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Aspects of phonology in Eboo-Nzikou
(Bantu B74)

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Abstract

This paper describes aspects of the phonology of *Eboo-Nzikou* which forms part of the Teke language group (Bantu B70) spoken in Congo-Brazzaville. It posits that *Eboo* and *Nzikou* are phonologically the same variety of Teke. Proto-Bantu reconstructions, as well as two previous phonological sketches of *Eboo* are taken as the basis for this study. Some of the findings of these sketches are re-interpreted in the light of further research and fieldwork carried out by myself and others.

A revised consonant, vowel and syllable inventory is presented for *Eboo-Nzikou*, with prenasalised consonants as sequences of nasal plus consonant. The number of vowel phonemes is increased to nine oral and seven nasalised vowels, compared to the previously proposed systems of five or seven oral vowels and five nasalised vowels. A mid-vowel split is shown to have occurred, with [e] and [o] functioning as phonemes in the verb system, as a result of advanced tongue root harmony, consonant loss and final vowel deletion. The emergence of two new high vowel phonemes is posited, as well as the nasalisation and lengthening of vowels, as a result of second consonant deletion in stems. Comparative analysis is based on Proto-Bantu reconstructions and data from other Teke varieties.

Keywords: African linguistics, Bantu languages, Congo-Brazzaville, Teke, *Eboo-Nzikou*, Proto-Bantu, phonology, advanced tongue root harmony, consonant loss, vowel assimilation, vowel splits, nasalisation.

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List of abbreviations

ATR	Advanced Tongue Root
C	consonant
C ₁ C ₂	first consonant, second consonant
e.g.	for example
FV	final vowel
G	glide
ibid.	same as above
i.e.	that is to say
intr.	intransitive
N	homorganic nasal consonant
pers.comm.	personal communication
sg	singular
SIL	Summer Institute of Linguistics
V	vowel
V ₁ V ₂	first vowel, second vowel
́	high tone vowel
́̀ or ́́	contour tones on a vowel sequence
̃	nasalised vowel
1sg	first person singular prefix
[taara]	phonetic representation
/taata/	phonemic representation
i/u	data on either side of a slash represents alternatives.
/u.dzi.a/	fullstops (.) in data represent syllable breaks.

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1. Introduction

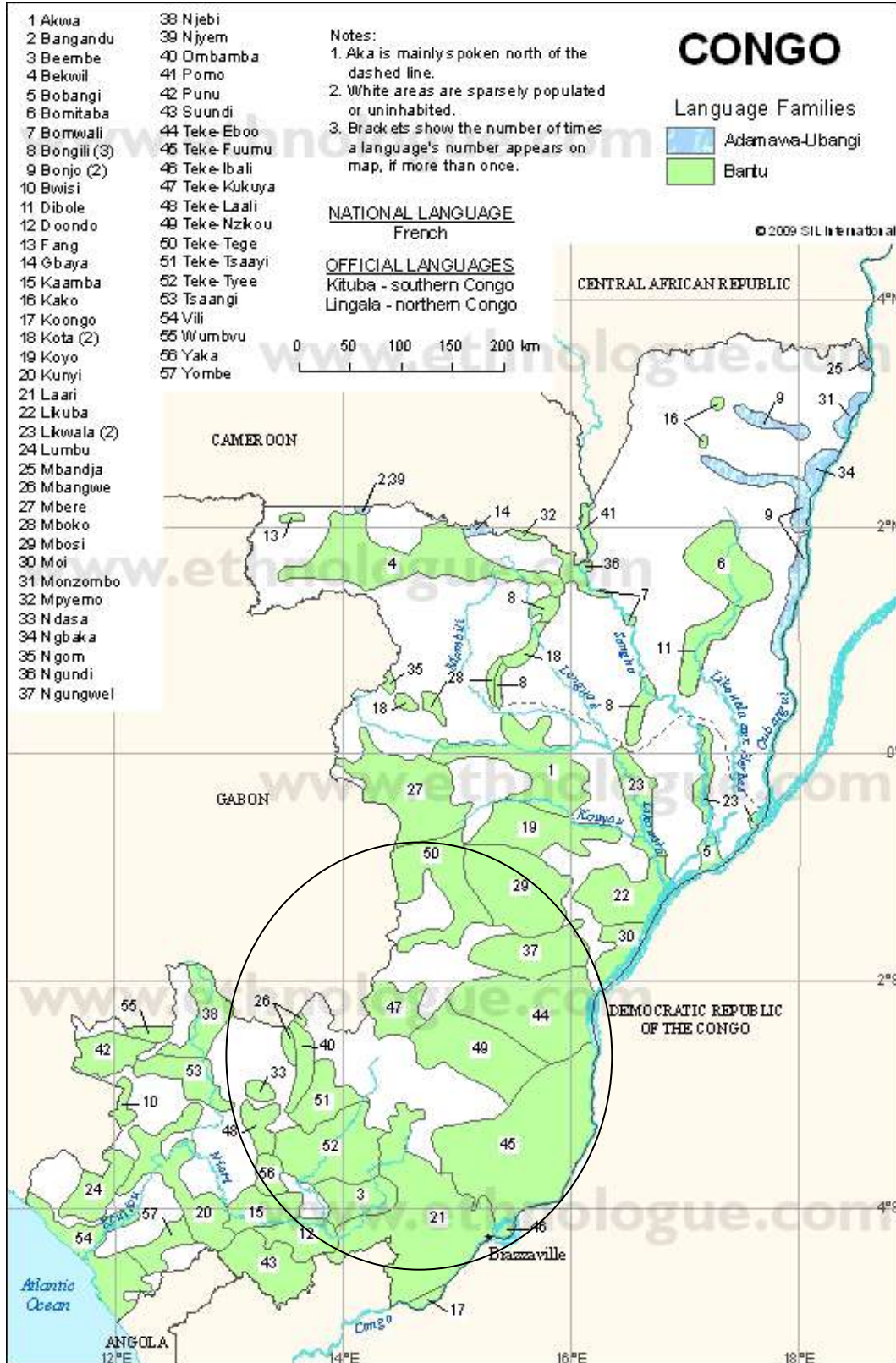
This study investigates aspects of the phonology of *Teke-Eboo* and *Teke-Nzikou*, with particular focus on the vowel system. The Teke cluster of languages and dialects are spoken over a wide area in the Republic of Congo (see Map 1, numbers 37, 44-52 and 56). *Ngungwel*, *Teke-Eboo*, *Teke-Fuumu*, *Teke-Ibali*, *Teke-Kukuya*, *Teke-Laali*, *Teke-Nzikou*, *Teke-Tege*, *Teke-Tsaayi*, *Teke-Tyee* and *Yaka*, are all considered to be part of the Teke cluster, although the names used for these varieties vary to some degree. A more detailed description of the cluster will be given in chapter 2.

An initial phonological sketch of *Teke-Eboo* written in 1986 by SIL (Summer Institute of Linguistics) linguists Ole Bjørn and Anne-Lise Kristensen, became the starting point for language development in the *Teke-Eboo* area. In 2003 the Teke Association *ABDATEK* (*Association pour la bible, le développement et l'alphabétisation en Téké*) was formed and an adult literacy programme launched in collaboration with SIL-Congo.

As a SIL linguist myself, I have been involved in the development of literacy materials for this programme, as well as an orthography and grammar manual (Raharimanantsoa 2011). The literacy programme expanded to cover the *Teke-Nzikou* area, and the same literacy materials have been used for both *Eboo* and *Nzikou* speakers with no difficulty, since the two are in fact the same variety of Teke. However, the writing system has posed a number of problems over the years, in particular with regard to the number of vowels which need to be written. Therefore this study seeks to review the initial phonological interpretations made in Kristensen and Kristensen's study of *Eboo*, and to investigate further the phonological processes which have taken place.

Increased contact with languages of wider communication means that some speakers of *Eboo* and *Nzikou* no longer distinguish clearly between certain vowels in some contexts. As the language changes, further phonological analysis is helpful to determine whether the orthography needs modification. It is beyond the scope of this study to make recommendations for orthography reform. However, it is hoped that this analysis will provide useful information for potential orthography reforms in the future.

Map 1: Linguistic map of Congo showing the area (encircled) where the Teke cluster is to be found : numbers. 37, 44-52 and 56 (Lewis 2009)



The following chapter provides the background to this study by describing the Teke cluster, and explaining the status of *Eboo* and *Nzikou* as essentially the same variety of Teke, based on dialect survey work. Reference is also made to other linguistic research which has been carried out within the Teke cluster.

In chapter three, the theoretical framework for this study is presented. Firstly, a brief overview of Proto-Bantu (PB) is given, as the background to all research into Bantu languages. This is followed by summaries of two phonological sketches of *Eboo*, one by Kristensen and Kristensen (1986) in which they propose an inventory of five oral vowel phonemes and five nasal vowel phonemes, and another containing seven oral vowel phonemes and five nasal vowel phonemes, proposed by Prince Abandzounou, a linguistics student at the University of Marian N'Gouabi, Brazzaville, who is currently preparing a phonology of *Eboo* as part of his Masters programme. These sketches provide the framework for this study. Chapter four describes the methods used in carrying out this research.

In chapter five, I review some of the initial interpretations from the *Eboo* phonological sketches in the light of further research carried out by myself and others, and present a revised inventory of consonants, vowels and syllables types. I posit that prenasalised consonants are actually nasal + consonant sequences, and *Eboo-Nzikou* has nine oral vowel phonemes and seven nasal vowel phonemes. I also present some of the underlying phonological processes occurring: Advanced Tongue Root (ATR) harmony, consonant loss, vowel assimilation and lengthening, glide formation and nasalisation processes, with reference to research carried out by Christiane Paulian (1975), Jean-Marie Hombert (1986), Rod Casali (pers comm. 2002), Myles Leitch (pers comm. 2002), and Koen Bostoen and Koni Muluwa (2011).

In writing this paper, I have two secondary aims. The first is to show that phonologically, *Eboo* and *Nzikou* are the same variety of Teke, with only very minor differences, and the second is to make a contribution to comparative phonological analysis of the Teke cluster as a whole. I make references to other Teke varieties for comparative purposes. One of the objectives of the *Plateforme pour le développement*

des langues congolaises (Forum for the development of Congolese Languages), set up in Brazzaville in 2011, is to develop a standard orthography for Congolese languages. It is hoped that this study can contribute towards a standardised orthography for the Teke cluster, which in turn can feed into research being carried out by this *Plateforme* for Congolese languages as a whole.

2. Background

2.1 The Teke language cluster

Some 17% of the estimated 4 million people living in the Republic of Congo (also known as Congo-Brazzaville) are thought to speak Teke (CIA world factbook 2012). This group of languages or dialects is spoken across a wide area in Congo, as well as in neighbouring parts of Gabon and the Democratic Republic of Congo (DRC). Teke is part of the Bantu family of languages, and according to Malcolm Guthrie's classification (1971), forms the B70 cluster. Table 1 presents this classification, as well as the equivalent Ethnologue names and codes (Lewis 2009), and the districts and regions where each variety is spoken.

For the purposes of this study, the eleven main Ethnologue names will be used to describe the different varieties of Teke, although for the sake of simplicity, without the prefix *Teke-* (thus *Tege*, *Ngungwel*, *Tsaayi*, *Laali*, *Yaka*, *Tyee*, *Nzikou*, *Eboo*, *Ibali*, *Kukuya*, *Fuumu*). These are the names commonly used by the people themselves, although they mostly consider themselves to be first and foremost Tekes. Reference will also be made to *Zanaga Teke*, which is not mentioned by Guthrie nor in the Ethnologue, but is the variety spoken in the district of Zanaga. Since this study focuses on *Eboo* (B74b) and *Nzikou* (B74a), and treats them as the same variety, the term *Eboo-Nzikou* will be used, unless just one of them is being referred to separately. Map 2 shows the Plateaux and Pool regions where *Eboo-Nzikou* is spoken, as well as the regions and towns mentioned in Table 1 where the other varieties of Teke are spoken.

It is important to define what is meant by the terms 'language' and 'language variety' in this study. In their book on dialectology, J.K.Chambers and P.Trudgill give a definition

Table 1: The Teke language group according to Guthrie (1971:36-37) and the Ethnologue (2009), including the area where each variety is spoken.

The Teke group according to Guthrie		Ethnologue name and code		Districts and regions where spoken
B71a B71b	Tege-Kali Njiniŋi	Teke-Tege	teg	Mainly in Gabon, but also the districts of Okoyo and Ewo (W Cuvette region) where it is known as Teke-Alima.
B72a B72b	Ngungwel Mpūmpū	Ngungwel	ngz	The district of Gamboma, Plateaux region.
B73a B73b	Tsaayi Laali	Teke-Tsaayi Teke-Laali	tyi lli	The N of the Lekoumou region. S of the Lekoumou region and the district of Tsiaki (Bouenza region).
B73c B73d	Yaa (Yaka) Kwe	Yaka Teke-Tyee	iyx tyx	The district of Sibiti (Lekoumou region). The districts of Vinza and Kindamba (NW Pool region), and the Lekoumou and Bouenza regions.
B74a B74b	Ndzindzui Boõ (Boma)	Teke-Nzikou Teke-Eboo	ebo nzu	The district of Djambala (Plateaux region). The districts of Ngabe (NE Pool region), Ngo, Mpouya and Mbon (SE Plateaux region) and DRC.
B75	Bali (Tio, Teke)	Teke-Ibali	tek	Along the Congo River around Brazzaville, and in DRC.
B76a B76b	Mosieno Dee	(subgroup of Teke-Ibali)		Dialects of Teke-Ibali spoken in DRC.
B77a B77b	Kukw̄a Fumu	Teke-Kukuya Teke-Fuumu	kkw ifm	The district of Lekana (Plateaux region). North of Brazzaville (N Pool region). Also known as Teke de Kimpila or Teke-Mpfaa.
B78	Wuumu (Wumbu)	(subgroup of Teke-Fuumu)		The district of Ignié (N Pool region).

of a language as "a collection of mutually intelligible dialects". (Chambers and Trudgill 1980:3). It is beyond the scope of this paper to determine whether Teke is a group of languages or of dialects. Whilst one can certainly talk of mutual intelligibility, the degree of intelligibility is certainly not 100% between all varieties. Therefore, the term 'language variety' will be used to describe the sub-groups of Teke, rather than 'dialect'. I adopt Chambers and Trudgill's definition of 'variety' as follows (ibid.:5): "We shall use 'variety' as a neutral term to apply to any particular kind of language which we wish, for

some purpose, to consider as a single entity[...]" In this instance, *Eboo-Nzikou* is one such case.

Map 2 : Political map of Congo, showing the area (encircled) where Eboo and Nzikou are spoken. (www.mapsoftheworld.com Consulted 25/04/2012)



2.2 Previous work

A number of linguists have worked on the Teke group of languages in the past, but some of their work is difficult to access today. Older books are no longer in print, and early computer articles and databases often used programmes and fonts which are no longer compatible with the current generation of computers. Documentation was also lost during the civil unrest and wars in Congo during the 1990s.

