The Historical Origin of Consonant Mutation in the Atlantic Languages

by

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Abstract

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Consonant mutation is a linguistic phenomenon whereby two or more sets of consonant phonemes alternate systematically within roots (or other morphemes) in a way that is not entirely predictable from the phonological environment. A number of Atlantic (Niger-Congo) languages of West Africa exhibit root-initial consonant mutation to mark noun class as well as various verbal morphosyntactic categories. This study treats the historical origin and development of these consonant mutation systems. I argue that despite their typological similarity, the mutation systems of the various Atlantic languages arose for the most part independently, in contrast with the prevailing assumption in the existing literature that these systems were inherited from a common source.

I begin with a typological survey of consonant mutation in the rest of the world's languages, providing a brief description of each phenomenon, as well as summarizing the theoretical treatments of these phenomena in the literature. I also examine the historical development of these mutation systems where such proposals are extant in the literature. Historically, consonant mutation— which is rather less rare than has often been claimed— generally arises from the interaction between an initial (or less often final) segment of one morpheme with the immediately adjacent segment of a preceding (or following) morpheme. For example, earlier **a-ta* and **ak-ta* (in which **a-* and **ak-* are two prefixes which can appear on the root **ta*) might develop into a mutation alternation /a-sa/ ~ /a-ta/.

The Atlantic languages which exhibit mutation are Fula and Sereer, Wolof, Kobiana and Kasanga, the Tenda languages, and Biafada and Pajade— all traditionally part of the proposed Northern Atlantic subgroup within Atlantic. The development of consonant mutation in all of these languages is consistent with the type of diachronic origin sketched above. For each of these languages I reconstruct the forms of the original triggers of mutation, as well as the regular sound changes that operated between these triggers and the initial consonants of lexical roots. In doing so I present reconstructions of the phonological and noun class systems of each proto-language, as well as their relevant verbal/pronominal systems. In addition to the regular sound changes that are the ultimate source of mutation, I identify a number of analogical changes that reshaped these systems of alternation in each language.

Finally, I explore the wider question of what genetic relationships exist between the Northern Atlantic languages, using the lexical, phonological, and morphological evidence presented in the preceding chapters. Having established that mutation in the Northern Atlantic

languages cannot be attributed to shared inheritance, the principal remaining sources of evidence involve shared lexical material and similarities in the noun class systems. I argue that there are no convincing developments in the noun class systems of the Northern Atlantic languages that can be taken as shared developments of this proposed subgroup, though a strong argument can be made for the grouping of Wolof with Bainunk-Kobiana-Kasanga, and much more tentatively for grouping Biafada-Pajade with this group. Otherwise, the similarities in the noun class systems of Northern Atlantic languages can be attributed to shared inheritance from Niger-Congo. The lexical evidence for this subgroup is somewhat more convincing, but is still extremely limited. Taking into account the patterns of language contact in the area, it seems entirely possible that the few potential lexical innovations of Northern Atlantic can be attributed to borrowing or shared retention. Thus I argue against the genetic unity of the Northern Atlantic subgroup, though all of these languages can be rather securely situated within Niger-Congo at large.

Abbreviations and symbols:

(P)FS	(Proto-)Fula-Sereer
(P)BKK	(Proto-)Bainunk-Kobiana-Kasanga
(P)KK	(Proto-)Kobiana-Kasanga
(P)WBKK	(Proto-)Wolof-Bainunk-Kobiana-Kasanga
(P)BP	(Proto-)Biafada-Pajade
1s, 2s, 3s	1st person singular, etc.
1p, 2p, 3p	1st person plural, etc.
1sS, etc.	1st person singular subject
1sO, etc.	1st person singular object
FOC	focus
DET	determiner
NC	noun class (marker)
DEM	demonstrative
REL	relative (marker)
PERF	perfect
IMPERF	imperfect
POSS	possessive
GEN	genitive (marker)
borr.	borrowing/borrowed from
V	vowel
A, Ə, E, etc.	vowel with unknown ATR specification
C	consonant
N	nasal consonant
X	oral consonant
*	reconstructed form
†	attested but no longer in use
×	ungrammatical form

A raised letter in parentheses before a lexeme indicates a source other than the primary source(s) for that language— see chapter 3, section 1 and footnote 156.

Deviations from the IPA are noted for each language in the "phoneme inventories" section of each chapter 2-5. Note especially that /x/ represents a voiceless uvular fricative [χ] in Sereer, Wolof, and perhaps Proto-Cangin, but /x/ is a voiceless velar fricative [x] in the Tenda languages and Bainunk.

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Introduction

A number of Atlantic languages of West Africa exhibit the phenomenon of consonant mutation, whereby the initial consonant of a root can alternate between multiple consonant phonemes as a mark of various morphosyntactic properties. The following examples from Fula show alternations based on the number of the noun 'hare' and the subject of the verb 'skip.'

wojere	'hare'	mi **f**olii	'I skipped'
boje	'hares'	ɓe **p**olii	'they skipped'

While consonant mutation is best known from the Celtic languages, the mutation systems of Fula and other Atlantic languages have long been cited as the best typological comparandum to the Celtic phenomenon. Consonant mutation is of particular interest to linguists not only for its supposed cross-linguistic rarity, but because it exists at the intersection of phonology, morphology, and syntax. As with any linguistic phenomenon, the question naturally arises as to how these complex systems came about historically. In the Atlantic languages specifically, consonant mutation has featured prominently in diachronic studies, being used as evidence for and against different subgroupings, and even being incorporated in discussions of Proto-Niger-Congo morphophonology. However, no satisfactory and comprehensive account of the origin of consonant mutation within the Atlantic languages currently exists. The goals of this study are as follows:

i. Foremost, to provide a detailed account of the historical origin and development of consonant mutation in each of the Atlantic languages that exhibits the phenomenon.
ii. In doing so, to reconstruct the phonological systems, noun class systems, and relevant verbal morphology and pronouns of each language group.
iii. To prove that consonant mutation arose independently in each of the various language groups and was not present in a putative proto-language, and to dispel the notion that consonant mutation in the Atlantic languages is a marker of genetic affiliation.
iv. Finally, to contribute to the wider question of genetic grouping and subgrouping within and outside of Atlantic, using the phonological, morphological, and lexical evidence established in exploring the history of consonant mutation.

The Atlantic languages which exhibit consonant mutation are: Fula, Sereer, Wolof, the Tenda languages (Bassari, Bedik, and Konyagi), Kobiana and Kasanga, and Biafada (with the closely-related Pajade showing some much more limited alternations). Chapter 1 examines consonant mutation from a typological perspective, allowing us to situate the Atlantic systems among the various mutation systems found elsewhere in the world, and establishing a basic methodology for exploring the diachrony of mutation systems. Chapters 2-5 give an account of mutation and its historical origins in each of the relevant Atlantic language groups. Unfortunately, Biafada cannot be treated in full due to a lack of documentation. What little can be said about Biafada will be discussed in Appendix A. Chapter 6 will summarize the arguments regarding the origin of mutation, and apply the conclusions of the previous chapters to the question of the genetic relatedness of the Atlantic languages.

The Atlantic languages

The "Atlantic" or "West Atlantic" languages have traditionally referred to all of the non-Mande languages spoken near the West African coast from Senegal to Liberia. The term originated in Koelle's (1854) *Polyglotta Africana*, where it may or may not have been intended as a genetic grouping. Subsequently, the Atlantic languages were proposed as a valid family, most notably by Westermann (1928) and Greenberg (1963). By the time of Sapir (1971), the genetic unity of the entire group had been called into question by a number of scholars (though Sapir himself maintained it), but a Northern and Southern group were taken to be separate but valid genetic groupings within a larger Niger-Congo macro-family. This classification is largely still current, though few authors have provided specific proposals for the organization of these potential families. Most notably, Pozdniakov and Segerer (2017) argue for the genetic validity of the Northern group, which they refer to simply as Atlantic. They also argue for the division of Northern Atlantic into two primary branches, one being the Bak languages, and the other sometimes known as the Senegambian languages. The various Atlantic languages are presented in Figure 1, with those exhibiting consonant mutation marked with (CM).

- <u>Northern Atlantic</u>
  - <u>Non-Bak ("Senegambian")</u>
    - Wolof (CM)
    - Fula (CM), Sereer (CM)
    - Cangin languages
    - Tenda languages (CM) (Bassari, Bedik, Konyagi)
    - Biafada (CM), Pajade
    - Kobiana-Kasanga (CM), Bainunk
    - Nalu, Mbulungish, Baga Mboteni
  - <u>Bak</u>
    - Joola languages
    - Manjak cluster (Manjak, Mankanya, Pepel)
    - Balanta
    - Bijogo (genetic affiliation unresolved)

- <u>Southern Atlantic</u>
  - <u>Mel</u>
    - Temne, Baga languages
    - Kissi, Bullom languages (incl. Sherbro)
  - Sua (aka Mansoanka)
  - Gola
  - Limba

Figure 1: Catalogue of Atlantic languages

The terminology regarding Atlantic languages is unfortunately not standardized, and is exceedingly confusing. One issue is the use of the term "West Atlantic" which is not in fact a subgroup of a larger "Atlantic" group, but is synonymous with it, being the term originally used by Westermann (1928), after Koelle. The terms "Northwest Atlantic" and "Southwest Atlantic" are thus synonymous with "Northern Atlantic" and "Southern Atlantic." However, more recently Pozdniakov and Segerer (2017) use "North Atlantic" to refer to the

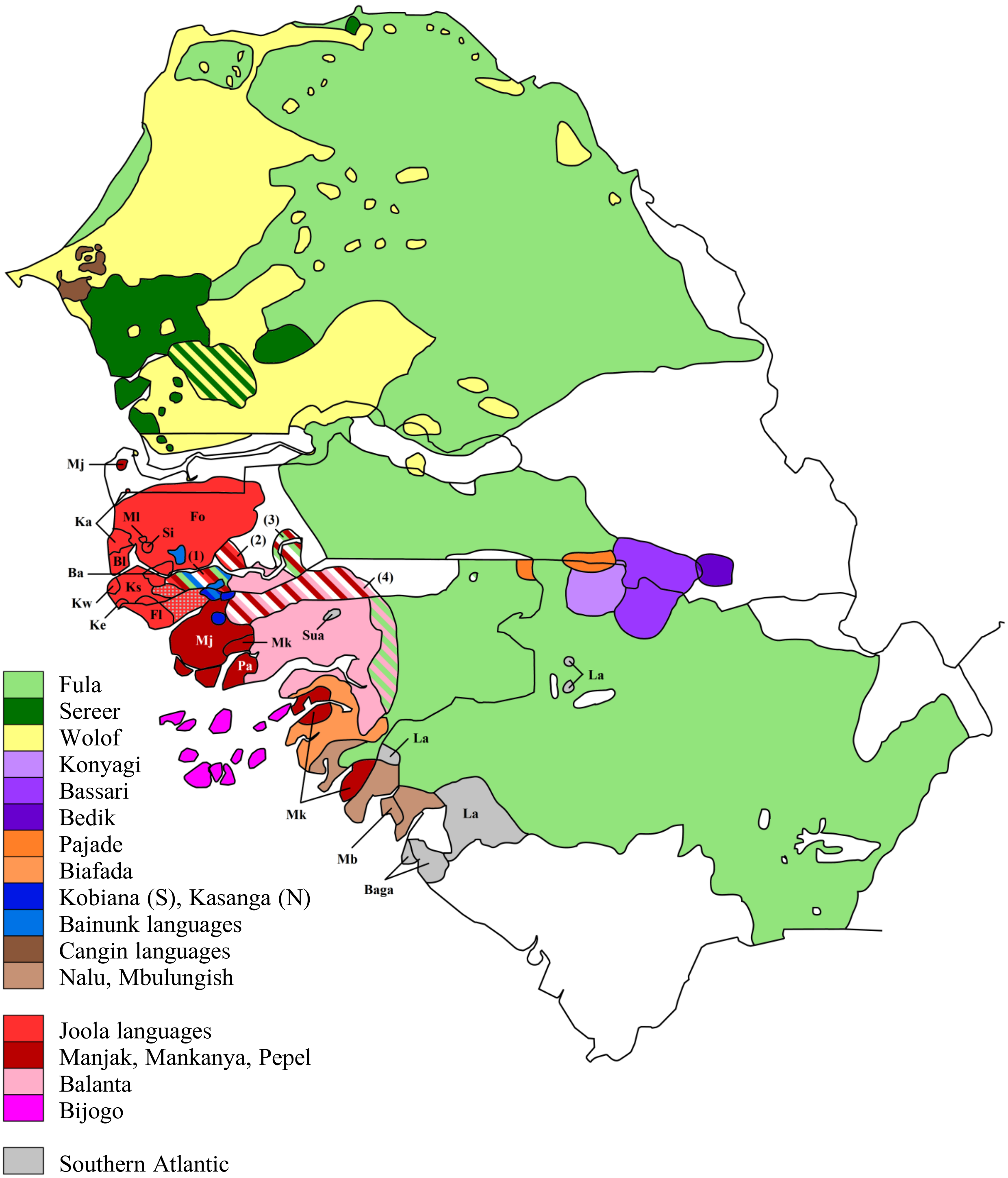
"Senegambian" languages, to the exclusion of the Bak languages (even though a number of languages of this branch are spoken to the south of the Joola languages which are part of Bak). The term "Senegambian" is itself misleading, as over half of its proposed members are spoken in Guinea and Guinea Bissau, and most Bak languages are in fact spoken in Senegambia. Throughout this study, "Atlantic" will be used in its broadest sense as a typological grouping. "Northern Atlantic" will be used in the traditional sense, including the Bak languages (and perhaps Bijogo, which P&S (2017) argue is part of Bak). Where it is necessary to refer to P&S's (2017) divide in the Northern Atlantic languages, "Bak" and "non-Bak" will be used.

The languages which are the subject of this study are all within Northern Atlantic, and so the Southern Atlantic languages will be set aside entirely. They are furthermore part of the proposed non-Bak ("Senegambian") subgroup. However, the genetic validity of both this non-Bak subgroup and Northern Atlantic as a whole is highly controversial, and for good reason. Even at a glance, it is clear that these languages are extremely distinct from each other. Between the most divergent members of the group, only a small handful of potential cognate roots and morphemes can be found. A proper analogue to the Northern Atlantic languages would not be Romance, or even Indo-European. If they do indeed form a genetic unit, their common ancestor would likely have been spoken at a time depth beyond that of most generally-accepted language families. Chapter 6 will explore in detail the evidence for the genetic grouping of these languages within Atlantic and Niger-Congo more broadly, but for now we can accept the term Northern Atlantic for its referential utility, even if it turns out to not be genetically valid. Figure 2 presents a map of the Northern Atlantic languages within Senegal, the Gambia, Guinea Bissau, and the northern part of Guinea, adapted from maps by Ethnologue[1].

Notes on the map:

- Bainunk: northern area = Guñaamolo, Gutobor; southern area = Gujaher (both north and south of the Senegal-Guinea Bissau border); area (1) = Gubëeher, Gufangor, Gubelor
- Joola: Fonyi (Fo), Karon (Ka), Mlomp (Ml), Gusilaay (Si), Banjal (Ba) (incl. Eegimaa), Kasa (Ks) (aka Esulalu), Kuwaataay (Kw), Keerak (Ke) (aka Her), Bliss (Bl), Felup (Fl) (aka Ejamat, extends across the border into Senegal); see Segerer (2009) for a fuller picture
- The red and grey "picnic blanket" pattern is Bayot, likely a mixed language (Joola and an isolate).
- Manjak cluster: Manjak (Ma), Mankanya (Mk), Pepel (Pa) (aka Papel)
- Cangin: Safen (SW), Noon (SE), Lehar (NE), Ndut (NW), Palor (center)
- The unlabeled light brown areas are Nalu. The related Baga Mboteni (not a Baga language) is not shown, but is spoken in a small coastal area near the Baga languages.
- Southern Atlantic: Sua (aka Mansoanka), Landoma (La), Baga languages. Other Southern Atlantic languages are spoken further to the southeast.
- White space represents various Mande languages.
- Fula extends well beyond this map, spoken as far as Sudan in the east, and central Cameroon in the south.

[1] There are two discrepancies with Ethnologue's maps: the placement of Kobiana, which is rightly located to the south of the Cacheu river; and the existence of Joola Bliss, after Segerer (2009). There may be other inaccuracies in the map that I am unaware of. It should be noted that the major languages of the area (Wolof, Fula, Mandinka) have wider distribution than can be shown on the map, due to the continued expansion of their native speaker populations, language shift among speakers of other languages, and their widespread use as lingue franche.



(1): Bainunk, Joola Fonyi, Joola Kasa, Manjak, Mankanya, Fula, Mandinka
(2): Joola Fonyi, Mankanya, Mandinka
(3): Manjak, Mankanya, Fula, Mandinka
(4): Manjak, Balanta, Mandinka

Figure 2: Map of the Northern Atlantic languages

Chapter 1: Typological overview of consonant mutation and its origins

Consonant mutation describes a system of alternation between consonant phonemes that is not predictable based only on the phonological environment. One language which famously exhibits this phenomenon is Fula, in which the initial consonant of nouns can change from singular to plural.

sg.	pl.	
gor-ko	wor-ɓe	'man'
mbaal-u	baal-i	'sheep'
haak-o	kaak-e	'leaf'

This study seeks to understand the historical origin of these consonant mutation systems in Fula and the other Atlantic languages of West Africa. To that end, it will be useful to understand the phenomenon of consonant mutation more broadly. This chapter has three goals: first, to provide a typological survey of consonant mutation in the world's languages; second, to determine a set of properties that can typologize these various mutation phenomena and, if possible, determine what qualifies or disqualifies a particular phenomenon as consonant mutation; third, to understand how systems of consonant mutation have arisen in the world's languages, thereby establishing a methodology for reconstructing the historical precursors and processes that lead to the creation of a mutation system, which can then be applied to Atlantic in the remainder of this study. This chapter is organized with these three goals in mind. The first part is a survey of the various phenomena that have been called consonant mutation in the literature, along with a brief discussion of the proposed synchronic analyses of each phenomenon and, where possible, its diachronic origins. Due to the lack of any generally agreed upon definition of mutation, I have included in this survey any phenomenon for which the term "consonant mutation" or "consonant gradation" has been applied in the literature. We will then explore the various ways in which these mutation systems differ from each other, and establish a set of descriptive properties that will be useful in categorizing consonant mutation phenomena. While we cannot arrive at a strict set of criteria which satisfyingly qualifies or disqualifies any given phenomenon as consonant mutation, it is possible to identify certain properties that are particularly influential in determining whether a given phenomenon is seen as a more or less prototypical case of consonant mutation. Importantly for our purposes, we will see that any definition of consonant mutation which includes the most well-known and uncontroversial cases must also include those of the Atlantic languages in question. Finally, building on the historical information presented in the first section, we will make note of the historical processes which most commonly give rise to consonant mutation. In doing so, we will lay out a basic methodology for determining the origin of a consonant mutation system using only data from modern languages.

1 Consonant mutation in the world's languages

It is often remarked that consonant mutation is a rare phenomenon in the world's languages. The prominent Celticist Ranko Matasović writes that "except in Insular Celtic, [consonant mutation is] found only in some West African languages, such as Fulbe, and in the isolated Nivkh language, spoken in Siberia" (2007: 98). Similar claims have been the standard until rather recently. In recent years, languages with mutation systems have been newly documented, and certain known systems of consonant alternation have been more commonly identified as mutation in the literature. In the face of this growing catalogue of mutation systems, it is not clear that the phenomenon is rightly termed a linguistic rarum (see also Iosad 2010: 127), and it is noteworthy that unlike some other rara, mutation systems have developed independently in almost all corners of the world. This section attempts to provide a comprehensive list of languages with robust systems of consonant mutation, but there will inevitably be numerous omissions, in some cases perhaps because the phenomenon has escaped my notice due to being exclusively known by some other name.

The descriptive traditions surrounding languages spoken in different areas of the world often differ greatly, and as such comparisons between mutation systems can be difficult without first translating the presentation of each system to a common scheme. While basic language- and area-specific terminology will be presented throughout this chapter, it is also imperative to establish some consistent terminology and standards of presentation. Mutation systems will be presented in a tabular format, as in this illustrative hypothetical word-initial mutation system:

Grade I	p	t	k	w
Grade II	b	d	g	b
Grade III	m	n	ŋ	w

In this system, there are three mutation *grades* (one per row), and four mutation *series* (one per column).

A mutation grade comprises the set of consonants which can appear in a particular grammatical environment or set of environments. For example, if all 1st person singular verb forms enforce mutation grade I, they could begin with /p/, /t/, /k/, or /w/, but not /m/, /n/, etc. Mutation grades are commonly referred to by a roman numeral, but are also often given phonetically descriptive labels. In some cases, a particular mutation grade can be identified as *unmutated*, serving as the basis for each other grade through some transformation. However in many systems it is impossible to identify a single grade which is more basic than the others.

A mutation series comprises the set of consonants that can alternate within a given morpheme. For example, for a single morpheme meaning ‘give’ there might be the forms *pa*, *ba*, and *ma* depending on the grammatical environment, but there would never be ˣ*wa* or ˣ*ta*. There will always be as many members of each series as there are mutation grades. For example, a three-grade mutation system will have series consisting of three consonants, e.g. /p~b~m/ or /t~d~n/. Note that it is not necessary for each member of the series to be distinct, as in the /w~b~w/ series. In such cases, it is sometimes conventional to present later cells in the series as blank if they do not differ from the unmutated consonant (assuming an unmutated grade can be identified). In most languages, there are certain series which exhibit no change between grades, often termed *immutable* consonants. It would be possible to list these as full series alongside the others, e.g. /l~l~l/, but to avoid clutter the immutable consonants will simply be noted separately, though unfortunately the full set of immutable consonants is not always given in basic descriptions. In some cases a consonant that appears in an alternating series can also exist in a non-alternating series (e.g. /m~m~m/ alongside /p~b~m/), in which case the term “immutable” should be used with caution.

The linguistic entity responsible for inducing mutation is known as the *trigger*. The trigger may be an overt morpheme or word, a grammatical feature or category, or even a particular syntactic construction. In our hypothetical system, 1st person singular subject agreement triggers grade I, yielding *pa* ‘I give.’ Here there is no overt affix, and so mutation is the sole marker of the grammatical feature. We might also have a prefix *a-* which marks 2nd person singular subject agreement along with enforcing grade II, yielding *a-ba* 'you give.' Here we could say either that the prefix enforces grade II, or that 2nd person singular subject agreement itself enforces grade II, depending on the analysis. Importantly, for a verb *tu~du~nu* beginning with the /t~d~n/ series, we would know that the 1st person singular form would be *tu* and the 2nd singular form *a-du*.

Before moving on to a description and discussion of mutation in each language, an explanation is warranted for how and why these phenomena in particular were chosen for inclusion in this survey. In conducting a typological survey of consonant mutation, we must have some way of determining which phenomena to consider. Here, it is not the case that we are starting with a well-defined phenomenon and then determining which languages exhibit it. The reality is that "consonant mutation" began as a term employed by Celticists to describe a rather clearly-delineated set of phenomena within a single language family, and since has been applied to a range of rather diverse phenomena which bear some resemblance to the Celtic prototype. Because the term was not originally intended to single out a particular sort of alternation found in all of the world's languages, there inevitably exist discrepancies in the way the term is employed outside of its original context. Certain phenomena which in the eyes of one author seem to share crucial properties with the Celtic systems might be seen as not similar enough by another. So then, the two options available to us are to either start by imposing a clear definition of mutation and then list the phenomena that fit this definition, or to start by examining the phenomena which have been termed mutation in the literature, and then determine which properties set these apart from other (morpho-)phonological processes. I have chosen to employ this second approach, since as we will see in section 2 a reasonable and concise definition of mutation is difficult if not impossible to give. This approach runs the risk of simply listing a set of disparate phenomena which in some way involve consonant alternations, but do not when taken together represent a unified phenomenon. To an extent this fear is realized, in that there is no single definition of mutation that would single out only the phenomena examined in this chapter to the exclusion of all others. However, we will see in section 2 that there are in fact a range of properties that when considered together can help to explain why the phenomena examined in this section are thought of as mutation, while other cases of consonant alternation are not. All in all, I believe that the phenomena surveyed in this chapter do represent a more or less unified phenomenon, in that they involve systematic alternations between sets of consonant phonemes that cannot be predicted solely by the phonological environment. That said, certain phenomena that fit this description are often excluded from discussions of consonant mutation simply because they are rather limited in one way or another. For example, alternations of the type *house* (n) ~ *house* (v), *bath* ~ *bathe* in English would fit a particularly strict definition of consonant mutation, but are limited to fricative voicing alternations in a single grammatical context, and are restricted to a very small set of lexical items. Inevitably there will be disagreements about whether a particular phenomenon is extensive enough to be considered mutation, but rather than trying to establish an arbitrary cutoff along multiple dimensions (the phonetic distance between alternating consonants, the number of triggers, the number of alternating consonants, the number of grades, etc.), it seems more fruitful to identify the various properties of these systems (as is undertaken in section 2), so that mutation-like phenomena can be usefully compared and typologized.

1.1 Celtic

The best known systems of consonant mutation are those of the Celtic languages. All Insular Celtic languages (Irish, Scottish Gaelic, Manx, Welsh, Breton, and Cornish) exhibit alternations in initial consonants triggered for the most part by a preceding grammatical word or morpheme. The nature of the alternations themselves varies markedly from language to language, involving changes in continuancy, voicing, nasalization, and to a lesser degree place. Here we will examine Irish and Welsh, the most widely spoken members of the Goidelic and Brittonic branches of Insular Celtic.

1.1.1 Irish

Irish (Ní Chiosáin 1991, Grijzenhout 1995, Pyatt 1997) exhibits a three-grade mutation system, generally described as the result of two mutation processes which can operate on an unmutated consonant: lenition, which has the effect of spirantizing, voicing, or otherwise weakening a consonant, and "eclipsis" (also known as nasalization) which voices or nasalizes a consonant.

unmutated	p p^j	t t^j	k c	b b^j	d d^j	g ɟ	m m^j	s ʃ	f f^j
lenition	f f^j	h h^j	x ç	w v^j	ɣ j	ɣ j	w v^j	h h^j	Ø Ø
eclipsis	b b^j	d d^j	g ɟ	m m^j	n n^j	ŋ ɲ			w v^j

Figure 3: Mutation grades of Irish

As indicated by the blanks in the above chart, eclipsis does not trigger any change in some phonemes. Eclipsis also has the effect of adding a prothetic /n/ or /n^j/ to vowel-initial roots. Besides the unmutated phonemes given above, words can underlyingly begin with /n, n^j, r, r^j, l, l^j/, the status of which is somewhat more difficult to pin down. Alternations involving these consonants are not indicated in writing, but do occur, though the segments which are targeted differ by dialect. Hickey (1995: 152-7), while lamenting the lack of proper attention given to the subject, describes a sort of reduction that affects these sonorants in lenition environments, resulting in a three-way distinction between e.g. velarized /n/, palatalized /n^j/ and a "reduced" /n/.

Mutation is lexically triggered by certain high-frequency words on a following content word. Triggers include prepositions, articles, possessive pronouns, numerals, and forms of the copula. Each such lexical item is associated with a particular mutation grade, completely independent of the segments contained within that word. An example involving numerals (Ní Chiosáin 1991: 18, 74):

(1) t^jax 'a house'
t^jr^ji: h^jax 'three houses'
ʃaxt d^jax 'seven houses'

'Three' is lexically specified for assigning lenition, and 'seven' eclipsis. In some cases mutation marks some morphological category, even in the absence of a preceding morpheme. Most notably, preterite, imperfect, and conditional verb forms exhibit lenition, originally triggered by a pre-verbal particle which is preserved only in the Munster dialect (Hickey 1995). In addition, compounding and all instances of prefixation trigger lenition in the second morpheme (Ní Chiosáin 1991: 30).

1.1.2 Welsh

The situation in Welsh (Morris Jones 1913, Ball and Müller 1992) is somewhat more complicated, both in terms of the alternations and the triggers. Welsh initial consonants are subject to three mutation processes. Soft mutation induces voicing or frication, nasal mutation induces nasality, and spirant mutation (also "aspirate mutation") induces frication of voiceless stops. There is a further "mixed" mutation grade, described as the result of spirant mutation on voiceless stops, and soft mutation on other consonants.

unmutated	p	t	k	b	d	g	m	ɬ	r̥
soft	b	d	g	v	ð	Ø	v	l	r
nasal	m̥	n̥	ŋ̊	m	n	ŋ			
spirant	f	θ	x						
mixed	f	θ	x	v	ð	Ø	v	l	r

Figure 4: Mutation grades of Welsh

As in Irish, mutation is commonly triggered by a preceding word. In the following examples (Ball and Müller 1992: 1), three of the possessive pronouns differ phonologically only in the mutation that they assign:

(2)	i kaθ	'their cat'	(no mutation)
	i gaθ	'his cat'	(soft mutation)
	və ŋ̊aθ	'my cat'	(nasal mutation)
	i xaθ	'her cat'	(spirant mutation)

In addition to lexically specific triggers, certain inflectional information on a preceding word can act as the trigger for mutation. For example, adjectives undergo soft mutation when preceded by a feminine singular noun. There are also morphologically-conditioned mutations where no preceding word acts as an overt trigger, for example mixed mutation is triggered on any negated verb. Mutation can in addition be triggered by syntactic factors; e.g. soft mutation is triggered on the first word after an immediately post-verbal constituent (Iosad 2007: 2).

(3a)	gwɛl-ʊɨd	**d**raig	[ar ə mɨnɨð]
	see-IMPERS.PST	dragon	on the mountain
	'a dragon was seen on the mountain'		

(3b)	gwɛl-ʊɨd	[ar ə mɨnɨð]	**ð**raig
	see-IMPERS.PST	on the mountain	dragon
	'a dragon was seen on the mountain'		

1.1.3 Synchronic analyses

Most analyses of Celtic languages attribute mutation to abstract phonological entities which are associated with the triggering word or morpheme. One solution is to take each mutation as triggered by an abstract phoneme located at the end of lexical items which trigger mutation. This analysis is proposed by Hamp (1951) for Celtic languages in general. In the case of Irish, a phoneme /L/ induces lenition, and /N/ induces eclipsis. Thus, the word *mo* 'my' which triggers lenition, is underlyingly /moL/. This approach has been criticized for proposing a phoneme which fails to surface in environments where is has no reason not to; for example, Scottish Gaelic has no prohibition on word-final nasal consonants, so why should /N/ fail to surface when it is utterance-final? Furthermore, why should word-final /N/ trigger mutation, while other word-final nasal consonants do not (Stewart 2004: 43)? Other proposals avoid this problem by assuming that the trigger of mutation is not a full phoneme, but rather some less-than-phonemic phonological entity such as a floating feature (Lieber 1983) or an "anchored autosegment" which is only partially featurally specified (Swingle 1993). As in Hamp's proposal, these phonological entities are underlyingly present at the end of words which trigger mutation.

A somewhat different approach is to simply associate individual lexical items with a diacritic feature that signals the application of a mutation process on a following word (Oftedal 1962). Under Oftedal's analysis, Hamp's /moL/ is represented as /mo^{L}/. This feature is not part of the phonology of the word, and thus is not linearized with respect to the phonemes of the word. As such, the phonological effects of mutation are not the result of the interaction of phonological features between morphemes. In addition, Oftedal allows these diacritics to be associated with particular morphological and syntactic constructions, rather than only lexical items. Focusing on the syntactic conditioning of mutation, Iosad (2007, 2008a, 2010) argues for a similar sort of analysis, whereby mutating roots have multiple underlying allomorphs which are lexically inserted during the course of the syntactic derivation. This sort of analysis can still attribute the mutation patterns themselves to phonological processes (as in Ní Chiosáin 1991), the application of which is signaled by the triggering context; but the environment for these changes is completely divorced from phonology. The basic distinction is thus between analyses which attribute mutation to some phonological entity in the input which triggers a phonological process, and those that see the phonological alternations as effectively pre-defined, with the different allomorphs of a given morpheme determined by its morphosyntactic environment.

