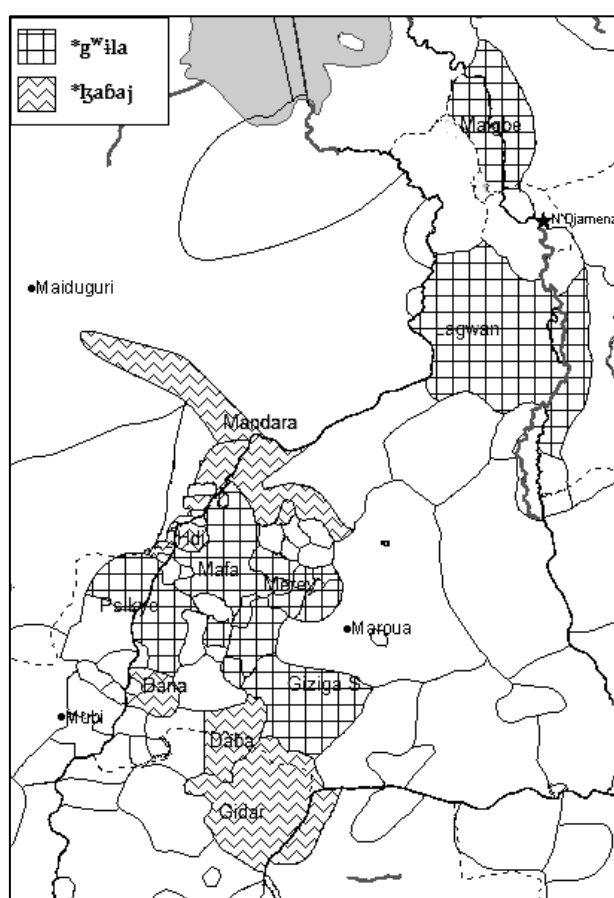
Map 58 - Isoglosses for 'left'

'Millet'

*hɨjɨ - Mandara, Mofu, Bata, Higi, Hurza, Lamang, Gidar, Sukur groups. This widely attested root may be the Proto-Central Chadic root, though the lack of a

single root for a concept that is so fundamental to current life-styles may indicate that the root is not as old as Proto-Central Chadic, and that millet was less fundamental to the Proto-Central Chadic speaking people than it is to their descendants.
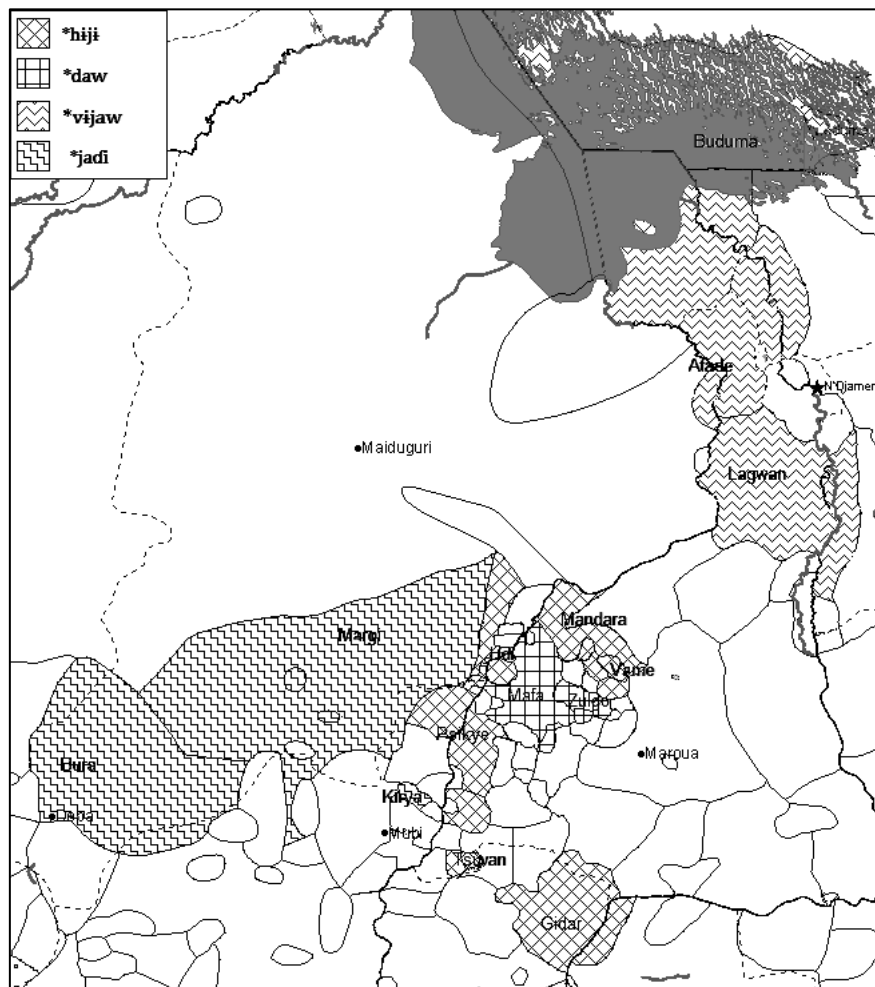
Map 59 - Isoglosses for 'millet'