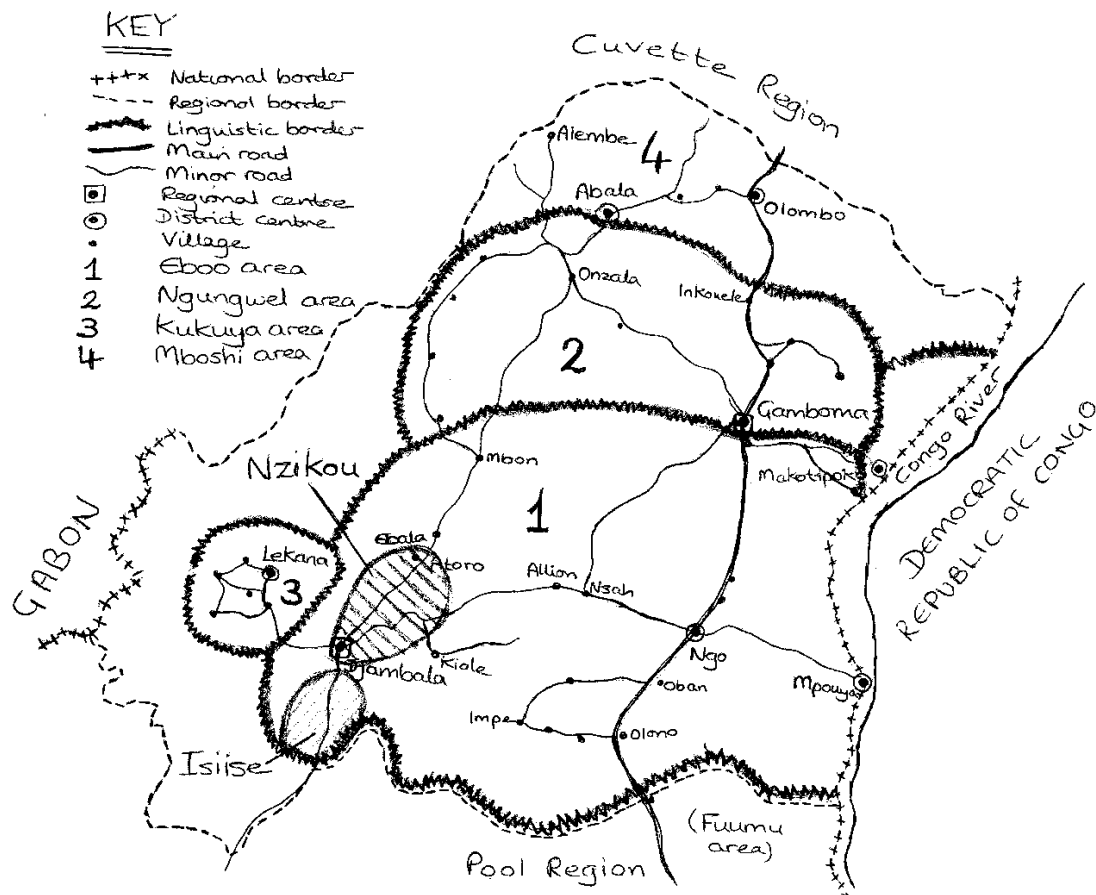
A dialect survey of the whole Teke group in Congo was carried out in 1984 by SIL linguists Don and Thelma Webster, and Ole-Bjørn Kristensen (1984). This study looked at mutual intelligibility between varieties, as well as making lexical comparisons. *Eboo* was included in the study, but there was no separate data for *Nzikou*. In their conclusion, Webster and Kristensen note a strong correlation between *Eboo* and *Ngungwel* in terms of mutual intelligibility and lexical similarity. They suggest that literature in *Eboo* could probably serve not only *Ngungwel* speakers, but also *Kukuyas*, *Nzikous*, *Ibalis* and possibly *Fuumu* speakers. With the exception of *Nzikous*, this has yet to be tested.

Linguists at the University of Marian N’Gouabi in Brazzaville, such as Leonce-Yembi Bouka (1988) and José Ndamba (1996), have also carried out dialect surveys and comparative studies in the Teke group. While Bouka (1988) carried out lexical comparisons of the varieties spoken in the Lekoumou region, Ndamba (1996) carried out mutual intelligibility testing in all the varieties of language spoken in the Plateaux region, contrasting *Eboo*, *Nzikou*, *Kukuya*, *Ngungwel*, *Teke-Alima (Tege)* and *Mbochi* (the latter is not part of the B70 group).

Ndamba used the linguistic computer programme 'Wordsurv', developed by SIL to aid in the collection and analysis of word lists, to measure the degree of linguistic proximity between varieties spoken in the Plateaux region. (This programme can be downloaded freely from <http://www.softpedia.com/get/Office-tools/Office-suites/WordSurv.shtml>.) For a discussion of Wordsurv and the other methods used by Ndamba for testing mutual intelligibility, as well as his definitions of the key concepts of language, dialect, variety, intelligibility, see Ndamba 1996.

Concerning *Eboo* and *Nzikou*, Ndamba's results using Wordsurv show that the degree of linguistic proximity is between 92.1% and 95.9%. Given that speakers of a same variety rarely understand each other perfectly (i.e. 100%) this is an extremely high percentage, and leads Ndamba to conclude that *Nzikou* is a subvariety of *Eboo*, since *Nzikou* is spoken in a small geographical area around the town of Djambala, within the much larger *Eboo* area (see Map 3). His map shows also a second subvariety, *Isiise*, spoken to the south of the *Nzikou* area, although *Isiise* is not mentioned by Guthrie (1971) or in the Ethnologue (2009), unlike *Nzikou*.

Map 3: Map of the Plateaux region showing the language areas: 1. Eboo (including Nzikou and Isiise), 2. Ngungwel, 3. Kukuya and 4. Mbochi (adapted from Ndamba 1996).



Whilst there are a few lexical differences between *Eboo* and *Nzikou* - in particular, concerning names of species of animals and plants - there are very few

morphophonological differences. *Nzikou* more often maintains the class 5 prefix *li-*, whereas for most *Eboo* speakers, this has become *i-*. The third person singular prefix on verbs is *a-* for *Eboo* speakers but *u-* for *Nzikou* speakers, and words with a syllable structure (V.)CVV ending in *-ε* or *-a* in *Eboo* usually end in *-ɔ* in *Nzikou*.

e.g. 'to sleep'	<i>Eboo:</i> uyéẽ	<i>Nzikou:</i> uyéɔ
'to wash'	<i>uswaa</i>	<i>uswaɔ</i>
'mother'	<i>maá</i>	<i>maɔ</i>

These can be considered the main differences between *Eboo* and *Nzikou*, although, as we shall see, there is also an additional phoneme which appears in just one word in *Nzikou* (section 5.1).

The fact that *Nzikou* speakers use the same literacy materials as *Eboo* speakers in ABDATEK's literacy programme in the Plateaux region, is a final factor which leads us to consider *Eboo-Nzikou* as the same variety. Although the *Eboo* area is much larger, the term *Eboo-Nzikou* is used in recognition of the fact that the town of Djambala, where speakers call themselves *Nzikou* speakers, is the regional capital for the Plateaux and thus has influence in the area as a whole. The term *Eboo-Nzikou* in this study is used to differentiate between the data used in the above-mentioned phonologies, which was taken purely from the *Eboo* zone, and the data on which I base my further research which incorporates data from the *Nzikou* zone.

It is interesting to note in passing that Ndamba's research (1996) gives both *Kukuya* to the west and *Ngungwel* to the north of the *Eboo* area an 85% degree of linguistic proximity with *Eboo*, which confirms that they are closely related varieties. On the other hand, *Tege*, spoken further to the Northwest in the Cuvette region, is only found to have a 72% degree of proximity. Ndamba further notes that *Kukuya* is the variety within the cluster which has remained closest to the original forms of Proto-Bantu (ibid.: 52).

Apart from this survey work, and the two phonological studies already mentioned, other research in the Teke cluster which was useful for this study includes Christian Paulian's phonology and noun class study of *Kukuya* (Paulian 1975), Jean-Marie Hombert's work

on nasalisation of Teke vowels (Hombert 1986, 1987a, 1987b), Larry Hyman's article on Prosodic domains in *Kukuya* (Hyman 1987) and F. Nsuka Nkutsi's phonological sketch of four varieties of Teke spoken in DRC (Nsuka Nkutsi 1990).

I am indebted to Ole Bjorn and Anne-Lise Kristensen, not only for their phonological sketch of *Eboo* (1986) but also for their "Introduction to the Verbal system of *Eboo*" (1987), and to Ken Wesche for his paper on the *Eboo* noun class system (Wesche 1994).

3. Theoretical framework

This study is not based on one particular linguistic theory, but takes a descriptive approach and draws on general linguistic theory used in describing languages. In his "*Dictionary of linguistics and phonetics*", David Crystal (2003 :33) defines one of the main aims of descriptive linguistics as being "to give a comprehensive, systematic, objective and precise account of the patterns and use of a specific language or dialect, at a particular point in time." Not only are the current patterns and use of *Eboo-Nzikou* described, but this study also takes a diachronic look at how these patterns may have developed from PB. Comparative analysis with neighbouring Teke varieties also helps to shed light on the patterns and processes.

Crystal (ibid.) adds a further clarification concerning the descriptive approach: "The aim of descriptive linguistics is to describe the facts of linguistic usage as they are, and not how they ought to be, with reference to some imagined ideal state". This poses a problem, in that younger *Eboo-Nzikou* speakers, or those who have moved to the capital Brazzaville, often feel that they do not speak the language as well as the older generation of speakers, or those who still live in the language area. There is a sense of language loss, whereby some of the distinctive forms are no longer used by all. This study takes into account some of the divergent forms and fluctuations in everyday use.

Since both the PB reconstructions for consonants and vowels, as well as the phonological sketches of *Eboo* by Kristensen and Kristensen (1986) and by Abandzounou (2012), are taken as the theoretical framework for this study, an overview

of the BP reconstructions and the conclusions of the phonological studies is presented below. Other theoretical works will be discussed where they are referred to in the text. Unless stated otherwise, PB data (marked with an asterisk *) is taken from Meeussen's online dictionary (<https://www.metafro.be/blr>).

Although tone is significant in *Eboo-Nzikou*, tone analysis falls outside the scope of this study. However, a high tone will be marked on a vowel (V) with an acute accent (´), and low tones will be unmarked. Fusion of tones sometimes occurs, giving rise to contour tones on vowels or a tone which may be realised as a mid level tone. Contour tones tend to cause a lengthening of the vowel, so in reality it is often difficult to differentiate between a short vowel with a contour tone and a reduplicated vowel with contrasting tones (\hat{V} or $\acute{V}\grave{V}$, \check{V} or $\grave{V}\acute{V}$). For the purpose of this study, contour tones will be written as two contrasting tones on a VV sequence.

3.1. Overview of Proto-Bantu consonants and vowels

The simplest consonant and vowel reconstruction proposed by Meeussen and others for PB is as follows (Hyman: 2006:42):

Eleven consonants: *p* *t* *c* *k*
 b *d* *j/y* *g*
 m *n* *ɲ*

Seven vowels: *i* *ɪ* *e* *a* *o* *ɔ* *u*
 (originally written as: *ɨ* *i* *e* *a* *o* *u* *ʉ*)

Four syllable types: CV, CVV, V, N

Hyman (2006:43) notes that the syllabic V and N were probably limited to prefixes, with classes 9 and 10 having the prefix /n-/, and that the nasal occurring in nasal + consonant sequences between vowels does not appear to be syllabic. However, other PB reconstructions (e.g. Schadeberg 2006: 146 and Mutaka 2000: 249) include prenasalised consonants: /mp/, /nt/, /nc/, /nk/, /mb/, /nd/, /nj/, /ng/.

Although /b/,/t/ and /g/ were realised as plosives after N, they may have been realised as the continuants [β], [l] and [ɣ] elsewhere (Mutaka 2000:249). There is also some doubt about /c/ and /j/ (for the rest of this study referred to as /y/) which may have been the fricatives /s/ and /z/ or the affricate /dʒ/. (Hyman 2006:42).

PB did not have nasalised vowels. Meeussen (Hyman 2006:43) also questions whether PB had long vowels, since "PB roots with non-identical vowels in sequence have also been reconstructed, e.g. **baij*- 'carve', **biad*- 'give birth', but many have involved 'weak' intervening consonants, e.g. glides, that dropped out in the pre-PB."

Bantu languages today typically have seven or five vowels. In the case of five vowels, /ɪ/ and /ʊ/ have merged with /i/ and /u/ and only the latter remain. (Hyman 2006: 45). However, it is likely that pre-PB had nine vowels (Mutaka 2000: 249):

This can be deduced from vowel harmony in Bantu where a system of nine vowels is found, i.e. two sets of high vowels (i, ɪ, u, ʊ) and two sets of mid vowels (e, ε, o, ɔ), a set of which is tense and the other lax, and the vowel "a".

These sets of vowels are known as plus/minus Advanced Tongue Root (+/- ATR), and will be discussed in relation to *Eboo-Nzikou* in 5.4.2.

Whereas most of the varieties of Teke spoken today have five vowels (i, ε, a, ɔ, u), *Ngungwel* identifies seven vowels (i, e, ε, a, ɔ, o, u), as do the languages in the *Mboshi* cluster (B20), to the north of the *Ngungwel*-speaking area in Congo. The proposed nine vowel system for *Eboo-Nzikou* (i, ɪ, e, ε, a, ɔ, o, ʊ, u), will be discussed in chapter 5.

3.2 Phonological sketch of *Eboo* according to Kristensen and Kristensen (1986)

An overview of Kristensen and Kristensen's phonology of *Eboo* (ibid.) is given below.

3.2.1 Consonant phonemes and allophones

Kristensen and Kristensen (ibid.) identifies 26 consonant phonemes (Table 2), which have the following allophones:

[ɾ] is an allophone of /t/ in second consonant (C₂) position in roots

[ʃ] is an allophone of /s/ before /i/ for some speakers

- [tʰ] is an allophone of /ts/ before unrounded vowels for some speakers
- [dʰ] is an allophone of /dz/ before unrounded vowels for some speakers
- [ntʰ] is an allophone of /nts/ before /i/ for some speakers
- [ndʰ] is an allophone of /ndz/ before /i/ for some speakers

Table 2: Consonant inventory for Eboo according to Kristensen and Kristensen (1986)

Manner of articulation \ Place of articulation	Place of articulation					
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar
Plosives	p b		t			k
Fricatives		f v		s		
Affricates				ts dz		
Prenasalised consonants	mp mb	mf mv	nt nd	nts ndz		ŋk ŋg
Nasals	m		n		ɲ	ŋ
Approximants					y*	w
Laterals			l			

*Note: /y/ in African linguistics represents the IPA phone [j]

3.2.2 Consonant combinations as units or sequences

Kristensen and Kristensen's study (ibid.) makes the following interpretations:

- *Affricates*

The affricates /ts/ and /dz/ are interpreted as units, since they are never ambiguous, non-reversible and /z/ does not exist as a phoneme.

e.g. *utsúla* 'to forge' *udzúo* 'to drive'

- *Nasal + consonant*

Nasal + consonant (NC) sequences are interpreted as units, both between vowels and in initial position, since there are no ambiguous CC sequences, NC is non-reversible, the nasal shares the same point of articulation with the following C, and /g/ does not exist as a phoneme. NC can also be preceded by a V as a plural prefix

e.g. *ndóbo* 'blue' *nganywa* 'truth'
 mbva - ambva 'dog - dogs'.

However, word initial NCs are sometimes the nasal prefix /n-/ followed by the stem initial consonant.

e.g. *ífú - mfú* 'hair - hairs' (class 5/10)
 ibóónó - mbóónó 'pancreas-pancreases' (class 5/10)

N may also be a verb prefix in the case of the first person singular (1sg) narrative tense.

e.g. *ufa* 'to come' *me mfi dzáandu* 'I came from the market'
 ulura 'to pass' *me ndurí dzáandu* 'I passed the market'

(Note that *ulura* becomes *nduri*. Kristensen and Kristensen (ibid.) mentions that [d] is therefore an allophone of /l/.)

- *Consonant + glide*

/w/ and /y/ are interpreted as consonants in all positions (since when preceded by another consonant they can be followed by one or two vowels, and there are no other occurrences of sequences of more than two vowels).

Concerning what Kristensen and Kristensen (ibid.) refers to as labialised and palatalised consonants, these are interpreted as prosodic features of the syllable (see section 3.2.4).

However, Kristensen and Kristensen's study draws attention to the following:

- Labialised consonants [sic]:

- /f/ labialised is realised as the affricate [pf]
- /v/ labialised is realised as the affricate [bv]
- /s/ labialised is realised as [s^w]
- /ts/ labialised is realised as [t^fw] before /i/, /e/ et /a/

/dz/ labialised is realised as [dʒ^w] before /ü/ and as [dz^w] before /a/

(Note: /ü/ symbolises here the front rounded vowel /y/)

/nts/ labialised is realised as [nt^fw] before /i/

/ndz/ labialised is realised as [ndz^w] before /o/

/y/ labialised is realised as [y^w] before /e/

- Concerning palatalised consonants:

/s/ palatalised is realised as [ʃ] before /e/ and /o/

/ts/ palatalised is realised as [tʃ]

/dz/ palatalised is realised as [dʒ]

/nts/ palatalised is realised as [ntʃ] before /e/, /o/ and /u/

Kristensen and Kristensen's study also makes mention of a phenomenon which they refer to as glottalised consonants (ibid.: 23):

Dans cette section nous allons traiter des phones dont nous ne sommes pas certains de l'interprétation. Il s'agit de [β̥, b̥, m̥, bv̥, f̥, ts̥, k̥], tous des phones avec une sorte de forte aspiration, pour la plupart réalisés avec une courte variante de [e].” (In this section we will look at some phones which we are not sure how to interpret. The phones in question are [β̥, b̥, m̥, bv̥, f̥, ts̥, k̥], all of which are pronounced with strong aspiration, and mostly realised together with a short variant of [e]).