1.1.4 Diachronic origin

The ultimate origin of mutation in Celtic languages is well understood. In each language, certain regular sound changes which operated within words operated also across word boundaries between especially "tightly-bound" pairs of words. In essence, each modern mutation process is the direct result of a regular historical sound change. Morris-Jones (1913: 161-176) gives an account of these sound changes in Welsh. Soft mutation is the result of lenition in the environment between a vowel and a following vowel or sonorant; thus, words ending in a vowel triggered soft mutation in a following word. Nasal mutation is the result of the assimilation and subsequent fusion of a nasal with a following consonant. Spirant mutation is the result of the spirantization of voiceless geminate stops (*pp, *tt, *kk > f, θ, x). The source of these geminates was in many cases the assimilation of an obstruent to a following stop, so that words ending in an obstruent such as **ak* > *a* 'and' became triggers of the spirant mutation (Ball and Müller 1992: 63). In Irish, lenition mutation was the result of intervocalic lenition, and nasal mutation (eclipsis) the result of nasal fusion, though the nasal was saved pre-vocalically. Regular degemination avoided the creation of a fourth mutation grade as in Welsh (Hickey 1995: 12). In summary, mutation arose in Celtic languages when the initial consonant of roots underwent a regular sound change in the environment of the final vowel or consonant segment of the preceding word. The identity of these final consonants can be determined with a high degree of certainty using comparative evidence from other Indo-European languages. Because these consonants were "swallowed up" by the regular sound changes, and final vowels were often subject to deletion, the resulting alternations were rendered completely phonologically opaque.

After the establishment of mutation as a grammatical system of alternation, it was subject to various analogical pressures. For example, because most feminine singular nouns were at one point vowel-final in Welsh, they triggered soft mutation. After these final vowels were lost, soft mutation was taken as a general marker of a preceding feminine singular noun, and extended to cases in which the noun was not historically vowel-final (Morris-Jones 1913: 176). Some individual lexical triggers also changed their assigned mutation. For example, Irish *ocht* 'eight' triggers eclipsis, despite having never ended in a nasal historically. This is due to the influence of the surrounding numerals 'seven,' 'nine,' and 'ten,' all of which were historically nasal-final, and thus triggered eclipsis by regular sound change (Windisch 1882: 29). Hickey (1995: 152) discusses a particularly striking analogical change in the history of Irish, whereby an entirely new lenition mutation, /p/ → /f/, was introduced in analogy with the other voiceless stops. With Celtic languages having lost Indo-European *p, the only words to begin with this sound were Latin borrowings. Earlier Latin borrowings nativized /p/ to /k^w/ (McManus 1983), and by the time initial /p/ was introduced, lenition was already a feature of Irish. So then, the lenition of /p/ to /f/ was not due to a regular sound change, but was introduced analogically to fit the phonetic character of the overall system. Many other examples of analogical extension and reorganizations of mutation patterns can be found throughout all Insular Celtic languages. The role of analogy in shaping the modern mutation systems of the Celtic languages must not be understated, but can unfortunately not be explored in full here.

1.2 Numic

The Numic languages (Uto-Aztecan) of the western United States make use of systems of morpheme-initial consonant mutation. The best-known example is that of Southern Paiute, as described by Sapir (1930). In root-medial position, there is a phonemic contrast between the spirantized, geminated, and nasalized series of consonants. Word-initially, a subset of consonant phonemes is encountered, represented by the "underlying" grade in Figure 5. However, when preceded by another morpheme within the same word, whether due to affixation or compounding, the morpheme-initial consonant will appear in one of the three other grades.

underlying	p	t	k	k^w	ʦ	s	m	n
spirantized	β	ɹ	ɣ	$ɣ^w$	ʦ	s	$ŋ^w$	n
geminated	pp	tt	kk	kk^w	tʦ	ss	mm	nn
nasalized	mp	nt	ŋk	$ŋk^w$	nʦ	s	mm	nn

Figure 5: Mutation system of Southern Paiute

As the underlying grade is never contrastive with the other three, there is in fact only a three-way contrast possible for the initial consonant of each morpheme, which is neutralized to the underlying grade when word-initial. For the most part, the grade of the initial consonant is lexically determined by the preceding morpheme within the word. In Sapir's words, "...for the purposes of derivation and composition one needs to know always whether a given stem or suffix is one that spirantizes, geminates, or nasalizes" (1930:63). Thus, when the verbalizing suffix *-ka* is added to different nominal roots, the grade of its initial consonant is dependent on the preceding root, each of which arbitrarily assigns a particular mutation grade.

(4)	aŋka-ɣa	'to be red'
	kuttsa-kka	'to be gray'
	paɨ-ŋka	'to be smooth'

There are however some complications to this system. Some suffixes appear consistently in a particular grade regardless of the preceding stem, e.g. *-βaa* 'future' and *-kka* 'plural subject.' In compounds, the second member often exhibits the geminated grade even when the preceding root calls for some other grade, e.g. *aŋka-ppayɨ* 'red-fish = trout,' despite *aŋka* being a spirantizing root (Sapir 1930: 70). Certain postpositions mutate based on the animacy of the preceding noun, disregarding the noun's inherent mutating effect (Press 1980: 45).

A similar mutation system is found in the closely related Chemehuevi (Press 1980), generally considered to be dialectal with Southern Paiute as part of Colorado River Numic. Unlike in Southern Paiute, mutation in compounding is apparently regular, but Chemehuevi has its own set of notable exceptional conditions on mutation. For example, "In Chemehuevi... the form of the past tense suffix *-vɨɨ* ~ *-mpɨɨ* is determined (for some verbs) by whether the verb is to be interpreted as inchoative or not" (Press 1980: 45). Other Numic languages exhibit similar three-grade mutation systems, though often involving different featural mutations, such as preaspiration in Tümpisa Shoshone (Dayley 1989) and Comanche (Armagost 1989). The Comanche system is notable for involving far fewer alternations than most of its relatives. As described by Armagost, only the five stops undergo any alternation, and of these only the labial and coronal stops alternate with a sound in the "voiced spirant" series.

stop	p	t	ʦ	k	kʷ
presaspirated stop	ʰp	ʰt	ʰʦ	ʰk	ʰkʷ
voiced spirant	β	ɾ			

Figure 6: Mutation system of Comanche

Furthermore, in most analyses of the language, including Armagost (1989), the preaspirated stops are analyzed as sequences of two phonemes, /h/ and a stop. Thus, it could be argued that morphemes which trigger preaspiration simply end in /h/, which would reduce the true mutation system to a /p ~ β/ and a /t ~ ɾ/ series.

1.2.1 Synchronic analyses

There are two basic approaches to analyzing Numic mutation, which are in effect quite similar to each other. The first is to assign a feature to each morpheme which determines which mutation it triggers. Whether this feature is linearized with respect to the phonemes of the morpheme in question varies by analysis. Sapir (1930) employs such a lexical feature analysis for Southern Paiute, as does Press (1980) for Chemehuevi. The other strategy is to attribute mutation to abstract morpheme-final consonants which are simply unrealized in word-final position. Under this analysis, nasalization is triggered by a preceding nasal consonant /N/, and gemination by a stop /T/. Dayley (1989) analyzes Tümpisa Shoshone in this way, giving words like /sikkih/ = [sikki] 'right here' (triggering preaspiration) and /ümatün/ = [ɨw̃arɨ] 'rain' (triggering nasalization). Chomsky and Halle (1968) analyze Southern Paiute mutation in this way. Press (1980: 41) summarizes the various representations of spirantizing, geminating, and nasalizing morphemes in Southern Paiute under three different analyses.

	Sapir	Nichols	Chomsky & Halle		
spirantizing	na^{s}-	na-	na-	[na]	‘reflexive’
geminating	pɨŋka^{g}-	pɨ"ka'-	pɨNkaT-	[pɨŋka]	‘keep on’
nasalizing	nɨ^{n}	nɨ"	nɨN	[nɨ]	‘person’

Figure 7: Various analyses of Southern Paiute mutation

Sapir makes use of non-linearized features associated with each root, Nichols (1973, writing about Numic languages more broadly) makes use of linearized final features (<"> causes nasalization, <'> causes gemination, spirantization is automatic intervocalically), and Chomsky and Halle employ abstract phonemes. Because in Numic languages (unlike in Celtic) mutation always operates in the presence of a preceding morpheme, whatever abstract phonological entity is responsible for mutation can be safely docked at the right edge of morphemes which are otherwise composed of pronounced phonemes. For this reason, both the featural and segmental analyses of Numic mutation seem rather less abstract than the phonological-trigger analyses of Celtic discussed in section 1.1.3.

1.2.2 Diachronic origin

For any given Numic language, it is easy to imagine that its system of mutation arose somewhat recently, and even from internal reconstruction of that single language, a historical account in line with the synchronic segmental-trigger account would be straightforward. For example, for Southern Paiute we could propose that morpheme-final consonants were abundant at an earlier stage, and when these consonants came in contact with a following morpheme-initial consonant, the cluster underwent some fairly simple sound changes. A coda stop would combine with a following consonant to yield the geminate series, a coda nasal would give rise to the nasalized series, and no coda consonant at all would yield the spirantized series, as the initial consonant of the following morpheme would be in an intervocalic environment. Similarly, in Comanche a coda laryngeal consonant, perhaps simply [h], could trigger preaspiration of the following consonant, and so forth. These coda consonants need simply be subject to word-final deletion, as proposed in Dayley’s (1989) synchronic analysis of Tümpisa Shoshone, and we would be left with the modern mutation systems. That many of these mutation systems are so amenable to synchronic analyses whereby mutation is triggered by an abstract phoneme might tempt us to assume that not long ago, these phonemes were synchronic realities, realized as a consonant segment in all contexts. Comparing a more limited mutation system like Comanche’s to a more robust system like Southern Paiute’s, we could hypothesize that Comanche is more conservative, simply having undergone fewer sound changes involving these coda consonants.

While it is almost certainly the case that the ultimate origins of mutation in the Numic languages can be attributed to these sorts of segmental interactions, such a naive mapping of the synchronic segmental-trigger analysis to a historical explanation is anything but straightforward. As it turns out, these elusive coda consonants cannot be reconstructed to Proto-Numic, where a system of mutation must have already been in place (Babel et al. 2013).

lenis[2]:	*p	*t	*ʦ	*k	*kʷ	*s	*m	*n	*ŋ	*w	*y
fortis:	*pp	*tt	*tʦ	*kk	*kkʷ	*ss	*mm	*nn	*ŋŋ		
nasal:	*mp	*nt	*nʦ	*ŋk	*ŋkʷ					*ŋw	*ɲy

Figure 8: Proto-Numic mutation system

Furthermore, the sound changes affecting morpheme-initial consonants are in many cases not what we would assume given the synchronic alternations. For example, the preaspirated series of Central-Numic languages like Comanche and Tümpisa Shoshone is *not* the result of an earlier morpheme-final [h]-like segment, but arose from the earlier geminate series by a stress-conditioned sound change, as demonstrated by Miller (1980). McLaughlin (1992) convincingly shows that the relatively limited mutation system of Comanche evolved from an earlier system with much more robust alternations, and thus a system like Southern Paiute's is in fact more conservative when compared with the proto-language.

Even in the earliest identifiable ancestor of Numic, Proto-Uto-Aztecan (PUA), spoken 3000-5000 years in the past (Hill 2001), the hypothesized coda consonants responsible for mutation cannot be reconstructed. Whorf (1935), in his treatment of PUA writes, "...we can divide final vowels into two classes, "ordinary" or spirantizing and those which exert an "antispirantizing" influence." He goes on to note that these "antispirantizing" vowels are of two types, nasalizing and non-nasalizing. Whorf proposes that these three classes of vowels are the result of the earlier existence of coda consonants, and that "these final and unknown consonants disappeared but left their reflexes in anti-spirantizing and nasalizing powers attendant upon certain final vowels in daughter languages." He represents these different vowels as *V, *V^x, and *V^n; essentially describing the same system for PUA as is attested in modern Numic languages. Hale et al. (1962) come to the same conclusion, using the symbols *V_s, *V_n and *V_u. It seems that the ultimate historical triggers of mutation in Numic simply cannot be identified.

1.3 Corsican

In Cismontane (Northern) Corsican (Dalbera-Stefanaggi 1978, 2001), most initial consonants can take two forms depending on a combination of its phonological and lexical environment. Most initial consonants are lenited after a vowel, but certain lexically-specified vowel-final words block lenition. This phenomenon has its origins in a historical process of (mostly) intervocalic lenition, and it is generally described in these same terms synchronically[3]. The alternating initial consonants with their lenited and unlenited variants are as follows:

(orthography)	*p*	*t*	*z*	*chj*	*c(i/e)*	*c(h)/q*	*f*	*s*	*b*	*v*	*d*	*ghj*	*g*
unlenited	p~h	t	ʦ	c	ʧ	k	f	s	b	b~v	d~ð	ɟ	g
lenited	b	d	ʣ	ɟ	ʤ	g	v	z	β̞~w	β̞~w	Ø~ð̞	j	Ø~w

Figure 9: Mutation system of Corsican

[2] The lenis stops were likely allophonically voiced and perhaps spirantized in intervocalic position.

[3] Outside of the work of Dalbera-Stefanaggi, the literature on this subject is unfortunately quite lacking. The best remaining sources are web pages dedicated to advocating the use of the Corsican language, such as <http://gbatti-alinguacorsa.pagesperso-orange.fr/cartes/mutation.htm>. Lexical data throughout this section is drawn from the INFCOR online dictionary.

The remaining initial consonants do not alternate:

(orthography)	*sc(i/e)*	*g(i/e)*	*sg(i/e)*	*z*	*l*	*r*	*m*	*n*	*gn*	*s(b/d/g)*
invariant	ʃ	ʤ	ʒ	ʣ	l	ɾ	m	n	ɲ	z

Notes: The pronunciation of <p> as [h] is encountered only phrase-initially. Phrase-initial <d> may also be unpronounced, especially in common words like *di* 'of' and *da* 'from.' The symbols [β̞] and [ð̞] represent approximants. <gh>; i.e., [g] before a front vowel, does not alternate. Lenition also operates in the southern dialect, but affects only <c(h), ghj, v, f, s>.

Some transcriptions record the unlenited variants as geminates, though only when post-vocalic. In such an account, <l, r, m, n> also are part of the system of alternation, being geminates when unlenited after a vowel[4]. Note that by this description, there are in fact three phonetic realizations of each alternating consonant; e.g. for <t>: [d] when lenited, [tt] when unlenited after a vowel, and [t] when unlenited after a consonant or phrase-initially. I will follow this geminate analysis here, simply because it does not run the risk of under-representing the existing contrasts. Impressionistically, geminates in Northern Corsican are phonetically quite short at best, and an analysis without geminates is perfectly reasonable. To my ear, there does not seem to be a length contrast between singletons and the supposed geminates, but of course there is no possibility for a true comparison of the two series, since an unlenited singleton can appear only phrase-initially or after a consonant, and geminates can only appear in the complementary environment. Cravens (1987), using data from Dalbera-Stefanaggi (1978) specifically argues that there are no geminate stops in Northern Corsican (with geminate /l, r, m, n/ in only some villages), though unfortunately I know of no phonetic studies confirming the status of these consonants. Regardless of the exact phonetic situation, the phonological contrast is clearly between only two grades, though one of these may have two allophonic sets of realizations.

The conditions on word-initial lenition are both phonological and lexical. Phonologically, the initial consonant must be preceded by a vowel-final word, and followed by a voiced sound. Additionally, in words beginning with <squ>, [sk] lenites to [zg] after a vowel and before [w]. After a consonant or phrase-initially, lenition never operates. By conventional accounts of Corsican phonology, lenition applies also word-internally, so that the initial consonant in *tola* [tɔla] 'table' and the medial consonant in *latu* [ladu] 'side' are both /t/, though word-medially there is no possibility of alternation. Below are some examples of word-initial consonants in three environments: phrase-initially, after a consonant-final word *un* 'a,' and after a vowel-final word *u* 'the.'

(5)		isolation	un _	u_	
	ghjacaru	[ɟagaru]	[uɲɟagaru]	[ujagaru]	'dog'
	zitellu	[tsidellu]	[untsidellu]	[uʣidellu]	'boy'
	granu	[granu]	[uŋgranu]	[uranu]	'wheat'
	cignale	[ʧiɲale]	[uɲʧiɲale]	[uʤiɲale]	'boar'

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[4] In the recordings I have heard, there is generally no audible difference between these sounds in each word-initial environment. However, lenited <m, n> are in some cases nasal flaps [ṽ, r̃], while the unlenited versions are always nasal stops [m, n]. <l> and <r> seem to be [l] and [ɾ] in all cases. Word-medially, the distinction between <m, n> and <mm, nn> is clearer, with the singletons often being nasal flaps.

However, there is a further condition that qualifies Corsican lenition as consonant mutation, rather than a purely predictable and automatic phonological process. Lenition is blocked by certain vowel-final lexical items, indicated in the orthography with a grave accent mark. Some words are segmentally identical, but distinguished only by whether they trigger mutation or not:

(6)	*so petra*	[sobedra]	'his stone'	vs.	*sò petre*	[soppedre]	'they're stones'
	a cosa	[agoza]	'the thing'	vs.	*à Corsica*	[akkorsiga]	'to Corsica'
	e forche	[evorke]	'the pitchforks'	vs.	*è forche*	[efforke]	'and pitchforks'
	sta sera	[stazera]	'this evening'	vs.	*stà sicuru*	[stassiguru]	'it's calm'

In polysyllabic words, the accent mark also indicates stress (otherwise penultimate), but in monosyllabic words its sole purpose is to indicate that the word does not trigger lenition. When considering only polysyllabic words, it is possible to describe the context for lenition in purely phonological terms; i.e., it is blocked post-tonically. However, there is no rule of post-tonic strengthening within words (e.g. *andàvanu* [anˈdaβanu] 'they were going' with lenited <v>). Furthermore, this explanation cannot account for the monosyllabic words— it is not the case that those which block lenition are stressed while those which allow it are unstressed.

1.3.1 Synchronic analysis

Two general approaches to a synchronic analysis of Corsican mutation seem reasonable. The vowel-final words that block lenition could simply be marked with a diacritic feature, similar to the diacritic features proposed for Celtic mutation. However, for Corsican the proposal of an abstract consonantal phoneme or "ghost consonant" is particularly attractive, and an analysis of this sort is put forward by Scheer (2009), following Dalbera and Dalbera-Stefanaggi (2004). Under this proposal, those words which block lenition end in an unpronounced consonant /C/— *a* 'the' is underlyingly /a/, while *à* 'to' is /aC/. Because lenition fails to take place after a consonant, the lack of lenition after /C/ follows automatically. Furthermore, the exceptionless entailment that polysyllabic words with final stress impede lenition can be explained as a stress-to-weight rule in which stress is attracted to a final closed syllable. This ghost consonant account is particularly attractive if the description of the unlenited series as geminates after a vowel is accurate, as the moraic ghost consonant can simply assimilate to the following consonant, resulting in a geminate. Finally, for a number of these words with a proposed final ghost consonant, a consonant is in fact pronounced under certain circumstances. Some vowel-final words have free variants with an additional *-lV*, *-rV*, or *-nV*: e.g. *avà ~ avale* 'now,' *maiò ~ maiore* 'greatest,' *bè ~ bene* 'well.' In most nouns and adjectives ending in a proposed ghost consonant in the singular, a consonant surfaces in the plural, e.g. *pallò*, *palloni* 'ball(s).' In future and conditional verb forms, built morphologically from the infinitive followed by a form of *avè* 'to have,' *-r* surfaces at the end of the infinitive, e.g. *cullà* 'to ride,' *cullaraghju* 'I will ride.' Additionally, *à* 'to/at' and *è* 'and' have optional variants *ad* and *ed* before a vowel, and *cù* 'with' has a variant *cun* in all positions. In these cases, the proposal of an underlying final consonant does not seem particularly abstract.

1.3.2 Diachronic origin

The historical explanation for Corsican mutation is rather straightforward, paralleling the above synchronic account. The final vowels that block lenition (represented graphically with a grave accent) are those that were once followed by a consonant. Historically, this consonant would have formed a geminate with the following word-initial consonant, preventing lenition.

(7)

Cors.	Latin source[5]		Cors.	Latin	
è	et	'and'	(l)e	illae	'the'
hè	est	'is'	(l)i	illī	'the'
sò	sunt	'are'	so	suus	'his/her'
à	ad	'to/at'	(l)a	illa	'the'
stà	stat	'is'	sta	ista	'this'
dì	dīcere	'to say'	di	dē	'of'
chì	quid/quis/quem	'that/who'	to	tuus	'your'
cù	cum	'with'			
-à	habet	'3rd sg. fut.'			
-à	-āre	'inf.'			
-ità	-itāt-	'-ity'			
avà	aequālis	'now'			

Importantly, these same sound changes can be observed word-internally. That is to say, the sound changes that gave rise to initial mutation in Corsican were not specific to word-initial position.

(8) Internal lenition:

vita	>	vita	[bida]	'life'
populus	>	populu	[pobulu]	'people'
gravis	>	greve	[greβ̞e]	'heavy'

Lack of lenition due to gemination:

lectus	>	lettu	[lettu]	'bed'
captiāre	>	caccià	[katʃˈtʃa]	'hunt'
adfundāre	>	affundà	[affunˈda]	'deepen'

Corsican lenition is thus the result of a regular sound change for which the domain was larger than a single word. However, a few facts are not explained by simply positing the same sound changes in all positions. Earlier word-final *-r*, *-l* and *-n* generally become synchronic blockers of lenition, for example in the infinitive ending (earlier *-r*) — the explanation being that they formed geminates with the following word-initial consonant through assimilation. However, word-internally, clusters beginning in these consonants did not simplify: e.g. *parte* 'part,' *pulvina* 'dust,' *pensà* 'to think.' Certain other clusters like *tr* also did not result in geminates within a word (Lat. *alter(um)* > Cors. *altru* 'other'). It seems that a general dispreference for word-final consonants was also at play here, such that clusters that would not have simplified word-internally did simplify across word boundaries. Thus more broadly, we must be careful in our expectations of how sound changes that lead to initial mutation apply in other environments.

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[5] The forms given here are the standard Classical Latin forms. Needless to say, the lenition sound changes that took place in Corsican took place long after the Classical period, and as such certain important changes had already taken place at the time of lenition; e.g. the basic masculine ending must have already developed to *-u*, as it behaves as a vowel-final morpheme for the purposes of lenition.

1.3.3 Italian raddoppiamento sintattico

Corsican mutation can be seen as a particularly salient example of the phenomenon known as *raddoppiamento sintattico* (Angel Borrelli 2002) found in many if not most varieties of Italian. In standard Italian, word-initial consonants are geminated after certain vowel-final words. The triggering words are essentially the same as those described above for Corsican; i.e. polysyllables with final stress and monosyllables which historically ended in a consonant (not indicated consistently in the orthography), though a few triggers are disyllables with initial stress. Unlike the Corsican phenomenon, Italian *raddoppiamento* is rarely referred to as "consonant mutation" in the literature (though see Zimmer 2005). This discrepancy is likely due to the lack of lenition in standard Italian, which fails to yield the more phonetically drastic alternations seen in Corsican. However, it is noteworthy that the Tuscan dialect is sometimes mentioned in discussions of consonant mutation. The characteristic *gorgia toscana* by which postvocalic stops are spirantized (generally only voiceless ones) is blocked by gemination, and as such the alternations triggered by *raddoppiamento* are more phonetically drastic than those of other dialects.

1.4 West Africa

Systems of initial consonant mutation are encountered in a number of Atlantic languages within West Africa, as well as some Mande languages spoken further to the south. Initial consonant mutation is also a feature of some Senufo languages, which Carlson (1994) attributes to the fact that "*nasal + voiceless obstruent clusters of the proto-language are realized as voiced obstruents" (140), but these will not be explored further here due to a lack of information. Finally, Blench (2006) identifies a seemingly unproductive pattern of consonant mutation in some Plateau languages of central Nigeria, used to mark noun and verb plurality. As the Senegambian mutation systems will be discussed in the remaining chapters, this section will treat Mande and the Plateau languages.

1.4.1 Mande

A two-grade system of initial consonant mutation is found in many Southwestern Mande languages, and some Western Mande languages. Mende (Southwestern) shows the following alternations (Iosad 2008):

strong	p	t	k	kp	f	s	mb	nd	nj	ng
weak	w, β	l	g, w	gb	v	ʤ	b/ɓ	l	y	w, y

Figure 10: Mutation system of Mende

Nouns, verbs, adjectives, and postpositions are subject to mutation, dependent on their immediate syntactic environment. In verbs, a weak initial consonant is used when it is preceded by an object. Nouns show weak grade when preceded by a possessor noun in a genitive construction, and in the second member of a noun-noun compound. Adjectives and postpositions show weak grade when following a noun. In the following example, weak grade is triggered on the verb only when its object immediately precedes it.

(9a)	ngúlɛ́-í	mìa	ndòpó-ì	**kp**àndì-á
	oil-DEF	FOC	child-DEF	heat-PERF
	'the child has heated the oil'			

(9b)	ndòpó-ì	ngúlɛ́-í	**gb**àndì-á
	child-DEF	oil-DEF	heat-PERF
	'the child has heated the oil'		

Similar systems of alternation are found in other Southwestern Mande languages like Loma, Loko, and Bandi (Kastenholz 1996). While synchronic analyses of Mende generally take the strong grade as basic (though see Iosad 2008 for a counterargument), Hyman (1973) demonstrates that the historical development of these systems is the result of earlier nasal prefixes (still found in some closely related languages) which gave rise to the strong grade, while a general process of intervocalic lenition reshaped the unprefixed weak grade. Tateishi (1990) gives what is essentially a synchronic version of this historical analysis, attributing Mende mutation to a prefix which surfaces only in the appropriate syntactic contexts.

In Kpelle (Southwestern), initial consonant mutation marks definiteness on nouns (along with a suffix *-i*, which does not surface after a final nasal), and assumes the function of a 3rd sg. object pronoun on verbs. The two-grade mutation system is as follows:

unmutated	p	t	k	kp	f	s	ɓ	l	y	ɣ	w
mutated	b	d	g	gb	v	z	m	n	ɲ	ŋ	ŋw

Figure 11: Mutation system of Kpelle

In addition, initial nasals become syllabic with an added low tone. Some examples of definite nouns (Leidenfrost and McKay 2007: 11):

(10)	indef.	def.	
	pɛ́rɛ	bɛ́rɛi	'house'
	kéleŋ	géleŋ	'truck'
	fãa	vãai	'wind'
	ɓɔrɔ	mɔrɔi	'bag'
	ɣîla	ŋîlai	'dog'
	nɛnî	n̩ɛnîi	'woman'

An example with a 3rd sg. object (Leidenfrost and McKay 2007: 19):

(11a) a núu tôlii
'he is calling a man'

(11b) a dôlii
'he is calling him'

Note that other object pronouns are segmental prefixes on the verb. Mutation in Kpelle must be the result of an earlier low tone nasal prefix. It is however noteworthy that the definite form of nouns is accompanied by a segmental suffix, which is of course not adjacent to the mutating consonant.

Some Western Mande languages make use of an altogether different pattern of mutation. Jɔ (Carlson 1993) exhibits initial alternations between a nasal and non-nasal grade:

non-nasal	b	d	r	ʤ	gb	f	s	ʃ	y	w
nasal	m	n	n	ɲ	ŋm	v	z	ʒ	ɲ	ŋ

Figure 12: Mutation system of Jɔ

All voiceless stops are prenasalized in nasal grade. In Jɔ, nasal grade is triggered by lexically-specified preceding nouns (and some pronouns and adjectives). Approximately one fifth of nouns exert this effect, and only when they are "syntactically linked" to the following word. Carlson attributes this mutation to earlier final nasal consonants which were lost in the modern language.

1.4.2 Plateau languages (Hyam)

Blench (2006) reports that various Plateau languages of central Nigeria (at least Hyam, Berom, Aten, and Cara) exhibit initial consonant alternations between the singular and plural form of nouns and verbs (a plural verb is "either an iterative, habituative or implying a plural subject or object"). The language with the most widespread alternations is Hyam, for which Blench provides all of the attested consonant alternations. Some alternations involve the simple palatalization of the consonant to form the plural: /x, h, k, g, gb, kp, n, ŋg, p, w/, and /kp^w→kp^j/, /h^w→h^j/. Other consonants undergo less predictable alternations:

sg.	ʧ	f	b	d, d^j	ɣ	x^w	m	ʃ	t	v	ʒ
pl.	ts	s	dz	g^j	y	h^{jw}	n̪	s	k^j	z	z

Figure 13: Mutation alternations of Hyam

There are a few other alternations (e.g. r~y, gb~gb^w) that occur in only one word. Words beginning in the consonants /dz, ʤ, r, s, ts, w, j, ɥ, z/ undergo no change when pluralized. These singular/plural alternations are not accompanied by a segmental affix (e.g. *bim/dzim* 'to fetch,' *ʒu/zu* 'room(s)'). It must be noted that these alternations do not apply to the entire lexicon. Blench reports that the "alternations are very sporadic; they do not occur on all nouns or verbs." It is unfortunately not known what percentage of the lexicon exhibits an alternation, or whether this alternation process is productive. Perhaps the most notable feature of this system is the disparate nature of the place changes involved in the different series. While many consonants are simply palatalized, labials except /p/ become alveolar/dental, alveolar stops become palatalized velars, and most astoundingly, palatal consonants are depalatalized. The phonetic irregularity of these alternations would render a featural affixation analysis complicated at best.

These alternations developed from earlier plural prefixes, still preserved in related languages. However the precise pathway by which these prefixes yielded the modern pattern is far from clear. The attested prefixes are of a variety of shapes, including the reduplication of the initial CV- of the root. Furthermore, singular forms are also marked with prefixes. It seems likely that a once wider range of possible initial alternations was narrowed to the current set, with palatalizing alternations becoming preferred for most consonants. Ternes (1990: 15) gives some rather straightforward examples from Kaningkom in which initial palatalization and labialiazation are equivalent to the *i-* and *u-* prefixes of neighboring Nindem.

1.5 Bantu

Many Bantu languages of Sub-Saharan Africa exhibit consonant alternations that are sometimes described as mutation. Two unrelated processes are relevant: stem-initial alternations (most commonly nasalization), and stem-final spirantization.

1.5.1 Initial Alternations

1.5.1.1 Nasalization

Most Bantu languages have certain prefixes which nasalize the initial consonant of the stem. The historical prefixes which can trigger this nasalization are the 1st person singular prefix **N*- for verbs, and in the nominal system the noun class 9/10 prefix **N*-. In some languages, secondary nasalization arises from the class 1, 3, 4, and 6 prefixes **mu*-, **mu*-, **mi*-, and **ma*- when the vowels of these prefixes are deleted. The resulting nasal alternations are occasionally referred to as consonant mutation in the literature (e.g. Peng 2003 for Kikiyu).

In some Bantu languages, the addition of a nasal prefix is described as the straightforward addition of a nasal phoneme /N/, unspecified for place (Odden, to appear). There are often different allophonic realizations of some phonemes after a nasal, but the nasal behaves very much like a separate consonant, in some cases even functioning as a syllable nucleus. In these languages, NC sequences can simply be seen as consonant clusters. However, in other Bantu languages prenasalized stops are best analyzed as single segments rather than clusters, and thus when a prenasalized stop alternates with some other consonant at the beginning of a stem, it need not be analyzed as the prefixation of a phoneme, but can rather be treated as the replacement of one phoneme with an entirely different one. Herero (R30: Möhlig and Kavari 2008) is one such language, in which the majority of stem-initial consonants alternate with a prenasalized stop when put in noun class 9 (*o*-) or 10 (*oðo*-).

basic	p	t	t̪	k	(h)	ʃ	w	v	r	ð	y	Ø
prenasalized	mb	nd	nd̪	ng	(nʤ)	nʤ	mbw	mb	nd	nd̪	nʤ	ng

Figure 14: Initial nasal alternation in Herero

Some examples (from Möhlig and Kavari 2008 and Kolbe 1883):

(12)

other noun class		class 9	
oʃi-pé	'new'	o-mbé	'new'
oʃi-t̪ít̪í	'small'	o-nd̪ít̪í	'small'
e-andá	'family name'	o-ngandá	'family/house'
oka-ðérá	'little bird'	o-nd̪érá	'bird'
oʃi-re	'long'	o-nde	'long'
oʃi-ví	'bad'	o-mbí	'bad'
oka-hupa	'little calabash'	o-nʤupa	'calabash'

The nasals /m, n, n̪, ɲ/, fricative /θ/, and in most cases /h/ do not undergo any alternation.