*daw – Mafa, Mofu, Hurza, (Maroua) groups. This root is probably a feature of the Mandara Mountains.

*vɨjaw – Kotoko Island, North and Centre, Hurza groups. This root is a feature of the Lake Chad area.

*jaɗî – Margi, (Higi) groups.

'Moon'

*tira – Mandara, Higi, Lamang, Musgum, Kotoko Centre and North, Daba, Tera, Sukur, Gidar groups. This is a well attested root across Chadic, reconstructed by Newman for Proto-Chadic as *təra.

*kɨja – Margi, Mofu, Hurza, Mafa, Maroua, Kotoko South and Island groups. This root may be an innovation in the Mofu-Mandara-Margi major group, or else a feature of the Northern Mandara Mountains.
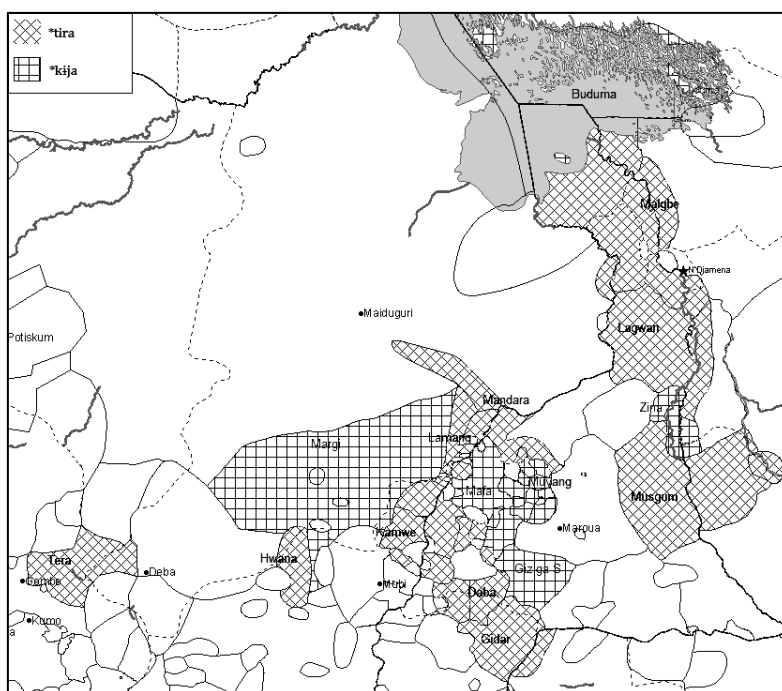
Map 60 - Isoglosses for 'moon'

13.2.5 Summary

The number of multiple roots for one and the same concept within Central Chadic shows the complexity of the linguistic situation in the region. Although we cannot identify the origin of each root in these lists, we can see patterns of shared history between groups of languages. In the cases where the shared histories are not due to genetic relationships, they are indicative of contact between the groups. The patterns of sharing support the broad picture of contact-induced change in the four regions described earlier, namely the Nigerian Plains, the Mandara Mountains, the Eastern Plains and the Lake Chad area.