Examples of this phenomenon given by Kristensen and Kristensen (ibid.) are as follows:

[b̥i]	'us' (exclusive)	[uf̥úɔ]	'to cover'
[líp̥i]	'raphia'	[m̥éí]	'urine'
[ubv̥íira]	'to render'	[ts̥éú]	'day'
[k̥hi]	'pipe'		

They suggest that [b̥], [p̥], [k̥^h] and [ts̥] are probably glottalised consonants occurring before the high vowels /i/ and /u/, while [f̥], [m̥] and [bv̥] are probably palatalised consonants, occurring before the high vowels /i/ and /u/. However, they are not able to draw firm conclusions.

Christian Paulian addresses this same phenomenon in her phonology of *Kukuya* (1975), although in slightly different terms, referring to a 'constriction' or 'marked form' which only occurs with the stem initial consonant (C₁). Paulian (ibid.:75) defines this 'constriction' as a narrowing of the passage of air between C and V, or a kind of friction which results in a [w] before back vowels and [y] before front vowels. She notes that the constriction can occur with most consonants and gives rise to many minimal pairs with the 'non-constricted' forms. The examples she gives occur before the high vowels /i/ and /u/, as well as the mid-vowels /e/ and /o/, but never before /a/.

Paulian (ibid.:83) remarks that this 'constriction' affects both the initial consonant and the vowel, but does not appear to fall into any category). However, she observes (ibid.) that there are cases where, compared to Proto-Bantu, “*la « marque » semble être due à la chute d’une consonne (et la mise en contact de deux voyelles).*” (the 'marked form' seems to be due to the falling away of a consonant (which brings two vowels into contact)). This phenomenon will be discussed in detail in section 5.3.2.

3.2.3 Vowel phonemes and allophones

Table 3 shows the five oral and five nasalised vowel phonemes identified by Kristensen and Kristensen (1986) for *Eboo*. Kristensen and Kristensen (ibid.) considers the degree of lip rounding to be more pertinent than the distinction between front and back vowels, since they identify the front unrounded [ü] as an allophone of /u/ (see below).

Table 3: Vowel inventory for *Eboo* according to Kristensen and Kristensen (1986)

Roundedness Height	Unrounded	Rounded
High	i ĩ	u ù
Mid	e ě	o õ
Low	a ã	

The following allophones are identified:

[ɪ] is an allophone of /i/ when it is the initial vowel in a noun prefix

[ɛ] is the normal realisation of /e/, although pronunciation can vary as far as [e]. In the reduplication /mpempe/ 'cockroach', V₁ is realised as [ə].

[ɔ] is the normal realisation of /o/, although pronunciation can vary as far as [o], in particular when it is the only vowel in the stem of the word.

[o] is an allophone of /u/. [u] and [o] are free variants.

[ɯ] is an allophone of /u/ when following /i/ or the semi-vowel /y/.

[ü] (symbolising here the front rounded vowel [y] to avoid confusion with the approximant) is an allophone of /u/ following a labialised consonant, as in the word [dzwüa] 'well, hole'.

Apart from a few nasalised vowels in noun prefixes, nasalised vowels are only attested by Kristensen and Kristensen (ibid.) in the final vowel (FV) position. Kristensen and Kristensen (ibid.) comment that in *Ngungwel*, vowels are even more strongly nasalised and the end of words are frequently truncated. In contrast to this, nasalised vowels do not exist in *Kukuya*. Thus the study suggests that further contrastive analysis between *Eboo*, *Ngungwel*, *Nzikou* and *Kukuya*, could determine whether what they provisionally interpret as nasalised vowels are in fact a succession VN, where N has disappeared over time, leaving the vowel nasalised.

3.2.4 Vowel length and definition of the syllable

Kristensen and Kristensen (ibid.) defines the two basic syllable types as V and CV, and interprets the long realisations of each vowel in verb prefixes and between consonants as monosyllabic and biphonematic: /VV/, which gives the following:

V	e.g.	/a.dza/	'water'	/u.dzi.a/	'to love'
CV		/sé/	'roof'	/ka.la/	'charcoal'
VV		/ii.sá.li/	'(I) have worked'		
CVV		/mpaa/	'buffalo'	/i.laá/	'elephant's trunk'

This has the advantage of not adding further vowel phonemes, and takes into account the sequences of different vowels which they identify as being part of the same syllable between consonants. Sequences of different vowels in word final position however, are defined as two syllables: e.g. /u.ne.a/ 'to shake, stir'.

The earlier discussion in Kristensen and Kristensen (ibid.) concerning /w/ and /y/ as consonants in all environments, would also give the two following syllable patterns:

CwV or CyV e.g. /bwó/ 'they' /tyǒ/ 'hoe'
 CwVV or CyVV e.g. /u.mwaa.la/ 'pride' /i.tyoo/ 'Teke language'

However, the study notes that in a V_1V_2 sequence of different vowels between consonants, V_1 is always [i] or [u], e.g. /míene/ 'advisor to the king'. These sequences are potentially minimal pairs with words interpreted as CyVV and CwVV (e.g. /ukyééle/ 'to wait for'), although no robust minimal pairs are identified. Thus the interpretation is left open.

3.3 Phonological sketch of *Eboo* according to Abandzounou (2012)

An overview of the phonology of *Eboo* prepared by Prince Abandzounou (2012) is given in Table 4.

Table 4: Consonant inventory for Eboo according to Abandzounou (2012) (Orthographic representations of IPA symbols are given in brackets)

Place of articulation / Manner of articulation	Place of articulation					
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar
Plosives	p b		t			k
Fricatives		f		s	ʃ(sh)	
Affricates		pf bv		ts dz		
Prenasalised consonants	mp mb	mpf mbv	nt nd	nts ndz		ŋk(nk) ŋg(ng)
Nasals	m		n		ɲ(ny)	ŋ
Approximants	ɥ(yw)				y	w
Laterals			l			

3.3.1 Consonant inventory and allophones

Abandzounou (ibid.) identifies 29 consonant phonemes. The three additional consonant

phonemes in his chart are: /pf/, /ɥ/ and /ʃ/, (orthographically pf, yw and sh respectively) for which he provides minimal pairs, e.g.:

/pf/ - /mpf/	<i>pfúlá</i>	'entrance to village'	<i>mpfúlá</i>	'calabash'
/pf/ - /bv/	<i>upfila</i>	'to abandon'	<i>ubvila</i>	'to dive'
/pf/ - /f/	<i>upfila</i>	'to abandon'	<i>ufila</i>	'to spit'
/ɥ/ - /f/	<i>uywá</i>	'to be cooked'	<i>ufá</i>	'to finish'
/ɥ/ - /s/	<i>uywóólɔ</i>	'to spoil'	<i>usóólɔ</i>	'to fade'
/ɥ/ - /ʃ/	<i>uywiɔ</i>	'to send'	<i>ushiɔ</i>	'to hide'
/ʃ/ - /s/	<i>ushóórɔ</i>	'to be mistaken'	<i>usóórɔ</i>	'to withdraw'
/ʃ/ - /y/	<i>ushóónɔ</i>	'to go around'	<i>uyóónɔ</i>	'to start to ripen'

As does Kristensen and Kristensen (1986), Abandzounou (2012) identifies [r] as being an allophone of /t/, when occurring in C₂ position in roots: e.g. [taara] 'father'.

Abandzounou (ibid.) identifies what Kristensen and Kristensen's study refers to as a labialised /v/ as the phoneme /bv/, replacing /v/. The prenasalised labiodental consonants, are identified as /mpf/ and /mbv/, rather than /mf/ and /mv/ as in the previous study. Although the difference in pronunciation is minimal, this interpretation provides greater parallelism with the palatal prenasalised affricates /nts/ and /ndz/.

Finally, Abandzounou (ibid.) notes that prenasalised consonants only occur as C₁ in roots, and never as C₂ unless the word is reduplicated: e.g. *nkinkia* 'twig'.

3.3.2 Vowel inventory and allophones

Abandzounou (ibid) identifies seven oral vowels and five nasalised vowels (see Table 5). The inclusion of /e/ and /o/ as phonemes will be discussed fully in section 5.4.1. The five nasalised vowels only occur in word final position. Abandzounou gives the following (near) minimal pairs for the oral mid-vowels:

e/ɛ	<i>ibyeli</i>	'lighting'	<i>byeli[sic]</i>	'knife'
	<i>ingyere</i>	'vaccination'	<i>ingyele</i>	'hour'
	<i>ngé</i>	'dirt'	<i>ngé</i>	'friend'
	<i>uké</i>	'woman'	<i>ké</i>	'cigarette'

o/ɔ	<i>ibwóní</i>	'supplication'	<i>ubwóní [sic]</i>	'jigger'
	<i>ukólo[sic]</i>	'to turn'	<i>ukólɔ</i>	'to be captured'
	<i>tó</i>	'buttocks'	<i>tɔ</i>	'kind of caterpillar'
	<i>ndo</i>	'sorcery'	<i>ndɔ</i>	'word'

Table 5: Vowel inventory for Eboo according to Abandzounou (2012)

Backness \ Height	Front	Central	Back
	High	i ĩ	
Mid (upper)	e		o
Mid (lower)	ɛ ě		ɔ ð
Low		a ã	

The following are allophones:

[y] following a consonant is an allophone of /i/ before a different vowel.

[w] following a consonant is an allophone of /u/ before a different vowel.

e.g. *ɲkiélé* 'noise' is realised as [ɲkyélé],

udzua 'to hit' is realised as [udzwa].

Thus contrary to Kristensen and Kristensen (1986), Abandzounou (2012) interprets [y] and [w] following consonants as glides and not as consonants, although they function as consonant phonemes when not following another consonant.

3.3.3 Definition of the syllable.

Abandzounou's study defines the syllable in *Eboo* as the tone bearing unit and as a group of sounds which may be pronounced in one emission of breath. He identifies three kinds of open syllables: monophonemic: V, biphonemic: CV and triphonemic: CGV, where G is a glide [w] or [y] preceding the vowel. He then defines the possible syllable patterns for words (excluding glides) as follows:

Monosyllabic words:

V *táara á mẽ* 'my father'

CV *ngá* 'owner'

Bisyllabic words:

CV.V	<i>buɔ</i>	'fear'
	<i>mpáa</i>	'animation'
V.CV	<i>ipú</i>	'hat'
CV.CV	<i>tumi</i>	'jigger'
	<i>ngandú</i>	'friend'

Trisyllabic words:

CV.CV.CV	<i>ngayulu</i>	'lightening'
CV.CV.V	<i>ngamio</i>	'river'
CV.V.CV	<i>ngoole</i>	'kind of green leaf vegetable'
	<i>ukóóró</i>	'to sink down, get stuck'

According to Abandzounou's study, there is a good deal of fluctuation in the way tones, consonants and vowels are pronounced in *Eboó*. He notes the following consonant fluctuations:

/p/ ~ /pf/	e.g.	<i>pɔ́</i> ~ <i>pfɔ́</i>	'kneading trough'
/p/ ~ /b/		<i>ipúbi</i> ~ <i>ibúbi</i>	'gorilla'
/p/ ~ /mp/		<i>púta</i> ~ <i>mpúta</i>	'wound'
/mb/ ~ /b/		<i>mbyele</i> ~ <i>byele</i>	'hatred'
/mb/ ~ /mp/		<i>mbe</i> ~ <i>mpe</i>	'palm leaf'
/nt/ ~ /t/		<i>ntaba</i> ~ <i>taba</i>	'goat'
/f/ ~ /s/		<i>ufuḽ</i> ~ <i>usuḽ</i>	'to buy'
/f/ ~ /mpf/		<i>fúli</i> ~ <i>mpfúli</i>	'flower'
/l/ ~ /y/		<i>ulíe</i> ~ <i>uyíe</i>	'to suck'
/nd/ ~ /l/		<i>ndɔ́bɔ</i> ~ <i>lɔ́bɔ</i>	'bait'
/ɲ/ ~ /n/		<i>unyina</i> ~ <i>unina</i>	'to grow, get big'
/ŋ/ ~ /n/		<i>uŋwɔ́nɔ</i> ~ <i>unwɔ́nɔ</i>	'selfishness'
/ts/ ~ /t/		<i>tsúúnu</i> ~ <i>túúnu</i>	'kind of wild fruit'

He notes the following vowel fluctuations:

/i/ ~ /ɛ/	e.g.	<i>-bí</i> ~ <i>-bé</i>	'bad'
/i/ ~ /u/		<i>mpií</i> ~ <i>/mpiú</i>	'night'

/ɛ/~ e/	<i>ishéni ~ /ishéni</i>	'writing'
/a/ ~ i/	<i>pfira ~ /pfiri</i>	'deception'
/a/~ ɛ/	<i>ubvía~ /ubíɛ</i>	'to cause to fall'
/a/~ ɔ/	<i>nká ~ /nkɔ́</i>	'grand parent'

All of this fluctuation is perhaps typical of a language which does not have a widely used written form and where certain contrasts are becoming lost, e.g. the nasal preceding a consonant is not always heard, plosives and affricates at the same place of articulation may be heard as the same, and vowels may be in free variation.

As well as free fluctuation Abandzounou (ibid.) also identifies a process of vowel harmony occurring with the mid-vowels, whereby e/ɛ, o/ɛ, o/ɔ and ɔ/e never occur together in the same word. He takes the word *bɔ́ɔ́ɔ́* 'man' as an example of an initial root vowel causing all the following vowels in the word to harmonise with it. These vowel harmony processes will be discussed in section 5.4.1.

4. Method

Apart from the data which has already been presented as the theoretical framework for this study, the data used for the analysis comes basically from two sources.

Firstly, much of the data and background knowledge about the language cluster comes from data collected over the past three decades by SIL linguists Ole Bjorn and Anne-Lise Kristensen, Ken Wesche, Gary and Cathy Dawson, Pauline Linton, Helga Müller and myself, who have been involved in the linguistic analysis of *Eboo-Nzikou*, the creation of a *Eboo-Nzikou* dictionary database, and the production of literacy manuals for an adult literacy programme in *Eboo-Nzikou* villages. Where an alternative source is not stated, *Eboo-Nzikou* data used in this study is taken from the dictionary database.

Secondly, some additional data was collected for this and future comparative studies within the Teke cluster, during my four-week stay in Brazzaville in February 2012.

In order to obtain appropriate data for contrasting the high vowels in *Eboo-Nzikou*, I devised a list of 44 words contrasting the high vowels in a mixture of verbs, nouns and adjectives, and elicited them from speakers of *Eboo* and *Nzikou*. In order to make comparisons with other Teke varieties, recordings were also made with speakers of *Fuumu*, *Ngungwel*, *Tege*, *Kukuya*, *Zanaga Teke* and *Tyee*. *Zanaga Teke* is the variety of Teke spoken in the district of *Zanaga*, not mentioned by Guthrie (1971) nor in the *Ethnologue* (2009).

Those chosen for the elicitation were mother-tongue speakers of different ages who had spent at least their childhood in the language area, but who live currently in Brazzaville. Due to time constraints, it was not possible to travel to the language areas to make the recordings. The data was recorded using a Samsung Handy digital stereo voice recorder, and then transferred to computer for analysis.

Since the main focus of the study was *Eboo-Nzikou*, the data was elicited from four different *Eboo* speakers and three different *Nzikou* speakers. Given that the *Kukuya* speaking area to the west and the *Wuumu/Fuumu* speaking area to the south are geographically the closest varieties to *Eboo-Nzikou*, recordings were obtained with more than one speaker of these varieties also. Just one speaker was recorded for *Ngungwel*, *Tege*, *Zanaga Teke* and *Tyee*. The *Tyee* data is included to represent the group of southwestern varieties (*Tyee*, *Laali*, *Yaka* and *Tsaayi*). See Annexe 1 for details of the speakers.

Not all the 44 words contrasting high vowels in *Eboo-Teke* gave rise to words with the same root in the other varieties. However, 24 words were identified as providing useful data for contrastive analysis with the other varieties, and the results are discussed in the section of this study dealing with the interpretation of high vowels (see 5.4.2). Where differences were noted in the elicitation from speakers of the same variety, all the variants were noted.

5. Re-analysis of phonological aspects of *Eboo-Nzikou*

This chapter presents a re-analysis of some aspects of *Eboo-Nzikou* phonology, based on my own data and research.