Umbundu (R10: Schadeberg 1982) exhibits a similar system of alternation, but here the voiceless stops alternate with plain nasals (though note /k~h/).

basic	p	t	ʧ	k	v	l	y	Ø
nasalized	m	n	ɲ	ŋ/h	mb	nd	nʤ	ng

Figure 15: Initial nasal alternation in Umbundu

In the verbal system, a 1st person singular subject or object is marked by nasalizing the initial consonant of the stem.

(13)

imperative		1st sg. subj.	
vànʤá	'look!'	mbànʤa	'I look'
làndá	'buy!'	ndànda	'I buy'
yéva	'hear!'	nʤéva	'I hear'
èndá	'go!'	ngènda	'I go'
pópya	'speak!'	mópya	'I speak'
túma	'send!'	núma	'I send'
cíl̰a	'dance!'	ɲíl̰a	'I dance'
kwátá	'take!'	ŋwátà	'I take'

In the nominal system, a number of irregular alternations exist between singular/plural pairs where one is in a historically nasalizing class, e.g. *e-téké* / *olo-néké* 'night(s)' (class 5/10) (Schadeberg 1996). A regular alternation exists when forming agentive nouns in the nasalizing class 1. Note that in the nominal system, /k/ nasalizes to /h/, rather than /ŋ/ as in the verbal system.

(14)

root		agentive noun (class 1)	
-pónda	'slay'	ó-móndi	'murderer'
-túnga	'construct'	ó-núngi	'inhabitant'
-cítiwà	'be born'	ó-ɲítiwe	'native'
-kémba	'lie'	ó-hémbi	'liar'

1.5.1.2 Class 5 alternations

Some Bantu languages exhibit initial alternations that are not the result of nasalization. In Luganda (JE15: Clements 1986), the class 5 prefix (Proto-Bantu *į-), used in forming augmentatives, results in the gemination and in some cases hardening of stem-initial consonants.

(15)

noun root	augmentative	
-kubo	kkubo	'path'
-tabi	ttabi	'branch'
-bala	bbala	'spot'
-sajja	ssajja	'man'
-fumu	ffumu	'spear'
-langa	ddanga	'lily'
-yinga	jjinga	'stone'
-wanga	gg^wanga	'nation'

In Shona (S10: Fortune 1980: 50), the phonological exponent of class 5 is simply the voicing of an initial /p, t, k, pf, ʧ, tsv/[6].

(16)	class 5 (sg.)	class 6 (pl.)	
	ɓángá	ma-pángá	'knife'
	ɗangá	ma-tangá	'pen for animals'
	goré	ma-koré	'cloud'
	bveni	ma-pfeni	'baboon'
	ʤírá	ma-ʧírá	'cloth'
	ʣvatsvátsva	ma-tsvatsvátsva	'spider sp.'

When used to form augmentatives, this prefix induces voicing in an even wider range of consonants: /ʦ, f, s, ʃ/, in addition to those listed above.

(17)	augmentative (cl. 5)	root	
	ʣíru	-ʦíru	'big, fat heifer'
	bvuro	-furo	'large amount of grass'
	ʣíkaná	-síkaná	'large girl'
	ʤiri	-ʃiri	'large bird'

It is unclear if these four additional alternations were introduced analogically in augmentative forms, or were lost in other class 5 contexts. Voicing of initial consonants as the mark of class 5 is also found in Aka (C104: Akinlabi 2011), spoken at the opposite extreme of the Bantu-speaking area.

1.5.1.3 Synchronic analyses

It is standard in the Bantu literature to treat initial nasalization as the result of a prefix of the form *N*-, even in languages where prenasalized stops are analyzed as single segments (e.g. Peng 2013). Though not often stated in these terms, this is essentially an abstract phoneme-trigger analysis of the same sort used by Hamp for Celtic. Other analyses intentionally avoid proposing a segmental prefix, describing the alternations as the substitution of one phoneme for another. In describing what is essentially the same process in Umbundu and Herero, Schadeberg (1982) identifies a segmental prefix *N*- in Umbundu, and terms the resulting prenasalized stops "consonant clusters," whereas Möhlig and Kavari state for Herero, "When nouns and adjectives are constructed in class 9/10, a stem initial consonant is substituted by its homorganic pre-nasal" (2008: 36). These alternations could also be analyzed as the affixation of a nasal feature, which is perhaps the spirit by which *N*- is to be interpreted in some analyses. For the class 5 gemination in Luganda, Clements (1986) proposes that the class 5 prefix is a mora, to which the initial consonant of the stem is linked by a general phonological process of the language. For Shona, Lafon (1994) analyzes the class 5 prefix as having a featural allomorph *V[oice]-*.

1.5.1.4 Diachronic origin

In the case of initial nasalization, prefixes consisting of a single homorganic nasal segment can be reconstructed for the class 9/10 marker and the 1st person singular marker

[6] Note that [ɓ, ɗ] are the only voiced stops at these places of articulation, and thus can be thought of as simply /b, d/.

(Schadeberg 2003). Because Proto-Bantu roots were all consonant-initial[7], it is difficult to know what the un-assimilated value of this nasal would have been at some earlier stage. In the case of Umbundu, some of the *N-* prefixes which trigger nasalization can be traced back to an original **mV-* prefix, as in the class 1 prefix **mu-* responsible for nasalization in agentive nouns, which survives as *mu-* or *m̩-* in most of the surrounding languages.

The origin of the initial alternations in class 5 can be attributed to sound changes triggered by the original class 5 prefix **į-*. The exact phonetic nature of this so-called "super-high" vocalic segment is disputed, but it was certainly a high front vowel which was likely accompanied by frication of some sort (Maddieson 2003). In Luganda, it developed first into a glide, perhaps simply [j], and then this segment assimilated to a following consonant. It is retained as a glide in closely related languages, cf. Lusoga *e-i-gumba* = Luganda *e-ggumba* 'bone' (Clements 1986: 64). In Shona and Aka, this same original prefix is ultimately responsible for the voicing of following consonants, though the pathway by which **į-* came to uniquely voice consonants in these languages has to my knowledge not been explored.

1.5.2 Spirantization

Many Bantu languages exhibit stem-final spirantization of consonants before the causative suffix **-į*, and in some cases also the agentive **-į*, adjectival **-ų*, and perfective **-įd-e*. This process is commonly referred to as consonant mutation in the literature (see Zoll 1995), though the purely phonetic terms "spirantization" and "frication" are more often employed. The effects of mutation in the causative can be seen in Bemba (M42: Hyman 2003: 54) as a change of /p, b/ to /f/ and /t, l, k, g/ to /s/.

(18)	stem	causative stem	
	leep-a	leef-y-a	'be long'
	lub-a	luf-y-a	'be lost'
	fiit-a	fiis-y-a [fiːʃja]	'be dark'
	lil-a	lis-y-a [liʃja]	'cry'
	buuk-a	buus-y-a [buːʃja]	'get up'
	lúng-a	lúns-y-a [lúnʃja]	'hunt'

Other languages exhibit somewhat different patterns: in Luganda (JE15: Hyman 1997) /t, k/ become /s/, and /l, g/ become /z/ before *-y* 'causative,' *-i* 'agent,' and *-y-e* 'perfective.' As the /y/ in these suffixes is not pronounced after /s, z/, mutation is the sole exponent of the causative in /t, k, l, g/-final roots. The adjectival suffix *-u* triggers a different mutation pattern whereby /p, t, k/ become /f/, and /b, l, g/ become /v/. Crucially, these mutations cannot be considered an automatic result of the following high vowel, as other suffixes containing high vowels do not trigger mutation.

Zoll (1995) analyzes these mutations in terms of consonantal features on the vowel of the mutating suffix, which are spread to the preceding root-final consonant. Thus, a vowel /i/ can be given two featural specifications, one for a "normal" vocalic segment, and one for a "consonantal" vowel inducing mutation. This synchronic analysis in many ways parallels the

[7] This is in fact a somewhat contentious claim, as many roots reconstructed with an initial obstruent *j (or glide *y) only show evidence of this initial consonant in that the realization of the nasal prefix before them is as a palatal nasal in some languages. It could be argued that the prefix itself was a palatal nasal, surfacing as such on vowel-initial consonants. In the case of the 1st sg. prefix, there is good evidence from a number of languages for reconstructing **ni-*.

historical origin of these mutation patterns. The original phonemic distinction between the super-high vowels **i̧* and **u̧*, which were likely produced with accompanying frication, and the plain high vowels **i* and **u* was lost on the vowels themselves, merging to /i, u/ in the languages in question, but the spirantizing effect of the super-high vowels on the preceding consonants was maintained even after the vowels themselves lost their frication.

1.6 Austronesian

Many Austronesian languages have developed stem-initial consonant alternations resulting from prefixes which historically (and often synchronically) contained nasals. Most of these alternations are treated as simple sandhi processes subsumed under the general term "Nasal Substitution," and are not considered consonant mutation in the literature. However, the Central Vanuatu languages as well as the Nias language of Sumatra have developed clear systems of consonant mutation.

1.6.1 Nasal Substitution

Blust (2004) gives an extensive overview of Nasal Substitution in Austronesian languages. These patterns arise when a nasal-final prefix, most commonly one descended from Proto-Austronesian **maŋ-* 'active verb' or **paŋ-* 'agent/instrument,' precede a consonant-initial root. A commonly cited example is that of Malay/Indonesian, in which root initial /p, t, s, k/ appear to be replaced by a homorganic nasal /m, n, ɲ, ŋ/ when prefixed with *meŋ-* 'active verb,' e.g. *pukul* → *me-mukul* 'to hit.' Before other consonant-initial roots, the final nasal of this prefix either assimilates or is deleted depending on the consonant. Before vowel-initial roots, it surfaces as /meŋ-/ (*ikut* → *meŋ-ikut* 'to follow'), and before monosyllabic roots as /meŋe-/. Because /ŋ/ is preserved as an overt consonantal segment in these environments, there is no mystery as to why many initial consonants are nasalized. Phonological rules of assimilation and deletion affecting /ŋC/ sequences can account for the root-initial consonant alternations, and as such they are to my knowledge never considered to be consonant mutation.

1.6.2 Central Vanuatu

A large number of the languages of Central Vanuatu (Southern Oceanic) exhibit a system of initial consonant mutation that cannot be analyzed synchronically as the phonological interaction of two segments. Crowley (1991) provides an excellent overview of these systems, along with a discussion of their historical origin. These languages make use of a two-grade mutation system for verbal roots, whereby certain morphosyntactic categories are marked by mutating the initial consonant of the verb. Taken as a whole, these two grades can be termed oral and nasal, but as these terms are often not particularly accurate in describing the individual patterns of each language, the terms "primary" and "secondary" are employed.

In the Epi languages Lewo, Bierebo, Baki, and Bieria, mutation to the secondary grade is used to mark realis.

primary	v	w	t	c	k	h	
secondary	p	p^w					(Lewo)
secondary	p	p^w	nd	nj	nk		(Bierebo)
secondary	mb		c	s			(Baki)
secondary	mb		nd			m	(Bieria)

Figure 16: Mutation systems of Epi languages

Conspiciously, the Epi language Maii exhibits mutation only of /v, t/ to /b, d/, with realis being marked elsewhere by an overt prefix *m-*.

In the closely related languages of Namanamanga and Nakamir, primary grade is triggered on a verb following the conditional marker *pe* (Nam.) / *pe/be* (Nak.), intentional marker *ŋa* (Nam.) / *pa/pu/ba* (Nak.), imperative marker *p*^{w}*a* (Nam.) / *Ø* (Nak.), nominalizing circumfix *na-/-ana* (Nam.) / *na-/-ean* (Nak.), and when used as a modifier or in the second part of a compound.

	Namanamanga				Nakamir				
primary	v	w	k	r	v	w	k	r	t
secondary	p	p^w	ŋ	t	b	b	ŋ	d	d

Figure 17: Mutation systems of Namanamanga and Nakamir

In Nāti, secondary grade is triggered by the future tense prefix *a-* and the negative prefix *sa-*. Interestingly, /t/ and /k/ mutate only in active verbs, and not stative verbs.

primary	v	t	r	w	ʔ	k
secondary	mp	nt	ntr	mpw	ŋk	ŋk

Figure 18: Mutation system of Nāti

In each of the above languages, a number of initial consonants are invariant, for example /p, m, n, ŋ, l, s, h/ in Nāti.

1.6.2.1 Historical source

Crowley traces most of these mutation patterns back to a Proto-Central Vanuatu realis marker **m(V)-*. In a few languages like Maii, it is preserved as a segemental prefix, but in most others it has fused with following consonants, yielding the modern mutation patterns. Mutation in some languages carries on the original function of this realis marker, as in the Epi languages. In other languages mutation has developed a more complicated function, as in Namanamanga and Nakamir, but here the morphology that triggers the primary endings would have been roughly those that did not occur with the realis marker at some earlier stage. In some other cases, the source of mutation may not have been the realis marker **m(V)-*. For Nāti, Crowley proposes that an earlier irrealis marker **na* may have come to mark future tense, and then fused with the following verb. In an altogether different type of pattern from those described above, alternations of the type *biles~viles~hiles* 'turn' (Southeast Ambrym) can straightforwardly be explained as the development of prefixed forms *ba-hiles, va-hiles* (still found in Paamese).

The fact that so many Central Vanuatu languages make use of superficially similar mutation patterns has led others to propose a system of oral vs. nasal grade mutation for the proto-language. Crowley however shows that it is impossible to reconcile the various phonological developments across these languages with an original mutation system in the proto-language. The development of mutation must have technically been a separate innovation in a large number of sub-branches and individual languages. Crowley admits that, "Given the widespread distribution of patterns of verb-initial mutation in the languages of Central Vanuatu, it is almost too much to expect that systems that seem in very many ways to be so similar should have evolved completely independently since the breakup of Proto-Central

Vanuatu" (209). Reconciling the necessity of independent developments of mutation with its widespread distribution, Crowley proposes that the proto-language likely exhibited allophonic alternations triggered by the nasal prefix **m(V)-*; for example, heteromorphemic sequences of **mt*, **mk*, and **mv* may have been pronounced as [md, mg, mb] respectively, but could not have neutralized with the proto-prenasalized stops, which often show completely different reflexes. From this "inherently unstable" starting point, a system of mutation was a natural development. Crowley summarizes, "...there was no original oral-nasal grade alternation, but as a result of a morphophonemic asymmetry that had developed in Proto-Central Vanuatu [...] the descendent languages were in a sense predisposed toward the development of nasal grade-like mutated roots in certain morphosyntactic contexts" (179).

1.6.3 Nias

The Nias language (Northwest Sumatran, Brown 1994) makes use of mutation to mark case. The initial consonant of nouns appears in one of two grades depending on its case— unmutated in the ergative, and mutated in the absolutive and genitive, e.g. *siʔo* 'stick (erg.),' *ʤiʔo* 'stick (abs./gen.). Nouns also appear in mutated form as the object of certain prepositions, but not others. Verbs apparently also undergo initial consonant mutation to mark tense, but this is not explained further.

unmutated	t	k	f	s	b	d	r	ʔ	ʔ
mutated	d	g	v	ʤ	mʙ	nr	nr	g	n

Figure 19: Mutation system of Nias

The remaining stem-initial consonants /w, l, m, n, g, h, ʤ/ do not mutate. Whether /ʔ/ alternates with /g/ or /n/ is lexically determined. Historically, certain velar and uvular consonants became /ʔ/, yielding the /ʔ ~ g/ alternation, while originally vowel-initial and ʔ-initial roots gave rise to the /ʔ ~ n/ alternation. Brown proposes that the origin of this pattern can be found in earlier case prefixes containing a nasal segment. For the genitive case, this is Proto-Austronesian **ni*, and Brown assumes that some similar nasal morpheme marked absolutive case at an earlier stage.

1.7 Iwaidja

The Australian language Iwaidja (Iwaidjan, non-Pama-Nyungan, Evans 1998) exhibits a two-grade mutation system within both verbal and nominal paradigms.

unmutated	m	w	y	ŋ	w	ɺ
mutated	b	b	ʤ	k	k	ɹ

Figure 20: Mutation system of Iwaidja

In verbs, mutation marks a 3rd person singular subject on intransitive verbs, as well as 3rd singular objects on transitive verbs (provided the subject is not also 3rd person). In the nominal system, mutation marks the singular of certain lexically-specified nouns, adjectives, and prepositions e.g. *baryun / maryun* 'young man/men,' as well as a few noun > noun derivations involving metaphorical extension, e.g. *maŋartalk* 'flame,' *baŋartalk* 'foliage.'

In all cases, mutation can be traced to a historical gender prefix **aK-* which is synchronically seen only in the hardening of a following consonant— historically the blocking of intervocalic lenition. An overt gender prefix is used in related languages to mark the same morphological alternations that mutation marks in Iwaidja, and the final consonant of this prefix also causes hardening of following stops. This final consonant surfaces as /w/ in some languages before a vowel, but is otherwise deleted before another consonant, and thus the exact identity of *K is apparently unknown.

The closely related Maung shows similar alternations, for example *i-mawur* ‘a man’s arm,’ *a-bawur* ‘arm,’ and *i-ŋidjalg* ‘human body (male),’ *a-gidjalg* ‘fruit’ (Capell and Hinch 1970: 47). However Capell and Hinch (1970: 36) analyze these as phonologically-conditioned sandhi alternations resulting from consonant clusters across word or morpheme boundaries, with the class 6 gender prefix in question being underlyingly *aw-*. Under such an analysis these alternations are not truly consonant mutation since they are entirely phonologically triggered. However the behavior of the specific prefix *aw-* does not follow from the general principles that Capell and Hinch lay out for these sandhi phenomena, and furthermore the class 5 prefix *ma-* seems to have an effect on root-initial consonants despite being listed as vowel-final, e.g. class 4 *u-wadbadi* ‘bare (of ground),’ class 5 *ma-ŋadbadi* ‘leafless (of trees),’ class 6 *a-gadbadi* ‘tuberless (of root plants)’ (Capell and Hinch 1970: 47). Thus it seems that the Muang phenomenon might be reasonably treated as consonant mutation, though unfortunately relevant data is scant in Capell and Hinch. If a mutation analysis is warranted, Muang would present perhaps the closest typological parallel to the Atlantic mutation systems, in which segmental noun class prefixes are also triggers of mutation.

1.8 Fataluku and Makalero

Heston (2015: 97-108) describes a pattern of consonant mutation in the related Papuan (Trans-New-Guinea) languages Fataluku and Makalero of East Timor. In certain environments, a verb-initial consonant will alternate with an independent phoneme of the language.

	Fataluku					Makalero		
unmutated	t	s	h	f	Ø	t	h	Ø
mutated	ts	ts	ts	p	n	d	s	n

Figure 21: Mutation systems of Fataluku and Makalero

Heston analyzes all of the contexts for mutation in Fataluku as being serial verb constructions, in which the non-initial verb can exhibit the mutated grade. The element identified as the first verb in the construction generally has an entirely grammatical meaning, but can appear as the sole verb in a clause, e.g. *naa* ‘be at’ in example (19). Some examples:

(19a) ana taya
1s sleep
‘I sleep’

(19b) ana lee naa tsaja
1s house at sleep
‘I sleep at the house’

(20a) ikar-e
cold-VB
'to be cold'

(20b) tali nikar-e
beyond cold
'to be very cold'

However, whether mutation applies is lexically specific to the potentially mutating verb, and can also vary by speaker.

Heston provides a historical account of mutation in both languages by which an earlier morpheme **n* appeared after the initial verb in the serial verb construction, which may survive also as a locative suffix *-n* in Fataluku. Already in Proto-Timor this **n* had transphonologized into a mutation system, which Heston reconstructs as follows:

unmutated	*t	*s	*p	Ø
mutated	*d	*D [dz]?	*b	n

Figure 22: Reconstructed mutation system of Proto-Timor

The subsequent development of the modern mutation systems can be attributed to regular sound changes that operated in each language (*s > h, and it seems also *s > s in Fataluku in some cases).

1.9 Uralic

A number of Uralic languages (most Finno-Saamic languages and Nganasan) show morphologically-conditioned medial consonant alternations known in the literature as "consonant gradation." Medial consonants can appear in either strong or weak grade depending on their morphological environment. The gradation system of Finnish (Pöchtrager 2001) involves geminates weakening to singletons, and voiceless singletons weakening to voiced consonants, or assimilating to preceding nasals, /l/, and /r/. The weak grade of /k/ presents some further complications which will not be detailed here.

strong	pp	tt	kk	p	t	k	mp	nt	nk	lt	rt
weak	p	t	k	v	d	Ø	mm	nn	ng [ŋŋ]	ll	rr

Figure 23: Finnish consonant gradation system

The conditioning of weak grade in Finnish is both phonological and morphological in nature. Gradation only targets stops between voiced segments, and never occurs before a long vowel. Weak grade is often triggered by suffixes that create a closed syllable in which the mutating consonant is the onset, such as the genitive suffix *-n*.

(21) <u>nominative</u> <u>genitive</u>
matto mato-n 'carpet'
katu kadu-n 'street'
ranta ranna-n 'beach'

However, there are numerous exceptions to this phonological tendency. For example, weak grade is triggered in imperatives (*kerto-a* ‘to tell,’ *kerro!* ‘tell!’), as well as the negative, despite having no overt segmental suffix. Some suffixes which create a closed syllable fail to trigger weak grade, such as the 1st person plural possessive suffix *-mme*.

Finnish consonant gradation is usually regarded as a case where a once-regular phonological alternation is still influenced by phonological factors, but has become obscured by various historical changes to the point that certain morphological constructions must be associated with one consonant grade or the other. However, analyses at two opposite extremes also exist in the literature: Skousen (1971) sees Finnish consonant gradation as completely morphologically conditioned, with speakers simply memorizing various paradigmatic forms rather than being influenced at all by phonology, and Pöchtrager (2001) argues forcefully that consonant gradation is to be seen as an entirely phonologically-conditioned phenomenon, with the apparent exceptions being “illusion[s] resulting from an inadequate model of syllable structure” (32). Nonetheless, even Pöchtager would have to admit that the alternations are only predictable once speakers have learned a number of patterns which are on the surface arbitrary, and thus it seems best to treat Finnish consonant gradation as a form of mutation.

In the Estonian gradation system (Trosterud and Uibo 2005, Gordon 1997), the original phonological conditioning is even further obscured, such that segmentally identical case suffixes can trigger different gradations, e.g. genitive *-e* triggers weak grade, but partitive *-e* triggers strong grade. The types of attested alternations between strong and weak grade are also more numerous in Estonian, in part due to the fact that it has developed a three-way length distinction.

strong	ppp	ttt	kkk	ppp	ttt	kkk	p	t	k
weak	pp	tt	kk	p	t	k	v/Ø	j/Ø	j/Ø

Figure 24: Partial Estonian gradation system

These are the possible alternation patterns involving stops when not in consonant clusters. Sonorants and /s/ also mutate, and the mutations of consonants in clusters are somewhat complicated. While alternations within an inflectional paradigm are generally two-way, because of the overlap of consonants in each grade, a strong grade consonant (e.g. /p/) may be interpreted as weak for the purposes of some other morphological operation, and further strengthened, leading to a three-way alternation within a single root. For this reason Estonian is often described as having a three-grade gradation system, though only a two-grade system (strong vs. weak) can be referenced by morphological processes. Some roots exceptionally show no alternations at all.

The historical origin of consonant gradation in Finnish, Estonian, and Saami has been discussed extensively in the literature. Gordon (1997) provides an overview of the traditional account alongside his own historical account. These differ most notably in that the traditional account holds that gradation is essentially the result of a lenition sound change, while Gordon attributes it to fortition. All accounts agree that as a result of certain regular sound changes, there was a phonologically regular alternation between weaker consonants in the onset of closed syllables, and stronger ones in the onset of open syllables. Certain further sound changes and analogical reshapings of this transparent system yielded a more opaque system of alternation in the modern languages, e.g. Estonian *jalk ~ *jalan > jalk ~ jala ‘foot (nom./gen.)’ after the regular loss of final /n/ (cf. Finnish *jalka ~ jalan*).

1.10 Nivkh

The Nivkh (Gilyak) language of eastern Siberia exhibits root-initial alternations between stops and fricatives (Shiraishi 2000, 2006).

stop	p^h	p	t^h	t	c^h	c	k^h	k	q^h	q
fricative	f	v	r̥	r	s	z	x	ɣ	χ	ʁ

Figure 25: Mutation system of Nivkh

Underlyingly, stops and fricatives are lexically contrastive root-initially[8], and this distinction surfaces phrase initially (e.g. *xu-* 'kill' vs. *k^herqo-* 'catch'). However, when preceded by another word, this contrast is subject to a phonologically-conditioned neutralization. After a word ending in a vowel, glide, or stop, initial stops become fricatives, and if the preceding word ends in a fricative or nasal, initial fricatives become stops. These alternations can be seen as dissimilatory between two obstruents, and assimilatory between an obstruent and a preceding sonorant or vowel.

(22)

unmutated		mutated	(Shiraishi 2006: 86-88)
t^hom	'fat'	hɨjk r̥om	'hare fat'
kujva	'ring'	toto ɣujva	'silver ring'
ciɣr̥	'tree'	qoj ziɣr̥	'larch tree'
r̥xɨrp-	'forget'	ɲɨŋ t^hxɨrp-	'forget us'
xu-	'kill'	c^hxɨf k^hu-	'kill a bear'
za-	'beat'	xan ca-	'beat a dog'

However, this phonological rule of alternation applies only within certain syntactic domains, qualifying the process as consonant mutation rather than a simple phonologically-automatic alternation. Specifically, mutation applies only between a verb and its preceding complement, a noun and its preceding modifier or possessor, and a noun and a postposition, as well as after prefixes and in reduplication. The following two examples exemplify the syntactic contrastiveness of mutation (Shiraishi 2006: 95).

(23a) eɣlɲ r̥o-
child hold
'the child holds (something)'

(23b) eɣlɲ t^ho-
child hold
'(someone) holds the child'

In the first example, mutation does not apply to the verb, as the preceding noun is the subject, whereas in the second, the object noun triggers mutation.

[8] For the most part, nouns are stop-initial, and verbs are cited as fricative-initial, but there are an appreciable number of fricative-initial nouns, and a few stop-initial verbs. It is noteworthy that the fricative-initial nouns never undergo mutation, while the few stop-initial verbs do. Shiraishi (2000) proposes that all verbs are in fact underlyingly stop-initial, so that the only active phonological process is spirantization, and never hardening. This analysis must be historically correct, as transitive verbs were at one point obligatorily prefixed with an object marker *i-* when not preceded by an overt object, which induced post-vocalic spirantization. It is unclear what the explanation is for verbs with stop-initial citation forms.

1.11 Mundurukú

The Tupi language Mundurukú (as well as the closely related Kuruáya) uses consonant mutation in much the same way as Nivkh (Picanço 2005). Seven of the language's 17 consonant phonemes participate in a two-grade alternation between root-initial voiced and voiceless sounds (the alternations in Kuruáya are similar, and not discussed further).

	Mundurukú			Kuruáya		
voiced	b	d/n	ʤ	b	l [l, ð, l̰]	d [ɖ, ʤ]
voiceless	p	t	ʧ	p	t	ʧ

Figure 26: Mutation systems of Munduruku and Kuruáya

The trigger of each grade is in part phonological— the voiceless consonants appear after a stop (oral or nasal), and the voiced variants appear elsewhere. The choice of /d/ vs. /n/ is completely dependent on the quality of the following vowel (oral vs. nasal). When phrase initial, only /p, ʧ, d~n/ surfaces, and thus mutation can be seen as voicing of an underlying /p, ʧ/ as well as devoicing of underlying /d~n/.

(24a)	ayáʧát	pətét	(24b)	toʃáw	bətét
	woman	name		chief	name
	'woman's name'			'chief's name'	

However, mutation occurs only in the second of two words or morphemes that are especially closely linked syntactically: a possessor followed by an inalienable noun, a verb and its preceding internal argument, a noun followed by a postposition, any word and a following enclitic particle, a verb with the causative prefix *mə-*, and in compounds. In other syntactic environments, mutation apparently fails to occur, though unfortunately Picanço provides no examples of mutation failing to operate in a relevant phonological environment. Picanço speculates that this pattern originated as the regular intervocalic voicing of /p/ and /ʧ/, and the resulting alternations were spread by analogy to /d/-initial roots.

1.12 Japanese (rendaku)

The phenomenon of *rendaku* in Japanese is generally not described as consonant mutation, but could quite reasonably be considered as such. Especially when considering its historical origin, rendaku is a useful point of comparison with other mutation systems. Rendaku causes the voicing of the initial voiceless obstruents /h, t, s, k/ to /b, d, z, g/. As in Nivkh and Mundurukú, this alternation is triggered only within a particularly tight-knit domain— here only within a compound, where the initial consonant of the second element is targeted. Also like these two other languages, the alternation appears on the surface to have a phonetic motivation, as the targeted consonant is inevitably intervocalic or (more rarely) post-nasal and prevocalic. Note however that intervocalic voiceless obstruents are perfectly common in Japanese, so this cannot be taken as a general phonologically-triggered rule. Some examples of rendaku:

> *yama* 'mountain' + *kawa* 'side' → *yamagawa* 'mountainside'
> *hotaru* 'lightning bug' + *hi* 'fire' → *hotarubi* 'lightning bug's glow'
> *shumoku* 'hammer sp.' + *same* 'shark' → *shumokuzame* 'hammerhead shark'

There is an important exception to this process known as Lyman's Law which states that rendaku will not occur if the second element already contains a voiced obstruent later in the word. Thus, voicing does not take place in the following compounds:

> *haru* 'spring' + *kaze* 'wind' → *harukaze* 'spring breeze'
> *umi* 'sea' + *hebi* 'snake' → *umihebi* 'sea snake'
> *ao* 'blue' + *sagi* 'heron' → *aosagi* 'grey heron'

Lyman's Law is often thought of as a sort of voicing dissimilation, though it conspicuously is not triggered by other voiced consonants (nasals and sonorants). Furthermore, there are some lexical exceptions to rendaku (e.g. *kata-kana* vs. *hira-gana*), and so the process is not entirely predictable.

Historically (Frellesvig 2010: 40-43), rendaku was not the result of intervocalic voicing, but of a nasal "linker morpheme" used in compounds. This morpheme was in most cases originally *no* (still used as the genitive marker), but in some cases dative *ni*, both of which lost their vowel in these compounds, developing into a simple homorganic nasal. In pre-modern Japanese, the voiced series of obstruents was prenasalized (as it still is in some Northeastern (*Tōhoku*) dialects), and in fact the ultimate origin of almost all voiced stops in Japanese can be traced to either borrowing, or an earlier /NVC/ sequence (e.g. *pi**muk**atsi* > *fi*^{ŋ}***g****asi* > *hi**g**asi* 'east,' -***nip**a* > -^{m}***b****a* > -***b****a* 'place').

Pre-Japanese	p	t	ts	k	NVp	NVt	NVts	NVk
Early Middle Japanese	f	t	(t)s	k	^{m}b	^{n}d	^{n}dz	^{ŋ}g[9]
Mod. Tokyo Japanese	h	t	s	k	b	d	z~dz	g~ŋ

Figure 27: Origin of Japanese voiced obstruents

Lyman's Law was thus originally a prenasalized obstruent dissimilation rule, very much like Meinhof's Law in various Bantu languages. The (hypothetical) evolution of *yamagawa* (with rendaku) and *harukaze* (with no rendaku due to Lyman's Law) is as follows:

	'mountainside'	'spring breeze'
earlier Japanese	yama-no-kapa	paru-no-ka^{n}tse
vowel loss	yama-^{ŋ}kapa	paru-^{ŋ}ka^{n}tse
dissimilation		paru-ka^{n}tse
Modern Japanese	yama-gawa	haru-kaze

The crucial difference is that in 'spring breeze' two prenasalized stops arose, prompting the denasalization of the first of these stops. After its establishment as a common feature of compounds, rendaku was quickly extended to novel compounds which would have never contained a linking *no* or *ni* historically. Such expanded uses of rendaku are attested from the earliest Japanese writing, and are seen even in some non-native compounds.