The following table shows the roots which can be associated with particular areas. The Proto-Central Chadic roots are not included.

Root	Nigeria Plains	Mandara Mountains	Eastern Plains	Lake Chad
arm	*dzɨvɨ [y]			
leg				*ʃi
neck				*ɣɨwaj
two		*tsɨjaw		*kasi
five	*hʷɨtif			*ɬensi
six			*ɬira	*vɨnahkɨr
seven	*mɨɗɨp	*tasɨraɗ		*kʷatal
ten	*kʷɨm	*kɨrɨw		*hɨkan
crocodile				*rigɨ
donkey		*ziⁿgʷa		
elephant	*dzɨwɨn [y]			*nɨvi
hare	*vida	*hʷaⁿdav	*hʷaⁿdav	
horse	*takʷ			*bɨskʷan
camel				*kaligimo
lion	*lɨvari	*zɨjɨl	*mabor	
mouse			*katakam	*kʷɨsɨm
horn			*mahʷa	*lagan
baobab		*ᵐbatuɓ		
beer		*ɣʷɨzɨm		
broom	*sɨmɨt [y]		*sɨrɨkʷ	
millet	*jaɗi	*daw		*vɨjaw

Table 178 - Roots associated with areal diffusion

13.3 Developments

In this section we will follow through the linguistic developments in the history of Central Chadic, and speculate on how these developments could relate to the history of the Central Chadic peoples.

Proto-Central Chadic would have been spoken somewhere around Lake Chad and the Mandara Mountains. The language split into Proto-Central Chadic North, Proto-Central Chadic South and Proto-Hurza. Proto-Central Chadic North may have been spoken around Lake Chad and the rivers that fed into it. Proto-Central Chadic South may have been spoken in the mountains further south, and it was the separation of the peoples of these two environments that resulted in the separation of the two languages.

At some point, some of the Central Chadic North peoples may have moved south and settled on the western edge of the Mandara Mountains, and their language developed into Proto-Higi in the south and Proto-Lamang in the North. These two groups may have been separated by the presence of the Sukur civilisation. Another group, comprising the Gidar, Musgum and Maroua peoples, settled to the east of the Mandara Mountains. The Margi-Mandara-Mofu people group remained to the north of the Mandara Mountains until events in the Kanem empire caused them to migrate further south, or seek refuge in the mountains in the case of the Mofu group peoples. When the Kanem empire relocated to Bornu, the Kotoko groups became isolated from the rest of the Central Chadic peoples.

The Central Chadic South peoples were fragmented by the southward movement of the Central Chadic North peoples, and by northward movement by non-Chadic peoples from the south. The Proto-Bata and Proto-Tera peoples had moved away from the Mandara Mountains to the west, with the Proto-Tera people living to the north of the Proto-Bata people. The Proto-Tera group became isolated from the rest of the Central Chadic peoples by the migration of the Margi group people, and were split into two locations, resulting in the separate development of West Tera and East Tera. The peoples speaking Bata group languages were split up and had their territory reduced by the arrival of non-Chadic peoples. The Bata and Bachama peoples became separated from the rest of the group, who found refuge on the south-western edge of the Mandara Mountains. The Sukur, Mafa and Daba peoples remained on the Mandara Mountains.

The Proto-Hurza speaking people were probably originally to the east of the Mandara Mountains, but became victims of the migrations of the Central Chadic North peoples, the Kanuri and the Fulani, eventually finding small parcels of territory on the eastern edge of the Mandara Mountains.