5.1 Consonant inventory and allophones

I identify 20 consonant phonemes, as shown in Table 6.

Table 6: Revised consonant inventory for *Eboo-Nzikou*

(Orthographic representations of IPA symbols are given in brackets)

Manner of articulation \ Place of articulation	Place of articulation					
	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar
Plosives	p b		t			k g
Fricatives		f		s	ʃ(sh)	
Affricates		pf bv		ts dz		
Nasals	m		n		ɲ(ny)	ŋ
Approximants	ɥ(yw)				y	w
Laterals			l			

Firstly, it should be noted that the consonant chart for *Nzikou* is identical to the chart for *Eboo*, apart from one potential phoneme (not included in the chart). There is one word in *Nzikou* which contains the phoneme /h/: *hε* 'also' which in *Eboo* is pronounced *kε*. Christiane Paulian (1975) in her study of neighbouring *Kukuya*, identifies the same word *hε* as being the unique occurrence of the phoneme /h/ (ibid.:52). It is hard to justify adding it to the phoneme chart on the basis of just one occurrence.

Secondly, my data supports the inclusion by Abandzounou (2012) of /pf/, /ɥ/ and /ʃ/ as phonemes.

- /pf/ The *Eboo-Nzikou* dictionary database contains many words having /pf/ as the initial consonant in noun and verb roots, and this consonant frequently forms minimal pairs with other sounds, as exemplified by Abandzounou (ibid.).
- /ɥ/ Similarly, the *Eboo-Nzikou* dictionary database contains many words having /ɥ/ as the initial consonant in noun and verb roots, and this labio-palatal approximant frequently forms minimal pairs with other sounds, as exemplified by Abandzounou (ibid.).
- However, when following another consonant, [ɥ] functions as a glide in the same way as [w] and [y], although occurrences of this are few. Thus what Kristensen and Kristensen (1986) refers to as the vowel sound [ü], being an allophone of /u/ following a labialised consonant, is in fact this labio-palatal glide followed by /i/. e.g. /dzɥia / 'hole' (previously interpreted as [dʒwüa]). It functions as an allophone of /u/ when occurring between C and /i/, although it is not always distinguished from the allophone [w] which occurs between C and other vowels.
- /ʃ/ There are a few monosyllabic words with [ʃ] which are not in free variation with /s/. These may be loan words which have become integrated into *Eboo*, such as *usié* 'to saw' comes from the French word *scier*. Thus it seems to be necessary to add /ʃ/ as a phoneme, as Abandzounou has done.

e.g.:	<i>ushié</i>	'kind of bird'	<i>usié</i>	'to saw'
	<i>shé</i>	'string used in hunting traps'	<i>sé/sé</i>	'roof'
	<i>shé</i>	'also, despite the fact that'		

Thirdly, I concur with Abandzounou as to the presence of the labio-dental affricates /pf/ and /bv/. Although /f/ occurs as a separate phoneme, no cases of [v] not preceded by [b] have been identified, and thus the affricate /bv/ replaces /v/ in the phoneme chart.

Finally, I identify the following allophones:

[ɾ] is an allophone of /t/ when in C₂ position

[ʃ] is an allophone of /s/ before high vowels for some speakers

[tʃ] is an allophone of /ts/ before high vowels for some speakers

[dʒ] is an allophone of /dz/ before high vowels for some speakers

[d] is an allophone of /l/ when preceded by /n/

5.2 Eboo-Nzikou consonants and Proto-Bantu

A summary of the simplest PB consonant reconstruction (see 3.1) and the consonants of *Eboo-Nikou* is given below for contrastive purposes.

PB:	<i>p</i>	<i>t</i>	<i>c</i>	<i>k</i>	Eboo-Nzikou:	<i>p</i>	<i>t</i>	<i>k</i>		
	<i>b</i>	<i>d</i>	<i>j/y</i>	<i>g</i>		<i>b</i>		<i>g</i>		
						<i>pf</i>	<i>f</i>	<i>ts</i>	<i>s</i>	<i>f</i>
						<i>bv</i>		<i>dz</i>		
	<i>m</i>	<i>n</i>	<i>ɲ</i>			<i>m</i>	<i>n</i>	<i>ɲ</i>	<i>ŋ</i>	
						<i>ɣ</i>	<i>l</i>	<i>y</i>	<i>w</i>	

It has already been stated that in PB, the dental plosive /d/ may have been realised as the lateral [l], except following a nasal (see 3.1). This can be observed in *Eboo-Nzikou*, as the following example taken from Annex C (18) shows:

'to vomit' PB: **dók* *Eboo-Nzikou*: *ulúɔ* /ulóɔ/

For *Eboo-Nzikou*, this is better expressed as the phoneme /l/ which assimilates to [d] following N. This phenomenon has also been observed by Christina Thornell (2005: 9) in the Kerebe language (Bantu E24), and is a typical example of post-nasal voicing which Hyman describes as "perhaps the most widespread process affecting NC" in Bantu languages (Hyman 2006:50). The observation made by Abandzounou (2012) that /nd/ can be in free variation with /l/, e.g. *ndɔbɔ* ~ *lɔbɔ* 'bait', is a further indication of this phenomenon in *Eboo*, which is also observed by Kristensen and Kristensen (1986).

By comparing *Eboo-Nzikou* with PB forms (taken from Schadeberg 2006:162), it appears that not only is /l/ preceded by N realised as [d], but that [y] which is underlying [ly], preceded by N, is realised as [dz].

e.g. class 5/10 *ilyǎ* - *ndyǎ* 'tongue' - 'tongues' PB 11/10: **lɔ-lími*
class 5/10 *iyála* /- *ndzála* 'fingernail' - fingernails' PB 11/10: **lɔ-yála*

Given that the PB form for 'fingernail' is **lɔ-yála*, we can see that the prefix vowel has been lost, bringing [l] and [y] into contact to become [ly]. Loss of the lateral has then

occurred. However, with a preceding N, the underlying form [ly] resurfaces as the affricate /dz/.

In the case of the 1sg nasal prefix for the narrative tense, /y/ becomes [gy].

e.g.:	<i>uyε - mēŋ nyini</i>	'I went'	PB: * <i>gɪ-a</i>
	<i>uyáa - mēŋ nyáa</i>	'I knew'	PB: * <i>yíyɪ(b-a)</i>

In the first example, the PB form **gɪa* has undergone glide formation and a vowel change to become [gyε]. The plosive [g] has been lost, but resurfaces in the context of a preceding /n-/ prefix, which has become the homorganic N. The process is less clear in the second example, since there was no voiced consonant in the PB form. However, it is a further example of post-nasal voicing. Hyman (2006:52) remarks that Bantu languages seem to prefer that "post-nasal consonants be [+voice] rather than [-voice] and [-continuant] rather than [+continuant]".

It is interesting to note that in the southern Teke variety *Tyee*, not only [gy] but also [gw] can be heard even without a preceding N. In the second example below, [gw] is in free variation with [w].

e.g.	'to sleep'	<i>Tyee: ɔgyeŋeŋe</i>	<i>Eboo: uyεē</i>
	'you' (sg)	<i>gwε/wε</i>	<i>wε</i>

It may be posited, therefore, that a process of glide formation in *Tyee* caused /gi/ and /gu/ before another vowel to become /gy/ and /gw/. In the second example, the velar plosive is no longer necessary, leaving /w/ as a phoneme in its own right. It is very likely that the same process has occurred in *Eboo-Nzikou*, but there are no longer any remaining cases of /gw/.

The above examples give an indication as to why /d/ and /g/ are phonemes in PB, but are only realised as such in *Eboo-Nzikou* today with a preceding N or a following glide /w/ or /y/. Due to deletion of the plosive in certain contexts, the glides have become approximant consonant phonemes in their own right.

As is typical for Bantu languages, it is likely that a process of assibilation has occurred whereby plosives became the fricatives /f/, /v/, /s/ and /z/ before high vowels (Mutaka 2000:251). No cases of /z/ have been identified in *Eboo-Nzikou* apart from in the affricate /dz/, but the voiced fricative /v/ was originally identified in Kristensen and Kristensen's study, although it appears to have become lost in present day speech. However, the following examples show voiceless plosives in PB which have become the voiceless fricatives /f/, /s/ and /ʃ/ in *Eboo-Nzikou*, mostly before a high vowel, but sometimes before a mid or low vowel also:

'to cover'	PB: *kút/kúk	<i>Eboo-Nzikou</i> : ufúɔ /ufúɔ/
'to blow'	*pɔɔp/peep	ufula
'to buy'	*cóm̩b	ufúɔ̃/usúã
'to wash'	*camb	uswaa
'corn'	*cángú	sáá
'to hide'	*cok	ushio
'to laugh'	*cep	ushebe

These fricatives may have undergone a further process of change to become the affricates /pf/ and /ts/. Examples of this are harder to find, but there are a few:

'bone'	PB: *kúpa	<i>Eboo-Nzikou</i> : pfiá
'to forge'	*túd	utsúla
'ear'	*tói	tswí

Concerning /c/ and /y/ in PB, it is not clear whether they should be viewed as palatal stops or affricates (Hymam 2006:42). In *Eboo-Nzikou*, the affricates /dz/ and perhaps /bv/ appear to have emerged from the palatal PB phonemes /c/ or /y/:

'to love'	PB: *ciim	<i>Eboo-Nzikou</i> : udzia
'eye'	*yíco	dzí
'stick/spatula'	*yiko	dzuu
'dugout canoe'	*yáto	bvaari

It may be that /ŋ/ emerged as a result of the PB prefix /n-/, which became homorganic with a following velar consonant, and then became phonemic following a process of

post-nasal voiced consonant deletion such as occurs in Yao (Bantu P21) described by Hyman (ibid.:51). However, in other cases, it appears to have evolved from /y/ or /ɲ/.

e.g. 'crocodile'	PB * <i>ɲgandó</i>	Eboo-Nzikou: <i>ɲaani</i>
'bird'	* <i>yɔni</i>	<i>ɲwini</i>
'to drink'	* <i>nyó</i>	<i>uɲwá</i>

Further research is needed to confirm these processes for *Eboo-Nzikou*.

5.3 Consonant combinations as sequences or units

5.3.1 Affricates

Having confirmed the interpretation of the affricates /pf/, /bv/, /ts/ and /dz/ as phonemes, their interpretation as units can also be confirmed, for the same reasons given for /ts/ and /dz/ in Kristensen and Kristensen' study in 3.1.2. They are never ambiguous, are non-reversible and neither [v] nor [z] exist as phonemes.

5.3.2 Nasal + consonant

Although both Kristensen and Kristensen (1986) and Abandzounou (2012) interpret NC as a unit, both between vowels and in initial position, Kristensen and Kristensen (ibid.) give examples which show that this was not the case in the past (3.2.1). The nasal was originally a separate, sometimes syllabic, prefix which became homorganic with the following C₁ in noun roots. Many nouns with this nasal prefix from classes 1, 9 and 10, appear to have then changed classes, and added a further prefix from the new class.

In *Eboo-Nzikou*, the PB noun class pair 11/10 has become 5/10. At the same time, some of these words appear to have moved again to become 5/6. We find that the noun class pair 5/6 consists of nouns with two different kinds of prefixes in the singular: either \emptyset or /li-/ or /i-/ and that words with the prefix /li-/ or /i-/ add N before the stem in the plural form, in addition to the prefix vowel changing to /a-/, as the following examples show:

<i>ipána</i>	'stick'	<i>ampána</i>	'sticks'	PB: * <i>pímbo</i> 9/10, 11/10
<i>ikíí</i>	'voice'	<i>ankíí</i>	'voices'	PB: * <i>kingó</i> 9/10

A look at the PB forms shows that these words were originally in the plural class 10 which has the prefix /n-/. After /n-/ became homorganic with C₁ they moved to class 6, and added the class 6 prefix /a-/.

This phenomenon is well documented by Hyman (2006), who considers that "In PB, noun and verb roots did not begin with NC". (Ibid: 50). He goes on to say that "many Bantu languages have introduced new sequences of N + C. The most common is the loss of [u] in mu- prefixes[...]. The resulting syllabic [m] may then undergo homorganic nasal assimilation." (Ibid:52). Examples of this in class 1 in *Eboo-Nzikou* are numerous.

e.g. /mu- dzááni/ → *ndzááni* 'spider'
 /mu- bvubi/ → *mbvubi* 'hippopotamus'
 /mu- kwóló/ → *nkwóló* 'snail'

Furthermore, there are a very large number of nouns where NC is preceded by V, not only as the plural prefix, but also as the singular class prefixes /a-/, /i-/ or /u-/, suggesting other past changes in noun class.

e.g. *indõ* 'sheep' (class 7)
impfiri 'sorcery' (class 7)
umpásá 'fish tail' (class 3)

We have already noted that C₁ in verb roots is never N followed by C, although there is a 1sg N verb prefix which is widely attested in PB as being /ni-/, but which over time lost the vowel and became homorganic with C₁ (Hyman 2006:43).

All of these examples of N as a separate prefix in the past point to an interpretation of NC as a sequence of two units, rather than as one unit. Similar processes concerning NC combinations have been observed in the Mpiemo language (Bantu A86c) by Christina Thornell and Mechtild Tronnier (1999). Following a detailed analysis of the phonetic and morphological aspects of these processes, as well as the syllable structures, this study concludes that an interpretation of these combinations "in both word medial and word initial position as separate units is favoured." (Thornell and Tronnier 1999:140).

We have only looked so far at NC in stem initial position. There are also occurrences of NC in the C₂ position, although these are fairly rare. Abandzounou (2012) points to cases where the word is reduplicated. Some of the other occurrences are loan words, or two words which may have merged together in the past. It is not clear whether all the occurrences can be explained in this way, or whether a syllable structure CVC will be needed to account for them.

e.g.	<i>impfulaŋga</i>	'butterfly'
	<i>ilandzi</i>	'mixture' (from French 'mélange')
	<i>ikúlúŋgú</i>	'proverb'
	<i>isandzi</i>	'stringed musical instrument'
	<i>kúrínɡwi</i>	'kind of drum'
	<i>ndibanɲkiɛ</i>	'chimpanzee'
	<i>ngandu</i>	'crocodile'

My preferred interpretation of NC combinations is therefore as sequences. This could be further checked by measuring the duration of N, as suggested by Thornell and Tronnier (1999:138) for Mpiemo.

One disadvantage of interpreting NC as a sequence is that it adds to the number of possible syllable patterns. However, a further argument in favour is that [g] only exists in a sequence preceded by ŋ, and therefore [ŋg] cannot really be considered a prenasalised [g]. The interpretation of NC as a sequence decreases the number of phonemes by ten, and adds one new phoneme /g/, occurring uniquely in NC sequences.

In many cases of NC in the C₂ position in PB words, C has been deleted, causing vowel lengthening and glide formation, as will be seen in the following section.

5.3.3 Consonant + glide

Kristensen and Kristensen's study (1996) indicates that most of the consonants can be followed by the glides [w] or [y]. These glides are "typically derived from underlying vowels." (Hyman 2006:55). It is sometimes clear that a PB prefix and a root have merged, causing the glide and sometimes also vowel lengthening.

e.g.	'child'	Class 1	PB: * <i>mu-</i>	<i>yána</i>	<i>Eboo-Nzikou: mwaána</i>
	'yam'	Class 7	* <i>ki-</i>	<i>kwá</i>	<i>ikwá</i>

In other cases, the glides appear to be the result of the deletion of the plosive in a C₂ consisting of /nd/. This is confirmed by the data from Jean-Marie Hombert (Hombert (1986) presented in 5.4.3.

e.g.	'to follow'	PB: * <i>-doond-</i>	<i>Eboo-Nzikou: ulwɔɔɔɔ</i>
	'striped rat'	* <i>-béndé</i>	<i>mbyééné</i>

I concur with Abandzounou's interpretation of [w] and [y] as allophones of /u/ and /i/ before another vowel, when the sequence occurs between consonants. In this environment there are no non-ambiguous sequences of different vowels.

e.g.	<i>ɲkiélé</i>	'noise' is realised as [ɲkyélé],
	<i>udzua</i>	'to hit' is realised as [udzwa].