[9] The prenasalized stops may well have remained voiceless ([^{m}p], etc.) even into the Middle Japanese period, as Frellesvig suggests.

1.13 Western Nilotic

A number of Western Nilotic languages show mutation of final consonants. An overview is given by Trommer (2011). One characteristic of these mutation systems is a large number of mutation grades, with each grade often specific to a small set of suffixes or constructions. Nuer presents a rather simple system, in which final consonants of both noun and verb roots can appear in three grades (Lieber 1987: 78).

voiced	β	ð	d	ʝ	ɣ
voiceless continuant	f	θ	r̥	ç	h
voiceless stop	p	t̪	t	c	k

Figure 28: Mutation system of Nuer

Underlyingly, final consonants can be in any of these grades, and so there is in truth a fourth "unmutated" grade consisting of most of the consonants found in the other grades. In nouns, mutation is highly irregular, with individual roots exhibiting different grades in the genitive or plural, but apparently with no consistent pattern. In the verbal system, specific mutation grades are assigned by different tense and aspect suffixes; for example, the past participle is associated with mutation to the voiceless continuant grade. Some examples (Crazzolara 1933):

(25)	'overtake'	'hit'	'pull out'	'scoop hastily'	
infinitive	coβ	ja:ç	guð	kêp	(no mutation)
neg. pr. ptc.	còp	ja:c	gut̪	kep	(voiceless stop)
past ptc.	cof	ja:ç	guθ	kɛ̌f	(voiceless continuant)

Lieber analyzes these alternations as the result of the affixation of feature bundles, e.g. [+cont, -voi] or [-cont, -voi] which fill in underspecified root-final segments. Trommer (2011) makes it clear that the root-final consonants must in fact be prespecified for all features to account for the underlying contrasts that surface in unmutated forms (e.g. the infinitive), but supports the featural affixation approach.

A more complicated system is found in Päri (Trommer 2011: 263).

1	p	t̪	t	c	k	m	n̪	n	ɲ	ŋ	r	l	j	w
2.0	b	d̪	d	j	Ø	m	n̪	n	ɲ	ŋ	r	l	j	w
2.1											d	d		
3.0	p	t̪	t	c	k	mb	n̪d̪	nd	ɲɟ	ŋg	jj	nd	jj	ww
3.1											t	t		
4.0	mm	n̪n̪	nn	ɲɲ	ŋŋ	mm	n̪n̪	nn	ɲɲ	ŋŋ	rr	nn	jj	ww
4.1											nn	nn	ɲ	mm(ww)
5	mb	n̪d̪	nd	ɲɟ	ŋg	mb	n̪d̪	nd	ɲɟ	ŋg	jj	nd	jj	ww

Figure 29: Mutation system of Päri

The consonants of grades 2.1, 3.1, and 4.1 differ from those of 2.0, 3.0, and 4.0 only where noted. Each of these eight grades is triggered by a handful of affixes (in some cases a single affix) in the verbal system. The phonological form of the affix does not correspond at all with the triggered mutations, and in fact most of the relevant affixes are segmentally null. It is unclear whether Päri also exploits mutation in the nominal system, but the related languages Dholuo and Anywa make use of mutation in both the nominal and verbal systems.

Trommer treats all of these mutations as the result of featural affixation, or else the addition or deletion of a mora. In a few cases, he proposes a more or less abstract phonemic suffix. The ultimate historical origin of these alternations has not to my knowledge been determined.

1.14 Blin (Cushitic)

Fallon (2006) describes a non-initial consonant mutation pattern in Blin (Central Cushitic: Eritrea) plural formation. Consonants alternate as follows:

sg.	b	d	d	d	ʤ	g	g^w	x	x	x^w	x^w	w	r	l	r
pl.	f	t	s	ʃ	ʃ	k	k^w	k	k’	k^w	k^w’	k^w	t	t	l

Figure 30: Mutation alternations in Blin

Some alternations are found in only one or two words (ʤ~ʃ, l~t). The alternating consonant is generally the rightmost obstruent (in one case this is word-initial), though /r/ and /l/ sometimes participate in mutation as well.

(26)	<u>singular</u>	<u>plural</u>	
	dərgum-a	dərkum	‘sycamore’
	ləx-a	lək	‘fire’
	ʤəxəl-a	ʤəkəl	‘bird’
	gax-á	gák’	‘cave’
	nɨx^{w}ax^w	nɨx^{w}ak^w’-ti	‘husband’s father’
	jɨb-á	jɨ́f	‘leopard’
	ʔɨttɨb	ʔɨttɨf	‘navel’
	ləbbək-a	ləffək	‘heart’
	mad-a	mas	‘friend’
	fədən	fəsən	‘seed’
	dan	ʃán	‘brother’
	tawin-a	tak^{w}in	‘clothes’
	ʃənʃura	ʃənʃut	‘ant’
	ʔunar	ʔunat	‘week’
	bir-a	bil	‘bull/ox’
	gər	gəl	‘calf’

There are also examples in which multiple consonants alternate within the same root:

(27)	<u>singular</u>	<u>plural</u>	
	g^{w}ədig^w	g^{w}əsɨ́k^w	‘belly’
	ʔɨxɨr	ʔikɨl	‘father’
	dɨx^{w}ar-a	dɨk^w’ɨl	‘donkey’
	ʃabɨr	ʃafɨt	‘leather rope’

Note that many plurals are formed with a suffix *-(r)a*, and these do not undergo mutation. Other plurals are formed by reduplication, and these do sometimes show mutation (usually in both the base and reduplicant):

(28)

	singular	plural	
	ʔɨgɨm	ʔɨkɨkɨm	'thorn'
	ʔɨngʷ-i	ʔɨngʷɨkʷ	'teat'
	ʔəb	ʔəfɨ́f	'mouth'
	kad	kasɨ́s	'stomach'
	gix	gikɨk	'horn'

Fallon analyzes the plural forms as underlying, with mutation being the result of featural affixation of [voice] and/or [continuant] or [-lateral]. This account does not seek to explain which mutation alternations are exhibited by specific roots, nor does it attempt to explain in full which consonants in a root are targeted by mutation (for /r, l/ and roots with multiple mutating consonants). Fallon does not speculate about the historical origin of this pattern, but it is doubtless related to the phenomenon of templatic gemination seen elsewhere in Afro-Asiatic.

1.15 Chaha

The Ethiopian Semitic language Chaha exhibits a number of morphologically conditioned consonant alternations, termed "sound mutations" by Banksira (2000). Certain derivational and inflectional forms trigger one of two common processes on root consonants: simple palatalization, and labialization with concomitant palatalization. Palatalization can be seen in 2nd person singular feminine verb forms, of which this process is the sole marker (191).

(29)

	stem	*2nd sg. fem.*	
	wat'	wac'	'swallow'
	wɨt'a	wɨc'ə	'go out'
	dak'	dakʲ'	'laugh'
	t'af	t'ɛf	'patch'
	k'am	kʲ'am	'eat sth. small'
	faf	fɛf	'scrape'
	kɨtɨf	kɨtif	'hash'

Only coronal and velar consonants can be palatalized. A coronal consonant is palatalized only when it is the final consonant in the stem, though in some words it is not the final segment (as in 'go out'). A velar consonant, on the other hand, is palatalized even when it is not the final consonant, as in 'eat sth. small.' Only one consonant per word can be palatalized. If more than one palatalizable consonant is present, only the rightmost one is visible to the palatalization process, even if this means that no consonantal change is triggered. For example, in 'hash' the /k/ cannot be considered for palatalization because of the following /t/, which itself cannot be palatalized because it is not the final consonant in the stem.

One inflectional form which makes use of labialization with palatalization is the verbal participle.

(30)	imperative	verbal participle	
	k'əmba	k'əmbʷa	'broken at once'
	t'ɨrək'	t'ɨnnɨkʷ'	'dried a lot'
	a-mɨrt'	mʷɨrc'	'escaped unnoticed'
	mət'ɨs	mʷɨt'ɨʃ	'broken at once by pulling'
	gɨms	gɨmʷɨʃ	'broken in big chunks'
	kʷ'ənt'ɨs	kʷ'ɨnt'ɨʃ	'pinched'

Only labial and velar consonants can be labialized, and only the rightmost labializable consonant will undergo the change. If the root contains a final coronal consonant, it will be palatalized. Final velars are not palatalized, as a consonant cannot be both labialized and palatalized, and labialization takes precedence. However, note that the stem-initial velar in 'broken at once' is not palatalized, where it would have been subject to change under simple palatalization. This same labialization + palatalization process accompanies some overt segmental suffixes, such at the deverbal nominalizer *-ə*, e.g. *kɨtɨf* > *kɨtfʷ-ə* 'dish of hashed meat.'

There is in addition a distinct process of labialization without concomitant palatalization which targets the first non-final labializable consonant, employed only in forming the adjectival/nominal participle, e.g. *mʷɨk-mʷɨk* 'very ripe' from a root √*mk*. Independent of the three processes already mentioned, certain inflectional and derivation forms are marked by the devoicing of root-medial consonants (and /r/→/n/), arising from an earlier process of templatic gemination. Rose (2007) describes this process as consonant mutation. Finally, jussive verb forms trigger depalatalization of underlyingly palatalized root consonants. In total then, Chaha makes use of five distinct processes of morphologically-triggered consonant alternation. But note that in Chaha we are not dealing with a 4 or 5 grade mutation system; rather, there are multiple distinct two-grade systems in operation. These can interact if some morphological environment calls for the application of two distinct mutation patterns; e.g. devoicing of a root-medial consonant and labialization + palatalization can both be triggered within the same root by certain inflectional forms.

Banksira proposes that palatalization is the result of a suffix beginning with, or consisting entirely of a phoneme /I/, labialization + palatalization is the result of an affix containing /U/, and non-final labialization is the result of an infix /-U-/. These are not in fact meant to be abstract phonemes, but rather /I/ is the same phoneme that surfaces as [j] and [i] within roots, and /U/ is the phoneme underlying [u] and [w]. When appearing in a suffix, but *not* within a root, these phonemes behave somewhat idiosyncratically, in that their root node is deleted, leaving behind floating features: [high] for /I/ and [round] and [high] for /U/. Other analyzes of Chaha (e.g. McCarthy 1983, Akinlabi 2011) treat these processes as the result of the direct affixation of floating features.

Banksira's analysis fits well with the historical origin of these processes, which lies in affixes beginning in a (semi-)vocalic segment. Compare for example the Chaha nominalizing suffix *-Uə* with Amharic *-o*, as in *kɨtf-o* 'hashed meat dish' (cf. Chaha *kɨtfʷ-ə*), where /o/ is apparently the regular reflex of earlier **wə*. In the case of the proposed infix *-U-*, Amharic exhibits an infix *-u-*; compare Amharic *fis's'-u-m* with Chaha *fʷɨc'ɨm* 'absolute' (206). Banksira does not speculate as to whether the palatalization and labialization of non-final consonants is the result of regular sound change or was introduced analogically.

1.16 Sino-Tibetan causatives

A number of Sino-Tibetan languages exhibit devoicing or aspiration of initial consonants in verb stems to signal the causative. Some examples from Burmese (VanBik 1999):

(31)

stative root		causative form	
kye	‘be ground’	k^hye	‘grind up’
lat	‘be bare’	l̥at	‘uncover’
mrup	‘be buried’	m̥rup	‘bury’

In some languages only a handful of roots show this alternation, but in Burmese it is more robust, with over 50 such stative-causative pairs. Nonetheless, this process is apparently not productive in any modern language. These two series of consonants are lexically contrastive outside of these causative pairs, and we can schematize the alternation as a two-grade mutation system. The precise trigger of mutation could be analyzed as a featural prefix (e.g. [+aspirated]) functioning in essentially the same way as a segmental causative affix, or else an aphonological morphosyntactic feature (e.g. [causative]). Historically, these alternations can be traced back to the Sino-Tibetan causative prefix **s-*.

1.17 Burushaski

Holst (2014: 26-33) notes the presence of consonant mutation in Burushaski, drawing an areal parallel to the Sino-Tibetan phenomenon mentioned in the previous section. At least two distinct patterns of alternation exist. In the first, some instances of morpheme-initial /b, d, g, ɢ/ devoice to /p, t, k, q/ in the presence of certain prefixes. The triggers of the alternation are four prefixes: *a-* ‘negative,’ *dV-*, *nV-* (grammatical prefixes with no more specific name), and *s-* ‘causative.’ At least the following alternations are seen (Holst 2014: 29):

(32)

unmutated	mutated	
dV-	tV-	‘d-prefix’
gu-, go-	ku-, ko-	‘2nd sg.’
ba-	pá-	‘to be’
bi-	pí-	‘to be’
gucár-	kúcar-	‘to walk’
girmín-	kírmin-	‘to write’
ɢas-	qás-	‘to laugh’

It is not clear how many other roots or affixes are affected by this phenomenon, but it does not seem to be widespread.

In the second pattern, some tokens of /b, g/ alternate with /w, y/ in semantically related roots. Holst provides only a few examples (*baʈ* ‘skin’ / *waʈ* ‘bark,’ *gál-* ‘break (intr)’ / *yál-* ‘break (tr)’), and it seems this phenomenon is extremely limited. Nonetheless there is at least one root which can show a three-way alternation: *gán-imi* ‘he took it,’ *a-yán-imi* ‘he took me,’ *nu-kán* ‘having taken it.’

1.18 Oto-Manguean languages

The term “consonant mutation” has been used in describing some stem-initial alternations in various Oto-Manguean languages. However in most cases it seems that these are best treated as segmental prefixation, and the alternations in question are quite typologically distinct from other systems termed "mutation." Jaeger and Van Valin (1982) mention a process of consonant mutation in Yatée Zapotec, giving examples such as: *ʤóLáʔ* 'I am reading,' *béLáʔ* 'I read,' *góLáʔ* 'I will read.' It is not clear why these are not analyzed as cases of prefixation, but other aspectual markers in the language are in fact termed "prefixes." In Northern Pame, a number of morphemes are realized as changes in a root consonant (palatalization, glottalization, etc.). For example: *n'kwás* 'my cow' ~ *neʧǎ:s* 'your cow,' *n'tʰúʔ* 'my armadillo' ~ *nʧhǔ:ʔ* 'your armadillo' (Berthiaume 2012: 51). Avelino (1997) terms these sorts of changes mutation, but Berthiaume (2012) argues that they are simply surface realizations of segmental prefixes (e.g. *n-ʔw-* '1st person possessor,' *n-əj-* '2nd person possessor').

1.19 Summary of synchronic analyses

Broadly speaking, there are two approaches to analyzing mutation synchronically. The first is to propose some phonological entity which induces mutation in the appropriate contexts. This may be in the form of an independently-existing phoneme of the language (Banksira 2000 for Chaha, De Lacy 2008 for Irish and Chaha among others), an abstract or "defective" phoneme or timing slot (Hamp 1951 for Celtic, Evans 1998 for Iwaidja), or a floating feature or feature bundle (Trommer 2011 for Western Nilotic, Lieber 1983). This phonological entity may itself be a morpheme, or else may be part of the underlying representation of morphemes which trigger mutation. These analyses treat mutation as a primarily phonological phenomenon, essentially being the result of the interaction between phonological entities in the underlying representation. This approach is especially attractive in cases where the trigger of mutation is consistently adjacent to the mutating consonant (e.g. Numic, Corsican, most Central Vanuatu languages).

The other approach is to use non-phonological diacritic features on triggering morphemes (Sapir 1930 for Southern Paiute, Oftedal 1962 for Celtic), or simply to specify in the grammar the morphological and syntactic environments associated with each mutation grade (Green 2003 for Celtic, Iosad 2007, 2008a, 2008b for Welsh, Mende, etc.). The mutations themselves can either be stated in the form of phonological rules (Ní Chiosáin 1991), or simply prespecified as allomorphy in the lexicon (Green 2003, Iosad 2008a), but in either case mutation is crucially not the result of a phonological trigger. This approach is attractive in dealing with syntactically-triggered mutation, as well as mutation patterns that are seemingly more phonetically arbitrary.

Finally, it seems desirable to clarify two terminological issues. First, there is no substantive difference between the terms "consonant mutation" and "consonant gradation" as used in the literature. The latter term is used consistently for the Uralic languages, but for other systems these two terms are used interchangeably. Second, "consonant mutation" is not to be contrasted with "featural affixation"; indeed almost all cases of mutation have been analyzed as featural affixation somewhere in the literature. Rather, consonant mutation is a phenomenon, and featural affixation is an analysis— one that is often used in analyzing consonant mutation systems, but also phenomena such as ablaut and tonal affixes.

2 Properties of consonant mutation systems

Having seen the various systems to which the term "consonant mutation" has been applied, we now turn to what is meant by the term "consonant mutation," what properties these systems share, and in what ways they can differ from each other.

2.1 What qualifies as consonant mutation

Consonant mutation is a sub-type of the broader phenomenon of consonant alternation. In order to single out consonant mutation from other instances of consonant alternation, we would ideally have a set of criteria or perhaps a single criterion which is shared among cases of consonant mutation but not other consonant alternation phenomena. Such a set of criteria is as it turns out rather difficult to arrive at. The following definitions of consonant mutation are found in the literature:

> Grijzenhout (2011: 37): “a change in one phonetic property of a consonant that affects its degree of sonority and that does not depend on the position of the consonant within a prosodic domain (i.e. neutralization and enhancement phenomena are excluded), nor on the position immediately adjacent to a segment with which it forms a natural class (i.e. progressive and regressive voicing and place assimilations are not regarded as instances of “consonant mutations”). More specifically, the term “consonant mutation” refers to a class of processes by which a consonant turns into a segment with a different degree of voicing, continuancy, or nasality that is not due to neutralization or assimilation to a neighboring segment of the same natural class”
>
> Inkelas (2014): “alternations in [...] consonants that are too complex to be treated as simple assimilation, dissimilation, or contextual neutralization”
>
> Lieber (1983: 72): “mutations are phenomena in which lexical stems exhibit two or more allomorphs that differ only in a single marginal segment [...] and which appear in distinct morphological, syntactic, or phonological environments.”
>
> Iosad (2010) for initial consonant mutation: “changes in the first consonant of a word which are not obviously caused by the phonetic / phonological context”

These definitions agree on some basic points, but otherwise seem to describe rather distinct ranges of phenomena. Inkelas and Iosad’s definitions are rather vague in some respects, though this is not necessarily a fault. On the other hand, some of Grijzenhout and Lieber’s requirements seem too strict— why should internal alternations be ruled out, or those involving place changes or consonant length?

A common criterion, both explicitly stated and implicitly assumed in treatments of consonant mutation, is that the alternations not be purely phonologically conditioned. That is to say, whether or not a consonant alternation is triggered must be arbitrary and unpredictable given only the phonological environment of the consonant in question. This criterion rules out cases of allophony, as these are by definition phonologically conditioned. It also rules out cases of phonologically-determined allomorphy. Take as an example the alternation of certain root-final consonants in the Palor language of Senegal (D’Alton 1984).

(25)	_V:	elsewhere:	
	ʔol-	ʔod-	'see'
	law-	lab-	'mount'
	pud-	pun-	'fly'
	xeg-	xeŋ-	'throw'
	vs.		
	wol-	wol-	'send'
	kod-	kod-	'raise'
	ben-	ben-	'accompany'

Whether or not a given Palor root will exhibit any alternation at all must be lexically specified, but in cases where the final consonant can appear in two forms, the choice of allomorph is determined entirely by its phonological environment— one before a vowel, and the other elsewhere.

However, this criterion is by no means straightforward. Whether or not an alternation is conditioned entirely by phonology can depend on one's analysis. We have seen that the most common analyses of mutation systems involve positing phonological entities of some sort that interact with the mutating consonant, and as such, these analyses technically attribute mutation to phonological conditioning. Take Chomsky and Halle's (1968) analysis of Southern Paiute mutation, whereby nasal grade is triggered by an abstract phoneme /N/, and geminate grade by /T/ at the end of a preceding lexical item. If we accept these phonemes as part of the underlying representation, mutation is simply the effect of predictable and rather straightforward sandhi rules between two adjacent consonants. Thus we must constrain the notion of what it means to be "phonologically-conditioned" to cases in which the phonological environment can be stated in terms of *concrete* (i.e. non-abstract) phonological entities.

Even this constrained definition of phonologically-conditioned alternation leaves much room for interpretation. There are broadly speaking three grey areas:

1) Questions of segmentation:

In some cases it is possible to analyze the same sound as either a single consonant or a cluster. We saw that this is often the case with prenasalized stops in Bantu languages (section 1.5.1). As such, the Umbundu prefix *N-* might be taken as a concrete phoneme which surfaces as a nasal in clusters like /mb/, or else an abstract feature which causes one phoneme /v/ to be replaced by another, /^{m}b/.

2) Triggers which sometimes appear as a concrete phoneme:

If the trigger of mutation can surface as a concrete phoneme in some environments while triggering a segmental change in others, is the alternation necessarily disqualified as mutation? This was the reason given for dismissing the cases of Austronesian Nasal Substitution in section 1.6.1. Because the Indonesian prefix *meŋ-* surfaces as /meŋ/ in a form like *meŋ-ikut* 'to follow,' the change seen in *pukul* → *me-mukul* 'to hit' can be seen as triggered by an overt segment /ŋ/ which assimilates to and then deletes the following voiceless stop. However, if this is grounds for dismissing nasal substitution, it could also be used to dismiss Irish eclipsis (nasalization) for the same reason. Recall that eclipsis triggers changes in a following consonant, but also adds a prothetic /n/ or /n^{j}/ to a vowel-initial root. De Lacy (2008) argues explicitly that eclipsis is the result of a morpheme of the shape /n/. The Irish situation is thus in principle quite similar to that of Indonesian. Note that in both languages, sequences of a nasal and a following mutable consonant are permitted (Irish *banc* [baŋk] 'bank,' Indonesian *aŋkat* 'to lift'), though these could be explained as non-derived environment effects.

Another complication involves seemingly abstract triggers which appear as a concrete phoneme depending on dialectal or social factors. Zimmer (2005: 134-137) considers changes induced by word-final /s/ in certain Spanish dialects (most notably Andalusian and Canarian) to be true mutation. Here, alternations such as [la βaka ~ la faka] for <*la vaca ~ las vacas*> 'the cow(s)' (Andalusian dialect) certainly seem on the surface to involve some abstract or even non-phonological trigger. But it cannot be ignored that that speakers of these dialects are intimately familiar with the consonantal pronunciation of final <s> as [h] or [s] in different dialects and social situations, and so these realizations must be considered as part of the speakers' phonological grammar. It is even likely (though to my knowledge no relevant study exists) that speakers of the dialects in question might themselves exhibit a consonantal realization of <s> in certain sociocultural contexts, which would make it very difficult to argue that there is no consonantal phoneme in the underlying representation.

3) Which phonological entities count as abstract?

There will inevitably be disagreement over what qualifies a phonological entity as concrete vs. abstract. A prime example is the mora, which can be used to relatively straightforwardly account for Luganda initial consonant gemination in class 5 (section 1.5.1). The mora is of course in a sense an abstract proposal of phonological analysis, but has very concrete realizations as vowel or consonant length. If cases of moraic affixation are included under the banner of consonant mutation, we must now include phenomena such as Semitic templatic gemination, which are never considered as such in the literature. And yet numerous uncontroversial cases of consonant mutation involve rather straightforward consonant gemination, as in the Numic languages and Biafada (Atlantic). If a moraic analysis can exclude a phenomenon as true consonant mutation, we are forced to say that for Corsican, whether or not the language has consonant mutation at all is dependent on the rather subjective judgment of whether certain sounds are long enough to be considered geminates. Similar issues are encountered with nasal mutations in various languages. It seems undesirable that a phenomenon's status as consonant mutation should be determined purely by a particular linguist's analysis of nasalization as being either phoneme substitution, featural prefixation, or segmental prefixation.

While it is by no means easy to evaluate, the criterion of phonologically arbitrary triggering is the *only* one which can be said to be shared among all cases of consonant mutation in the literature. It seems impossible to identify any further criteria which would not result in the disqualification of some phenomenon which is generally referred to as mutation. For example, the alternation between palatal and non-palatal stem-final consonants to mark case and number in both Irish and Russian is generally not cited as consonant mutation. But what disqualifies them? If it is their final position, Western Nilotic mutation is ruled out. If it is the phonetically straightforward nature of their alternations, Nivkh is ruled out, among others. If it is the fact that they operate only within the nominal system, Central Vanuatu mutation is excluded for operating only in the verbal system. If it is the exploitation of only two grades, a whole host of mutation systems are disqualified. This is not to say that all instances of consonant alternation which fit this single criterion must be classified as mutation. However, it is clear that what determines whether a phenomenon falls under the rubric of consonant mutation is not a well-defined set of criteria, but a combination of properties, none of which are necessary to qualify an alternation as consonant mutation. In what follows, we will explore the ways in which mutation systems differ, and will find that some properties are more or less important in determining whether or not a given system is likely to be thought of as consonant mutation.

2.2 Nature of the trigger: morphological, lexical, or syntactic

One of the most important ways that mutation systems differ is in the triggers of mutation. This variable provides perhaps the most basic and intuitively useful typology of mutation systems. There are in essence three types of triggers: morphological, lexical, and syntactic.

Morphologically-triggered mutation can be described as mutation that serves the same purpose as an affix, or co-occurs with an overt affix. This is seemingly the most common trigger of mutation cross-linguistically. Examples of morphological categories marked by mutation include (but are not limited to) noun class, tense/aspect, person/number agreement, case, and derivation between parts of speech. It seems that anything that could conceivably be marked with an affix can be marked by mutation. Note that in many cases, an overt affix accompanies mutation, but here mutation can still serve a morphological function by disambiguating otherwise homophonous affixes. The cases of Atlantic, Western Nilotic, Bantu, Chaha, Austronesian, Uralic, and Sino-Tibetan languages all involve morphologically-triggered mutation. Historically, these systems arise when an overt affix triggers some change in its base, and the affixal segments responsible for the sound change are either lost in the process, or lost in a subsequent sound change.

In lexically-triggered mutation, certain lexical items or affixes are inherently associated with a specific mutation grade, and impose this on another word or affix in its vicinity. This differs from morphologically-triggered mutation in that any morpheme (not only a grammatical one) can trigger mutation, and mutation cannot be triggered in the absence of some overt triggering word/morph. Thus, while lexically-triggered mutation can signal the presence of some grammatical morpheme, mutation is never the sole marker of some grammatical category. In theory this would lessen the functional load of lexically-triggered mutation when compared with morphologically-triggered mutation, but it often serves to distinguish otherwise homophonous morphs or lexical items. Note that lexically-triggered mutation may or may not operate across word boundaries— it may only operate between a lexical item and its affixes or between members of a compound, as in Numic. Lexically-triggered mutation is found in Numic, Celtic, Western Mande, Nias (with prepositional triggers only), and Fula (in the case of suffix mutation triggered by the preceding nominal root).

Syntactically-triggered mutation operates only when a word is placed in a certain syntactic configuration. For example, verbs in Mende exhibit weak grade only when immediately preceded by their object, and in Welsh, soft mutation is triggered on the first word after an immediately post-verbal constituent. Note that it is possible for multiple types of triggers to operate within a single language, as in Welsh (section 1.1.2).

2.3 Phonological transparency of the trigger's effect

In most cases, the relation between the trigger and the mutating consonant is completely phonologically opaque. However, this is not always the case. Consider the case of Bantu causative spirantization (section 1.5.2), in which assibilation of a preceding stop is triggered by a causative suffix *-i* or *-y*. Assibilation before a high front vowel or glide is a common process in the world's languages, and thus there seems to be some phonological connection between the shape of the trigger and the mutation induced. The process is in fact opaque, as certain other suffixes beginning with the same sounds do not trigger mutation, but the relation between the phonological shape of the trigger and the change in the preceding consonant that it induces cannot be ignored. Cases like these are less likely to be analyzed as mutation, as they involve alternations that seem less phonologically arbitrary.

Nivkh and Mundurukú present a somewhat extreme scenario in which the trigger for mutation can always be described in terms of the immediate phonological environment (intervocalic). These only qualify as mutation because the regular phonological process is blocked outside of specific syntactic configurations. Thus, when mutation applies in Nivkh and Mundurukú, it is always completely phonologically transparent— only when it fails to apply is there any opacity.

Another important consideration is the position of the trigger with respect to the mutating consonant. The trigger may be adjacent to the consonant, as is often the case with noun class prefixes in Atlantic; non-adjacent, as with Fula initial mutation triggered by noun class suffixes; or completely absent, as with case marking on Nias nouns, which is not accompanied by any overt affix. Systems in which the trigger is adjacent to the mutating consonant are more amenable to analyses in which an abstract phoneme or feature bundle is part of the affix itself.

2.4 Breadth of alternations

Another consideration is how widespread the mutation alternations are within the language. There are three dimensions involved:

1) Number of consonants subject to mutation

In some systems, only a minority of consonants exhibit mutation, as in Lewo, which has only two mutation series, /v ~ p/ and /w ~ p^w/. All other initial consonants are immutable. At the opposite end of the spectrum, the Tenda languages Konyagi and Bassari (Atlantic) have no immutable consonants at all. The more immutable consonants the language has, the less useful mutation is in signaling the relevant morphological, lexical, or syntactic information.

2) Number of lexical items subject to mutation

A basic distinction can be drawn between languages in which mutation is productive, and those in which it is not. Especially unproductive cases of alternation are less likely to be identified as consonant mutation at all, such as the lexically-specific voicing of final fricatives in English to signal N>V derivation (e.g. *mouth, house, proof~prove*). Even in productive systems, it is common for certain lexical items (often recent borrowings) to fail to undergo mutation. There is also the related question of which parts of speech are affected by mutation. Some languages exhibit mutation only on verbs or only on adjectives and nouns, while others exploit mutation in both the nominal and verbal system.

3) Number of unique triggers of mutation

In most mutation systems, the same mutation grade is exploited by multiple triggers in the language. A morphologically-triggered mutation system may make use of numerous distinct affixes which trigger the same mutation grade, as with Fula noun class markers, of which eleven trigger a change to grade II, and nine a change to grade III. However in some languages mutation is triggered in only a few, or even a single context. For example, the only trigger of mutation in Shona is noun class 5, and the only use of initial devoicing in Burmese is to signal the causative.

Along all three dimensions, systems which show more robust alternations are more likely to be seen as true consonant mutation, while those that are limited to a small set of consonants, lexical items, or contexts are inherently less systematic, and may be given some other name.

2.5 Nature of consonant alternation

We have seen that consonant mutation can involve changes in a variety of phonetic properties. The most common are voicing, continuancy, nasality, and gemination, but can also include aspiration and place of articulation. Often a mutation grade primarily involves the change of a single feature, e.g., [continuant] in Nivkh and [voice] in Shona. In other cases a single grade may be signaled by different featural changes depending on the mutating consonant, as with Irish lenition, signaled by spirantization, voicing, debuccalization, or deletion. Even in cases where a single featural change is considered primary, it can be accompanied by other "secondary" changes in some consonants. While these are often phonetically straightforward (e.g. geminate hardening, or voicing as an effect of nasalization), some are typologically unexpected, as with nasal grade inducing devoicing in the Atlantic language Konyagi (/w~b~mp/, etc.) and trilling in Nias (/b~mʙ/, /d~nr/).