As a result of these movements, Central Chadic peoples from different branches of its history came to live in contact with each other. The Margi, Bata and Higi peoples shared the plains to the west of the Mandara Mountains, and the Mafa, Lamang, Sukur, Daba, Mofu, Hurza and Mandara peoples had contact within the Mandara Mountains themselves. There were also areas of contact between the Kotoko groups in the region just to the south-east of Lake Chad, and between the Gidar, Maroua, Musgum and probably the Hurza group on the plains to the east of the Mandara Mountains. Within each of these areas there was sharing of lexical items and shared development of phonological systems.

Up until the time when the proto-languages of the major groups were spoken, the behaviour of the palatalization prosody had remained more or less the same, probably causing the fronting of vowels and the movement of laminals to the post-alveolar place of articulation. This was the Mixed Prosody system, which is retained in some languages. At the time of the separation of the major group proto-languages into the proto-languages of the different groups the behaviour of the palatalization prosody diversified. In the Bata group, the palatalization prosody became entirely focussed upon the consonants of words. This behaviour, the Consonant Prosody system, spread to the neighbouring Higi and Margi groups, though in slightly different ways.

Meanwhile in the area of the Musgum or Gidar groups the palatalization prosody developed into a system of vowel harmony. This behaviour, the Vowel Prosody system, spread to the neighbouring groups, both within Central Chadic (Maroua, Daba, Mafa, Mofu, Hurza), and also Kera from East Chadic. As a result of the development of vowel harmony, the front vowel *i no longer contrasted with *ɨ in palatalized words in some languages, and this loss of contrast may have been the trigger for its merger with one of the other vowel phonemes.

Following on from this, the labialization component of labialized velars began to be reanalysed in different ways. In Consonant Prosody languages, the labialization was able to transfer onto labial consonants, creating sets of labialized labial consonant phonemes. In some Vowel Prosody languages, the

labialization was reanalysed as back-rounding vowel harmony, creating languages with two prosodies, palatalization and labialization.

The spread of these systems is not complete. In the northern part of the area between the areas where the Consonant Prosody and Vowel Prosody systems are used (i.e. the Mandara, Lamang and Sukur groups), the behaviour of the palatalization prosody varies between being more consonant focussed or more vowel focussed, or combining the two, or being in the process of disappearing. Further to the north, in the four Kotoko groups, the palatalization prosody has gradually been disappearing as an active feature.

As the groups separated into today's individual languages, more differentiation has occurred. On the Consonant Prosody side, the rules concerning which consonants may be palatalized or labialized have changed in each language. Sometimes this has reduced the number of consonants that may be affected, but in other cases the number has greatly increased. On the Vowel Prosody side, some languages have remained with just the palatalization prosody, others have added the labialization prosody, and some have allowed the two to combine to create front-rounded vowels. In addition, there is variation in whether these prosodies only affect *a, or whether they also affect *ɨ.

The result is today's wonderfully diverse range of languages with interesting and varied phonologies.

13.4 Further research

The conclusions in this study are based on the data and phonological analyses that are available. Much can be gained from increasing this knowledge. In particular, further research in the Bata, Margi, and especially the Higi group would increase our knowledge of the Consonant Prosody system. There are also certain interesting groups where there has been little research, such as the Tera and Kotoko South groups.

It is hoped that this study will also contribute to historical research in the rest of the Chadic family, and also in Afroasiatic studies. There are several questions that come out of this research. Amongst the consonants, it is unclear as to whether *p and *f were separate phonemes, and also as to whether there was a distinction between *ɬ and *ɮ at the time of Proto-Central Chadic and earlier. Further research is also needed to determine whether the affricates *ts and *dz existed as such at this time, and also to determine whether the pre-nasalized

consonants can be traced back as far as Proto-Chadic. There is also the question of the origins of the implosive phonemes, and whether they relate to the 'emphatic' consonants (pharyngealised or ejective) found in other branches of Afroasiatic.