If the glide is in the only or final syllable, it looks more like a labialised or palatalised consonant than a glide, since it is not obvious that there was an underlying vowel or a deleted C₂ in a following NC combination. In the following *Eboo-Nzikou* examples, there is no [y] or [w] in the equivalent words in *Tyee*. However, it is not clear what the PB forms were:

'I, me'	<i>Eboo-Nzikou: mẽ/mye</i>	<i>Tyee: mɛ</i>
'he, she'	<i>ndyé</i>	<i>ndé</i>
'you' (pl)	<i>byé</i>	<i>bé</i>
'they'	<i>bwó</i>	<i>bó</i>

In CV.V stems where there is no C₂, a sequence of two different vowels may occur. The first V in these sequences is often /u/ or /i/, but the syllable break between the two vowels is maintained and glide formation does not take place. Thus we find the following contrastive pairs of words between monosyllabic and bisyllabic words:

/bwó/	'they'	/byé/	'you' (pl)
/bú.ó/	'knee'	/bí.ɛ/	'baldness'

The possible combinations of different vowels with no following C, is as follows:

<i>u + a</i>	<i>ulúa</i>	'illness'
<i>i + ε</i>	<i>bíε</i>	'baldness'
<i>i + a</i>	<i>usia</i>	'rope'
<i>a + ð</i>	<i>mað</i> variant <i>maã</i>	'mother'
<i>u + ɔ</i>	<i>yuɔ</i>	'arrow'
<i>i + u</i>	<i>mpiú</i>	'night'
<i>ɪ + a</i>	<i>ubía</i> /ubía/	'to refuse'
<i>ʊ + ɔ</i>	<i>ubúɔ</i> /ubóɔ/	'to heal'
<i>ε + ɔ</i>	<i>unεɔ</i> variant <i>unεε</i>	'to stick, join'
<i>i + e</i>	<i>ubvíe</i>	'beauty, goodness'

Apart from $\varepsilon + \text{ɔ}$ and $a + \text{ð}$, all the sequences have V_1 as a high vowel, and they are thus ambiguous, being liable to glide formation. However, even when V_1 is /a/ or /ε/, the word has a variant which reduplicates this vowel V_2 as the FV. Therefore there are no really non-ambiguous sequences.

These word final sequences merit further investigation to discover why some may have been subject to syllable loss and glide formation, while others have not. It could be that these are not examples of glide formation, but rather labialisation or palatalisation of the preceding consonant. However, I provisionally concur with the conclusions of Kristensen and Kristensen's study in treating consonant + glide as a prosodic feature at the syllable level. This also has the advantage of not adding a large number of consonant phonemes.

5.4 Overview of vowel inventory

There are different possible vowel interpretations for *Eboo-Nzikou*, as previous studies have shown. Contrary to those studies, I interpret *Eboo-Nzikou* as having nine oral vowel phonemes, and seven nasalised vowel phonemes, as shown in Table 7. Annex B gives a list of minimal pairs for these vowels, taken from the SIL dictionary database.

Table 7: Revised vowel inventory for Eboo-Nzikou

(Orthographic representations of IPA symbols are given in brackets)

Backness \ Height		Backness		
		Front	Central	Back
High	1st degree	i ĭ		u ũ
	2nd degree	ɪ(ĭ) ĩ(ĩ)		ʊ(ɯ) ʊ̃(ũ)
Mid	3rd degree	e		o
	4th degree	ɛ ě		ɔ ð
Low	5th degree		a ă	

5.4.1 ATR harmony and the mid vowels /e/ and /o/

In nouns and all parts of speech apart from verbs, the third degree mid-vowels are often in free variation with the fourth degree mid-vowels, or the choice is determined by vowel harmony. As has already been indicated by Abandzounou (2012), "the mid vowels e/ɛ, o/ɛ, o/ɔ and ɔ/e never occur together in the same word", thus respecting +/-ATR harmony. However, in verbs, as will be seen below, the fourth degree vowels serve as past tense markers and therefore function as phonemes.

Setting aside the verbs, there are several factors which point to [e] and [o] being allophones of /ɛ/ and /ɔ/:

- [e] and [o] have no equivalent nasalised forms, unlike all the other vowels.
- There are many words where [e] and [ɛ] are in free variation.

e.g. *mbwɛ ~ mbwe* 'younger sibling'
 nkẽ ~ nké 'oar'
 sé ~ sé 'roof'

- The choice between [o] - [ɔ], and between [e] - [ɛ] is often determined by vowel harmony. There is clear evidence of right to left vowel harmony occurring, with the high vowel [i], and sometimes also [u], changing any fourth degree vowels which precede them into the equivalent third degree vowel.

e.g. *utyɔɔɔ ~ utyooli* 'grand-child'
 ishɔɔɔ ~ ishooɪ 'six'
 mbyeɛɛ ~ mbyeeli 'knife'

The vowel harmony rules operating here are as follows:

$\varepsilon \rightarrow e / _ _ Ci$

$\text{ɔ} \rightarrow o / _ _ Ci$

I therefore question the following data provided by Abandzounou (2012) in section 3.3.2: *byeli* 'knife' and *ubwóni* 'jigger', where ε and ɔ appear to occur before a FV *-i*.

- In general, nouns with a mono-syllabic stem and stems containing the +ATR vowels /u/ and /i/, as well as /a/, seem to favour [o] and [e], whereas bi-syllabic nouns where both the vowels are mid-vowels are always [ɔ] and [ɛ].

e.g.	<i>kwóólí</i>	'however'	<i>bé</i>	'date palm'
	<i>uko</i>	'king'	<i>toké</i>	'maternal aunt'
	<i>ityó</i>	'statue'	<i>ushelí</i>	'straw'
	<i>soofúli</i>	'lung'	<i>ngadzwé</i>	'porcupine'
	<i>ndzo</i>	'elephant'	<i>ubvía</i>	'beauty'
	<i>kɔɔɔ</i>	'paw (animal)'	<i>ibyele</i>	'thigh'
	<i>bɔɔlɔ</i>	'man'	<i>ukééne</i>	'desert'

However, there are exceptions, as the following examples show:

e.g.	<i>ityɔɔ</i>	'Teke language'	<i>ubvye</i>	'good, well'
	<i>ndɔ́</i>	'word'	<i>bíe</i>	'baldness'
	<i>búó</i>	'knee'	<i>ndyé</i>	'he, she'

- There are very few true minimal noun pairs between the mid-open and mid-close vowels.

On the other hand, the following factors lead us to consider [o] and [e] as separate phonemes in the verb system:

- In response to the first point above, Denis Creissels (1994:76) points out that it is very frequent in West-African languages to find less nasalised vowels than oral ones, and that the following vowel system is typical:

i	u	ĩ	ũ
e	o		
ɛ	ɔ	ẽ	õ
	a		ã

- Since *Kukuya* to the West and *Tyee* to the south appear to have five vowel phonemes with just /ɔ/ and /ε/ as mid-vowels, and in most cases retain a CVCV or CVVCV structure in their verb and noun roots, it seems that Proto-Teke did not have the third degree vowels as phonemes. They emerged perhaps as a result of the shortening of roots, with the C₂ and/or the FV becoming lost, as can be seen in both *Ngungwel*, and *Eboo-Nzikou*. In *Ngungwel* /o/ and /e/ are separate phonemes, having minimal pairs with /ɔ/ and /ε/. One would therefore expect to find these vowels in *Eboo-Nzikou*. In neither variety are [o] and [e] nasalised.
- A striking feature of *Eboo-Nzikou* which is not mentioned by Kristensen and Kristensen or by Abandzounou, is that only the fourth degree vowels [ε] and [ɔ] are found in verb infinitives, whereas these vowels become third degree [e] and [o] when the verbs are conjugated in the past. Thus they are in full complementary distribution, and throw into question Abandzounou's data in 3.3.2 showing *-kólo* 'to turn' to be a minimal pair with *-kólɔ* 'to be captured'.

e.g.	<i>ulyeεε</i>	'to say'	<i>mẽ ilyeeli</i>	'I said'
	<i>ulwóórɔ</i>	'to dream'	<i>mẽ ilwóóri</i>	'I dreamed'
	<i>ushebe</i>	'to laugh'	<i>mẽ ishebi</i>	'I laughed'
	<i>uneɔ</i>	'to join together'	<i>mẽ ineo</i>	'I joined together'
	<i>ulie</i>	'to lick'	<i>mẽ ilie</i>	'I licked'
	<i>ubó</i>	'to obtain'	<i>mẽ ibó</i>	'I obtained'
	<i>ume</i>	'to remove'	<i>mẽ ime</i>	'I removed'

In analysing these forms, it should be noted that the normal FV for infinitives in *Eboo-Nzikou* is *-a*. However, when the root vowel is *ε*, the FV becomes *-ε* instead of *-a*, and when the root vowel is *ɔ* or *ɔ*, the FV becomes *-ɔ*.

e.g.	<i>upala</i>	'to go out'	<i>ubééεε</i>	'to hit'
	<i>ulila</i>	'to cry'	<i>ushéne</i>	'to write'
	<i>ubvǎira</i>	'to give back'	<i>ubvuuuɔ</i>	'to assemble'
	<i>ufuura</i>	'to go down'	<i>unyɔɔɔ</i>	'to open'

Hyman (2006:47) notes that "many Northwest Bantu 7V languages modify /a/ to [ɛ] after /ɛ/ and to [ɔ] after /ɔ/", so this is not unusual. The FV for the past form of these verbs is still *-i*. However, vowel harmonisation with the FV *-i*, according to the two +/-ATR sets /i e o u/ and /ɪ ɛ ɔ ʊ/, causes the root vowels *ɛ* and *ɔ* to become *e* and *o*. The root vowel *#* does not change.

e.g.	<i>ushɛnɛ</i>	'to write'	<i>mẽ ishɛni</i>	'I wrote'
	<i>unyɔɔnɔ</i>	'to open'	<i>mẽ inyooni</i>	'I opened'
	<i>ubvɛɛnɔ</i>	'to assemble'	<i>mẽ ibvɛɛni</i>	'I assembled'

Further complications arise with shortened verb stems having a CVV structure in the past tense. When the infinitive FV is *-a*, the normal past tense FV *-i* assimilates to the root vowel. Therefore the past tense FV remains *-i* following an *i* root vowel, but becomes *ɪ*, *u* and *a* respectively, following *ɪ*, *u* and *a* root vowels. If the FV was nasalised in the infinitive form, this carries across onto the past tense FV.

e.g.	<i>ubia</i>	'to hunt'	<i>mẽ ibii</i>	'I hunted'
	<i>ukĩã</i>	'to hesitate, doubt'	<i>mẽ ikĩã</i>	'I hesitated'
	<i>upua</i>	'to fan'	<i>mẽ ipuu</i>	'I fanned'
	<i>utaã</i>	'to play'	<i>mẽ itãã</i>	'I played'

There are many CVV verbs stems which have the infinitive FV as *ɔ*, and a few having *e*. This has sometimes resulted from ATR harmonising with the root vowel, as seen above in the case of CVCV stems. However, there are also cases where the root vowel is a +ATR vowel, so it is not clear why the FV is a -ATR vowel. Contrastive analysis with the longer CVCV stems found for these verbs in other Teke varieties is needed to determine what processes have occurred here, and a good starting point for such analysis is the data provided by Hombert (1986) in his study of nasalisation of vowels in Teke (see section 5.4.3).

A look at the past forms for these verbs shows that the FV *-i* has disappeared, and that the infinitive FV *-ɔ* and *-ɛ* has become *-o* and *-e* respectively, in harmony with the underlying *-i*. A further process of ATR harmonisation has resulted in the root vowel also becoming *e* or *o* if it was previously *ɛ* or *ɔ*.

e.g.	<i>uyáɔ</i>	'to know'	<i>mẽ íyáɔ</i>	'I knew'
	<i>uluɔ</i>	'to teach'	<i>mẽ íluo/lue</i>	'I taught'
	<i>ubíɔ</i>	'to shout'	<i>mẽ íbíɔ</i>	'I shouted'
	<i>uywíɔ</i>	'to send'	<i>mẽ íywíɔ</i>	'I sent'
	<i>uwoɔ</i>	'to collapse'	<i>mẽ íwoo</i>	'I collapsed'
	<i>uneɔ</i>	'to join together'	<i>mẽ íneo</i>	'I joined together'
	<i>uyee</i>	'to free'	<i>mẽ íyee</i>	'I freed'
	<i>ulíe</i>	'to lick'	<i>mẽ ílíe</i>	'I licked'

In the case of nasalised FV *-ẽ* and *-õ* however, the nasalisation blocks harmonisation, and the past tense FV remains the same as the infinitive form. In the case of a *#* root before a FV *ɔ*, this also resists harmonisation, and the past tense FV assimilates to *#*.

e.g.	<i>uyéẽ</i>	'to sleep'	<i>mẽ íyéẽ</i>	'I slept'
	<i>uwõõ</i>	'to succeed'	<i>mẽ íwõõ</i>	'I succeeded'
	<i>ubiõ</i>	'to touch'	<i>mẽ íbiõ</i>	'I touched'
	<i>uyúõ</i>	'to sing'	<i>mẽ íyúũ</i>	'I sang'
	<i>uyúɔ</i>	'to listen'	<i>mẽ íyúũ</i>	'I listened'

The past tense FV *-i* also disappears in the case of CV stems when the infinitive FV is *e* or *ɔ*. and the FV, which is also the root V, becomes the +ATR vowel *e* or *o*, in harmony with the underlying *-i*. Once again, a nasalised FV blocks this harmonisation.

e.g.	<i>uya</i>	'to come'	<i>mẽ íyi</i>	'I came'
	<i>ubó</i>	'to obtain'	<i>mẽ íbó</i>	'I obtained'
	<i>ume</i>	'to remove'	<i>mẽ íme</i>	'I removed'
	<i>usõ</i>	'to enter'	<i>mẽ ísõ</i>	'I entered'

Thus we find minimal pairs between /e/ and /ɛ/ and between /o/ and /ɔ/:

e.g.	<i>ndyé álíe</i>	'he will lick'	<i>ndyé álíe</i>	'he licked'
	<i>ndyé ábíɔ</i>	'he will shout'	<i>ndyé ábíɔ</i>	'he shouted'

It is clear that the FV *-i* (or its harmonising effect in its absence from the surface structure) is not the sole past marker in *Eboo-Nzikou*, since in the case of nasalised FVs,

there is no way of distinguishing the tense from the FV. Tone almost certainly acts also as a tense marker, although this is beyond the scope of this study. However, the minimal pairs given above do show clearly that /o/ and /e/ are fulfilling the function of phonemes in these verbs.

Koen Bostoen and Koni Muluwa (2011) describe a similar process of +/-ATR harmony following the disappearance of a FV in what they refer to as 'phonologisation' of the mid-vowels in Hungan, a Bantu H42 language spoken across the Congo River in DRC, not very far from the Teke cluster, which also spreads across into DRC. They describe the process as a 'vowel split' where the mid-vowel phonemes /e/ and /o/ and their allophones [e] and [o] have 'split' to become four mid-vowels phonemes: /ɛ, ɔ, e, o/ (Bostoen and Muluwa 2011:248):

The vowel split itself started out as an internally-motivated allophonic variation between tense and lax mid vowels that subsequently became phonologized through an externally-motivated loss of the conditioning environment. It can therefore be considered as a contact induced language-internal change.

We can also see an externally-motivated loss of the conditioning environment in *Eboo-Nzikou*, with the truncated verb stems causing the loss of the past tense FV /-i/. The influence of the underlying /-i/ past tense marker is however still seen, in that it changes all the fourth degree mid vowels to third degree mid-vowels in the past form.

Thus, as in Hungan, we can say that *Eboo-Nzikou* has split mid vowels, with the allophones [e] and [o] becoming phonemised in verbs.

5.4.2 The high vowels /i/ and /o/

The re-analysed vowel inventory gives four high vowels for *Eboo-Nzikou*: /i, ɪ, ʊ, u/. We referred already in section 3.1 to +/-ATR vowels which form two sets:

+ATR vowels	[i, u, e, o]
-ATR vowels	[ɪ, ʊ, ɛ, ɔ, a]

although [a] can often appear with either set.

In commenting on the high vowels, Herman Batibo (Batibo 2002: 142) notes that:

The high lax vowels [ɪ] and [ʊ] are... very common in African languages. The vowel [ɪ] is sometimes transcribed as [ɪ̥], and the vowel [ʊ] as [ʊ̥] or [ɔ̥]. As indicated, the two vowels differ from [i] and [u] because they are articulated with the muscles of the tongue relaxed, while the latter are articulated with the muscles of the tongue tightened.