Some authors draw a distinction between cases where alternations from one grade to another are phonetically consistent across consonants, or else easily analyzable as the change of a single feature, and those which involve less straightforward changes. Lieber (1983: 111) singles out "phonetically quirky mutations," and Iosad (2010) distinguishes between "well-behaved" mutation systems which are easily treated in an autosegmental analysis, and those which involve more complicated alternations. While this is never explicitly given as a factor in whether a phenomenon is considered mutation or not, it is conspicuous that many of the phenomena often excluded from consideration (e.g. Chaha by Lieber 1983 and Bantu nasalization by Iosad 2010) involve rather simple alternations, such as the addition of a secondary articulation. It seems that the more phonetically unexpected or idiosyncratic the alternation, the more likely it is to be seen as mutation.

Another consideration is the position of the mutating consonant. It is most often domain-initial, but may also be final as in Nuer, medial as in Finnish, or variable as in Chaha. Lieber (1983) and Swingle (1993) restrict the term consonant mutation to cases of initial and final consonant alternation, but there seems no principled reason to treat the alternation of medial consonants as a different phenomenon.

2.6 Number of mutation grades

Languages show a number of differences in how their phonemes are organized into mutation grades. Perhaps the most important is the number of grades themselves. There must by definition exist at least two grades, and most languages exploit only these two. Others make use of three (Irish, Atlantic languages), or even more (Welsh, Western Nilotic languages). While this might at first seem to be a somewhat trivial variable, it is in fact extremely important in determining whether a given alternation is likely to be labeled as consonant mutation. If a two-grade alternation exists, there is generally some more phonologically-descriptive name that can be given to the alternation, e.g. nasalization in Umbundu, or gemination in Luganda. This avoids the need for the term "mutation" to be employed. In three-grade systems which make use of these exact same changes (e.g. the Atlantic languages Biafada and Kobiana, each with a grade of nasalized consonants and a grade of geminated consonants), "mutation" is inevitably adopted in describing the system as a whole. There is to my knowledge no system of alternation involving three or more grades which has failed to be termed "mutation," while some two-grade systems which exhibit the same phonetic alternations (and with the same sorts of triggers) escape this appellation.

2.7 Summary and the status of the Atlantic mutation systems

While it is difficult to concisely define consonant mutation, we have seen that there are a number of properties of particular importance in determining whether a system is likely to be known as "mutation." Looking ahead to the following chapters, it is noteworthy that for almost all of these properties, the Atlantic languages that are the subject of this study exhibit (for the most part) exactly those properties which most readily qualify a system of consonantal alternation as mutation. Below is a brief review of these properties, along with their status in Atlantic mutation systems.

- A high percentage of the consonant inventory is involved in mutation alternations.
  - Atlantic: Most or all consonants are involved in mutation.
- Mutation is productive, with a high percentage of the lexicon subject to alternations.
  - Atlantic: Highly productive (except perhaps Wolof).
- Multiple word classes participate in mutation (e.g. not only nouns or only verbs).
  - Atlantic: Mutation is employed in the nominal and verbal systems of all languages but Wolof (nominal only).
- There are many unique triggers of mutation. Individual lexical items may each have a specific mutating effect.
  - Atlantic: Many unique triggers (large number of triggering noun classes and verbal categories), though only Fula has individual lexical triggers, which affect its noun class suffixes.
- Certain triggers either have no segmental material, or are not adjacent to the mutating consonant.
  - Atlantic: While segmental noun class prefixes are a common trigger of mutation, many grammatical categories are marked solely by mutation, and there are a number of cases of distant triggers.
- Multiple phonetic features are involved in the alternations (e.g. nasality, voicing, continuancy, gemination).
  - Atlantic: At least three phonetic features involved in mutation in each language.
- The alternations are not phonetically straightforward (Lieber's "quirky mutations"). It is difficult to attribute the change from one grade to another to a simple featural affix.
  - Atlantic: Quirky mutations in most languages; e.g. devoicing in nasal grade (Sereer, Konyagi). Others have more straightforward alternations (Biafada, Kobiana), which could be explained by the addition of a mora or nasal feature.
- Though somewhat uncommon, the trigger itself may be in some way phonologically related to the triggered alternation, yielding a less arbitrary-seeming system of alternations. These cases are less likely to be seen as mutation.
  - Atlantic: Never phonologically transparent.

- There are more than two mutation grades. Most mutation systems make use of only two grades, and it cannot be coincidental that those with more than two are the most commonly cited examples of consonant mutation. Mutation systems with more than two grades are found only in the Celtic languages, Numic, Western Nilotic, and Atlantic.
    - Atlantic: Three grades in all but Wolof.

None of these properties can be used to separate systems which are clearly consonant mutation from those that are not; in fact, no such simple distinction can be made. Rather, it seems more productive to take a broader view of consonant mutation, which would include any system of consonant alternation that is in any way phonologically arbitrary. Rather than trying to further separate systems of alternation into those which are and are not consonant mutation, it is more fruitful to focus on the many often independent properties that distinguish these systems, and use these to more meaningfully describe and categorize the phenomena in question. If we recognize the full diversity of consonant mutation systems, we will likely find that it is not possible or even desirable to arrive at a single unified analysis of consonant mutation phenomena.

3 The historical development of consonant mutation

Having examined the historical origins of various mutation systems in section 1, certain commonalities emerge in their development which provide some basic expectations for how any mutation system might arise over time. In this section, we will summarize how mutation systems generally develop, and establish a basic methodology for investigating the diachrony of a mutation system that is not yet understood.

3.1 Identifying regular sound changes which lead to mutation

A crucial requirement for the development of all the mutation systems we have examined is that a sound change operate in a domain larger than a single morpheme. As the resulting mutation system involves morphemes which differ segmentally in the presence of triggers which were historically outside of the morpheme itself, this would seem to be an absolute requirement. In some cases, this domain is even larger than the word, though the most common historical triggers of mutation are in fact affixes.

The ultimate origin of consonant mutation is in almost all cases a sound change or set of sound changes which affects a consonant in the environment of an immediately preceding or following sound. The only exception is the Uralic languages, in which the trigger was metrical rather than segmental. This exception aside, an important source of information about the sound changes that give rise to any system of consonant mutation is the identification of regular internal sound changes involving a consonant and an adjacent segment. Because of the regularity of sound change, if we can identify through traditional comparative means certain word- or morpheme-internal sound changes, we would expect these same changes to be responsible for mutation when the relevant sequences appear across morphemes or words. For example, by knowing that /g/ in native Japanese vocabulary is generally the result of an earlier *NVk sequence (e.g. *pimukasi* > *higasi* 'east'), we can assume that the change of /k/ to /g/ in rendaku was ultimately the result of a preceding /NV/ element. By the same token, any sound change we propose to have resulted in mutation across a boundary should also apply within a morpheme. As a concrete example, if we say that word-final /t/ gives rise to a hardened grade (for example **at fa > a pa*), we should not expect sequences like /tf/ to appear without appeal to some secondary development, as this sequence should have also developed to /p/.

This approach makes the crucial assumption that a sound change will operate identically within a morpheme and across a morpheme boundary. In most cases, this is essentially true, but there are some important caveats. Sound changes which create complex or marked segments may operate differently at a word boundary. Most notably, because languages are often less tolerant of geminates or prenasalized stops in initial position, a sound change which creates these sounds word-internally may result in a singleton word-initially. A related effect is seen in Corsican, in which obstruents like /t, d/, etc. assimilate to a following consonant, resulting in a geminate both word-internally and across a word boundary. However, the consonants /l, r, n/ assimilate *only* across word boundaries, remaining unchanged word-internally before a consonant. This discrepancy can probably be attributed to a general dispreference for final consonants, but not for word-internal codas. We might also suspect that metrical differences at different positions in the word, or word-final reduction of certain consonants might result in differing outcomes for the same sequence of sounds within and across words. Regardless of the reason, we must be aware that it is possible for the ultimate result of sound changes to be somewhat different in mutation environments (originally across morphemes) when compared to tautomorphemic environments. There is also the very real possibility that certain sequences will arise across a word or morpheme boundary, but never internally. In this case, there may be no relevant evidence from internal sound changes to support the sound changes that gave rise to mutation.

3.2 Types of segmental interactions leading to mutation

Turning to the specific sound changes which have given rise to mutation in the world's languages, we find that certain mutation effects are likely to be the result of specific types of sound change. At this point we will focus on initial consonant mutation systems, not only because final consonant mutation systems are much rarer, but because looking forward almost all of the systems that we will discuss in the Atlantic languages involve initial mutation. We are thus interested in the morpheme- or word-final "triggering segments" which preceded an initial consonant in the following morpheme, and which provided the environment for some change affecting this consonant. These triggering segments can be grouped into three categories: vowels, nasals, and obstruents. Bantu presents the additional category of spirantized vowels, which at least in Luganda behave similarly to obstruents. Unfortunately there are far fewer clear examples involving liquids/glides as triggering segments.

Effects of a preceding Vowel:
Spirantization: Irish, Welsh, Breton, Mende, Nivkh, Corsican
Voicing: Welsh, Breton, Mende, Corsican
Deletion: Irish, Welsh, Breton

Effects of a preceding nasal:
Voicing: Irish, Jɔ, Bantu, Austronesian, Japanese
Nasalization: Irish, Welsh, Mende, Jɔ, Bantu, Austronesian, Japanese
Hardening, (affrication): Fataluku, Mende, Central Vanuatu languages

Effects of a preceding obstruent:
Gemination: Corsican, Italian
Devoicing: Breton (from earlier gemination), Burmese (triggered by *s-)
Spirantization: Welsh, Breton (both from earlier gemination)
Aspiration: Burmese, and note Comanche preaspiration from earlier geminate series

Effects of a preceding spirantized vowel:
Gemination + hardening: Luganda
Voicing: Shona

The effect of a preceding vowel is essentially to lenite a following consonant. This lenition may take the form of voicing, spirantization, or ultimately deletion. A preceding nasal predictably results in nasalization, often accompanied by voicing. There are many cases in which the synchronic alternation involves only voicing, with the nasal component having been lost at some point. Initially, preceding obstruents commonly assimilate to a following consonant, forming a geminate. These geminates can then develop in a number of different ways, most commonly by hardening or devoicing, but also becoming aspirated and then subsequently spirantized in a number of languages. Note that gemination is not the only way in which a preceding obstruent can induce a change in the following consonant; for example in Burmese there is no reason to suspect that the prefix *s- ever formed a geminate, instead simply causing aspiration/devoicing directly.

Knowing that mutation generally arises from interactions between a consonant and an adjacent segment, we are naturally not limited to comparisons with sound changes that specifically lead to mutation. In assessing the naturalness or plausibility of a historical change responsible for mutation, we can draw upon our more general knowledge of sound changes.

3.3 Determining the identity of the historical triggering segment

In almost all cases, a crucial step in the development of a mutation system is the loss of the triggering segment[10]. This may occur as part of the sound change in question (as with the development of geminates in Corsican), or secondarily at some later point in time (as with the loss of final vowels sometime after Celtic lenition). If the triggering segment were not lost, the resulting alternation would not be opaque, resulting in purely phonologically-triggered alternations. Because the triggering segment is necessarily lost in the development of mutation, it can often be difficult to determine its original form.

There are two sources of evidence for the identity of a triggering segment: comparative and language-internal. Comparative evidence is extremely useful when available. If related languages have preserved the triggering segment in cognate forms, the identity of this segment in the proto-language can be determined by standard reconstruction. Recall the example of the Central Vanuatu languages, in which secondary grade corresponds to an overt prefix *m-* in the Maii language. If an ancestor or older form of the language is attested, there can be an even more direct source of information about the triggering segment. Of course, even with comparative data, determining the original form of the triggering segment is subject to the standard pitfalls of linguistic reconstruction.

[10] The other possibility is the merging of the triggering segment with some other segment that did not trigger the change. This is the case for Bantu Spirantization in some languages, where the triggering degree 1 “super-high” vowels merged with the degree 2 high vowels, which did not trigger spirantization. I know of no cases of initial consonant mutation where a similar merger occurred.

The clearest source of language-internal evidence involves a triggering segment that is preserved before a vowel. In Irish, eclipsis (historically nasalization) surfaces as a segment /n/ or /n^j/ on a vowel-initial word. Similarly, in Nias mutation is marked on ʔ-initial words as /n/, suggesting this value for the original triggering segment. While this particular source of evidence is only relevant for consonantal triggers, more broadly it is important to be on the lookout for any elements that trigger mutation which can be etymologically connected to some morpheme with additional segmental material. The essential assumption, as with all internal reconstruction, is that these cases of allomorphy can be traced back to a single non-alternating form. As an example, in Japanese certain compounds are formed with an overt morpheme *no* before the second element, serving the same function as rendaku in other compounds. If these two compounding strategies are assumed to represent the same original structure, we might be able to identify *no* as the ultimate source of rendaku even in the absence of clear historical evidence. However with language internal evidence we must be particularly aware of the possible effects of analogy. Specifically, it is common for one "linker consonant" to be generalized where a range of consonants could have appeared originally. In Irish, *m as well as *n could trigger eclipsis, and intervocalic *m did not regularly develop to /n/, but the dental nasal was analogically generalized to all cases of prevocalic eclipsis.

In the absence of comparative or language internal evidence, the exact identity of the historical triggering segment may be impossible to determine. However, based on the resulting sound changes, we can offer a possible guess as to the type of sound responsible. In Iwaidja, the historical trigger of mutation was reconstructed as simply *K, lacking any convincing evidence of this sound's identity. Based on the fact that Iwaidja mutation is realized as hardening for most sounds, we can be fairly certain that this sound was a consonant, and more speculatively an obstruent. We must however be careful in going much further in assuming the identity of a triggering sound based purely on its historical effect. Recall that spirantization can be the result of either a preceding vowel (as in Irish) or a preceding obstruent (as in Welsh), two classes of sounds which are perhaps maximally different from each other. Furthermore, it can be dangerous to assume that a synchronic alternation is the result of a straightforwardly parallel diachronic process. For example, In Mende, there is a grade of mainly voiced continuants and another consisting of voiceless sounds and stops. Knowing that nasals tend to have a voicing effect on following consonants, it is somewhat unintuitive that the second of these grades is in fact the result of a historical preceding nasal, while the first represents the regular development of the consonants. In Mende, the nasal prevented the spirantization and voicing of a following consonant, which otherwise occurred when the nasal was not present. Similarly, in Bantu languages, synchronic analyses often attribute alternations like /l~nd/ and /v~mb/ to the hardening effect of a nasal prefix. However, these alternations are reconstructed as */d ~ N-d/ and */b ~ N-b/, such that there was never necessarily any historical process of post-nasal hardening, only a general lenition of *d and *b when not after a nasal.

3.4 Analogical changes

After a mutation system has been established, it is subject to a number of analogical pressures. In general, languages seek to regularize the application of mutation patterns, giving rise to instances of mutation which cannot be directly attributed to sound change. In the lexical domain, mutation patterns are readily extended to borrowings. Grammatically, a certain mutation can come to consistently mark a feature which it marked only inconsistently at first, as with the extension of Welsh soft mutation following all feminine nouns, many of which did not end in a vowel historically. Even the phonemic alternations themselves can be reshaped by analogy, most drastically in the introduction of mutation to a sound which did not historically undergo any change, as with the Irish /p/ → /f/ lenition.

3.5 Determining the age of a mutation system

In addition to the question of how a mutation system developed, we would ideally like to determine when it developed. Specifically, when languages with consonant mutation exist within a given language family, there is a question of whether a mutation system existed in some higher node within the family tree. We have seen that the age of a language's consonant mutation pattern cannot be reliably determined through internal reconstruction— this can only be achieved through comparison with related languages. Recall that within Numic, the rather phonetically straightforward alternations in any one language might suggest a recent origin for mutation, but in fact mutation must be reconstructed even for the oldest identifiable mother language. On the other hand, the phonetically less transparent alternations of the Central Vanuatu languages led some to assume that a system of nasal mutation existed in the proto-language, but careful examination of the required sound changes suggests that mutation was a parallel but independent development in these languages. Indeed, the only way to reliably determine whether a proto-language exhibited consonant mutation is by careful application of the comparative method, and never simple typological comparison. The fact that multiple daughter languages within a family make use of mutation is no guarantee that the parent language had already developed such a system. In other cases, there may be evidence for the reconstruction of an earlier mutation system that has not survived as a productive system into its daughter languages.

The Celtic languages are of particular interest for this question, being among the best studied diachronically. All modern Insular Celtic languages exhibit some form of lenited initial mutation grade, being the result of more general lenition sound changes which also operated word-internally. It is tempting to assume that a putative Proto-Insular-Celtic (the existence of which is controversial) would have exhibited this feature in some way. However, Matasović (2007: 97-98) argues that no such lenition can be reconstructed to the proto-language, attributing the parallel development instead to strong areal forces:

> This development [lenition] cannot be posited in Common Insular Celtic, because the outcomes are different in British and Goidelic: in British, the voiceless stops become voiced between vowels, while in Goidelic they become voiceless fricatives. What is common to IC developments is that in both cases lenition applied across word boundaries. It is as if both languages at the same time developed a rule prohibiting the occurrence of voiceless stops between vowels; such a rule could initially have developed in bilingual communities, and subsequently spread to monolingual speakers of both languages. After the phonetic lenition of stops, and the subsequent apocope of final vowels, the results of word-initial lenition were grammaticalized, producing the system of consonant mutations. This development had to be independent in British and Goidelic, because it presupposes earlier independent lenition, but there had to be some sort of causal connection. This conclusion cannot be avoided, because consonant mutations are typologically so rare that it would be extremely improbable that they developed in two neighbouring languages at approximately the same time, yet completely accidentally. The most likely explanation is that consonant mutations, as a type of morphophonemic rule, first developed in bilingual communities speaking early

forms of British and Goidelic. The rules turned out differently in the two languages, because their phonological systems were already significantly different from each other.

The two major thrusts of this argument are extremely important to keep in mind as we turn to the development of mutation within Atlantic in the following chapters. First, even given the existence of typologically similar mutation systems among related languages, mutation cannot be reconstructed to the parent language if the required sound changes cannot have taken place prior to the branching of this mother node. And second, when such similarities exist, there is not a two-way choice between shared inheritance and coincidence— it is entirely possible to attribute them to areal influence.

3.6 Summary

When confronted with a system of consonant mutation whose origin is not yet understood, the following guidelines should be followed. Using comparative and internal reconstruction, seek to establish the regular sound changes that affected consonants across morpheme boundaries. Look for changes involving an immediately preceding segment in the case of initial mutation. These changes should, with some possible caveats, apply in all positions, even internal to a morpheme. The changes which most commonly give rise to mutation in the languages of the world are: postvocalic lenition; nasalization and/or voicing due to a preceding nasal; and gemination due to the assimilation of a preceding obstruent, further leading to devoicing, hardening, or spirantization in some cases. To determine the precise identity of the segment which historically triggered the change in the mutating consonant, look for cognates to the relevant triggers in related languages which may have preserved the triggering segment. In addition to comparative evidence, language internal allomorphy or traces of allomorphy may preserve the triggering consonant in certain environments, most notably before a vowel. Know that in some cases it may be impossible to identify with certainty the original triggering segment, though a reasonable guess can sometimes be made based on the outcome of the sound change(s). Finally, recognize that analogy can reshape mutation systems and extend it to environments that did not yield mutation by regular sound change.

Chapter 2: Fula and Sereer

The two Atlantic languages best known for their systems of consonant mutation are Fula (also Fulfulde, Peul) and its closest relative Sereer (also Serer, Seereer). Some basic examples from each:

<u>Sereer</u>		<u>Fula</u>	
a **x**aw-a	'he beats'	'o **h**aw-ii	'he has defeated'
a **nq**aw-a	'they beat'	ɓe **k**aw-ii	'they have defeated'
o-**k**oor	'man'	**g**or-ko	'man'
goor	'men'	**w**or-ɓe	'men'
fo-**ng**oor	'little men'	**ng**or-koñ	'little men'

In both languages, the initial consonant of a verb stem can exhibit up to two alternants, with nominal stems exhibiting up to three. Each language's mutation system is closely tied to its noun class system, as each noun class requires a specific mutation "grade" of the noun root. What follows is a historical account of how these two related systems of consonant mutation and noun class morphology evolved in each language. We will begin by examining the mutation systems synchronically. With the empirical facts established, we will proceed to a historical explanation for the modern mutation systems, consisting of a reconstruction of the Proto-Fula-Sereer (PFS) consonant inventory, noun class system, and inventory of pronouns, as well as the regular sound changes and analogical changes which took place in each language. Finally, we will examine the synchronic analyses of Fula and Sereer mutation in light of these historical facts, proposing the basics of a historically-informed analysis which aims to more elegantly account for the observed mutation patterns in each language.

To preview the historical analysis: the proto-language marked noun classes morphologically with a set of $C_1V(C_2)$ pre-nominal markers. Depending on the identity of C_2, the noun class marker induced one of two possible changes in the following root-initial consonant: nasalization or fortition, with *n inducing nasalization, and other consonants (*x, *k, and *l) inducing fortition. Similarly, the final nasal consonants of plural pronouns induced nasalization of the initial consonant of verb roots. No system of mutation existed in Proto-Fula-Sereer, despite the typological similarities between the two modern systems, and despite the fact that similar mutation systems exist in the surrounding languages. Rather, the modern mutation systems of Fula and Sereer developed independently (but under strong areal pressure), with each language undergoing separate nasalization and fortition sound changes which often yielded rather different outcomes. After these nasalization and fortition sound changes operated in Fula, the original pre-nominal noun class markers became suffixes, whereas in Sereer they remained in their original position, but underwent a great deal of erosion.

1 Sources

My principal source for the Sereer data is fieldwork in Berkeley, California, and in Senegal with speakers of the Saalum (Saloum) dialect from the towns of *A Ndooroong*, *A Pec*, *O Njomdi*, and *Yerwaago* (recordings and field notes are available in the California Language Archive at UC Berkeley). Data on the Siin (Sine) dialect comes from McLaughlin (1994), W.C. Faye (1980, 1994), S. Faye (2013), and Fal (1980), as well as Crétois's (1972-77) multi-volume pan-dialectal dictionary. Information about the Ñominka dialect (as spoken in the town of Mar Loj/Mar Lodj) comes from Renaudier (2012). Other synchronic descriptions of Sereer mutation can be found in Faye (1994) and McLaughlin (1994, 2000).

My sources for Fula are a number of dictionaries of various dialects: Niang (1997) for Pulaar dialects, Gamble and Baldeh (1981) for the Firdu dialect of Pulaar, Bautista (1991) for the Niger dialect, St. Croix (1998) for Nigerian dialects, Seydou (2014) for the Maasina dialect, Seydou (1998), a cross-dialectal dictionary of verb roots, and De Wolf (1995), an extensive cross-dialectal multi-volume dictionary; as well as two reference grammars: Arnott (1970) on the Gombe dialect of Nigeria, and Gamble et al. (1993) on the Firdu dialect of The Gambia. Forms cited throughout are from Pulaar (a cover term for the relatively homogenous dialects spoken in Senegal and The Gambia) unless otherwise noted.

2 Synchronic background

Sereer and especially Fula are two of the better known and documented Atlantic languages. Fula is one of the most widely spoken languages in Africa, spoken by traditionally migratory Fulani herders, as well as among sedentary Fula groups in villages and cities across much of West Africa, and as far east as Sudan. Fula is furthermore used as a lingua franca in many areas, and has a large number of non-Fulani speakers. Estimates range between 15 and 30 million speakers. There is a great deal of dialectal variation across the Fula-speaking area, with a traditional distinction (since Klingenheben 1927: 95) made between the western dialects (known as Pulaar or Pular in Senegambia and Guinea, and including the Fuuta Jaloo dialect) and Eastern dialects (spoken mostly in Niger, Nigeria, Cameroon, Burkina Faso, and parts of Chad and Sudan) with the Maasina dialect of Mali being somewhat intermediate between the two dialect groups.

Fula’s closest relative Sereer is spoken in Senegal and The Gambia, mainly in the Siin-Saalum region of Senegal. Ethnologue gives an estimate of 1,410,700 speakers, making it the third-largest Northern Atlantic language after Fula and Wolof. The dialectal variation within Sereer is rather minor, and there is complete mutual intelligibility between all speakers. The language is sometimes called Sereer-Sine in the literature to disambiguate it from the Cangin languages, which are also sometimes called Sereer. This term is misleading, as Siin (*a-singandum*) is only one of a number of Sereer dialects. The other notable Sereer dialects are Saalum (*a-peefey*), Ñominka (*a-ñoominka*), Baol (*a-’ool*), Sereer of the Petite Côte region (aka Jegem, spoken in Mbour, Palmarin, and Joal-Fadiouth), and Sereer of Njagañaaw.

2.1 Phoneme Inventories

The consonant inventory of Fula (Pulaar dialect) is given below:

		labial	coronal	palatal	velar	glottal
egressive stop	voiceless	p	t	c	k	’
	voiced	b	d	j	g	
continuant	voiceless	f		s	h	
	voiced	w	r	y		
implosive stop		ɓ	ɗ	ƴ		
prenasalized stop		mb	nd	nj	ng	
nasal		m	n	ñ	ŋ	
lateral continuant			l			

Figure 31: Consonant phoneme inventory of Fula

The symbols are that of the language’s orthography. They differ from the IPA in the following ways: <’> = [ʔ], <j> = [ɟ], <y> = [j], <ƴ> = [ʄ], <ñ> = [ɲ]. The prenasalized stops are all homorganic. For convenience, the glottal stop will occasionally be written as <ʔ> here. Phonologically, /s/ is treated as palatal, and /h/ as velar for reasons that will become clear when the mutation system is discussed, but they are phonetically [s] and [h]. Other dialects show only minor differences. In the Nigerian and Adamawa dialects, /c/ is pronounced as [ʃ], and in the Adamawa dialect /w/ is pronounced as [v]. Gemination is contrastive for all non-prenasalized stops, and depending on the dialect also for certain other consonants.

The consonant inventory of Sereer (Siin dialect) is as follows:

		labial	coronal	palatal	velar	uvular	glottal
egressive stop	voiceless	p	t	c	k	q	’
	voiced	b	d	j	g		
continuant	voiceless	f		s	h	x	
	voiced	w	r	y			
implosive stop	voiceless	ƥ	ƭ	ƈ			
	voiced	ɓ	ɗ	ƴ			
prenasalized stop		mb	nd	nj	ng	nq	
nasal		m	n	ñ	ŋ		
lateral continuant			l				

Figure 32: Consonant phoneme inventory of Sereer

The orthographical notes regarding Fula are true also for Sereer. In addition, <x> = [χ], and <nq> = [ɴɢ]. The consonant inventory of Sereer is very similar to that of Fula, but differs in the presence of the typologically rare series of voiceless implosives, as well as three uvular consonants. The Saalum dialect and at least one variety of Siin have collapsed /x/ and /h/ as /x/. The Ñominka dialect lacks the distinction between the voiced and voiceless implosives, and has merged /ng/ and /nq/ to /ng/. Sereer does not make use of geminate consonants, though series of two identical phonemes are possible across a morpheme boundary.

Fula and Sereer share a simple vowel system consisting of five qualities, /a, e, i, o, u/, all with two contrastive lengths, for a total of ten vowel phonemes.

2.2 Fula initial consonant mutation

2.2.1 Basic alternations

Initial consonant mutation in Fula involves changes in continuancy and nasality. The mutation system is generally schematized as a set of three *grades*. These grades are traditionally identified by roman numerals, but are also referred to by the more meaningful terms “continuant grade,” “stop grade,” and “nasal grade.” Since at least Klingenheben (1927), the mutation system of Fula has generally been presented as follows, but note that this presentation omits stops in grade I, which exist in mutation series of the type b~b~mb, etc. (see section 2.2.4).

	Voiceless			Voiced			
	lab.	pal.	vel.	cor.	lab.	vel.	pal.
Continuant (I)	f	s	h	r	w	ʔ/w/y	y
	|	|	|	|	|	|	|
Stop (II)	p	c	k	d	b	g	j
	|	|	|	|	|	|	|
Nasal (III)	p	c	k	nd	mb	ng	nj

Figure 33: The basic mutation system of Fula

Each consonant alternates only with the consonants to which it is connected by a line in this chart. For example, /g/ never alternates with /k/, nor /f/ with /b/. We can make reference to mutation *series* consisting of three alternating consonants, such as the r~d~nd series. Note that /g/ alternates with three different consonants in grade I. These mutations involving /g/ will be discussed in more detail in section 2.2.5, but the basic facts are that the y~g~ng series occurs before front vowels, w~g~ng before back (round) vowels, and ʔ~g~ng before /a/. All consonants not given in Figure 33 (/l/, /t/, nasals, and implosives) do not alternate, and are said to be immutable. There are no restrictions on the distribution of these consonants— wherever a specific grade is required, these immutable consonants simply appear unchanged. Note that /s/ functions as palatal, and /h/ as velar in Fula.

2.2.2 Verbal mutation

Whether a root appears with its initial consonant in grade I, II, or III depends on the morpho-syntactic environment. Mutation is present in both the nominal and verbal systems of Fula. In verbs, mutation is triggered by subject agreement. When agreeing with a singular subject, the verb root appears in grade I, and when agreeing with a plural subject, it appears in grade III.

singular	plural	
rew	ndew	'follow'
war	mbar	'kill'
fen	pen	'lie'
socc[11]	cocc	'scrub'
yolb	njolb	'be loose'
'and	ngand	'know'
haaɗ	kaaɗ	'be bitter'

Figure 34: Fula verbal number mutation

In addition, relative forms of verbs require grade III, unless the subject agreement marker is preposed and singular[12]. For example: *mi war-ii* 'I have come' vs. *nde **ng**aru mi* 'when I came' (De Wolf 1995: xl; Gombe dialect). These two morpho-syntactic triggers (subject number

[11] Throughout this chapter, Fula verb roots with final consonant clusters or geminates will be given as the bare root. However, these roots cannot stand by themselves, as final clusters are prohibited. In the absence of any suffix (as in the imperative), they appear with an epenthetic /u/; thus, *soccu* "scrub!" but never ˣ*socc*.

[12] In effect, only 3rd person singular relative forms do not trigger mutation to grade III, though the exact conditions on mutation in relative verbs differ slightly by dialect— some also employ mutation with focus constructions that use morphologically relative verb forms.

agreement and relativization) are the only ones relevant in verbal mutation. Tense, aspect, mood, etc. have no effect on mutation.

2.2.3 Nominal mutation

In the nominal system (nouns and adjectives), mutation is triggered by noun class. Fula has a rich inventory of noun classes, marked by suffixes on the nominal stem. In addition to these suffixes, each noun class requires a specific grade of mutation for the initial consonant of the nominal root. The following chart (based on De Wolf 1995: xxxii and Arnott 1970: 88) gives the noun classes of the Pulaar and Nigerian (Gombe) dialects. Classes which appear in only one dialect are marked with a P or N— all others appear in both dialects.