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English Summary

The goal of this study is to reconstruct the phonology of Proto-Central Chadic. Central Chadic is a language group spread across Chad, Cameroon and Nigeria and is a primary branch of the Chadic language family within the Afroasiatic phylum of languages. It is characterised by a high degree of phonological diversity, much higher than within the other branches of Chadic. Previous reconstructions of Chadic or its branches have focussed on the consonantal system. Here we will also tackle what may loosely be called the vowel system. The result is a reconstruction of the sound system of Proto-Central Chadic (though not including tone or stress), and of the daughter languages of Proto-Central Chadic, the ancestors of the present day groups of Central Chadic languages. The study includes a detailed sub-classification of the Central Chadic languages, and the reconstruction of more than two hundred lexical items.

In general, the Central Chadic languages are described as possessing very few underlying vowels, typically two, but in some cases just one (Barreteau 1988; Bow 1999). However the number of surface vowels is often considerably higher. There are two principal causes for this. Firstly, labialized and palatalized consonants play an important role in modifying the underlying vowels. Secondly, word-level vowel-harmony can cause the fronting or back-rounding of vowels throughout a word.

In the languages where vowel harmony is present, it is analysed as being caused by a phonemic entity known in Chadic linguistics simply as a 'prosody'. In this study we will show that there are languages where the palatalization of consonants is also due to the presence of a prosody.

From this basis we will categorise the Central Chadic languages typologically as following one of four phonological systems. The first is the Vowel Prosody system, where the predominant feature is the presence of vowel harmony. The second is the Consonant Prosody system, where the languages possess large sets of palatalized and labialized consonants. The third system is the Mixed Prosody system, where features of both Vowel Prosody and Consonant Prosody are present, and the fourth system is the Kotoko system, where there are no active prosodies.

In the Central Chadic languages, as well as in the history of Central Chadic languages, there is a strong interplay between the vocalic, consonantal and prosodic systems. Before any comparative analysis can be done, it is essential that the roles of these three components are understood in the individual languages.

Our task, then, is not only to reconstruct the underlying vowels and consonants of Proto-Central Chadic, but also to reconstruct the history of labialized and palatalized consonants, along with the palatalization and labialization prosodies.

There are several important results that come out of the study. The first is the reconstruction of a palatalization prosody for Proto-Central Chadic that has reflexes that cause front vowel harmony in Vowel Prosody languages and palatalize consonants in Consonant Prosody languages.

The second is to show that back-rounding vowel harmony and the labialization of labial consonants are not due to the existence of a Proto-Central Chadic labialization prosody, but are of comparatively recent origin, and are the result of processes that have affected labialized velars.

A third result is the reconstruction of three underlying vowel phonemes for Proto-Central Chadic. This system was largely preserved in the Consonant Prosody Languages, but was reduced to a two vowel system in the Vowel Prosody languages.

The book is in three sections. Section I, covering the first four chapters, gives the background for the rest of the study. Chapter 1 sets out the goals of the study, and describes the methodology used. It also presents the geographical and cultural location of the Central Chadic peoples, and gives an overview of the sources used to provide data for the study. Chapter 2 looks at the genetic and areal affiliations of the Central Chadic languages, summarising the previous research on the classification of the languages, and describing the main areas of language contact and contact-induced change. In chapter 3 we present the genetic classification used in the study, giving evidence from regular sound changes. We also describe several interesting and unusual phonological processes that are found within the history of Central Chadic, such as compensatory reduplication and compensatory prefixation. Chapter 4 is a

review of the literature on Central Chadic phonology, highlighting the key issues.

Section II, comprising chapters 5 to 9, presents a typology of the phonological systems that are present within Central Chadic, and describes the key phonological features of most of the individual languages and also the group proto-languages. Chapter 5 covers the Vowel Prosody languages, which are characterized by systems of vowel harmony, and chapter 6 describes the Consonant Prosody languages, which are characterized by complex systems of consonant palatalization and labialization. In chapter 7 we look at the Mixed Prosody languages, where elements of the Vowel Prosody and Consonant Prosody systems have combined, and chapter 8 describes the Kotoko languages, where neither the Vowel Prosody nor the Consonant Prosody systems are present. Chapter 9 is a summary of the phonological features of the languages and their immediate ancestor languages.