We have already noted Kristensen and Kristensen's observation (1986) that /i/ may be pronounced as being close to [e], which is in fact probably /ɪ/, and that /u/ has the following variants: [ɔ̥] and [ɯ̥], which may be realisations of /ɪ/.

In discussing *Kukuya*, Paulian (1975) also suggests that what she refers to as a 'constriction' occurring after consonants in certain words could be caused by two additional, very high vowels /i̥/ and /u̥/, giving *Kukuya* a seven phoneme vowel system which is identical to Proto-Bantu. Ian Maddieson (Maddieson 2006: 19-20) comments that "the distinctive characteristic of these original vowels was indeed an unusually narrow constriction, nearly consonantal in character." However, three things should be noted in regard to Paulian's discussion (1975) of 'constriction' in *Kukuya*:

- i. It is not clear from the limited data available that the examples of 'constriction' which Paulian identified 37 years ago have retained their 'markedness' today.
- ii. The examples of 'marked forms' in *Eboo-Nzikou* are mostly not the same words as those which Paulian (ibid.) identified as being marked in *Kukuya*. However, the examples given by Kristensen and Kristensen (1986) in 3.1 can still be heard as 'marked forms' today, although I posit that they concern the 2nd degree high vowels, not the first degree high vowels.

[b ^ɛ i]	'us' (exclusive)	[uf ^{ɔ̥} úɔ]	'to cover'
[líp ^ɛ í]	'raphia'	[m ^ɛ í̥]	'urine'
[ubv ^ɛ ííra]	'to render'	[ts ^ɛ ú̥]	'day'
[k ^h i]	'pipe'		

- iii. It seems very likely that in *Eboo-Nzikou*, as Paulian (ibid.83) suggests for *Kukuya*, the 'marked form' is due to the falling away of a consonant, bringing two vowels into contact).

In positing therefore for two [-ATR] high vowel phonemes /i/ and /ɔ/ in *Eboo-Nzikou*, the examples of words containing the so-called 'glottalised' consonants provided by Kristensen and Kristensen (1986) may be rewritten as follows:

<i>bíí</i>	'us' (exclusive)	<i>ufííɔ</i>	'to cover'
<i>lípí</i>	'raphia'	<i>míí</i>	'urine'
<i>ubvííra</i>	'to render'	<i>tsííí</i>	'day'
<i>kí</i>	'pipe'		

This interpretation is supported by Rod Casali and Myles Leitch, who analysed *Eboo* vowels and measured their acoustic height in 2002. Leitch (pers. comm. 27/09/2002) concludes that, in his view: “This is definitely a +ATR dominant system with both advanced and retracted high vowels robustly contrasting.” Casali (pers. comm. 2002) describes this kind of vowel system in general as follows:

In my experience...the 'culprit' in cases where it is difficult to decide among 5, 7, or 9 vowels very often turns out to be a seven-vowel system /i ɪ ε a ɔ ʊ u/ (where ɪ ε ɔ ʊ are lax or '-ATR' vowels). This system very commonly (I would say 'usually') has 9 vowels phonetically because /ε/ and /ɔ/ have tense +ATR allophones [e], [o] that occur before (or, in some languages, following) syllables containing /i/ or /u/. So it is not difficult to see how it could be mistaken for a nine-vowel system, especially if the process that realizes /ε/, /ɔ/ allophonically as [e], [o] does not always apply in careful speech, so that there is some free (and/or inter-speaker) variation as well. On the other hand, the phonetic difference between the high lax vowels /i/, /ɔ/ and the high tense vowels /i/, /u/ is often rather difficult to hear, and native speakers may not always be able to reliably describe the difference, especially if they are influenced by familiarity with some other orthography that does not represent these distinctions.

This describes very well the *Eboo-Nzikou* situation and fits with the data. It also corresponds to what Denis Creissels refers to as the ancient Bantu system with four degrees of openness, which he schematises as follows: (Creissels 1994: 70)

<i>i</i>	<i>u</i>
<i>ɪ</i>	<i>ʊ</i>
<i>e/ε</i>	<i>o/ɔ</i>
<i>a</i>	

However, a further process of 'phonologisation' of the third degree mid-vowels has later occurred in *Eboo-Nzikou*, resulting from ATR harmony processes and FV deletion (see 5.4.1), and has given rise to nine vowel phonemes in verbs today.

Regarding the four high vowels, Casali (pers. comm. 01/08/2002) adds that "Teke may be in the process of losing these contrasts (which has happened in other Bantu languages), which might be reflected in a lot of variation and/or disagreement among speakers." It is certainly true that there is a lot of variation and disagreement among speakers about these vowels. It has been noted that *Nzikou* speakers, more than *Eboo* speakers, tend not to make a difference between /u/ and /ʊ/ in many cases, and their pronunciation defaults to /u/. This is also true of the /i/-/ɪ/ distinction, but to a lesser degree. However, younger speakers of *Eboo* often do not make the distinction either, and just use /u/ and /i/.

The high [-ATR] vowels occur in three different contexts, which give rise to different interpretations also. The following data is taken from SIL's dictionary database for *Eboo-Nzikou*.

i. When /ɪ/ and /ʊ/ are between consonants in verb stems, the vowel length is consistently long (CVVCV), and there are no contour tones. This suggests that the vowel is one syllable with 2 moras VV.

e.g.	<i>ubvíira</i>	'to render'	
	<i>uníina</i>	'to suffer a loss'	
	<i>udzuułɔ</i>	'to open'	(<i>Nzikou: udzuulɔ</i>)
	<i>upfíúúnɔ</i>	'to knock over'	(<i>Nzikou: upfúúúnɔ</i>)

There are no minimal pairs between /uu/ and /ʊʊ/ in the database. There are just a few minimal pairs between /ii/ and /ɪɪ/, such as:

<i>usíila</i>	'to set upright'	<i>usíila</i>	'to remain, stay'
<i>ukíila</i>	'to roll something'	<i>ukíila</i>	'to be caught in the act of sorcery'

ii. When /ɔ/ and /ɪ/ are the root vowels in CVV verb stems, they are consistently short , and carry either a H or a L tone. This suggests that the vowel is one syllable with one mora: V.

e.g.	<i>ubíá</i>	'to refuse'
	<i>upíá</i>	'to make dirty (water)'
	<i>ubúɔ</i>	'to heal'
	<i>ubúɔ̃</i>	'to fall over'

There are a number of minimal pairs with /i/ and /u/, such as:

<i>upíá</i>	'to make dirty (water)'	<i>upia</i>	'to strangle'
<i>udzíɔ</i>	'to erase, extinguish'	<i>udzíɔ</i>	'to surround'
<i>ubúɔ</i>	'to heal'	<i>ubúɔ</i>	'to break' (intr)
<i>ubúɔ̃</i>	'to fall over'	<i>ubúɔ̃</i>	'to embrace'

In *Nzikou* and amongst the younger generation of both *Nzikou* and *Eboo* speakers, the /ɔ/ and /ɪ/ vowels in both these contexts (V and VV) are often not heard to be distinct from /u/ and /i/.

iii. When /ɪ/ and /ɔ/ are the stem vowel in monosyllabic nouns, the vowel appears to be halfway between short and long, and can have a contour tone. In the case of /ɪ/, the vowel can sometimes sound like a diphthong [eⁱ].

e.g.	<i>bíí</i>	'we'	<i>ibɯ</i>	'lower back'
	<i>dzíí</i>	'oeil'	<i>nú</i>	'bee'
	<i>mí</i>	'urine'	<i>tsúɯ</i>	'day'
	<i>kí</i>	'pipe'		
	<i>lipí</i>	'raphia'		

Even *Nzikou* speakers usually pronounce /ɪ/ and /ɔ/ in these words as being distinct from /i/ and /u/. It is easier to hear the difference, given that the vowel is word final. There are some clear contrasting minimal pairs between /i/ and /ɪ/, and /u/ and /ɔ/:

e.g.	<i>mí</i>	'urine'	<i>mí</i>	'warmth of the sun'
	<i>ibɯ</i>	'lower back'	<i>ibu</i>	'bark, skin, peel'

Batibo (2002:144) points out that diphthongs are rare in African languages, although they do exist, often arising in the case of adopted foreign words. However, Leitch (pers. comm. 27/09/2002) considers that in *Eboo* “There are monosyllabic diphthongs [ei] that seem to be bimoraic because they contrast in length with single vowel forms.” Further investigation is needed to determine which of the words containing [ɪ] can be considered as diphthongs and whether the perceived lengthening is an inherent feature of the -ATR vowel, or merely occurs when there is a contour tone.

In concluding that *Eboo-Nzikou* has four high vowels with the +/-ATR contrast, the questions which begs itself is whether these vowels came from PB which also has four high vowels. In comparing PB words containing the high vowels - using a PB word list taken from Mutaka (2000: 261-264) - with their *Eboo-Nzikou* equivalents, I found that in many cases, there was no equivalence between the PB and *Eboo-Nzikou* words. However, words with somewhat similar roots are presented in Table 8 below.

Table 8: PB words containing high vowels with their *Eboo-Nzikou* equivalents

The highlighted words contain the same high vowels in both languages.

Proto-Bantu	Eboo/Nzikou	Gloss
i (+ATR)		
* <i>bimb</i>	/ubiĩ/	to swell
* <i>bín</i>	/ubína/	to dance
* <i>cinga</i>	/usia/	thread, string
* <i>dím</i>	/udzyĩ/	to extinguish
* <i>dímu</i>	/ndzaĩ/	god, spirit, darkness
* <i>(g)ibu</i>	/ifuru/	ashes
* <i>gima</i>	/ŋgésye/	whole, healthy
* <i>yiná</i>	/dzújá/	pit, hole
* <i>yíno</i>	/dziiná/	tooth
* <i>kindo</i>	/ŋkyele/	noise
* <i>kingó</i>	/nkíí/	neck
* <i>mida</i>	/bviĩ/	nasal mucus
* <i>tim</i>	/utsyũ/	to dig, plant
* <i>tina</i>	/itsi/, /ibúna/	tree stump

Proto-Bantu	Eboo/Nzikou	Gloss
u (+ATR)		
* <i>búu/bi/búi</i>	/mbvi/	grey hair
* <i>bund/gund</i>	/ubwɔɔ/	to rot
* <i>dund</i>	/ufúla/	to swell
* <i>yuídí</i>	/ipfu/	death
* <i>kú</i>	/ukwá/	to die
* <i>kudu</i>	/mpfulu/	tortoise
* <i>kúpa</i>	/pfia/	bone
* <i>kúpi</i>	/upfi/	short
* <i>púm</i>	/upala/	to go out
* <i>tú</i>	/utswíla/	to spit
* <i>túko/tíkɔ</i>	/tsóo/	day
* <i>tumbi</i>	/ikúli/	stool

Proto-Bantu	Eboo/ Nzikou	Gloss
ɪ (-ATR)		
* <i>bɪdɪ/badɪ</i>	/bwɔɔɛ/	two
* <i>c/yɪmb</i>	/utsyɔʒ/	to dig
* <i>dɪd</i>	/ulɪla/	to weep, cry
* <i>dɪm</i>	/ukuna/	to cultivate
* <i>dɪmi</i>	/ilyóɔɔ//ilyʒ/	tongue
* <i>yíngí</i>	/ufuli/	many
* <i>kída</i>	/ukɪla/	tail
* <i>kɪma</i>	/ŋkyʒ/	monkey

Proto-Bantu	Eboo/ Nzikou	Gloss
ʊ (-ATR)		
* <i>bómb</i>	/ubuɔ/	to form, create
* <i>bót</i>	/ubura/	to bear fruit
* <i>bóvd</i>	/ubɪla/	to speak, say
* <i>gʊdʊ</i>	/kuulu/	leg
* <i>gʊdʊ</i>	/yulu/	sky, above
* <i>gʊdʊbʊ</i>	/nguulu/, /ngʊʊlu/	pig
* <i>yoki</i>	/yu/	smoke
* <i>yókɪ</i>	/nó/	bee, honey
* <i>yʊmbá</i>	/ndzwó/	house
* <i>yʊni</i>	/ŋwɪni/	bird
* <i>kómi</i>	/kú/	ten
* <i>kóni/kói</i>	/ikwii/	firewood
* <i>pʊta</i>	/mputa/	wound, sore
* <i>tóm</i>	/uqíɔ/	to send

Analysis of the data in Table 8 shows that a significantly higher percentage of words containing the PB high vowels /i/ and /u/ are found in the *Eboo-Nzikou* equivalents, than those containing the PB high vowels /ɪ/ and /ʊ/. In the case of /ɪ/, none of the fourteen PB words contain the same vowel in *Eboo-Nzikou*, and for /ʊ/ the percentage is 14%, whereas approximately 50% of the PB +ATR vowels maintain the same vowels in *Eboo-Nzikou* (see Table 9). For each of the four PB vowels, two or three of the *Eboo-Nzikou* equivalents contain a glide which could be the original PB high vowel. However, this does not significantly change the results.

Table 9: Percentage of Eboo-Nzikou words containing the Proto-Bantu high vowels

High vowel	Eboo-Nzikou words containing the same PB high vowels	Percentage of Eboo-Nzikou words containing the same PB high vowel
/i/ (+ATR)	8 out of 14	57%
/ɪ/ (-ATR)	0 out of 8	0%
/u/ (+ATR)	5 out of 12	42%
/ʊ/ (-ATR)	2 out of 14	14%

It is clear that in most other varieties of Teke, the PB vowels /ɪ/ and /ʊ/ have merged with /i/ and /u/, leaving only five vowel phonemes. The above analysis suggests that *Eboo-Nzikou* has also not retained the PB vowels /ɪ/ and /ʊ/ in most cases.

Assuming that *Eboo-Nzikou* emerged from Proto-Teke which appears not to have /ɪ/ and /ʊ/ at all, perhaps these high vowels have re-emerged as separate phonemes more recently. If this is the case, some other process must have occurred to cause the second degree vowels to split again from the first degree vowels.

Annex C shows my data containing high vowels in *Eboo-Nzikou*, elicited from speakers of *Eboo-Nzikou*, as well as the equivalent words elicited from speakers of six other Teke varieties. The PB equivalent is also given where known. The words containing /ɪ/ and /ʊ/ are highlighted, so that they can be spotted more easily. Where the word elicited in other Teke varieties did not share the same root with *Eboo-Nzikou*, the data was omitted. A number of observations can be made from this data:

- The vowel /ʊ/ was not clearly heard in any of the words elicited from speakers of varieties other than *Eboo* and *Nzikou*.
- The only other variety of Teke where /ɪ/ was clearly heard was *Kukuya*. One speaker pronounced /ɪ/ for all the same words where this occurs in *Eboo-Nzikou*. It was not entirely clear which vowel the second speaker was using. This result is not surprising, given that a) the first speaker has one *Kukuya*-speaking parent and one *Nzikou*-speaking parent, b) both *Kukuya* and *Nzikou* are spoken in Djambala, where both the speakers have lived, and c) Paulian (1975) heard what could be interpreted as –ATR vowels in *Kukuya* 37 years ago!
- The fact that /ʊ/ was not found in *Kukuya* is not surprising, given that this sound is often not usually distinguished from /u/ in neighbouring *Nzikou*.
- The high vowels used by the *Fuumu* speaker were not all easy to hear, and it is possible that sometimes they came close to /ɪ/ or /ʊ/. This would not be surprising, given that *Fuumu* is one of the closest varieties geographically to *Eboo*.
- The fact that a number of the *Eboo-Nzikou* words containing /ɪ/ or /ʊ/ seem to be

pronounced in *Fuumu* as /i/ and /u/, with no other changes in the word, suggests that the distinctiveness between these vowels has become lost in *Fuumu*, if it was ever there at all.

- All the words which contain /ɪ/ or /ʊ/ in *Eboo-Nzikou* show some kind of longer root in all the other varieties except *Fuumu* and *Nungwel*. There is often a velar or glottal consonant after the root vowel, and sometimes a different vowel. This suggests that /ɪ/ and /ʊ/ in *Eboo-Nzikou* emerged as a result of contraction of these longer forms in the other varieties.
- While *Ngungwel* clearly also has contracted forms with vowel assimilation taking place, it does not have the vowels /ɪ/ and /ʊ/. The reasons for this are not clear from this data.
- Many of the words in *Eboo-Nzikou* which contain /i/, /u/ and /o/ still have the same roots in the other varieties, indicating that no contraction has taken place in *Eboo-Nzikou* compared to Proto-Teke. However even where the other varieties have longer roots with an additional V, C or CV after the root vowel, the additional vowel is always the same as the root vowel.
- In contrast to the above, the FV is different (often /a/) from the root vowel in the longer forms in the examples where *Eboo-Nzikou* contains /ɪ/ and /ʊ/. When the contraction took place therefore, two contrasting vowels met, resulting in the new -ATR vowel.
- It is not clear how to explain the final pair of words (numbers 23, 24), since the contraction appears to have caused both nasalisation and a change in the vowel quality for number 23, yet in number 24, only nasalisation of the vowel took place.