Zero	Continuant	Stop	Nasal	Semantics	Grade	Dialect
-o	-jo / -wo	-ɗo / -ko	-ɗo	personal	II	
-ɓe	-ɓe (-'en)	-ɓe	-ɓe	personal pl.	I	
-(e)re / -de	-(e)re	-de	-nde	(round)	I	
-(i)ri / -di	-(i)ri / -di	-di	-ndi		III	
-(u)ru / -du	-(u)ru / -du	-du	-ndu		I	
-al	-wal	-gal	-ngal	(long & rigid)	II	
-ol	-wol	-gol	-ngol	(long & flexible)	II	
-a[13]	-wa	-ba	-mba		III	
-e	-ye	-ge	-nge		I	
-o	-wo	-go	-ngo		I	
-u	-wu	-gu	-ngu		III	
-a	-ha	-ka	-ka		III	
-i	-hi	-ki	-ki	(trees)	II	
-o	-ho	-ko	-ko	(leaves)	I	
-am	-jam	-ɗam	-ɗam	liquids	III	
-um	-jum	-ɗum	-ɗum	'neuter'	II	N
-el	-yel	-gel	-ngel	dimin.	II	
-al	-hal	-kal	-kal	dimin.	II	
-um	-yum	-gum	-ngum	dimin.	II	N
-ol	-hol	-kol	-kol	dimin.?	II	N
-oñ	-hoñ	-koñ	-koñ	dimin. pl.	III	
-a	-wa	-ga	-nga	augm.	III	N
-ii	-yii	-gii	-ngii	augm.	III	P
-o	-ho	-ko	-ko	augm. pl.	III	N
-e	-je	-ɗe	-ɗe	pl.	II	
-i	-ji	-ɗi	-ɗi	pl.	II	

Figure 35: Fula noun class suffixes

Each suffix in the above chart is given in four different grades. These suffix grades refer to the shape of the suffix itself, and are not to be confused with the initial consonant mutation grades (I, II, III). Each individual nominal stem triggers a specific suffix grade for its suffix[14]. Historically, these suffix grades arose due to interactions between the final segment of

[13] Gombe has *-ga, -nga* for *-ba, mba* in this class. See section 4.9.2 for an explanation.
[14] This oft-repeated claim is in fact an oversimplification, as specific roots sometimes trigger different suffix grades with different suffixes, and even undergo changes to the root itself, as with *wee-ndu / beel-i* 'lake(s),' with nasal suffix grade and no root-final /l/ in the singular, and zero suffix grade in the plural.

the stem and the initial segment of the suffix. Figure 36 shows examples of different nouns and adjectives in the *ngu* class, with their corresponding plurals in the *ɗi* class, taking different grades of these same suffixes.

sg.	pl.	suffix grade	
mol-u	mol-i	zero	'foal'
ɓalee-wu	ɓalee-ji	continuant	'black'
ngor-gu	gor-ɗi	stop	'male'
ndulu-ngu	dulu-ɗi	nasal	'wild pig'

Figure 36: Fula suffix grades of ngu *and* ɗi

While we will make reference to these suffix grades, a comprehensive account of these alternations will not be given here, and they almost certainly arose historically *after* the changes that led to initial consonant mutation[15].

The same set of noun class suffixes that appears on nouns appears on adjectives, which agree in noun class with the nouns that they modify. In addition, nouns can appear alongside a postposed determiner which agrees with it in noun class, and is identical in form to the nasal grade suffix (e.g. *lam-ɗam ɗam* 'the salt,' *jaaw-ngal ngal* 'the guinea fowl'). The one exception is the article for the personal singular noun class *'o* (not $^{\times}$*ɗo*). Fula noun classes are referred to by these determiners; thus, the liquid class is the *ɗam* class, and the personal singular class is the *'o* class.

Of concern to us are the mutation grades triggered by these noun classes. The effects of mutation in the nominal system are seen in two ways. First, within a single class, only members of the specified mutation grade may appear as the initial consonant of the root, with few exceptions (mainly borrowings). For example, nouns or adjectives in the *ndi* class must exhibit an initial consonant in grade III, whereas those in the *ngal* class must begin with a grade II consonant. Recall that immutable consonants (/t/, /l/, nasals, and implosives) can occur irrespective of the required grade.

[15] It will be seen in section 6.7 that the root-initial mutation changes took place when these markers were still pre-nominal, and the changes leading to the different suffix grades occurred only after the class markers had been established as suffixes at a later time. Furthermore, the use of different suffix grades has been subject to an overwhelming amount of analogical pressure, by which suffix forms which were not the result of regular interaction with the root have often replaced the form that would be expected. For example, we find *jaaw-ngal* 'guinea fowl' with the nasal suffix grade form, despite the fact that no nasal was ever present historically (cf. Sereer *a saaw*). We can be sure that this word would have been **jaaw-al* in earlier Fula with the zero grade suffix, since long vowels regularly shortened before a consonant cluster in Fula (a change which apparently predated the replacement of *-al* with *-ngal* in this noun). The reason for the replacement of *-al* with *-ngal* in 'guinea fowl' is not at all clear, but replacements of this type seem to be extremely common, to the point that it is very hard to say with any certainty what the "regular" outcomes of the interactions between roots and suffixes ought to be in many cases. As a further complication, suffix grades often differ between dialects, e.g. *nood-a* vs. *nor-wa* 'crocodile.'

ndi nouns (grade III)		*ngal* nouns (grade II)	
mbom-ri	'girl'	baas-al	'need'
ndoo-ndi	'ash'	dew-gal	'marriage'
njum-ri	'honey'	jardu-gal	'pipe'
ngaa-ri	'bull'	gerto-gal	'fowl'
kaa-ndi	'lion'	koy-ngal	'foot'
coo-ndi	'powder'	caƴ-al	'bamboo fence'
ley-di	'earth'	liw-al	'hawk'

Figure 37: Fula nouns in ndi *and* ngal *classes*

Secondly, changes in the initial consonant of a given root are induced by putting it in different noun classes. Each noun has a specified singular noun class and a corresponding plural one. In addition, a noun can be put in at least one diminutive noun class (*ngel*), and the diminutive plural class (*koñ*), as well as an augmentative class (*nga / ngii*), and in some dialects the augmentative plural class (*ko*). Thus, each noun can appear in a minimum of five different noun classes, each of which triggers a specific mutation. Adjectives can appear in every noun class, as they must agree with the noun that they modify.

sg.	pl.	dimin. sg.	dimin. pl.	
yees-o	jees-e	jees-el	njees-oñ	'face'
gor-ko	wor-ɓe	gor-gel	ngor-koñ	'man'
bal-ol	bal-i	bal-el	mbal-oñ	'ridge'
gerl-al	gerl-e	gerl-el	ngerl-oñ	'bush fowl'
hon-ndu	koll-i	koll-el	koll-oñ	'finger'
sekk-ere	cekk-e	cekk-el	cekk-oñ	'cheek'
cuur-ki	cuur-ɗe	cuur-gel	cuur-koñ	'smoke'

Figure 38: Fula nouns appearing in different noun classes

2.2.4 Stops in grade I

The examples we have seen so far all involve "fully-mutating" roots; that is, roots which always display the expected grade of consonant. However, there are a large number of "partially-mutating" roots which exhibit a stop in morphological environments that require a grade I consonant. Most of these partially-mutating roots contain a voiced initial consonant.

	sg. nde class (I)	pl. ɗe class (II)	
fully-mutating noun	waañ-ere	baañ-e	'cloud'
	rott-ere	dott-e	'backside'
	yah-re [yaare]	jah-e	'scorpion'
	yit-ere	git-e	'eye'
partially-mutating noun	barma-nde	barma-ɗe	'wound'
	daa-nde	daa-ɗe	'neck'
	jaa-nde	jaa-ɗe	'grass for cattle'
	gaaña-nde	gaaña-ɗe	'injury'

	sg. verb (I)	pl. verb (III)	
fully-mutating verb	war	mbar	'kill'
	reen	ndeen	'supervise'
	yaaj	njaaj	'be wide'
	'aam	ngaam	'be lazy'
partially-mutating verb	bacc	mbacc	'descale'
	dill	ndill	'move/vibrate'
	jat	njat	'stretch'
	gukk	ngukk	'reject'

Figure 39: Fully- and partially-mutating voiced-initial Fula roots

The nouns in Figure 39 are all in the *nde* class, which requires mutation grade I (continuant grade), and yet a large number of nouns in the *nde* class are stop-initial. The same is true for verb roots when appearing in the singular— it is not predictable whether a root will be continuant- or stop-initial. The roots which appear with an initial stop in these environments have been termed partially-mutating because they show the appropriate mutation in grade III (nasal grade), but not in grade I (continuant grade).

Partially-mutating roots with voiceless initial consonants also exist, although they are much fewer in number. Many are borrowings, but some apparently native vocabulary does follow this pattern.

Fully-mutating roots:			Partially-mutating roots:		
sg.	pl.		sg.	pl.	
fayan-de	payan-e	'cooking pot'	putt-ere	putt-e	'fart/lie (n.)'
(no voiceless coronal continuant)			taf	taf	'forge (v.)'
ceɗ-ɗo	seɓ-ɓe	'warrior'	caɓ	caɓ	'catch (v.)' (Nigerian dialects)
huur	kuur	'cover (v.)'	kuur	kuur	'separate (v.)'

Figure 40: Fully- and partially-mutating voiceless-initial Fula roots

As with their voiced counterparts, these voiceless partially-mutating roots exhibit the expected mutation in grade III, but not in grade I. Of course, because the grade III mutation of voiceless consonants is a voiceless stop, these roots effectively show no mutation. For this reason, rather than treating /t/ as inherently immutable and "stronger" than other voiceless stops, it can be grouped in with all other voiceless-stop-initial partially-mutating roots like those in Figure 40. No corresponding fully-mutating coronal roots exist simply because no voiceless coronal continuant exists in the language. It must however be noted that unlike p-, c-, and k-initial roots, t-initial roots are not statistically under-represented in Fula.

There are two ways to account for these partially-mutating roots. One is to lexically specify roots as either fully- or partially-mutating. The alternate analysis, which we will adopt (see section 7), is to add the voiced and voiceless stop phonemes into grade I, identifying eight additional mutation series (along with those in Figure 33) as follows:

	Voiceless				Voiced			
	lab.	cor.	pal.	vel.	lab.	cor.	pal.	vel
Grade I	p	t	c	k	b	d	j	g
	|	|	|	|	|	|	|	|
Grade II	p	t	c	k	b	d	j	g
	|	|	|	|	|	|	|	|
Grade III	p	t	c	k	mb	nd	nj	ng

Figure 41: Additional mutation series of Fula

Thus, the difference between the verb roots *huur* 'cover' and *kuur* 'separate' is simply that *huur* is underlyingly /h/-initial, and *kuur* is underlyingly /k/-initial. Of course, under this analysis the term "continuant grade" is no longer particularly meaningful in describing grade I. Rather, grade I can be seen as an unmutated grade which preserves all lexical contrasts, and from which the other two grades can be derived. As a final note, there are some roots with a non-alternating initial continuant (e.g. *hawsaa-jo, hawsa-'en* 'Hausa person/people'), but these are rare, and all borrowings.

2.2.5 Dialect differences

The primary dialectal distinction regarding consonant mutation involves the voiced velar series. In Pulaar, /g/ in grade II can alternate with /y/, /w/ or /ʔ/ in grade I, depending on the quality of the following vowel (/y/ before /i, e/, /w/ before /u, o/, /ʔ/ before /a/). In other dialects (e.g. Niger), the w~g~ng series has been eliminated in verbs and replaced by the labial w~b~mb series. In still other dialects (e.g. Gombe), /g/ alternates with /w/ before /a/ as well as before /u/ and /o/, and thus these dialects lack the ʔ~g~ng series seen in Pulaar.

	sg.	pl.	
Pulaar	'ar	ngar	'come'
Niger	war	mbar	'come'
Gombe	war	ngar	'come'

Figure 42: Fula mutations arising from *ɣ~g~ng

These differences arose due to the development of the earlier voiced velar continuant *ɣ (see section 4.9.2).

Also of note is that in some dialects (e.g. Gombe and Adamawa), /c/ is pronounced as [ʃ]. This discrepancy is purely phonetic, as it does not introduce any categorical (i.e. phonemic) distinctions between dialects. Finally, there are two nouns in which /g/ optionally alternates in some dialects with /h/ in grade I. The singular form of *git-e* 'eyes' is either *yit-ere* or *hit-ere*, and the plural of *gim-ɗo* 'person' (or suppletive *neɗ-ɗo*) is either *yim-ɓe* or *him-ɓe*.

As this h~g~ng mutation set appears in only these two words, and only optionally, it is not considered part of the regular mutation pattern of the language.

2.3 Sereer consonant mutation

2.3.1 Basic alternations

As in Fula, the Sereer mutation system makes use of three consonant grades (I, II, and III), and involves changes in continuancy and nasality. Unlike in Fula, Sereer mutations also involve changes in voicing.

Grade	labial			coronal		palatal		velar		uvular	implosive		
I	b	f	w	d	r	j	(s)	g	h	x	ɓ	ɗ	ƴ
II	p	p	b	t	t	c		k	k	q	ƥ	ƭ	ƈ
III	mb	mb	mb	nd	nd	nj		ng	ng	nq	ƥ	ƭ	ƈ

Figure 43: The basic mutation system of Sereer (Siin dialect)

Note that of the two voiced continuants in grade I, /w/ alternates with a voiced stop /b/, and /r/ with a voiceless stop /t/ in grade II. All consonants in grade II are stops, with /b/ being the only voiced stop. The implosives are not invariant, as in Fula. Rather, they alternate with the voiceless implosives in grades II and III. Nasal consonants and /l/ are invariant, as well as /ʔ/ and /y/, in contrast with Fula. Mutations involving /s/ are not completely predictable. In some cases it participates in a mutation series s~c~nj, but in most cases is invariant. We will see in section 2.3.4 that four additional series exist with voiceless stops in all grades.

2.3.2 Verbal mutation

The morphological environments which trigger mutation are roughly the same as in Fula. For verbs, singular subjects require the initial consonant of the verb to appear in grade I, whereas plural subjects require grade III.

singular	plural	
hum	ngum	‘tie’
fool	mbool	‘jump’
war	mbar	‘kill’
reef	ndeef	‘follow’
bet	mbet	‘surprise’
gar	ngar	‘come’
ɗaan	ƭaan	‘sleep’

Figure 44: Sereer verbal mutation

Unlike in Fula, relativization has no effect on mutation— only subject number agreement.

2.3.3 Nominal mutation

In the nominal system, mutation is triggered by noun class. Sereer noun classes are marked by prefixes, and each noun class requires a specific mutation grade for the initial consonant of the root. The following are the noun classes of the Saalum and Siin dialects.

Class name	Sg. Noun	Adj.	Grade	Determiner	Note
oxe	o-	o-	II	ox-e	personal class
ne	Ø-	Ø-	III	n-e	
fe	Ø-	fa-	any(n.)/III(adj.)	f-e(e)/fan-e[16]	
fe	fa-[16]	fa-	III	f-e(e)/fan-e	
le	Ø-	Ø-	I	l-e	
ole	o-	o-	I	ol-e	
fortis ole	o-	o-	II(n.)/I(adj.)	ol-e	
ale	a-	a-	II	al-e	
nasal ale	a-	a-	III(n.)/II(adj.)	al-e	
ga- aug. sg.	(g)a-[17]	a-	III	al-e	augmentative
gi- aug. sg.	gi-	a-	III	al-e	aug. (Saalum only)
onqe	o-	o-	III	ong-e/onq-e[18]	diminutive
fo- liquid	fo-	(f)o-	I	ol-e	liquids (Siin only)
	Pl. Noun				Pl. of:
we	Ø-	Ø-	I	w-e	*oxe*
ke	Ø-	Ø-	II	k-e	*ne*, *fe*, *nasal ale*
ake	a-	a-	II	ak-e	*le*, *ale*
axe	xa-	xa-	II	ax-e	*ole*, non-dimin. *onqe*
ga- aug. pl.	(g)a-	a-	III	ak-e	*ga- aug.*
gi- aug. pl.	gi-	a-	III	ak-e	*gi- aug.*
dim. pl.	fo-	fo-	III	n-e	diminutive *onqe*

Figure 45: Noun class system of Sereer

Other dialects have some minor differences in certain class prefixes, and will be discussed in section 6.1.1. Prefixes appear on nouns as well as adjectives and determiners, which agree with the nouns they modify. In most cases, the prefix on the noun and adjective are identical, but they differ in some classes. For certain classes, the determiner prefix bears a resemblance to the prefix on nouns and adjectives, but in others they are phonologically quite dissimilar. Contrary to some early descriptions of Sereer, these determiners are not inflectional suffixes—nouns can appear with or without a determiner, and they are enclitic on the noun phrase, not the noun itself. These determiners are bimorphemic, consisting of a noun class prefix followed by a vowel-initial determiner root. In Figure 45, the proximal definite determiner *-e* is given, but there are a number of other determiner roots (e.g. *-aa* 'distal definite determiner,' *-een* 'that,' *-um* 'which,' *-aaga* 'yonder'). As in Fula, classes are referred to by their proximal definite determiner (e.g. the personal singular is the *oxe* class), but the augmentative, liquid, and diminutive plural classes do not have unique determiners, and thus must be referred to using their prefixes, *gi-*, *ga-*, and *fo-*.

[16] Most nouns in the *fe* class are unprefixed synchronically, but *fa-* is present on some, which in most dialects is now fossilized as part of the noun stem (e.g. *fañiik* 'elephant,' *fanqon* 'death'). The determiner is *fee* in Siin, *fe* in Saalum, and *fane* in Ñominka (and rarely in Saalum).
[17] Both *ga-* and *a-* are found in Saalum, but only *a-* in Siin.
[18] Siin has *onq-* while Saalum generally has *ong-*, though *onq-* is preferred by some speakers, especially before a back vowel. Ñominka lacks /nq/ and thus has *ong-*.

Examples from each basic class (i.e. not diminutive or augmentative) of a noun phrase containing a noun, the adjective *ran* 'white,' and a determiner are given below:

sg. noun	adj.	det.	pl. noun	adj.	det.	
o-tew	o-tan	oxe	rew	ran	we	'the white woman/en'
nduus	ndan	ne	tuus	tan	ke	'the white knife/ves'
saate	fa-ndan	fe	caate	tan	ke	'the white village(s)'
xomb	ran	le	a-qomb	a-tan	ake	'the white turtle(s)'
o-ɓox	o-ran	ole	xa-βox	xa-tan	axe	'the white dog(s)'
a-caang	a-tan	ale	a-caang	a-tan	ake	'the white heron(s)'
a-ngas	a-tan	ale	kas	tan	ke	'the white well(s)'
o-nqool	o-ndan	onqe	xa-qool	xa-tan	axe	'the white moon(s)'
(f)o-jem	(f)o-ran	ole	xa-cem	xa-tan	axe	'the white salt(s)'

Figure 46: Sereer NPs showing class agreement and mutation

As in Fula, each noun has a default singular, and corresponding plural noun class, and can be put in the diminutive class (*onqe*) or either augmentative class (*gi-, (g)a-*), as well as the corresponding plurals (though augmentative singular and plural classes differ only in the determiner). Thus, each noun can appear in at least five noun classes.

sg.	pl.	dimin. sg.	
daɓ	a-taɓ	o-ndaɓ	'navel'
o-koor	goor	o-ngoor	'man'
wil	a-bil	o-mbil	'hair'
o-ɓay	xa-βay	o-βay	'hand/arm'
a-baaβ	a-baaβ	o-mbaaβ	'tree hollow'
mbaal	paal	o-mbaal	'sheep'
muus	muus	o-muus	'cat'

Figure 47: Sereer nouns appearing in different noun classes

2.3.4 Voiceless stops in grade I

The need to include the voiced stops in grade I is even more clear in Sereer than in Fula (see Figure 39 and Figure 41), as these stops show alternations in all three grades (e.g. Sereer b~p~mb vs. Fula b~b~mb). Furthermore, a large number of voiceless stops appear in environments that require grade I or grade III consonants. However, unlike their voiced counterparts, these voiceless stops show no mutation (just as in Fula, see Figure 40).

sg. vb. (I)	pl. vb. (III)		ole noun (I)		ne noun (III)	
paang	paang	'finish'	o-pang	'dance sp.'	pis	'horse'
tuuf	tuuf	'bend'	o-tund	'region'	teex	'medicine'
ci'	ci'	'give'	o-caay	'bridle'	ceq	'necklace'
kaβ	kaβ	'burn'	o-kaaf	'bilocation'	kom	'day'

Figure 48: Voiceless stop-initial Sereer roots

Whereas in Fula these voiceless stop-initial roots are rather rare, they are relatively numerous in Sereer, and include many common roots that cannot be identified as borrowings[19]. To account for these roots, it is necessary to acknowledge the following four mutation series:

Grade I	p	t	c	k
	|	|	|	|
Grade II	p	t	c	k
	|	|	|	|
Grade III	p	t	c	k

Figure 49: Additional mutation series in Sereer

That is to say, the voiceless stops must be included with /l, y, s, ʔ/ and the nasals as non-alternating consonants, with the complication that they also appear as the grade II consonant in some alternating series. Note that /q/ does not appear unambiguously in grade one, and thus there is no ˣq~q~q series[20].

Finally, there are a very small number of verb roots which contain an invariant initial prenasalized stop; that is, even when agreeing with a singular subject, they exhibit a consonant that occurs exclusively in grade III. These are all borrowings, mainly from Wolof (e.g. *njool* 'be tall' and *ndool* 'be poor'). Some noun roots show an invariant initial voiced stop, and these are also all borrowings, e.g. *o-bal / xa-bal* 'ball(s)' borrowed from French, and *dege / dege* 'peanut butter(s)' borrowed from Bambara.

2.3.5 Diminutive and augmentative mutation

As seen in Figure 49, roots with a voiceless stop in grade I exhibit this same voiceless stop in grades II and III. This holds true in the case of verbs and the basic noun classes, but in the case of diminutive and augmentative noun classes, these stops do in fact mutate to voiced prenasalized stops in grade III.

<u>sg.</u>	<u>diminutive</u>	<u>augmentative</u>	
o-kaas ole	o-ngaas onge	ga-ngaas ale	'cup'
pis ne	o-mbis onge	ga-mbis ale	'horse'
o-cax ole	o-njax onge	ga-njax ale	'riddle'
teex ne	o-ndeex onge	ga-ndeex ale	'medicine'
o-qir ole	o-nqir onge	ga-nqir ale	'whip'

Figure 50: Sereer diminutives and augmentatives of voiceless stop-initial nouns

We must therefore acknowledge the existence of distinct mutation patterns that operate only in the case of diminutives and augmentatives. Technically, Sereer makes use of a four grade mutation system, in which the fourth grade (perhaps "grade IIIb") is triggered only by

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[19] It should be noted that most of these are verb roots, and voiceless stop-initial roots are in fact quite rare in noun classes that require grade I. To give an idea of relative frequency, of all CVC verb roots in the Saalum dialect, 124 begin with /p, t, c, k/, 272 begin with /f, s, x/, and 229 begin with /b, d, j ,g/.

[20] No verbs are *q*-initial, and only two nouns in a grade I class have /q/: o-*qol* 'field' and *o-qir* 'whip,' both in the *ole* class. However, there exists a subclass of *ole* nouns with grade II mutation (the "fortis ole" class, see section 6.2.1.6), and so these two nouns are not clear evidence for /q/ being in grade I.

diminutive and augmentative noun classes, and differs from grade III only in having voiced prenasalized stops corresponding to the voiceless stops in grade I.

2.3.6 Dialect differences and mutation involving /s/

As seen in Figure 43, the consonant /s/ sometimes takes part in a mutation series s~c~nj, while in other cases /s/ is invariant. In verbs, it is always invariant. In diminutives and augmentatives, it always mutates to /nj/. Otherwise, the behavior of initial /s/ is unpredictable. With most nouns, a plural (enforcing grade II) will have /s/, but a few common nouns have /c/.

sg.	pl.	
soble le	soble ke	'onion'
suk le	a-suk ake	'male animal'
siñeel le	siñeel ke	'porcupine'
saax le	a-caax ake	'land'
saate fe	caate ke	'town'
saafu le	a caafu ke	'soap'

Figure 51: Sereer singular/plural pairs with s-initial noun roots

In the case of nouns derived from verbs, mutation is sometimes induced, and sometimes not. Sometimes, a totally unexpected mutation occurs.

verb		sg. n. (ne)	pl. n. (ke)	
seƈ	'be sunny'	njeƈ	ceƈ	'sun'
sox	'husk'	soq	soq	'millet husking'
siiñ	'smile w/ teeth'	ciiñ	ciiñ	'a smile w/ teeth'
		sg. n. (ale)	pl. n. (ake)	
sal	'branch out'	a-sal	a-sal	'branching stick'
sooc	'brush/scrub'	a-soocoor	a-soocoor	'tooth-cleaning stick'
sum	'be hot'	a-sumaan	a-sumaan ~ a-cumaan	'warmth'

Figure 52: Sereer nouns derived from s-initial verb roots

Some of these nouns are in the *ne* noun class, and thus have grade III enforced on their initial consonant. The noun *njeƈ* conforms to the mutation series s~c~nj, whereas in *soq* the /s/ is invariant. In *ciiñ*, the unexpected consonant /c/ appears. While /c/ can appear in grade III as part of the series c~c~c, it is not the expected outcome of /s/ in grade III[21]. The other nouns are in the *ale* class, and thus have grade II enforced in both the singular and plural forms. To my knowledge, none of these nouns can mutate to /c/ in the singular, though some can optionally mutate in the plural, despite the fact that the both the singular and plural noun classes require the same grade. In the Saalum dialect, the s~c~nj mutation pattern seems to be slightly more robust than in Siin, where it is reported to be marginal (though it never occurs in verbs in any dialect). In Ñominka /s/ is reported to be completely invariant (Renaudier 2012: 19).

[21] The explanation for this exception is that both words (*siiñ* and *ciiñ*) are borrowed from Wolof.

The distinction between velars and uvulars has been partially neutralized in Saalum. The phonemes /x/ and /h/ have completely collapsed to /x/[22], and the phonemic distinction between /ng/ and /nq/ is beginning to collapse. /k/ and /q/ are in general completely distinct, though some words show free variation between the two (e.g. *dakoox* or *daqoox* 'return,' *a-keñ* or *a-qeñ* 'wind'). The effect of these neutralizations on the mutation system is that the mutation series h~k~ng is regularly neutralized to x~q~nq, while very rarely remaining distinct as x~k~ng.

root in Siin	Saalum I		Saalum II		Saalum III	
hiic	o-xiic	'jujube'	kiic ke	'j. trees'	ngiic ne	'j. tree'
haɓas	xaɓas	'burp (v)'	qaɓas ke	'burps (n)'	nqaɓas ne	'burp (n)'

Figure 53: Equivalents of Siin h~g~ng in Sereer Saalum

In all cases, *x*-initial verb roots alternate with /nq/ in the plural in Saalum, and never /ng/. Ñominka has collapsed /nq/ and /ng/ to /ng/, but maintains the distinction between /x/ and /h/ and between /k/ and /q/ (Renaudier 2012: 17).

Implosives in Ñominka show no voicing distinction— they are all voiced. Contrary to McLaughlin's (1994) findings, Saalum does exhibit this distinction. Ñominka uses somewhat different noun class prefixes from other dialects (see Figure 93). The noun *o-kiin* / *wiin* 'person / people' (*o-ngiin* 'little person') shows an irregular w~k~ng mutation series. This is the only word to show such a pattern, and thus it is not considered to be part of the regular mutation system of the language.

2.3.7 Sereer non-initial mutation

In Sereer there is a much more restricted system of non-initial consonant alternation seen only in deverbal nouns, and affecting only the underlying consonants /ɓ, ɗ, ƴ, x/. These often mutate to /ƥ, ƭ, ƈ, q/ when deriving unaffixed nouns in *ale*, *ne*, *oxe*, and *onqe*, and *ale* nouns suffixed with *-ooƭ* 'manner of verbing.'

verb		derived noun	
deɓ	'rain'	a-teƥ ale	'rain'
luɓ	'borrow'	luƥ ne	'borrowing'
saɗar	'be scared'	o-caƭar oxe	'coward'
guuɗ	'steal'	o-kuuƭ oxe	'thief' (pl. *guuɗ we*)
roɗig	'be dirty'	ndoƭ ne	'dirt/filth'
xaaƴ	'show off'	o-nqaaƈ onqe	'showing off'
ƴax	'chew'	ƈaq ne	'chewing'
xaƴloox	'hunt'	nqaƈlax ne	'hunting'
ñaaƴ	'walk'	a-ñaaƈooƭ ale	'way of walking'

Figure 54: Sereer deverbal nouns with non-initial consonant mutation

[22] The variety of Siin presented in McLaughlin (1994: 84) also has no distinctive phoneme /h/. However, other accounts of the Siin dialect assert this phonemic distinction. Crétois (1972) gives the impression that this distinction has collapsed throughout much if not most of the Sereer-speaking area, and he gives x~k~ng as a regular mutation series alongside h~k~ng and x~q~nq.

Whether these consonants alternate is lexically specific, with about half of roots containing /ɓ/, two thirds of roots containing /ƴ/, and almost all roots containing /ɗ/ affected. Only a small minority of roots containing non-initial /x/ are affected. One f-final root shows a similar alternation: *duuf* 'plant' can be optionally nominalized as *a-tuup ale* (or *a-tuuf*) 'planting.'

Note that these consonant alternations are the same as those seen between grades I and II for initial consonants, and also between grades I and III for the implosives (but not /x/). The triggers of these non-initial mutations are all noun classes that assign grades II or III to initial consonants. Non-initial mutation is never witnessed in the verbal system for agreement with a plural subject, nor on adjectives when agreeing with grade II or III noun classes.

3 Historical background

3.1 Current literature

The most commonly cited overview of the genetic situation in Atlantic comes from Sapir's (1971) overview. In it, he proposes genetic subgroups based on lexico-statistical evidence, the most basic of which is a split between a northern and southern branch. Sereer and Fula, which Sapir identifies as forming a legitimate subgroup, fall within Northern Atlantic. He further groups Sereer and Fula together with Wolof to form the Senegal sub-branch (this is certainly inaccurate, as we will see in chapter 6). A more recent classification by Segerer (2010) groups Sereer and Fula together, but sees Wolof as much more distantly related. Segerer's classification again relies principally on lexical data, but takes into account some proposed sound correspondences to obtain more accurate judgments of cognacy. Interestingly, one of Segerer's subgroups (the non-Bak half of the northern branch), includes all of the languages which exhibit consonant mutation, including Fula and Sereer. While he himself does not make this claim, it might be assumed that the presence of consonant mutation in these languages is due to their genetic relatedness, which would provide a non-lexical argument for the relatedness of these languages. This exact claim is made by Stewart (2002: 203), who traces the mutation patterns even further back to Proto-Niger-Congo. Segerer and Pozdniakov (2017) also explicitly propose that the development of mutation was a shared innovation of this hypothesized branch of Atlantic. We will see that such a claim cannot be upheld.

Relatively little historical work on Sereer and Fula mutation and noun classes exists. Greenberg (1948) was one of the first to convincingly show that Fula is most closely related to Sereer, dispelling earlier popular theories of an Afro-Asiatic ("Hamitic" or else Semitic) connection. However, his Sereer data was by his own admission extremely limited (and in fact often erroneous), and mutation is only remarked upon as an argument for genetic relatedness. Some speculation is found in Sapir (1971), who assumes consonant alternation for PFS, and describes both languages as having noun class suffixes (accurate for Fula, but not Sereer).

The first serious treatment of Fula and Sereer noun classes and mutation is Doneux's (1975) historical comparison of the Atlantic languages, focusing primarily on noun class morphology. This paper is a first attempt to account for the wildly disparate manifestations of noun classes in a wide range of often distantly-related languages. With admittedly scant evidence from some languages, Doneux proposes general historical processes and methods for reconstruction which aim to explain the shape of class markers and the nature of mutation systems across many Atlantic languages. He proposes that the Atlantic proto-language must have made use of noun class prefixes of the form V-, CV-, NV-, and N-, with later developments of NVN- and C- in some languages. He assumes that mutation was not a feature of the proto-language, but arose due to interactions between segments in the prefix and the following nominal root. We will see that these claims are essentially correct as applied to Fula and Sereer, though there is no reason to preclude class markers of the more general shape CVC. While not attempting to be comprehensive, Doneux does make some specific claims about Fula and Sereer. He describes both as exhibiting a system of noun class suffixes (though only incipient in Sereer), which is the outcome of the grammaticalization of post-nominal determiners, alongside the erosion of the original prefixes (moreso in Fula than in Sereer) (1975: 48). He identifies specific cognate noun classes between the two languages, as well as between the other languages surveyed (1975: 99). In Sereer, he identifies descendants of historical noun class "augments," consisting of a single vowel which preceded the true class prefix, as familiar from the Bantu languages (1975: 103). Thus, the Sereer determiner prefixes *al-* and *ol-* are analyzed as historically polymorphemic, consisting of an augment **a-* or **o-*, and a true class marker **l-*, descended from an earlier CV- prefix. With regard to mutation, he does not address the specifics of either system, but notes that the "unexplained facts" of mutation in both languages can be explained as the effect of preceding consonants at the end of the noun class prefix (1975: 48).