In section III – chapters 10 to 13 – we turn our attention to the reconstruction of the phonological system of Proto-Central Chadic. Chapter 10 gives a reconstruction of the consonantal system, chapter 11 looks at the labialization and palatalization prosodies, and chapter 12 reconstructs the vowel system. In chapter 13 there is a summary of the Proto-Central Chadic phonological system, and a possible scenario for the history of the Central Chadic peoples, covering people movements, linguistic developments and language contact.

Full data for the reconstructions used in the analysis is available online, and can be found at http://centralchadic.webonary.org/. There is also a summary of the Proto-Central Chadic lexicon, along with key isoglosses and loanwords, at http://protocentralchadic.webonary.org/.

Nederlandse Samenvatting

Het doel van deze studie is de fonologie van Proto-Centraal Tsjadisch te reconstrueren. Centraal Tsjadische talen worden in Tsjaad, Kameroen en Nigeria gesproken en vormen een van de primaire takken van het Tsjadisch; Tsjadisch is een taalfamilie binnen het Afroaziatisch. Centraal Tsjadisch kent een veel grotere fonologische diversiteit dan de rest van het Tsjadisch. Eerdere reconstructies hadden vooral betrekking op het medeklinkersysteem. Deze studie behelst het klinkersysteem. De studie omvat een reconstructie van het Centraal-Tsjadische klanksysteem (zonder toon of klemtoon), zowel op het niveau van de subgroepen en het proto-Tsjadisch. Bovendien levert deze studie een gedetailleerde subclassificatie van het Tsjadisch en een reconstructie van meer dan 200 lexicale items.

Tsjadische talen worden in het algemeen beschreven met weinig onderliggende klinkers, meestal twee, in een enkel geval slechts een (Barreteau 1988, Bow 1999). Aan de oppervlakte zijn er echter veel meer klinkers. Daar zijn twee oorzaken voor. Een oorzaak is de invloed van gelabialiseerde en gepalataliseerde medeklinkers op de klinkers. Een tweede oorzaak is de klinkerharmonie op woordniveau die klinkers doet veranderen naar voorklinkers of geronde/achterklinkers.

Klinkerharmonie worden binnen de Tsjadistiek aangeduid met de term 'prosodie'. Ik laat in deze studie zien dat er talen zijn waarvoor de palatilisatie van de medeklinkers veroorzaakt wordt door zo'n prosodie.

Op basis hiervan catalogiseer ik de Centraal-Tsjadische talen in vier systemen: Ten eerste het Klinkerprosodie systeem dat gekenschetst wordt door aanwezigheid van klinkerharmonie; ten tweede het Medeklinkerprosodiesysteem met talen met grote aantallen gepalataliseerde en gelabialiseerde medeklinkers. Ten derde het Gemengde prosodiesysteem waarin de kenmerken van de eerste twee systemen voorkomen, en ten vierde het Kotokosysteem zonder actieve prosodieën.

In de huidige Centraal-Tsjadische talen maar ook in hun geschiedenis is ereen grote interactie tussen de klinkersystemen, de medeklinkersystemen en de prosodieën. Een zinvolle historische vergelijking vereist allereerst begrip van de rollen van de drie systemen in de individuele talen.

Het is dan ook onze taak om niet alleen de onderliggende klinkers en medeklinkers van het Centraal-Tsjadisch te reconstrueren maar ook de ontwikkeling van de gelabialiseerde en gepalataliseerde medeklinkers, en tevens de palatale en labiale prosodieën

De belangrijke resultaten van deze studie zijn de volgende: Ten eerste de reconstructie van een palatalisatieprosodie voor het Proto-Centraal Tsjadisch. Evidentie hiervoor is terug te vinden in de harmonie van voorklinkers in Klinkerprosodietalen en in de palatalisatie van medeklinkers in Medeklinkerprosodietalen.