An interesting point to note is that according to Mutaka (2000: 251) "Assibilation [...] is mostly found in languages which merged the high vowels (ɨ, i and ʉ, u)" (Mutaka 200:251). The fact that the process of assibilation has already been shown to have occurred in *Eboo-Nzikou* supports the hypothesis that the original four high vowels of PB may have merged to become just /i/ and /u/, as found elsewhere in the Teke cluster. Then, at a much later stage, a process of C₂ loss and vowel assimilation in stems may have caused the high vowels to split once again - as has happened with the mid-vowels

through a more clearly defined process of ATR harmony - and gives rise to an expanded 9V system for *Eboo-Nzikou*, compared to the 5V Proto-Teke system.

More evidence is needed to confirm the hypothesis that /ɪ/ and /u/ really have emerged again as separate phonemes, rather than being remnants of the original PB vowels which are in the process of disappearing. However, the following section concerning nasalisation of vowels includes some further data which supports the hypothesis.

5.4.3 Nasalised vowels

One characteristic of the Teke cluster is the presence of nasalised vowels, which do not exist in PB. They are found in *Eboo-Nzikou* and *Ngungwel*, as well as in *Tyee*, although in *Tyee* only the vowels /ɔ/, /a/ and /ɛ/ can be nasalised. The other varieties of Teke, do not appear to contain nasalised vowels. In *Eboo-Nzikou*, all the vowels can be nasalised except for /o/ and /e/.

Generally speaking, the nasalised vowels sound slightly longer than the oral short vowels, although their actual length has yet to be measured to ascertain whether this is really the case. In addition to this, realisations that are clearly two moras occur in verbs.

e.g. *uwuã* 'to rest' *awũũ* 'he rested'

A brief comparison of words in *Eboo*, *Kukua* and *Tyee* shows that nasalisation of the vowel occurred when a preceding nasal was deleted. In Table 10, the first two examples are verbs which have a nasal as C₂ in both *Tyee* and *Kukuya*, whereas in *Eboo*, the nasal

Table 10: The development of nasalised final vowels in Eboo

(Phonetic data from Annex C)

English	Tyee	Kukuya	Eboo
to sing	<i>ɔyími</i>	<i>kiyíma</i>	<i>uyóð</i>
to sleep	<i>ɔgyéɲeme</i>	<i>kiyééme</i>	<i>uyéẽ</i>
to bury	<i>odziyi</i>	<i>kidziiga</i>	<i>udzia</i>
to practice sorcery	<i>olóyɔ</i>	<i>kilɔgɔ</i>	<i>ulɔɔ</i>

has been lost, and the FV nasalised. In the remaining two examples, C₂ has again disappeared in *Eboo*, but no nasalisation occurred, since the deleted C₂ was not a nasal.

A much more detailed analysis of the development of nasalised vowels in the Teke group provided by Jean-Marie Hombert (1986), confirms this process and also points to the nasalisation process taking place in the context of entire NC₂ sequences becoming deleted. Data from *Ibali*, *Nzikou* and *Ngungwel* shows that "The nasalised vowel reflexes in these three languages correspond to the Proto-Bantu forms containing *mb or *m in intervocalic position" (ibid.:361). Nasalisation only occurs in *Ibali* where the PB forms contain *mb intervocalically, but in *Nzikou* and *Ngungwel*, it occurs also where just *m is found between vowels. In the case of *Ngungwel*, nasalisation has spread to PB occurrences of *n and *nd also.

Hombert (ibid.) describes two basic kinds of nasalisation processes:

1) regressive nasalisation, where a vowel preceding a nasal consonant becomes nasalised and the nasal then drops out = VN → $\tilde{V}N$ → \tilde{V}

2) progressive nasalisation, where a vowel following a nasal consonant becomes nasalised and the nasal then drops out = NV → N \tilde{V} → \tilde{V}

According to Hombert (ibid.365) progressive nasalisation can be observed in *Nzikou* in the case of: *mĩ* 'urine' and *ɲẽ* 'acidity', although N has not dropped out. However, most of the nasalisation processes occurring are regressive. In his Annex B, Hombert lists some 60 verbs and nouns containing *mb or *m in the C₂ position in PB words, as well as in *Fuumu*, *Kukuya* and *Ibali*. In the equivalent *Nzikou* words (and *Ibali* words in the case of *mb) *m and *mb have disappeared, the FV has become nasalised and the quality of the two converging vowels has changed (Hombert 1986:359-379). Some of Hombert's examples are given in Table 11.

Hombert's data provides important information, concerning not only the regressive nasalisation of vowels, but also the processes of consonant deletion, vowel assimilation, gliding and vowel lengthening, which are shown to be part of the nasalisation process, but which also occur in some contexts where there is no nasalisation of the vowels.

Table 11: Correspondences between Proto-Bantu V_1mV_2 and V_1mbV_2 , and Fuumu, Kukuya, Ibali and Nzikou reflexes (Hombert 1986: 378-379)

(Phonetic data : *v* and *o* are pronounced as *ɔ* and *ʊ* respectively in Nzikou today)

English gloss	Proto-Bantu	Fuumu	Kukuya	Ibali	Nzikou
to swell	* <i>bimb-a</i>	<i>bíma</i>	<i>byííma</i>	<i>bííma</i>	<i>bíĩ</i>
horn	* <i>cémbó</i>	--	<i>n-tsyéeme</i>	<i>n-tsíĩ</i>	<i>n-tsíĩ</i>
bat	* <i>gembú</i>	<i>ɣ-gyemó</i>	<i>ɣ-gyeemé</i>	<i>ɣ-giĩ</i>	<i>ɣ-giĩ</i>
white clay	* <i>pémbé</i>	--	<i>m-pyéémé</i>	<i>m-píĩ</i>	<i>m-píĩ</i>
to cook	* <i>dámb-a</i>	--	<i>láama</i>	<i>láã</i>	<i>láũ</i>
monitor lizard	* <i>bámbɪ</i>	<i>m-báama</i>	<i>m-báámi</i>	<i>li-báã</i>	<i>li-báũ</i>
god	* <i>yambé</i>	<i>n-zami</i>	<i>n-zaami</i>	<i>n-zãã</i>	<i>n-zaũ</i>
seven	* <i>cambʊ</i>	<i>n-samo</i>	<i>n-tsaami</i>	<i>n-saa</i>	<i>n-tsaũ</i>
to borrow	* <i>comb-a</i>	<i>cwomo</i>	<i>fwoomo</i>	<i>fuĩ</i>	<i>fuũ</i>
broom	* <i>kómbó</i>	<i>kwómó</i>	<i>kwóomi</i>	<i>i-kúĩ</i>	<i>i-kúũ</i>
to buy	* <i>cómb-a</i>	<i>súma/fúma</i>	<i>fwúuma</i>	<i>fúúma</i>	<i>fúũ</i>
to bake in ashes	* <i>bumb-a</i>	<i>bvúúma</i>	<i>bvwuuma</i>	<i>bvuuma</i>	<i>bvuũ</i>
name	* <i>kómbó</i>	<i>ɣ-kúmi</i>	<i>ɣ-kwúúmi</i>	<i>ɣ-kúúmi</i>	<i>ɣ-kúũ</i>
to dig	* <i>tím-a</i>	<i>tsíma</i>	<i>tsíma</i>	<i>tsíma</i>	<i>tfúũ</i>
to be surprised	* <i>cím-a</i>	<i>síma</i>	<i>síma</i>	--	<i>fúũ</i>
to climb	--	<i>kúma</i>	<i>kúma</i>	<i>kúma</i>	<i>kóũ</i>
hoe	* <i>témo</i>	<i>témo</i>	<i>téme</i>	<i>tému</i>	<i>tyĩĩ</i>
hundred	* <i>kámá</i>	<i>mu-ɣkámá</i>	<i>ɣ-kámá</i>	<i>ɣ-kámá</i>	<i>ɣ-kĩ</i>
drum	* <i>ɣoma</i>	<i>ɣgomo</i>	<i>ɣomo</i>	<i>ɣomo</i>	<i>ɣĩ</i>
tongue	* <i>dími</i>	<i>li-límu</i>	--	<i>li-límo</i>	<i>li-lyũ</i>
monkey	* <i>kíma</i>	<i>ɣ-kíma</i>	<i>ɣ-kíma</i>	<i>ɣ-kíma</i>	<i>ɣ-kyũ</i>
husband	* <i>dóme</i>	<i>mu-lúmi</i>	<i>ũ-lúmi</i>	<i>ũ-lúmi</i>	<i>u-lóũ</i>
chief	* <i>kúmu</i>	<i>m-fúmu</i>	<i>mfúmu</i>	<i>mfúmu</i>	<i>mpfũ</i>

The quality of V_1 plays a significant role in the process of nasalisation, although it is V_2 which becomes nasalised. From Table 11, we can identify the following PB vowels as converging after **mb* and **m* deletion in Nzikou to form new vowel sequences (*v* and *o* as transcribed by Hombert have become *ɔ* and *ʊ* respectively in Eboo-Nzikou today):

/mb/ deletion: **i + a*, **e + o*, **e + ʊ*, **e + e* → *iĩ*
**a + a*, **a + ɪ*, **a + e*, **a + ʊ* → *aũ* → *aĩ*
**o + a*, **o + o*, **ʊ + a*, **u + a* → *uũ* → *uĩ*
**ʊ + ʊ* → *uũ* → *uĩ*

/m/ deletion:	*i + a, *I + a	→ uñ → uñ
	*I + I, *I + a	→ yō/yōō → yō/yōō
	*e + o, *e + e	→ yñ/yññ
	*a + a, *o + a	→ ñ/ññ
	*o + a	→ oñ → oñ
	*o + e, *u + u	→ ò/òò → ò/òò

Although this concerns nasalisation, it can be assumed that the same combinations of vowels produced the shortened verb stems in *Nzikou-Eboo* where no nasalisation occurred (see section 5.4.1). It is interesting to note that /o/ appears in the resulting *Nzikou* vowel sequences, although /I/ is absent in the above examples.

Hombert (ibid.372) notes that long vowels are nasalised before short vowels. Put schematically, this means that: $V_1mbV_2 \rightarrow V_1V_1mV_2$ nasalises before V_1mV_2 . He also notes (ibid.:371) that the above nasalised reflexes in *Nzikou* are always back vowels. He posits that this is due to the labialisation effect of /m/ before it is deleted.

In the case of dental plosive deletion following a nasal in *Nzikou*, Hombert (ibid.370) shows that the preceding V is lengthened. In other words "When prenasalised stops become plain nasals [...] there is compensatory lengthening of the preceding vowel". (ibid.: 371). This process was discussed in 5.3.3.

e.g. 'to start'	PB: *bánda	<i>Eboo-Nzikou</i> : báána
'thorn'	*céndé	n-tsyééné
'to become black'	*pinda	piina

The fact that C₂ deletes following a nasal supports the hypothesis that NC sequences are not normally found in C₂ position in *Eboo-Nzikou* (see 5.3.2).

In the case of PB /ŋg/ between vowels, both the N and C are deleted in *Ibali* and *Nzikou*, and no nasalisation occurs (ibid.:370). However, the deletion causes further vowel changes, as the following examples show:

'to surround'	PB: * <i>dinga</i>	<i>Eboo-Nzikou</i> : <i>udzia</i>	* <i>i+a = ia</i>
'neck'	* <i>kíngo</i>	<i>nkíí</i>	* <i>i+o = ii</i>
'to become red'	* <i>beŋga</i>	<i>bie</i>	* <i>e+a = ie</i>
'news'	* <i>caŋgo</i>	<i>ntsaa</i>	* <i>a+o = aa</i>
'knee'	* <i>bóŋgó</i>	<i>búó</i>	* <i>o+o = uó</i>
'to teach'	* <i>doŋga</i>	<i>luó</i>	* <i>o+a = uó</i>
'moon'	* <i>cóŋgí</i>	<i>ntsywíí</i>	* <i>o+i = ywii</i>
'pepper'	* <i>dóŋgó</i>	<i>anziúú</i>	* <i>o+o = uu</i>

This gives rise to a vowel sequence /iɛ/ which could explain the presence of the FV /ɛ/ in some shortened verb stems in *Eboo-Nzikou* (section 5.4.1).

5.4.4 Vowel length

In a study of the typical features of the Bantu languages of the forest, of which *Eboo-Nzikou* is one, Claire Grégoire notes that: “...various authors point out that, although vowel length is relevant, minimum pairs that oppose a short vowel to a long vowel of the same quality are rare.” However, *Eboo-Nzikou* does have minimal pairs which contrast the short and long vowels, as the following examples show:

/i/	<i>uyila</i>	'to bring'	/ii/	<i>uyiila</i>	'to spend a long time'
/ɛ/	<i>ukyéle</i>	'to filter'	/ɛɛ/	<i>ukyééle</i>	'to wait for'
/a/	<i>ukala</i>	'to live, dwell'	/aa/	<i>ukaala</i>	'to turn, reply'
/ɔ/	<i>utó</i>	'to boil (intr)'	/oo/	<i>utóó</i>	'to be pierced'
/u/	<i>ufura</i>	'to pay'	/uu/	<i>ufuura</i>	'to go down, descend'

Whilst there are no minimal pairs for contrasting /o/ with /oo/ and /i/ with /ii/ in the same environment, it is clear that both short and long realisations exist. These vowels are always short in verb stems where they occur between a C and a V, but always long between consonants:

e.g.	<i>ubía</i>	'to refuse'
	<i>ukííla</i>	'to roll something'

Section 5.4.3 above refers to a process of vowel lengthening occurring when a following NC sequence is reduced to a simple nasal. This probably accounts for many of the long vowels found in the data. Other instances of vowel lengthening may be accounted for by the merging of a prefix and a root, as seen in 5.3.3.

Kristensen and Kristensen's interpretation of vowel length as a sequence of two vowels within a syllable works well where the same vowel is reduplicated, in that it avoids adding seven or nine phonemes to the vowel chart. I do not identify any cases of sequences of different vowels in the same syllable, although two different vowels do occur together where each vowel is syllabic:

/bú.ó/ 'knee' /bí.é/ 'baldness'

5.5 Definition of the syllable

Given that both NC and CG combinations have been interpreted as sequences, the syllable structure for *Eboo-Nzikou* can be schematised as follows:

(N) (C) (G) V (V)

- N represents an optional homorganic nasal preceding a C.
- C represents all the consonants presented in the consonant phoneme chart. It is never syllabic, but is an optional syllable onset.
- G following C represent an optional glide [y], [w] or [ɥ] preceding a vowel.
- V functions as the obligatory nucleus of the syllable and as the tone bearing unit. It may be reduplicated within a syllable. V syllables may occur in the initial, or final position in a word.
- CV syllables may occur in all positions in a multi-syllabic word.
- VV syllables may only occur word initially. Reduplicated vowels occur frequently in initial position as verb prefixes, carrying either a level tone or a contour tone.
- CVV syllables are only found stem initially or as verb prefixes.
- NCV, NCVV, CGV, CGVV, NCGV and NCGVV are usually found stem initially. In C₂ position in a stem, they are often loan words, reduplicated words or compound words.

Table 12 gives examples of the environments in which the ten possible syllable types may occur within *Eboo-Nzikou* words. Words of four or more syllables are rare, and are often loan words, duplicated words, or compound words.