We will see that this last broad claim about mutation is completely correct, but that the more specific assertions regarding the noun class morphology cannot in most cases be supported (see also chapter 6, section 4.1). While Sereer may in some centuries develop class suffixes from its modern determiners, they can in no way be analyzed as such synchronically in any dialect, being enclitic on the entire noun phrase (e.g. *muus maak ne* 'the big cat,' with the adjective *maak* intervening between the noun and determiner). Furthermore, we will see that the Fula suffixes must not have descended from earlier determiners, but from the class prefixes themselves (see section 6.7). Some of Doneux's proposed cognate noun classes can be confirmed (e.g. Fula *ngal* with Sereer *ale*, see section 6.2.1.5), but many cannot, and the forms of the reconstructed class markers can in almost all cases not be supported. Doneux assumes the basic form V-C- for most proto-prefixes (a vocalic augment followed by a consonantal class marker), but we will see that only one PFS class marker can be reconstructed with the form VC, with most having the form CVC or CV (see Figure 105 in section 6.6). Evidence from Fula and Sereer lends no support to the theory that any class markers in Atlantic were polymorphemic, and cannot support the existence of an augment distinct from the class marker itself at the stage of PFS. In summary, while Doneux's essential ideas about the origin of mutation in Atlantic are correct, we will see that most of his specific proposals regarding Fula and Sereer must be rejected.

Two subsequent authors have written specifically on the issue of PFS noun classes, Mukarovsky (1983), and Pozdniakov (1988). Both advance somewhat different theories from Doneux, with Pozdniakov assuming that the proto-language made use of a more complicated system of noun class circumfixes, the prefixal element of which induced mutation, while the suffixal element survived essentially intact in each language. Both authors also assume that PFS exhibited initial consonant mutation. We will see that neither of these assumptions can be upheld. Nonetheless, Pozdniakov and Mukarovsky go beyond Doneux in taking the highly important step of assembling a number of cognates between each language for each proposed cognate noun class pair, and Pozdniakov is thus able to correctly identify some cognate classes that had eluded Doneux (e.g. Fula *ngu* and Sereer *ne*, see section 6.2.1.2). However, many of Pozdniakov's proposed sound correspondences do not hold up when the lexicon as a whole is considered (while Mukarovsky does not exhibit any consistency in sound correspondences across cognate pairs), and many of the nominal cognates advanced as evidence for the cognacy of certain noun classes do not stand up to scrutiny, resulting in a number of misidentified noun class cognates. As with Doneux, the shapes of the reconstructed class markers are in most cases not particularly accurate. Many of the shortcomings of these historical accounts can perhaps be attributed to these scholars' limited access to Sereer data at the time[23].

3.2 The relation of Fula to Sereer

Sereer and Fula are each other's closest relative, as evidenced by their large amount of shared nominal and verbal morphology, as well as cognates exhibiting regular sound correspondences, most of which they do not share with other languages in the area. Oral tradition holds that the Fula and Sereer once lived together in the Fuuta Tooro region of northern Senegal, but when Islam came to Senegal approximately 1000 years ago, the Sereer migrated southward, while the Fula remained and converted to Islam. This account is supported to some extent by archeological and anthropological evidence (see McLaughlin 1994: 8, Clark 2005: 533), though Fula migrations would have already begun prior to the arrival of Islam. However, it is almost certain that these two peoples did not have a common language at the time of the Sereer migration. Impressionistically, the two languages are much more distinct than would be expected after only 1000 years of independent development within the same linguistic area, but of course social factors can cause languages to change at more or less rapid rates.

Sapir's aforementioned lexico-statistical survey found Fula and Sereer to have 37% shared lexicon for the 100 most basic words (35% by my own count using the standard Swadesh list). As more words are considered, this percentage decreases substantially. Of the first 200 Sereer nouns in the *ole* class collected in my fieldwork, only 15 Fula cognates can be identified. For the first 200 nouns in the *ne* class, only 19 are found to have Fula cognates. Of the first 1000 Sereer verbs collected with unique roots, 191 have Fula cognates. Compare these numbers with the 80% rate of shared cognates between French and Italian, or even the 59% shared between Spanish and Romanian in a 200 word list (Dyen et al. 1992), and it becomes clear that Fula and Sereer have diverged significantly since they split many centuries ago.

3.3 Sound correspondences and sound changes

Because the reconstruction of the Proto-Fula-Sereer mutation and noun class systems relies on the identification of cognates between Fula and Sereer, it will be useful to lay out some of the regular sound correspondences between the two languages, as well as the sound changes responsible for them. What follows is not a comprehensive list of sound correspondences and changes, but includes the major ones that are important in determining the cognacy of the examples cited in this chapter. For a discussion of the PFS consonant inventory, see section 4.10.

3.3.1 Vowels

Vowels have undergone relatively few changes in both languages. In most cases, a vowel in Sereer corresponds to the identical vowel in Fula (this is the case in 284/330 pairs of cognate roots identified so far).

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[23] These authors' primary source for Sereer is in all cases Crétois's (1972) dictionary, in which entries are listed in such a way that the noun class prefix on the article appears to be a suffix on the noun (e.g. *ɓox, o...ol* to indicate *o-ɓox* 'dog' with the obligatory prefix *o* and the optional determiner *ol-e, ol-aa,* etc.). This leads Podzniakov, and perhaps also Doneux, to interpret Sereer as having noun class suffixes (e.g. ˣo-*ɓox-ol*). Mukarovsky additionally cites Pichl (1963), who erroneously terms the Sereer determiners "suffixes."

Sereer	Fula	
daɗ	daɗ	'be ahead of'
ɗaan	ɗaan	'sleep'
fel	wel	'be good'
feed	weet	'be morning'
ɓir	ɓir	'milk (v)'
ɓiic	ɓiic	'screech'
fod	fot	'be equal'
ɓoor	ɓoor	'strip off'
juɗ	juɗ	'grill/roast'
juur	juur	'pour (out)'

Figure 55: Regular Fula-Sereer vowel correspondences

One somewhat common discrepancy is between a long vowel in Sereer and a short vowel in Fula. In general, this correspondence is due to the historically regular shortening of vowels in Fula before a consonant cluster.

Sereer	Fula	PFS root	
o-koor	gor-ko	*ɣoor	'man'
ngaaf	ngaw-ri	*gaaf	'millet'
faaɓ	fam-ru	*faaɓ	'frog'
naak	nag-ge	*naak	'cow'

Figure 56: Outcome of regular vowel shortening in Fula

However, there are a number cases in which vowel length discrepancies cannot be easily explained. These include cases in which a Sereer short vowel corresponds to a Fula long vowel, and cases where a Sereer long vowel corresponds to a Fula short vowel.

Sereer long	Fula short		Sereer short	Fula long	
ɓood	ɓod	'crawl/slither'	day	daay	'cease'
fool	fol	'jump/skip'	sam	saam	'fall'
gooy	woy	'be depressed'	naf	naaw	'hit/hurt'
fees	wes	'winnow'	xaɓ	haaɓ	'be eager/impatient'

Figure 57: Irregular Fula-Sereer vowel length correspondences

Even across dialects discrepancies in vowel length are sometimes found, and cannot always be explained.

While few regular sound changes affecting vowels have taken place, there are numerous seemingly sporadic discrepancies in vowel quality among words that otherwise appear to be cognate. The only such discrepancy supported by more than two cognate sets is Sereer /i/ corresponding to Fula /u/, but this correspondence is still rather rare.

Sereer	Fula	
yer	yar	‘drink’
ƴiƴ	ƴoƴ	‘be smart’
maar	moor	‘braid’
siɗ	seɗ	‘strain’
ñu’	ño’	‘gossip/whisper’
pis	puc-u	‘horse’
yip	yupp	‘pour’
ñiiñax	ñuuñ-u	‘ant’
lukuƴ	likiƴ	‘hiccup’

Figure 58: Vowel quality discrepancies between Fula and Sereer

Wherever two words appear to be cognate based on all other evidence, I will generally assume that they are, but of course we must view these cases with some caution.

3.3.2 Consonants

Many of the sound changes affecting consonants in these two languages involve PFS consonant clusters, and are related to consonant mutation. These changes are discussed in section 4.3. A few other changes affecting consonants are noteworthy. The first is the development of the proto-sound *ɣ.

Sereer	Fula	PFS root	
gar	’ar	*ɣar	‘come’
gas	’as	*ɣas	‘dig’
gen	yen (eastern dial.)	*ɣen	‘reside’
gim	yim	*ɣim	‘sing’
giig	yirg	*ɣirg	‘scrub’
gom	wom (eastern dial.)	*ɣom	‘dance’
goɗ	woɗɗ	*ɣoɗɗ	‘be far’
waag	waaw	*waaɣ	‘be able’
o-maag	maay-o/maaw-o	*maaɣ	‘river’
jeg	jey	*jeɣ	‘have/own’
ɓal-ig	ɓal-w	*ɓaal-iɣ	‘be black’
ran-ig	ran-w	*ran-iɣ	‘be white’

*Figure 59: Development of Proto-Fula-Sereer *ɣ*

In Sereer, *ɣ regularly becomes /g/ in all positions. In Fula, word-initial *ɣ develops in the western dialects (e.g. Pulaar) to /y/ before front vowels, /w/ before back vowels, and is deleted before /a/ (with /ʔ/ being inserted). In eastern dialects like Gombe, it becomes /w/ also before /a/. In non-initial position, *ɣ usually becomes /w/ in Fula, but sometimes becomes /y/. The exact conditions under which non-initial *ɣ develops to /w/ or /y/ are not entirely clear. Note that there is a separate proto-sound *g which remains a stop in both languages, though it is seemingly rarer than *ɣ: Ser. *gaañ* = Fu. *gaañ* ‘injure’ (perhaps borrowed from Wolof), Ser. *ƴuug* ‘bend at waist/bow head’ = Fu. *ƴuug-ee* ‘be hunchbacked.’

Also of note is the development of uvular *x in Fula.

Sereer	Fula		Sereer	Fula	
xaaɗ	haaɗ	'be bitter'	ƴax	ƴakk	'chew'
xeeñ	heeñ-ere	'liver'	sox	sokk	'de-husk'
xeƈ	heƴ	'fit'	sux	sukk	'block hole'
xaw	haw	'defeat'	sex	seh	'carve'
xirsoox	hirs-	'slit throat'	max	mah	'build'
xoox	hoore	'head'	ɗax	ɗah	'cure (medicine)'
xaw	haw	'defeat'	wox	woh	'bark (dog'

*Figure 60: Development of *x in Fula*

Word-initially, *x merges with /h/. In non-initial position, Sereer /x/ corresponds sometimes with Fula /h/, and sometimes with /kk/. Note that Sereer does not contrast /h/ and /x/ except root-initially (see footnote 40), so these two correspondences might represent the two Fula reflexes of earlier *h and *x. However the particular Fula verbs with /kk/ might also contain a fossilized consonantal suffix which assimilated to the preceding *x, resulting in a geminate. A regular development of singleton /x/ to /kk/ seems somewhat unlikely.

Fula has undergone a regular word-final devoicing of *d. Other voiced stops were not affected. Importantly, this word-final devoicing rule also applies to noun roots, even though synchronically they are obligatorily followed by a noun class suffix.

Sereer	Fula	PFS root	
a-ngid	yit-ere	*ɣid	'eye'
fod	fot	*fod	'be equal'
o-hiid	hit-aa-nde	*hiid	'year'
a-tud	dut-al	*dud	'vulture'
feed	weet	*feed	'dawn'
o-siid	ciwt-aa-ɗo	*siwd	'twin'
raad-land	rayt-ee	*rayd	'traumatize' (Fula passive)
maad	maat	*maad	'witness/notice/etc.'
xoɓid	hoɓt-	*xoɓ-id	'peel'
mud	mut	*mud	'sink'

*Figure 61: Final devoicing of *d in Fula*

That this process took place only word finally can be proven by suffixed forms in Fula such as *mud-aa-de* 'to sink intentionally,' cognate with Sereer *mud-oox* with the same meaning. This same root devoiced its final *d to *mut* when unsuffixed in Fula, but remains voiced when suffixed. The devoicing in noun roots is due to the fact that the Fula suffixes were at one time pre-nominal (see section **Error! Reference source not found.**), and only became suffixes some time after this final devoicing change. That the original final consonant in these forms was *d and not *t can be confirmed by the multiple *t-final reconstructions showing /t/ in both languages: Ser. *a-fat* = Fu. *ɗatal* 'road,' Ser. *ŋat* = Fu. *ŋat* 'bite,' Ser. *sut* = Fu. *suut* 'take out,' Ser. *'uut* = Fula (Nigerian dialects) *'uut* 'swell' etc.

There are three seemingly regular correspondence sets involving the labial continuants /f/ and /w/.

Sereer	Fula	FPS root	
fod	fot	*fod	'be equal'
fool	fol	*fo(o)l	'jump/skip'
fop	fof	*fop/fof?	'all'
faaɓ	fam-ru	*-faaɓ	'frog'
nof	nof-ru	*ru-nof	'ear'
o-tafax	taf	*taf	'forge' (Ser. 'smith')
lof	lof	*lof	'stick into mud'
fel	wel	?	'be good'
feed	weet	?	'dawn'
fañ	wañ	?	'hate'
foor	woor	?	'be (nearly) ripe'
reef	rew	?	'follow'
yaf	yaw	?	'despise'
o-gef	gew-ol	?	'crack'
waag	waaw	*waaɣ	'be able'
war	war	*war	'kill'
wuɗ	wuɗ	*wuɗ	'be ruined by termites'
wel	wel	*wel	'be sharp'
rew	rew-ɓe	*ɓe-rew	'women'
xaw	haw	*xaw	'defeat'
jaw 'cook'	jaw (Maasina)	*jaw	'blaze'

Figure 62: Fula-Sereer correspondence sets involving initial labial continuants

It is unclear what is to be made of the Sereer /f/ : Fula /w/ correspondence set, but it is extremely common—moreso even than the /f/ : /f/ set, though all three are well-represented.

To summarize: Fula and Sereer are demonstrably related to each other, and more closely than to any other language. In terms of their lexica, they share many cognates, but taken as a whole they have a rather low percentage of lexical overlap. Phonologically, cognate roots are often quite similar, with the most noticeable differences arising from the divergent development of consonant clusters (see section 4.7), and *ɣ in each language.

4 Historical account of mutation

4.1 Underlying assumptions

In Fula and Sereer, mutation involves changes in continuancy, nasality, and (for Sereer) voicing. Thus, we must consider all of the following possible historical effects of a preposed morpheme[24] on the root initial consonant: changing a non-continuant into a continuant (lenition), or vice versa (fortition), changing a non-nasal segment into a (partially) nasalized one (nasalization), or vice versa (denasalization), and changing a voiced segment into a voiceless one (devoicing), or vice versa (voicing). To determine which processes in fact operated, we must identify environments in which a restricted set of consonants can appear, and then determine which process was most likely to have given rise to this set. For example, if only continuants can appear after a certain preposition, we would assume that the preposition

[24] The term "preposed morpheme" is used to avoid assuming that the morpheme was a necessarily a prefix, proclitic, or free word, as all three would in theory be capable of inducing mutation historically.

had a leniting effect on the initial consonant of the root. If we find any environment in which there are no restrictions on what consonants can appear, we can assume that no mutation operated in that environment. Of course, it is possible that we could find no such "unrestricted" environment, which would indicate that all initial consonants were subject to some form of mutation.

In identifying and describing these "restricted environments," it will be useful to make reference to classes of consonants which share certain features. The following small-caps symbols will be used to stand in for these classes of consonants:

symbol	type of consonant	refers to:
P	voiceless egressive stop	p, t, c, k, q
B	voiced egressive stop	b, d, j, g
F	voiceless continuant	f, s, h, x
W	voiced continuant	w, r, y, ɣ
M	nasal	m, n, ñ, ŋ
MB	voiced prenasalized stop	mb, nd, nj, ng, nq
Ɓ'[25]	voiced implosive	ɓ, ɗ, ƴ
Ƥ'	voiceless implosive	ƥ, ƭ, ƈ

Figure 63: Cover-symbols for Fula-Sereer consonants used throughout this chapter

The labial consonants are used as the cover-symbols simply because this is the only place of articulation at which all relevant manner features are distinguished in both modern languages.

4.2 Analyzing the three mutation grades historically

The first thing to note is that root-initially, MB and in Sereer Ƥ' are never invariant, outside of a very few exceptional roots (see the end of section 2.3.4). That is to say, there are no roots in which some other consonant at the same place of articulation does not replace an initial MB or Ƥ' in a different morphological environment, given the opportunity. Except in rare cases of borrowing, they can never be the initial consonant of a verb root, and can always be straightforwardly analyzed as derived from some other consonant. In synchronic analytical terms, these consonants never appear in grade I. Thus, we will assume that all initial MB and Ƥ' are the result of some mutation.

There do exist environments in which all other sounds (P, B, F, W, Ɓ', M) can appear. These are singular verb roots, and certain noun classes; i.e., the environments which condition grade I consonants. Recall that, contrary to its association with "continuant grade," grade I must contain all continuants and stops (except MB and Ƥ') in both languages (see Figure 33, Figure 41, Figure 43, and Figure 49), and of course all invariant consonants can appear regardless of the conditioned grade. We can therefore assume that grade I is truly the "unmutated" grade, and that whatever preposed morpheme (or lack thereof) gave rise to these environments historically must have triggered no sound changes in the following consonant.

There are two groups of environments which restrict the set of initial consonants. First, certain noun classes require the initial consonant to be a stop, and in Sereer furthermore this stop must be voiceless, with the exception of /b/. These are the classes which condition grade II consonants. As the set of grade II consonants consists exclusively of stops in both languages, we will assume that whatever preposed morphemes gave rise to these environments

[25] An apostrophe is added after the implosives, as these small-caps characters appear very similar to regular P, B.

must have triggered the fortition (i.e. hardening, and in Sereer devoicing) of the following consonant. Historically speaking, grade II is truly “fortis grade” in both languages.

The second restricted environment is seen in plural verbs and certain noun classes, which require a restricted set of root-initial consonants that excludes B, F, W, and in Sereer B’. These are the environments which condition grade III consonants. As grade III is the only grade in which MB is found in both languages, it seems reasonable to assume that the preposed morphemes which created these morphological environments triggered nasalization of the following consonant. The synchronic characterization of grade III as “nasal grade” in both languages thus seems appropriate historically as well.

Sereer:													
unmutated	p	t	c	k	b	d	j	g	f	s	h	x	
fortition	p	t	c	k	p	t	c	k	p	s/c	k	q	
nasalization	p	t	c	k	mb	nd	nj	ng	mb	s/nj	ng	nq	
unmutated	w	r	y		ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	ʔ
fortition	b	t	y		ƥ	ƭ	ƈ	m	n	ñ	ŋ	l	ʔ
nasalization	mb	nd	y		ƥ	ƭ	ƈ	m	n	ñ	ŋ	l	ʔ
Fula:													
unmutated	p	t	c	k	b	d	j	g	f	s	h		
fortition	p	t	c	k	b	d	j	g	p	c	k		
nasalization	p	t	c	k	mb	nd	nj	ng	p	c	k		
unmutated	w	r	y	*ɣ	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)[26]
fortition	b	d	j	g	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)
nasalization	mb	nd	nj	ng	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)

Figure 64: Mutation grades of Sereer and Fula organized historically

To summarize, we hypothesize that the modern systems of three mutation grades in Sereer and Fula were created due to two distinct historical processes: fortition, which gave rise to grade II, and nasalization, which created grade III. Grade I represents the environments where neither historical process operated. Of course, the invariant consonants in each language would have also been preceded by whatever morphemes triggered these processes, but simply did not undergo any sound change in the presence of these morphemes. So then, organized historically, the consonants in grade I represent the full range of underlying, unmutated consonants in the language. Grade II represents the development of each of these sounds when they were preceded by a morpheme that triggered fortition, and grade III represents the development of each of the grade I sounds when they were preceded by a morpheme that triggered nasalization.

4.3 The mutation sound changes

We will now consider the exact nature of these historical processes of fortition and nasalization. If we assume that specific preposed morphemes triggered each of these processes,

[26] This series does not exist in the western dialects which reanalyzed all ʔ-initial roots as participating in the ʔ~g~ng series (see section 4.9.2).

it must be that the final segment of these morphemes interacted with the initial segment of the following root in the form of various sound changes. In the case of nasalization, it is safe to assume that the morpheme-final segment in question was a nasal phoneme (some consonant of the M class). In the case of fortition, the identity of the relevant morpheme-final segment is less obvious. It was presumably a consonant rather than a vowel, but for now we will simply refer to this consonant or set of consonants as X, as its identity is unknown. We must then assume the following sound changes for each language, where + is the boundary between the preposed morpheme and the following root:

Sereer:		Fula:	
Nasalization	Fortition	Nasalization	Fortition
***M+F > MB**	*X+F > P	***M+F > P**	*X+F > P
*M+W > MB	***X+W > P** (*Xw > b)	*M+W > MB	***X+W > B**
*M+P > P	*X+P > P	*M+P > P	*X+P > P
*M+B > MB	***X+B > P**	*M+B > MB	***X+B > B**
***M+Ɓ’ > Ƥ’**	***X+Ɓ’ > Ƥ’**	***M+Ɓ’ > Ɓ’**	***X+Ɓ’ > Ɓ’**
*M+M > M	*X+M > M	*M+M > M	*X+M > M

Figure 65: Mutation sound changes in Fula and Sereer

Outcomes which are different between the languages are bolded. In Sereer, *y and *s were not affected by either sound change. Note that in Sereer, while *ɣ and *r devoiced under fortition, *w did not.

These sound changes make certain predictions about the sound correspondences that should exist between cognate roots when they appear in the same grade in both languages. Furthermore, it predicts that there should be a restricted set of singular/plural pairs with regards to the consonant class of the initial consonant. For verbs, we predict that any unmutated (grade I) consonant can appear in the singular form, and that the plural form will always exhibit the appropriate outcome of nasalization on that consonant.

Sereer verb:				Fula verb:				
I	III			I	III			
sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.	
P	P	toƈ	toƈ	P	P	toƴƴ	toƴƴ	‘break open’
B	MB	daɗ	ndaɗ	B	MB	daɗ	ndaɗ	‘be ahead of’
F	MB (+s)	hum	ngum	F	P	hum	kum	‘tie’
W	MB (+y)	war	mbar	W	MB	war	mbar	‘kill’
Ɓ’	Ƥ’	ƴax	ƈax	Ɓ’	Ɓ’	ƴakk	ƴakk	‘chew’
M	M	nan	nan	M	M	nan	nan	‘hear’

Figure 66: Cognate Fula-Sereer verbs in singular and plural

Indeed, we find that there is a limited set of singular/plural pairs which can appear in each language for verbs. Furthermore, each singular/plural pair in one language corresponds to exactly one singular/plural pair in the other. For example, any verb with an initial voiceless continuant in Sereer corresponds with a voiceless continuant in Fula, and in Sereer the plural form has an initial prenasalized stop, while in Fula it has a voiceless stop.

For person nouns, we predict that any unmutated consonant should appear in the plural form, with the language-appropriate fortition form of each consonant appearing in the singular.

		Sereer person noun:				Fula person noun:		
II	I			II	I			
sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.	
P	F	o-pulaane	fulaane	P	F	pull-o	ful-ɓe	'Fula person'
P (+b)	W	o-tew	rew	B	W	debb-o	rew-ɓe	'woman'
P	P	o-tafax	tafax	P	P	tafoo-wo	tafoo-ɓe	'smith'
P	B	o-ponu	bonu	B	B	bon-ɗo	bon-ɓe	'evil person'
Ƥ'	Ɓ'	o-ƭaaɗaan	ɗaaɗaan	Ɓ'	Ɓ'	ɗaanotoo-ɗo	ɗaanotoo-ɓe	'sleeper'
M	M	o-maag	maag	M	M	maw-ɗo	maw-ɓe	'older sibling'

Figure 67: Cognate Fula-Sereer person nouns in singular and plural

Once again, we find that only the predicted set of singular/plural pairs is attested in each language.

For cognate animals in the Sereer *ne* and Fula *ngu* classes, we predict an even more limited set of only four types of singular/plural pairs, as both the singular and plural enforce mutation on the initial consonant.

		Sereer animal (in *ne* class):				Fula animal (in *ngu* class):		
III	II			III	II			
sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.	
P	P	pis	pis	P	P	pucc-u	pucc-i	'horse'
MB	P (+b)	mbaal	paal	MB	B	mbaal-u	baal-i	'sheep'
Ƥ'	Ƥ'	ƥook	ƥook	Ɓ'	Ɓ'	ɓow-ngu	ɓow-ɗi	'mosquito'
M	M	mol	mol	M	M	mol-u	mol-i	'foal'

Figure 68: Cognate Fula-Sereer animal nouns in singular and plural

This is indeed what we find in both languages.

4.4 Explaining these sound changes

With the mutation sound changes in Figure 65 established, we must now examine them and determine if they are in fact plausible, given what we know about sound change cross-linguistically. We will find that they do indeed seem quite natural, especially if we assume that the fortition changes were the result of gemination. We will first consider nasalization, and then fortition.

4.4.1 Nasalization

Ignoring the implosives, the nasalization changes in each language involve only three types of change: postnasal voicing, post-nasal hardening, and nasal deletion before a voiceless consonant (*NT > T). All three of these processes are widely attested cross-linguistically, especially within Niger-Congo. Post-nasal voicing (seen elsewhere in Japanese, Armenian, Zoque, etc., see Hayes and Stivers 2000) accounts for the development of M+F in Sereer. Post-nasal hardening (seen for example in Tswana and many other Bantu languages) accounts for the development of M+F and M+W in both languages. Nasal deletion (*NT > T, seen elsewhere in northwest Bantu languages such as Tuki (Bantu A), see Hyman 1980) accounts for the development of M+P in both languages, and M+F in Fula. All three of these processes can be assumed to have taken place in the history of other mutation systems within Atlantic (see Figure 72).

The only difficulty is the development of ᴍ + ʙ'. When nasalized, implosives devoice in Sereer, and are unaffected in Fula. Nasalized implosives are marked cross-linguistically (Halpert 2012: 358), so the lack of nasalization is unsurprising, but the devoicing in Sereer is perhaps unexpected. Post-nasal devoicing is not unheard of cross-linguistically (e.g. in Tswana, see Hyman 2001), but as no other consonants devoice due to nasalization in Sereer, this seems unlikely as an explanation for the *ᴍ + ʙ' > ᴘ' change. Instead, this change is likely due to an intermediate stage of gemination (*ᴍʙ' > ʙʙ' > ᴘᴘ' > ᴘ'). Geminate devoicing is typologically extremely common, and will be discussed in the following section on fortition. Cross-linguistically, implosives and nasals are known to develop from each other (Cun 2002: 157, see also Greenberg 1970), as has taken place in Fula, where /ɓ/ alternates freely with /m/ in final position synchronically in a few roots (Arnott 1970: 120). Between Fula and Sereer, a number of cognates exist in which one language has an implosive, and another a nasal (e.g. Sereer *moos*, Fula *ɓoos* 'massage,' Sereer *faɓ*, Fula *fam-ru* 'frog'). Given the fact that implosives and nasals can develop from each other in Fula and Sereer, the total assimilation of a nasal to a following implosive in the history of Sereer is not surprising[27]. Clements and Osu (2002) propose that implosives, like nasals, are non-obstruent stops, based on sharing a number of phonological and phonetic properties. These similarities could presumably have led to the misperception and/or reanalysis of a nasal implosive sequence as a geminate implosive, which subsequently underwent devoicing.

4.4.2 Fortition

In both Fula and Sereer, fortition induces hardening of continuants to stops, and in Sereer, devoicing of all consonants except *w. These changes would be natural as the result of gemination. By this account, the mystery segment ˣ fully assimilated to the root-initial consonant, creating a geminate. These geminates then degeminated in both languages— in Sereer due to a universal degemination change, and in Fula due to a more specific constraint against word-initial consonant clusters. It is also possible that certain consonants induced fortition in a following consonant without assimilating to it, as will be argued for *l in Fula (see section 6.2.1.5). It will be seen in section 4.7 that this set of consonants "ˣ" contained stops, most voiceless continuants, and *l, of which the consonants directly responsible for root-initial fortition are *k, *x, and *l (see section 6).

Cross-linguistically, there is a strong dispreference for voiced geminates, as well as geminate continuants. Kirchner (1998: 98) gives the following typological generalization:

> "The presence of a geminate continuant consonant, or voiced geminate obstruent, in the segment inventory of a language (whether derived or underlying) implies the presence of a corresponding non-continuant or voiceless geminate, respectively."

He explains this phenomenon by stating that, "More effort is required to produce a geminate continuant consonant than a geminate stop…" and, "More effort is required to produce a voiced geminate obstruent than a voiceless geminate." While Blevins (2008) provides some counterexamples to the above typological generalization, it overwhelmingly holds across the world's languages.

[27] This same process may also have operated in Fula, but as geminates do not devoice, but do degeminate word-initially, we would be left with no evidence to prefer a development *ᴍʙ' > ʙʙ' > ʙ' over a simple nasal deletion process, *ᴍʙ' > ʙ'.

Historical processes which devoice geminates are well-attested (e.g. in the Ethiopian languages Endegeň and Chaha (Rose 2003: 845)), and can easily explain Sereer devoicing in the fortis grade II. Of especial importance is that the typological tendency to devoice geminates provides an explanation for the appearance of the voiceless implosives in grade II in Sereer (and nasal grade, see previous section). Due to the extreme typological rarity of these sounds, their presence in Sereer demands an explanation. From a standpoint of universal phonological constraints, the geminate devoicing account is appealing because the constraint against voiced geminates is so strong cross-linguistically that a language might be expected to violate other high-ranked constraints— in this case the constraint against voiceless implosives— in order to satisfy it.

Synchronic processes of geminate hardening are common cross-linguistically, and can even be found in modern Fula.

nof-ru	'ear'	nopp-i	'ears'
rew-ɓe	'women'	debb-o	'woman'

Figure 69: Synchronic geminate hardening in Fula

When an underlyingly *d*-initial suffix causes the gemination of a stem-final continuant (excluding /l/), the resulting geminate hardens. This synchronic constraint against geminate continuants in Fula is formalized by Paradis (1986). Note that this synchronic hardening rule in Fula is probably due to a sound change that took place after those responsible for initial mutation (see section 6). Keer (1998: 157) further cites Faroese and Tümpisa Shoshone as languages with synchronic geminate hardening processes. A particularly striking example is found in the Bantu language Luganda (Hyman and Katamba 1999: 394).

class 5 sg.	class 6 pl.	
ttámà	ma-támà	'cheek'
bbálà	ma-bálà	'stain'
ssávù	ma-sávù	'fat, lard'
vvíívî	ma-víívî	'knee'
ddíbà	ma-**l**íbà	'skin, hide'
jjibâ	ma-**y**ibâ	'dove'
ggʷáàgi	ma-**w**áàgi	'centerpost of house'

Figure 70: Geminate hardening in Luganda

Here, noun class 5 (also used as an augmentative class) induces gemination of the root-initial consonant, and in the case of certain continuants, it hardens. Historically, this gemination was caused by the assimilation of the noun class marker **į*- (likely realized as a palatal glide at the time of the change) to the root-initial consonant.

Logically, there are two pathways by which a preceding consonant can result in the gemination and hardening of a following continuant.

Pathway 1: assimilation then hardening	*XF > FF > PP
	*XW > WW > BB
Pathway 2: hardening then assimilation	*XF > XP > PP
	*XW > XB > BB

Figure 71: Two potential pathways to geminate hardening

In the case of Fula, there is no reason to assume one pathway over the other. The outcome of *XF and *XW are identical to that of *XP and *XB respectively, and thus pathway 2, which would result in the complete merger of F and W with P and B after X, could account for the observed sound changes just as easily as pathway 1. In Sereer however, pathway 2 cannot account for the divergent fortitions of *b and *w into /p/ and /b/ respectively, as it would predict a total merger after X, with both sharing the same outcome. The only way in which pathway 2 could account for these divergent developments is if *b geminated and devoiced prior to the gemination of *w, which seems highly unlikely. Thus, we must assume that in Sereer, fortition created a true geminate continuant *ww which then hardened to /b/. Kawahara (2007) shows that geminate continuants are highly confusable with their stop counterparts, and sound changes of the "pathway 1" type would be an expected potential consequence of this fact. In Luganda it is especially clear that exactly this change has taken place, as there is a process of pre-vocalic gliding that yields /wo-a/ → wwaa → gg^{w}aa, in which there must have been a geminate [ww] (Hyman and Katamba 1999).