Het tweede resultaat is dat de klinkerharmonie van geronde/achter klinkers en de labialisatie van labiale medeklinkers terug te voeren zijn op een recentere ontwikkeling van een labialisatieharmonie in het proto-Centraal Tsjadisch hetgeen weer het gevolg is van processen die betrekking hadden op gelabialiseerde velaren.

Een derde resultaat is de reconstructie van drie (onderliggende) klinkerfonemen voor het proto-Centraal Tsjadisch. Dit systeem bleef overeind in de Medeklinkerprosodietalen maar werd gereduceerd tot een twee-klinker-systeem in de Klinkerprosodietalen.

Het boek is verdeeld in drie delen. In deel I (eerste vier hoofdstukken) geef ik de achtergrondinformatie voor de studie. Hoofdstuk 1 noemt de doelstellingen van de studie en de gevolgde methodologie. tevens plaats ik de Centraal-Tsjadische volkeren geografisch en cultureel en noem ik de bronnen die voor deze studie zijn gebruikt. Hoofdstuk 2 behandelt de genetische en areale classificaties gebaseerd op eerder onderzoek en de belangrijkste taalveranderingen ten gevolge van taalcontact. Hoofdstuk 3 presenteert de genetische subclassificatie die ik hanteer in deze studie inclusief bewijs voor de regelmatige klankwetten. Ik behandel hier ook een aantal interessante en ongebruikelijke historische processen zoals vervangende reduplicatie en prefigering. Hoofdstuk 4 bespreekt de bestaande fonologische literatuur over het Centraal Tsjadisch voor zover relevant voor deze studie.

Deel II, hoofdstukken 5 tot 9, gaat over de typologie van de fonologische systemen van de Centraal-Tsjadische talen en presenteert de belangrijkste fonologische kenmerken van de meeste talen en van de gereconstrueerde subgroepen. Hoofdstuk 5 behandelt de Klinkerprosodietalen met hun

klinkerharmonie; hoofdstuk 6 de Medeklinkerprosodietalen met hun complexe systemen van palatalisatie en labialisatie van consonanten; hoofdstuk 7 de talen met Gemengde systemen die klinker-en medeklinkerprosodie combineren, en hoofdstuk 8 de Kotoko talen die noch klinkerprosodie noch medeklinkerprosodie kennen. Hoofstuk 9 vat de fonologische kenmerken van de talen en hun prototalen samen.

In deel III, hoofdstukken 10 tot 13, komt de reconstructie van proto-Centraal-Tsjadisch aan de orde. De reconstructie van het consonantsysteem staat in hoofdstuk 10. Hoofdstuk 11 behandelt de labiale en palatale prosodie en hoofdstuk 12 de reconstructie van het klinkersysteem. Hoofdstuk 13 vat het proto-Tsjadisch fonologische systeem samen en suggereert een scenario voor de geschiedenis van de Centraal-Tsjadische volkeren waarin volksverhuizingen, taalverandering en taalcontact hun plaats krijgen.

Alle gegevens waar de reconstructies op zijn gebaseerd zijn, zijn beschikbaar in het gegevensbestand op de volgende website http://centralchadic.webonary.org/. Een selectie van het Proto-Centraal Tsjadisch lexicon met de belangrijkste isoglossen en leenwoorden kunt u vinden in http://protocentralchadic.webonary.org/.

Curriculum Vitae

Richard Gravina was born in 1965 in the county of Essex in the United Kingdom. He studied Mathematics at the University of Cambridge, where he received a B.A. in 1987. He later studied at London Bible College, receiving a diploma in Theology in 1990, and at the School of Oriental and African Studies, where he received an M.A. in Linguistics with distinction in 2002. From 1995 to 2008 he lived with his wife and children in Cameroon, working as a Bible translator and linguist with the Mbuko people and others.