Table 12: The ten possible syllable types for Eboo-Nzikou

Syllable type	Example	Gloss	Syllable type	Example	Gloss
V	<i>a</i> <i>i.kwá</i> <i>u.bú.ɔ</i>	of (possessive) yam to break (intr)	NCVV	<i>mbaa</i> <i>i.ntsaa</i> <i>ngii.na</i>	fire tear sky blue
CV	<i>bá</i> <i>u.ya</i> <i>u.ka.la</i> <i>(l)i.ka.ká.lá</i> <i>(l)i.pe</i> <i>u.lu.a</i>	palm tree to come to dwell traditional bed machete illness	CGV	<i>tyǎ</i> <i>i.tyó</i> <i>kwó.rɔ</i> <i>u.byɛ.ɔ</i> <i>u.kyé.le</i>	hoe statue toad to greet to filter
VV	<i>áa.sá.la</i>	(he) is working	CGVV	<i>tyóó</i> <i>mwaá.na</i> <i>u.kyéé.le</i>	kind of peanut child to wait for
CVV	<i>báá</i> <i>i.waa</i> <i>u.kaa.la</i> <i>líi.sá.la</i>	cheek ennemi to turn (we) are working	NCGV	<i>ntswí</i> <i>i.mpyu.ɔ</i> <i>ndyɛ.le</i> <i>u.mbwo.ri</i>	fish 4th week day beard soldier
NCV	<i>mpé</i> <i>mbí.a</i> <i>i.ndǎ</i> <i>nkí.ra</i>	grasshopper behind, back sheep twin	NCGVV	<i>ntswíí</i> <i>ntsyéé.ne</i> <i>ndwóɔ.lɔ</i> <i>u.ntyéé.ré</i>	moon thorn rainy season kind of locust

6. Conclusion and discussion

This study proposes a revised consonant, vowel and syllable inventory for *Eboo-Nzikou*, compared to the previous phonologies by Kristensen and Kristensen (1986) and Abandzounou (2012), and brings to light some interesting processes of change which *Eboo-Nzikou* has undergone in relation to PB and other Teke varieties.

By a process of assibilation such has occurred in many Bantu languages, *Eboo-Nzikou* has added a number of fricatives and affricates which do not occur in PB. Three approximants, as well as the lateral /l/, have also emerged as phonemes, with [d] being identified as an allophone of /l/, following a nasal. The phoneme /t/ is realised as [ɾ] in C₂ position in stems.

An analysis of nouns which appear to have changed their class adherence or added a new class prefix at some stage in the past, reveals that nasals in word initial nasal-consonant combinations were almost certainly separate prefixes which later became homorganic with the C₁ of the stem. The PB 1sg *ni- prefix on verbs has also lost its vowel and become a homorganic nasal attached to the C₁ of verb stems in *Eboo-Nzikou*. Thus prenasalised consonants are redefined as sequences of nasal + consonant. The occurrences of nasal + consonant combinations as C₂ in stems are fairly rare, and are often found to be compound words or loans from other languages.

Glide formation and vowel lengthening have sometimes occurred as a result of C₁ deletion, leading to the merging of prefixes and roots.

An even more significant phonological change which has taken place in *Eboo-Nzikou*, affecting in particular the vowels, is the widespread deletion of C₂ of PB stems. In some cases the deletion concerns a nasal, in others a plosive, and in still other cases, an entire nasal + consonant sequence has been deleted. The resulting changes include the emergence of nasalised vowels (in the case of nasal deletion), vowel lengthening (where /d/ is deleted following /n/), and vowel assimilation or change as a result of two vowels meeting (in all cases of C₂ loss except for the deletion of /d/ following /n/). A summary of the changes described in this paper as a result of C₂ deletion of PB *m, *mb, *d following *n, *ng, *c and *k is given in Table 13.

It is likely that *p and *g in C₂ position have also been deleted, since C₂ is mostly limited to n, l, or r, with occasional examples of b. Additional data is needed to confirm this. The phoneme /t/ is always realised as [ɾ] in C₂ position. Words having m, mp, mb, nd, s, k or ng as C₂ are often compound words or loans from other languages.

Table 13: Summary chart of PB C₂ deletion and resulting vowel changes in Eboo-Nzikou (From 5.4.3 [Hombert 1986] and Annex C [my data])

PB C₂ deletion	Change to vowels	PB example	Eboo-Nzikou	English gloss
<i>*m</i>	V ₂ nasalisation + changes to quality of converging vowels	<i>*kóma</i> <i>*tíma</i> <i>*témo</i>	<i>u-kóḽ</i> <i>u-tsyúḽ</i> <i>tyḽḽ</i>	to climb to dig hoe
<i>*mb</i>	V ₂ nasalisation + changes to quality of converging vowels	<i>*cémba</i> <i>*bám̄bi</i> <i>*cóm̄ba</i>	<i>n-tsíḽ</i> <i>li-báḽ</i> <i>fúḽ</i>	horn monitor lizard to buy
<i>*d</i> in <i>*n+d</i> sequences	V ₁ lengthening	<i>*bánda</i> <i>*pínda</i> <i>*céndé</i>	<i>u-báána</i> <i>u-piina</i> <i>n-tsyééné</i>	to begin to become black thorn
<i>*n+*g</i>	No nasalisation of V ₂ Changes to quality of converging vowels	<i>*kínga</i> <i>*doṅga</i> <i>*biṅga</i> <i>*béṅga</i>	<i>ḡ-kíí</i> <i>u-luṵ</i> <i>u-bia</i> <i>u-bía</i>	neck to teach to hunt to refuse
<i>*c, *k</i>	Changes to quality of converging vowels	<i>*yíco</i> <i>*yiko</i> <i>*dóka</i> <i>*kúta/kúka</i>	<i>dzíí</i> <i>dzuu</i> <i>u-lóṵ</i> <i>u-fóṵ</i>	eye spatula for cassava to vomit to cover

Of particular importance in the data in Table 13 is that the *Eboo-Nzikou* vowels resulting from C₂ loss include the second degree high vowels /i/ and /u/. PB reconstructions show that these vowels are not often found in *Eboo-Nzikou* equivalent words where PB has them, but rather where a PB palatal **c* or velar **k* C₂ has been deleted (or a bilabial **m* or **mb* C₂ in the case of /u/ only). Thus it appears that /i/ and /u/ have split from the proposed Proto-Teke two high vowels /i/ and /u/, as a result of two vowels converging following C₂ deletion.

A further significant process which this analysis brings to light is the emergence of /e/ and /o/ as phonemes in the verb system, as a result of C₂ deletion and ATR vowel harmony. Where C₂ has been deleted, the past marker FV *-i* no longer appears in the surface structure of stems ending in /ɛ/ and /ɔ/, but its underlying presence in the past tense causes FVs /ɛ/ and /ɔ/ to become the +ATR equivalents [e] and [o]. With the

disappearance of the conditioning environment (FV *-i*) from the surface structure, /e/ and /o/ emerge as phonemes in their own right.

Thus the processes described in this paper suggest that the original 7V system of PB became first the 5V system of Proto-Teke with the four high vowels having merged into two - as seen in many varieties of Teke today - and that at a later stage, widespread C₂ deletion in stems occurred in *Eboo-Nzikou*, leading to an expanded inventory of nine oral and seven nasalised vowels. ATR vowel harmony was also a major contributing factor in the emergence of 'phonemised' oral mid-vowels. This hypothesis is based on a limited amount of data, and needs to be confirmed by analysis of an extended corpus.

In addition to the need for a more thorough investigation of the processes surrounding the second degree high vowels, including the phenomenon of diphthongisation which has been posited for /ɪ/, the following areas merit further attention and study:

- Tone has not been analysed in this study, although the phonological processes which have been addressed presumably give rise to tone perturbations, and tones may fulfill a crucial role in maintaining distinctive forms where other contrasts have been lost.
- No satisfactory explanation has been found for the word final occurrences of CGV, which contrast with ambiguous bi-syllabic CV.V structures word finally.
- Much work remains to be done at the level of the Teke cluster as a whole. Of particular interest is further analysis of the phonological processes occurring in *Ngungwel*, which is perceived to have even more contracted and nasalised forms than *Eboo-Nzikou*, yet does not have the high vowels /ɪ/ and /ʊ/. It would be of interest to discover whether the same processes led to the mid-vowel split in both *Eboo-Nzikou* and *Ngungwel*.
- Further analysis of the Teke varieties which have a 5V system is needed, to see if they are also evolving towards shortened forms and vowel splits, or whether they are more stable. The data for *Tyee* and *Zanaga Teke* in Annex C shows the velar or glottal C₂ still in place where *Eboo-Nzikou* equivalent words have the second degree vowels /ɪ/ and /ʊ/. However, *Kukuya* and *Tege* show a loss of the

C₂ in words where *Eboo-Nzikou* has the second degree vowel /ɪ/, although not where *Eboo-Nzikou* has the second degree vowel /ʊ/.

- One of the aims of this study was to contribute towards a standardised orthography for the Teke cluster. However, the findings suggest that *Eboo* and *Nzikou*, which are clearly the same variety phonologically, as well as *Ngungwel*, may need a rather different kind of orthography than the other 5V Teke varieties, unless it can be shown that the other varieties are also moving towards an extended vowel system.

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Annex A: Speakers of Teke varieties used for eliciting and recording data

Teke Variety	Name	Age	Sex	Town/Village
Eboo	Celestin GUEBO	53	Male	Ngo
Eboo	Oulgue MIENGUES	21	Male	Ngo
Eboo	Prince ABANDZOUNOU	28	Male	Nsah
Eboo	Casimir AMPION	70	Male	District de Ngo
Nzikou	Estelle Chamaille NTSIBA	35	Female	Djambala
Nzikou	Samson OBI	32	Male	Djambala/Lekana
Nzikou	Désin Andiri IBIESSA	30	Male	Djambala
Ngungwel	Armel MBON	35	Male	Akana (Gamboma district)
Tege	Blaise MANGOONI	36	Male	Okoyo
Kukuya 1	Samson OBI	32	Male	Lekana/Djambala
Kukuya 2	Benjamin MONTSOUKA	43	Male	Lekana
Zanaga Teke	Lafleur Joseph LIKIBI	29	Female	Zanaga
Wuumu/Eboo	Philippe NGOUA YOULOU	53	Male	Imbamba (Mbe-Odziba road)
Wuumu	Hervé Annoncia MAYOULOU	35	Male	Ignie/PK45
Fuumu	Anicet IGASSEMO	51	Male	Lifoula

Annex B: Minimal pairs for 9 Eboo-Nzikou vowels

Pairs	First V	Gloss	Second V	Gloss
i/u	<i>ubíra</i> <i>bí</i>	to carry, bring egg	<i>ubúra</i> <i>bú</i>	to give birth port
i/e	<i>ubii</i> <i>ibi</i>	hunter fog	<i>ubvîe</i> <i>be</i>	beauty barge
i/ɛ	<i>tíí</i> <i>bí</i>	until egg	<i>antíé</i> <i>bé</i>	saliva plank of wood
u/o	<i>isú</i> <i>ntsyúúli</i>	wedge hedgehog	<i>isó</i> <i>ndyóóli</i>	safou (fruit) however

u/ɔ	<i>uwuɔ</i> <i>itsúúnu</i>	to redirect kind of fruit	<i>uwɔɔ</i> <i>itsɔɔ</i>	to collapse kind of bird
e/o	<i>ilé</i> <i>ké</i>	clothing jigger	<i>iló</i> <i>kó</i>	thing, object need
e/ɛ	<i>uké</i> <i>ngé</i>	woman dirt	<i>aké</i> <i>ngé</i>	tobacco friend
e/a	<i>bé</i> <i>dzwe</i>	date palm walk, outing	<i>bá</i> <i>idzwá</i>	kind of bell forest
o/ɔ	<i>ndo</i> <i>ibóó</i>	sorcery thing	<i>ndó</i> <i>ibɔɔ</i>	work wall
ɛ/ɔ	<i>ulíe</i> <i>utyééélé</i>	to suck clay jar	<i>ulíɔ</i> <i>utyóóóló</i>	to collect grand-child
ɛ/a	<i>ngé</i> <i>ukíe</i>	friend to visit	<i>ngá</i> <i>ukia</i>	owner to hit, strike
ɔ/a	<i>ngwɔ</i> <i>sɔɔ</i>	panther leaf	<i>ngwa</i> <i>sáá</i>	axe corn
ɪ/í	<i>upia</i> <i>usúila</i>	to dirty water to set upright	<i>upia</i> <i>usúila</i>	to strangle to stay, remain
ɪ/e	<i>ki</i>	pipe	<i>ké</i>	jigger
ɪ/ɛ	<i>ki</i>	pipe	<i>ké</i>	kind of fish
ɪ/ɔ	<i>ubíɔ</i>	to shout	<i>ubúɔ</i>	to heal
ɔ/u	<i>ibu</i> <i>ubúɔ</i>	lower back to heal	<i>ibu</i> <i>ubúɔ</i>	bark, peel to break (intr)
ɔ/o	<i>ndzɯ</i>	importance	<i>ndzo</i>	elephant
ɔ/ɔ	<i>ndɯ</i>	friend	<i>ndó</i>	word
ɪ/ĩ	<i>mí</i>	these (class 4)	<i>mĩ</i>	heat of the sun
ɪ/ĩ	<i>mía</i>	5 francs	<i>mĩ</i>	urine
u/ũ	<i>ulú</i>	green vegetable	<i>ulú</i>	swarm of bees
ɔ/õ	<i>mpfú</i>	plot	<i>mpfú</i>	chief
ɛ/ẽ	<i>té</i>	hope	<i>tẽ</i>	bell
ɔ/õ	<i>ufúɔ</i>	to show	<i>ufúõ</i>	to buy
a/ã	<i>uláɔ</i>	to get angry	<i>uláõ</i>	to cook

Annex C: Eboo-Nzikou words contrasting high vowels with six other Teke varieties

(Phonetic transcription. Words containing /i/ and /o/ are highlighted)

No.	Proto-Bantu	Eboo	Nzikou	Fuumu	Ngungwel	Tege	Kukuya	Zanaga	Tyee	English gloss
1	*bingo/dund	idzi	idzi	bidzi	--	--	kidzi	lendziti	ɛdzi	cloud
2	*yico	dzi	dzi	dzi	dzi	dzi	dzi	dzi	ilhi	eye
3	*kádi	uké	uké	ukáli	ókáa	okári	mukái	maká?i	mukáha	woman
4	--	kí	kí	kíu	kíu	kéa	kíu/kí	kásu	kíhi/kyíhi	pipe
5	--	ki	ki	ki	ki	kía	ki	ki	ki	this (class 5)
6	--	ké	ké	--	--	kára	káa	--	ekáha	jigger (insect)
7	--	ibi	ibi	ibwé	obé	biri	ibi	ubi?i	lebíhi	fresh, raw
8	*bíi	ibi	ubi	ibi	bi	ebi	ibi	ubi	lebi	bad
9	*bung	ubia	ubia	ubia	obiō	kabia	kibia	--	ɔbi/ɔbyii	to hunt
10	*béng	ubia	ubia	ubia	obé	kabira	kibia/ubia	kabi?a	ɔbihi	to refuse
11	--	usíla	usíla	--	--	kasila	kisíla/usíli	--	ɔsíyili	to set upright
12	--	usíla	ushíla	ushíla	osii	kasira	kisíla	kásila	ɔsíli	to remain, stay
13	--	idzo	idzo	idzubu	idzughu	kadzubigi	kídzububi	kədzugu	--	lid
14	*yíko	dzuu	dzuu	--	-	dzugu	dzuugu	dzuku	ɛdzuu	spatula for cassava
15	*pó/kókó	ibu	ibu	ibu	--	--	kibu	libu	ebu/ibu	bark, peel, skin
16	--	ibovébo	--	ibu	eboo	kabu	kibugu	kubuku	ɛbuyu	lower back
17	--	iloo	iloo	iloo	eluo	kalýɔ	kilɔkɔ	kəɔkɔ	ɛɔɔ	thing, object
18	*dók	uloo	uloo	ulua	oloo	kaluga	kilika	kəlika	ɔliyu	to vomit, be sick
19	--	uboo	uboo	ubio	oboo	kabuga	kibika	kəzi?úka	ɔbiyu	to heal
20	--	ubio	ubio	ubio	obwóo	kabwóɔ	kibwóɔ	kəbwóɔ	ɔbio	to break (intr.)
21	*dang	ufiɔ/ushúɔ	ufiɔ	usiɔ	oshio	--	kifiɔ	--	ɔshúɔ	to show
22	*kúu/kúk	ufoo	ufoo	ufua	ofoo	kafuga	kifuga	kəfuka	ɔfiyu	to cover
23	*kúmu	mpfɔ	mpfɔ	mpfumu	mpfã	mpfumu	mpfiú	mpfumu	mpfumu	chief, boss, lord
24	--	mpfiú	mpfiú	mpfiuumi	mpfiú	mpfiuumi	mpfiuumá	mpfiuumi	mpfiuumi	leaf vegetable