Finally, evidence for Fula and Sereer grade II being the outcome of gemination can potentially be found in other Atlantic languages. There is a strong areal tendency to develop three-grade mutation systems, with one grade containing continuants (grade I), one containing stops (grade II), and one containing nasalized sounds (grade III).

<u>Kobiana</u>

I	f	h	s	h	b	l	z	g	r
II	pp	tt	cc	kk	bb	dd	jj	gg	dd
III	pp	tt	cc	kk	mb	nd	nj	ng	dd

<u>Konyagi/Wamey</u> (adapted from Santos 1996)

I	f	r	s	x$^{(w)}$	w	l	y	y/w	w	w̃	l̰	ỹ	ỹ/w̃	w̃	v	r^{y}	y
II	p	t	c	k$^{(w)}$	b	d	j	g	g^{w}	m	n	ñ	ŋ	ŋ^{w}	ɓ	ɗ	ƴ
III	p	t	c	k$^{(w)}$	mp	nt	nc	nk	nk^{w}	m	n	ñ	ŋ	ŋ^{w}	mb	nd	nj

<u>Bassari</u> (adapted from Ferry 1991)

I	f	s	ʃ	x$^{(w)}$	w	r	y	ɣ	ɣ	w̃	n	ỹ	ɣ̃	ɣ̃	ɓ	l	ƴ
II	p	t	c	k$^{(w)}$	b	d	j	g	g^{w}	m	n	ñ	ŋ	ŋ^{w}	ɓ	ɗ	ƴ
III	p	t	c	ng$^{(w)}$/k$^{(w)}$	mb	nd	nj	ng	ng^{w}	m	n	ñ	ŋ	ŋ^{w}	m	n	ñ

<u>Biafada</u> (Wilson 1993)

I	f	r	s	h	l	b^{w}	b	d	j	g	m	n	ñ	ŋ	w	y
II	p	t	c	k	r	bb^{w}	bb	dd	jj	gg	mm	nn	ññ	ŋŋ	ww	yy
III	mp	nt	nc	nk	nr,nd	mb^{w}	mb	nd	nj	ng	mm	nn	ññ	ŋŋ	ww	yy

Figure 72: Mutation systems in other Atlantic languages

It must be stressed that these mutation systems are not "cognate" with the mutation systems of Sereer and Fula, as they developed independently (see chapter 6 section 2.2). Nonetheless, the typological similarities of the resulting systems are striking. Crucially, in Biafada and Kobiana, grade II contains geminates. While this evidence is purely typological, it shows an areal tendency for the existence of a mutation grade consisting of geminate stops.

4.5 Why lenition cannot have operated to yield grade I

The above analysis assumes that the mutation systems of Sereer and Fula arose due to two types of sound change which operated in each language: fortition and nasalization. However, a number of synchronic analyses of the Fula mutation system assume that the continuants are non-basic, and derived from their corresponding stops (Skousen 1972, McLaughlin 1994, and Elzinga 1996). The historical analog to this synchronic analysis would be that the continuants were created when stops lenited in certain environments. Such an analysis is impossible for either language. As discussed for both Fula (Figure 39 and Figure 40) and Sereer (Figure 48), if continuants are never taken to be underlying, it is impossible to predict when a stop will alternate with a continuant, and when it will not. This is because the proto-language contained roots which were continuant initial, as well as stop initial (at least for voiced consonants), as shown in Figure 73.

Fula	Sereer	PFS	
buɓɓ	buβ	*buXɓ	'crash into/slam'
daɗ	daɗ	*daɗ	'be ahead of'
jaɓ	jaɓ	*jaɓ	'agree'
gew	gef	*gef/w	'crack'
war	war	*war	'kill'
rim	rim	*rim	'give birth'
yaaj	yaaj	*yaaj	'be wide'
yim	gim	*ɣim	'sing'

Figure 73: Stop- and continuant-initial roots in Proto-Fula-Sereer

These facts were the motivation for including stops in grade I along with continuants, and assuming that grade I is underlying. In a synchronic analysis, it is possible to avoid underlying continuants by lexically specifying roots as fully- or partially-mutating. However, a historical account of mutation in both languages which acknowledges the regularity of sound change must include both stops and continuants as unmutated segments (see Figure 64), and does not support the idea that lenition played any role in the development of mutation in either language.

4.6 No categorical (phonemic) mutation in the proto-language

Mutation in Sereer and Fula arose due to the operation of two historical processes: fortition and nasalization. The outcomes of these processes are given in Figure 65. As these same broad processes must have operated in each language, it would at first seem natural to propose that they operated in the proto-language. Under this assumption, PFS would have made use of a system of categorical consonant mutation (i.e. alternations between phonemes, and not simply allophones), just as modern Fula and Sereer do. However, the actual implementation of nasalization and fortition in each language calls this proposal into question.

Recall that for many consonants, the two languages show different outcomes for the same process. These disparate outcomes are repeated below:

Nasalization:		Fortition:	
Sereer	Fula	Sereer	Fula
*M+F > MB	*M+F > P	*X+W > P (*XW > b)	*X+W > B
*M+Ɓ’ > Ƥ’	*M+Ɓ’ > Ɓ’	*X+B > P	*X+B > B
		*X+Ɓ’ > Ƥ’	*X+Ɓ’ > Ɓ’

Figure 74: Differing outcomes of nasalization and fortition in Sereer and Fula

Not reflected in this chart are the additional discrepancies involving *s and *y, which behave like other continuants in Fula, but remain unmutated (for the most part) in Sereer. Regarding nasalization: in Sereer, *MF must have first voiced (merging with *MW), and then hardened to *MB. In Fula, *MF must have first hardened (merging with *MP), and then undergone nasal deletion. These developments make it clear that no categorical mutation could have existed in the proto-language for voiceless continuants. If *MF had hardened in PFS, we would find the incorrect reflex for Sereer, and if it had voiced, the Fula reflex would be incorrect. The most that could have happened before the split of Sereer and Fula is some phonetic/allophonic development; e.g. [mpf] for *mf. A further consideration is that relative verb forms are nasalized in Fula, but not in Sereer, so they could not have already been nasalized in PFS (see section 5). If any nasalization sound changes took place in PFS, they would have to be repeated in exactly the same way in Fula to account for these relative forms.

For fortition: *XW and *XB cannot have devoiced in PFS, as this would result in the incorrect outcome for Fula. We saw in section 4.4.2 (below Figure 71) that *MW could not have hardened in PFS, as it does not merge with *MB in Sereer. Based on our current evidence, it is possible that fortition had already resulted in geminates in PFS, but they cannot have undergone hardening, devoicing, or degemination at this stage. Furthermore, the development of the **ɣol* class (see section 6) in each language shows that hardening after *l cannot have taken place in PFS, as this class triggers fortition in Fula but no mutation in Sereer.

One could propose that in the cases in which Sereer and Fula share the same outcome (e.g. *n-r > nd), a categorical mutation had already taken place in the proto-language. This would require that nasalization and fortition operated once in PFS on only certain root-initial consonants, and then once again in each daughter language for the consonants that were not affected by the first round of mutation. It is certainly far from unreasonable to propose that some consonants had already undergone mutation sound changes in PFS, while other consonants mutated due to later sound changes which took place after the two languages had split. However in effect, the only consonants that could have undergone mutation in PFS are the voiced stops and *r, *w, and *ɣ in the nasal grade (becoming voiced prenasalized stops)[28], and *f, *h, *x in the fortis grade (becoming voiceless geminate stops), though crucially not *s, which remains /s/ in Sereer grade II. Phonetically, nasal mutation would simply entail the

[28] Technically the voiceless stops could also have deleted a preceding nasal at the PFS stage, since both Fula and Sereer have plain voiceless stops in grade III for /p, t, c, k/. However recall that of these four consonants only *t was common, and furthermore the nasal could not have been deleted before voiceless continuants, as discussed above. It is extremely unlikely that a nasal would be deleted before a voiceless stop, but not a voiceless continunant.

place assimilation of a preceding nasal, and for the three continuants also hardening. The fortis mutation would involve the hardening of three geminate voiceless fricatives. Again, this scenario describes the maximum hypothetical extent of mutation in PFS— voiceless consonants, *y, and implosives could not have mutated in nasal grade, and voiced consonants, *s, and implosives could not have mutated in fortis grade, and once again no consonant could have mutated after *ɣol. It is entirely possible if not probable that none of these changes had yet occurred in PFS, especially since it is probably more parsimonious to assume that the Fula-specific changes *N-y > nj and *X-s, *N-s > c were part of a single change that also affected all other continuants in the language.

This observation is important because it calls into question the idea that exhibiting a mutation system is evidence for genetic relatedness. Recall that in both Segerer (2010) and Pozdniakov and Segerer (2017), a subgroup of Atlantic is proposed which contains all of the languages which exhibit consonant mutation. While we might at first be tempted to take this shared typological feature as being the consequence of genetic relatedness, this assumption is seriously challenged by the fact that even among two of the most closely-related members of this proposed subgroup the mutation systems developed independently.

4.7 The mutation sound changes in other environments

If the mutation systems of Fula and Sereer arose due to certain sound changes that operated between sequences of two consonants, it must be the case that these changes operated not only when the consonant cluster straddled the boundary between a root and the preceding morpheme. We would expect these exact same sound changes to affect the same clusters when they appeared in other positions. The sound changes needed to account for mutation in each language are reprised in Figure 75.

Sereer		Fula	
*x, k, l + P, B, F, W, Ɓ’	> C_2C_2 > P, Ƥ’ (but ww > b)	*x, k + P, B, F, W	> CC_{stop} > C_{stop}
*n + B, F, W	> MB	*l + P, B, F, W	> lC_{stop}
*n + P	> MP > P	*n + B, W	> MB
*n + Ɓ’	> ƁB’ > Ƥ’	*n + P, F	> MP > P

Figure 75: Sound changes leading to mutation in Fula and Sereer

Of course, *x, *k, *l, and *n are singled out as the C_1 in these C_1C_2 clusters because they are the consonants that happen to be reconstructed as pronoun-final and noun-class-marker-final consonants (see sections 5 and 6); but we would expect that if other consonants were found in C_1 of these clusters in PFS, they would also potentially undergo changes. There are two places in the modern languages where we can look for evidence of the development of PFS consonant clusters: root internally, and between a verb root and a suffix of the form -C.

4.7.1 Root-internally

We will first examine the root-internal evidence. Many PFS roots can be reconstructed with a form *CVCC, and roots of this shape are still very common in Fula. Many of these Fula roots contain a final geminate, which in all cases correspond to Sereer singletons, due to an unconditioned degemination process in the history of Sereer.

Sereer	Fula	PFS	
met	mett	*meXt	‘lick’
sañ-it	saññ-it	*saXñ-it	‘unbraid/unweave’
hut	hutt	*huXt	‘flay’
sip	sipp	*siXp	‘stick into’

Figure 76: Sereer historical de-gemination

The PFS form of these roots must then have either had a final geminate, or else a cluster in which the first consonant assimilated to the second. Furthermore, voiced geminates in Fula, whether implosive or egressive, correspond with voiceless singletons in Sereer. Logically, it must be that Sereer devoiced these geminates prior to degemination, as original singletons are not devoiced in Sereer.

Sereer	Fula	PFS	
goƭ	woɗɗ	*ɣoXɗ	‘be far’
jaƭ	jaɗɗ	*jaXɗ	‘prop up’
toƭ	toɗɗ	*toXɗ	‘make cracking sound’
naƭ	naɗɗ	*naXɗ	‘curve back inward’
raƥ	raɓɓ	*raXɓ	‘be short’
xoƥit	hoɓɓit	*xoXɓit	‘strip/deshell’
a-kaƥ-aar	gaɓɓu-gal	*gaXɓ	‘jaw’
buƥ	buɓɓ	*buXɓ	‘crash into/slam’
toƈ	toƴƴ	*toXƴ	‘crack open’
’at	’add	*’aXd	‘bring’
lak	lagg-aa	*laXg-(oox)	‘sharpen’
lok	logg	*loXg	‘hang on hook’

Figure 77: Devoicing of voiced geminates in Sereer

This process of geminate devoicing in Sereer is extremely important, as this same regular sound change is responsible for the fact that Sereer grade II consonants are predominantly voiceless stops. Thus, the same sound change proposed to explain devoicing in Sereer mutation grade II can indeed be seen to operate in other environments.

In addition to the geminate-final roots seen in Figure 76 and Figure 77 above, there are many roots of the form CVC_1C_2 in Fula, with a final consonant cluster. A number of these have Sereer cognates, and can be reconstructed for the protolanguage.

Fula		Sereer		PFS
lamƴ	‘lick lips/fingers’	laaƈ	‘stick out tongue’	*lamƴ
yurɓ	‘thread (pearls)’	yuuɓ	‘thread (pearls)’	*yurɓ
yirg	‘scrub’	giig	‘scrub’	*ɣirg
morñ	‘crush/crumble’	mooñ	‘crush/crumble’	*morñ
sirƴ	‘spit through teeth’	siiʄ	‘spit through teeth’	*sirɗ
ŋasɓ-in	‘bite lips/grit teeth’	ŋaβ	‘bite (for animals)’	*ŋasɓ
nawl	‘be jealous (women)’	naal	‘be jealous’	*nawl
siwt-	‘twin’	o-siid	‘twin’	*siwd
ngowl-a	‘snake species’	fa-ngool	‘snake’	*gowl/ɣowl
layɓ/lawɓ	‘wash’	laaɓ	‘wash butt’	*laɣɓ
dulk	‘poke/prod/nudge’	duq	‘touch’	*dulx

Figure 78: Fula CVC_1C_2 roots with Sereer cognates

In Sereer, not only are there no tautomorphemic geminates, but no consonant clusters of any kind in freestanding roots. Clusters are only found across morpheme boundaries, and in some CVCVC roots in which the second vowel is optionally deleted before a vowel-initial suffix. This lack of clusters can be attributed to three broad categories of sound change which operated in C_1C_2 clusters, depending mainly on the identity of C_1: 1) assimilation of C_1 to C_2, with subsequent degemination, 2) nasalization of C_2 by C_1, and 3) deletion of C_1, often with compensatory lengthening. This last process can be observed in many of the roots given in Figure 78, where C_1 is a voiced continuant (*w, r, y, ɣ). The first two processes are exactly the sound changes responsible for mutation in Sereer. Thus, in Sereer, the root internal evidence is completely consistent with the proposed mutation sound changes, as there are no longer any consonant clusters at all. All of the mutation sound changes in Sereer create single consonants from original clusters, including the prenasalized stops which function as single segments in the modern language.

In Fula, there are limitations on the identity of the cluster in CVC_1C_2 roots which support the proposed mutation sound changes. First, there are no geminate continuants, while all other consonants can appear as a geminate in C_1C_2 (this includes /ll/, as /l/ does not pattern with the mutating continuants phonologically). The only exceptions are found in certain dialects in which /rl/ and /st/ have developed to /rr/ and /ss/, and rarely in borrowings. This distributional fact supports the operation of geminate hardening, which is responsible for fortition. Second, in non-geminates, the consonants which can appear in C_1 position are very limited. In a survey of Seydou’s (1998) multi-dialectal dictionary of verb roots, 1624 roots were found with non-identical consonants in C_1C_2 position[29]. Of these, 315 were found in more than one of the four dialect areas surveyed. The number of times each consonant appears in C_1 of these multi-dialectal root clusters is given in Figure 79.

p	t	c	k	b	d	j	g	ɓ	ɗ	ƴ	f	s	h	w	r	y	l	m	n	ñ	ŋ	MB
0	0	0	0	0	0	0	0	1	0	1	2	22	0	22	121	37	46	34	7	10	12	0

Figure 79: Consonants appearing as the first member of a cluster in Fula verb roots

[29] This count excludes MB-final roots, as these are considered to be single phonemes synchronically. Roots identified by Seydou as borrowings or as derived from another part of speech were also excluded.

With only four exceptions, the only consonants which can be the first member of a cluster are nasals, the voiced continuants /w, r, y, l/, and the single voiceless continuant /s/. The rare instances of a stop, /f/, or /h/ appearing as C_1 are in most cases the result of the deletion of a vowel that is still present in other dialects (e.g. *likƴ* (Pulaar) = *likkiƴ* (Maasina and Nigerian dialects) = *likiƴ* (Adamawa dialect) 'hiccup'), and there generally exists a variant which does not display the offending sequence in the same dialect (*liiƴ* and *liyƴ* both appear as variants of *likƴ* in Pulaar). This phonotactic restriction against stops and voiceless continuants other than /s/ before another consonant is thus very strong in Fula, and is generally applied to loanwords. It seems quite possible that this phonotactic restriction, taken in conjunction with the fact that geminates in C_1C_2 position are so common, can be explained by the historical assimilation of stops and voiceless continuants (other than *s) to the following consonant; that is, the same sound change which led to fortition in Fula.

The effects of *l in C_1 position are somewhat less conclusive. Evidence from mutation suggests that in Fula, *l hardens a following consonant, without being deleted itself, as noun classes in which the marker ends in /l/ induce fortition, without deletion of the /l/ (see section 6.2.1.5). It is thus consistent that clusters of the form /lC/ are common in Fula CVCC verb roots. Additionally, the sequences /lf/, /lh/, /lr/, and /ly/ are never encountered, as predicted. However, the sequence /ls/ appears in 5 of the 315 roots, and /lw/ in 4. These sequences do not seem to be dispreferred in Fula, though they ought to be if all continuants were indeed hardened after *l. The reason for this discrepancy is unclear.

Nasals in C_1 position are consistent with the proposed mutation sound changes. In no case does a continuant follow *n or a homorganic nasal. The sequence /ms/ is encountered in 7 of the 315 roots, suggesting that this sequence might have undergone no change. We do encounter many roots containing a nasal followed by a voiceless stop or implosive, suggesting that the loss of the nasal in MP, MF, and MƁ' sequences occurred only word-initially, just as degemination only applied word-initially in Fula.

In summary, other than the problematic /ls/ and /lw/ sequences in Fula, the evidence from root-internal phonotactics supports the idea that the same sound changes that led to mutation in each language also operated morpheme-internally. The proto-language must have allowed a wide range of CC clusters, many of which underwent regular sound changes in Fula and Sereer which resulted in the elimination or reshaping of many of these clusters.

4.7.2 With -C verb extensions

Of course, morpheme internal facts provide only phonotactic evidence, and not actual alternations which directly attest to the proposed sound changes. To see these alternations, we must look for cases in which consonants come in contact across morphemes, where one or both of these morphemes can also stand on its own, or in contact with a vowel rather than a consonant. Unfortunately such environments are not extremely common in either language. There are no consonant-final prefixes in either language, and most suffixes are vowel-initial. There are however a number of common verbal derivational suffixes or "extensions" of the form -iC which have optional -C variants.

Fula		Sereer	
-(i)t	reversive/repetitive/etc.	-(i)t/d	reversive
-(i)r	applicative	-(i)t	applicative
-(i)n	causative	-(i)n	causative
-(i)d	associative/comprehensive	-(i)r	reciprocal
-(i)ɗ	denominative	-(i)ɗ	subject-affecting

Figure 80: Verbal extensions of the form -(i)C in Fula and Sereer

Facts from each language suggest that prior to the sound changes which led to mutation, the -C form of at least some of these extensions could optionally appear after verb roots ending in a single consonant, and many verb forms exist in each language in which this -C suffix has been fossilized, undergoing the expected sound change after the root-final consonant.

In Sereer, the reversive *-t* (perhaps < **-d*), applicative *-t*[30], and causative *-n* are all found fossilized in certain verb stems.

ɗag	'hang'	ɗat	<	ɗag-d	'pick/unhang'	Reversive
'uup	'bury'	'ut	<	'uup-d	'unbury'	
weg	'close'	wet	<	weg-d	'open'	
ƴuug	'bow head'	ƴut	<	ƴuug-d	'lift head'	
ɓuuɓ	'be cold'	ɓut	<	ɓuuɓ-t	'be cold'	Applicative
maad	'be present'	mat	<	maad-t	'be close'	
yen	'fall'	yet	<	yen-t	'fly'	
jol	'pass'	joot	<	jol-t	'cross (river)'	
faax	'be good/well'	fan	<	faax-n	'heal/doctor'	Causative
jol	'pass'	joon	<	jol-n	'pass by'	

Figure 81: Covertly extended verb stems in Sereer

In all of these "covertly extended" verb forms, the final consonant of the root and the consonant of the suffix have undergone exactly the expected sound changes. When the root-final consonant is a stop or voiceless fricative, it assimilates to the following consonant, creating a geminate, which devoices (in the case of *dd) and later undergoes degemination, but only after shortening a preceding long vowel. The reversive is especially noteworthy, as it can be internally reconstructed as **-(i)d*, but appears as *-(i)t* in the modern language. Sereer reversives without an unextended counterpart generally have *-id* (e.g. *xobid* 'deshell,' *wasid* 'descale,' *hurid* 'skim off,' *xoɓid* 'peel'). However, after the application of the mutation sound changes, the most common allomorph of the reversive would have been a stem-final *-t*, and this was extended to all other instances of the reversive extension, except where it could not be identified within a stem (as in *xobid*, etc.) due to the non-extended form no longer existing in the language[31]. In Fula, "covertly extended" stems of this sort can also be found.

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[30] The examples in Figure 81 with the "applicative" suffix are not particularly transparent, but it is often the case in e.g. Bantu that the applicative suffix is fossilized in certain verbs with a non-compositional meaning. There is of course no guarantee that all of the listed verbs are truly derived— some are rather less certain than others.

[31] It is however conspicuous that most verbs with *-id* have more a 'separative' meaning than a 'reversive' one. It is possible that *-id* and *-it* in fact represent two distinct original suffixes.

ɗat-	‘road’	ɗann	<	ɗat-n	‘set out on trip’	
reg	‘go down’	renn	<	reg-n	‘take down’	Causative
ñak	‘be insufficient’	ñann	<	ñak-n	‘shorten/lessen’	
heɓ	‘get/obtain’	hett	<	heɓ-t	‘regain/recover’	Repetitive
huɗ	‘swear/curse’	hutt	<	huɗ-t	‘swear’	Intensive
hoɗ	‘live at’	hodd	<	hoɗ-r/-d	‘live next to’	Recip./assoc.?
tiif	‘heap up/pile up’	tidd	<	tiif-d	‘heap up/pile up’	Comprehensive

Figure 82: Covertly extended verb stems in Fula

In these verb stems, the final stop or voiceless fricative of the root has assimilated to the consonant of the extension, creating a geminate.

But in Fula we also find productive morphophonological patterns which can be attributed to the earlier application of the mutation sound changes. Arnott (1970: 335) notes for the Gombe dialect that whether a verb root takes the -iC or the -C allomorph of the suffixes given in Figure 80 is largely determined by the final consonant of the root. He divides the root-final consonants into two groups: group A contains all egressive stops, voiceless continuants, and /ƴ/, and group B contains voiced continuants, nasals, /ɗ/ and /ɓ/. After group A consonants, the -iC allomorphs are preferred, and after group B consonants, the -C allomorphs are preferred (unless of course they are preceded by another consonant, since CCC clusters are impossible); however, the -iC allomorphs are allowed as a free variant even after group B consonants. Ignoring the implosives, the group A consonants are those that would have assimilated to the following consonant historically, and thus the only way in which they could be saved before these extensions would be when they appeared with the -iC allomorph. Arnott’s (1970: 350) description of the allomorphy of the applicative extension *-(i)r* is also extremely important in providing evidence for the mutation sound changes. When appearing after the consonants /n/, /l/, and /r/, this extension has the allomorph *-d* rather than *-r*. This supports the idea that historically, continuants hardened after *l, and voiced continuants hardened after *n. The nature of the hardening after /r/ is not completely expected, as we predict the sequence *rr to develop to /dd/, and not /rd/, but the fact that hardening of some sort occurs in this sequence is expected[32].

In summary, the -C and -iC allomorphs of these extensions alternated freely in the proto-language, and wherever the -C allomorph appeared, the resulting consonant cluster underwent the expected sound change in Fula.

*CVC-iC	>	CVC-iC	
*CVC$_A$-C	>	CVCC	(covertly extended roots)
*CVC$_B$-C	>	CVC$_B$-C	(but *lr, *nr, *rr > ld, nd, rd)

Figure 83: Development of roots with -(i)C extensions in Fula

[32] We might be tempted to propose that the regular change was in fact *WW > WB based on this evidence, but as the sequences /rd/, /wb/, and /yj/ are essentially non-existent in Fula roots, this development would seem less likely than our proposed *WW > BB change. However, if *WW sequences occurred only across morpheme boundaries in the proto-language, there is no obstacle to proposing *WW > WB as the regular change in Fula.

These changes are manifested in modern Fula by the dispreference for the -C allomorphs after the group A consonants, as these regularly assimilated to the following consonant, resulting in the "covertly extended" verb stems. The sound changes proposed to account for initial mutation can thus be seen to operate both within roots as well as across other morpheme boundaries in both languages.

4.8 Analogical changes in Sereer

4.8.1 Alternations involving /s/

Some of the facts of Sereer mutation are not accounted for by the regular sound changes presented so far. First, recall that /s/ participates in the mutation series s~c~nj only occasionally, being invariant in other cases. One possibility is that the mutation series was once robust, but is dying out in modern dialects, perhaps due to the phonetic discrepancy in place of articulation between /s/ and /c, nj/. Under this hypothesis, triplets such as *seƈ~ceƈ~njeƈ* 'sun' are retentions, whereas *sal~sal~sal* 'branch' have been leveled (see Figure 52). However, this account cannot explain why many roots that never appear in grade I classes are *s*-initial, e.g. *suk ne / suk ke* 'boat(s)', and *a-saaw ale / a-saaw ake* 'guinea fowl(s).' If the mutation to c~nj were indeed the regular sound change in all cases (creating hypothetical ˣ*njuk ne / cuk ke*, ˣ*a-caaw ale / a-caaw ake*), there would be no way to level these nouns as *s*-initial, as no *s*-initial forms of these roots would exist, and they might even be reanalyzed as underlyingly *j*-initial.

It is possible that this phenomenon is explained at least partially by dialect mixture. Recall that the mutation series s~c~nj is more robust in Saalum, and completely non-existent in Ñominka, with Siin somewhere in between. Perhaps some dialects regularly developed s~c~nj, and others s~s~s, and due to contact and dialect borrowing, both series exist within a single dialect. However, this scenario does not explain why /s/ never alternates with /nj/ in verbs (which require grade III with plural subjects) in any dialect.

Another possibility is that regular sound change yielded a series s~c~s (with nasal deletion in the nasal grade), and that verbs such as *seƈ* 'be sunny' are formed from the noun *njeƈ/ceƈ* 'sun' (which would truly be a *j*-initial root), in analogy with nouns such as *saax/a-caax* 'land(s).' Diminutives in /nj/ for *s*-initial nouns could also be formed in analogy with *j*-initial nouns. The proportional analogies can be schematized as:

original root	plural noun	modern root
*saax	a-caax 'lands'	: saax 'land'
*jeyƴ	ceƈ 'suns'	: __ = seƈ 'be sunny' (neologism)

root	plural noun	diminutive sg.
*jer	cer 'bodies'	: o-njer
*saax	a-caax 'lands'	: __ = o-njaax (replacing *o-saax)

Figure 84: Possible proportional analogies leading to a Sereer s~c~nj series

The linchpin in these analogies is the phoneme /c/, as it appears in both the j~c~nj series, as well as the hypothetical *s~c~s series. But again, this proposal (which assumes that in some dialect /c/ was the regular fortition of /s/) cannot account for the fact that even among roots which appear exclusively in fortition environments, s-initial roots are frequently encountered, e.g. *a-saaw ale / a-saaw ake* 'guinea fowl,' which appears only in noun classes that require grade II.

Perhaps the truth is that s~c alternations in Sereer are completely the result of borrowing from Wolof, from which Sereer has borrowed extensively for centuries, and in which this alternation is common. The analogies in Figure 84 would still be required to introduce /nj/ into the mutation series, but there are certainly enough borrowed pairs of words with an s~c alternation to prompt the introduction of mutation into non-borrowed s-initial roots.

4.8.2 Diminutives and augmentatives

As noted in section 2.3.5, voiceless stop-initial noun roots are exceptionally prenasalized in diminutive and augmentative noun classes (see Figure 50). This unexpected mutation can be explained by analogical change. Because singular nouns in the personal class like *o-tew* 'woman' are in grade II, many appear with an initial voiceless stop. Because the underlying root is in fact a voiced stop or continuant (*rew*), mutation to a prenasalized stop in diminutive and augmentative noun classes is expected. The prenasalization of voiceless stop-initial roots can be attributed to analogy with these personal nouns.

stem	*oxe* sg. noun (II)		diminutive (III)	
/rew/	o-tew	:	o-ndew	'woman'
/goor/	o-koor	:	o-ngoor	'man'
	ole sg. noun (I)			
/toƈir/	o-toƈir	:	__ = o-ndoƈir (replacing *o-toƈir)	'peanut splitter'
/kucala/	o-kucala	:	__ = o-ngucala (replacing *o-kucala)	'drawstring'

Figure 85: Proportional analogy in Sereer diminutive forms

There is a strong functional motivation for introducing mutation in all diminutive forms; namely, it makes the words identifiable as diminutives. As seen in Figure 85, nouns in the *ole* class would undergo no change at all in the diminutive were it not for the analogical introduction of mutation. In opposition to all other noun classes (minus the personal noun classes), the diminutive and augmentative morphemes have clear, identifiable semantic content, and thus there is a functional motivation to signal in any way possible the presence of these morphemes. It is perhaps also relevant that diminutives are cross-linguistically subject to somewhat irregular phonetic alterations, such as "expressive palatalization" in a number of languages (Kochetov and Alderete 2011).

4.8.3 Personal plurals

Mutation is optionally introduced by analogy in plural forms of some voiceless stop-initial roots. In all cases, the preferred form of the plural contains the voiceless stop, as expected. However, optional variants exist in which the stop is voiced in the plural.

singular	plural	variant pl.	root	
o-tafax	tafax	dafax	*taf[33]	'smith'
o-cii-cit	cii-cit	jii-jit	cit	'giver'

Figure 86: Analogized personal plural forms of Sereer voiceless stop-initial roots

As the personal noun class is semantically meaningful, there is a functional motivation for introducing mutation in order to indicate that a plural form is personal, as opposed to all other plural forms, which take grade II, and thus do not allow initial consonants like /d/ and /j/. This mutation is introduced in analogy with words like *o-koor*/*goor* 'man/men.' Note that in the analogized forms, agentive nouns (formed with partial reduplication) voice both the stem-initial and root-initial consonant, as a form such as ˣ*jii-cit* would have no structural parallel in any existing agentive noun, where the plural is formed by reduplication without mutation, and thus the stem-initial and root-initial consonant are always identical.

Furthermore, some personal nouns with historically continuant-initial roots have a variant plural with a voiced stop.

singular	plural	variant pl.	root	
o-teefanke	reefanke	deefanke	reef	'cow-walker'
o-baa-bar	baa-bar	waa-war	war	'killer'

Figure 87: Analogized personal plural forms of Sereer voiced continuant-initial roots

In some words (e.g. *o-teefanke*), these variant forms arise because the more common singular form, appearing in grade II, can potentially correspond to two different consonants in grade I. In other rare cases (like *o-baa-bar*), the alternation has simply been leveled, though this leveling is only possible in cases where the initial consonant can appear in both grade I and II (e.g. /b/ as part of the b~p~mb series and w~b~mb series). In the case of *baa-bar* 'killers,' this historically innovative plural has become the more common form.

4.8.4 Non-initial mutation

The phenomenon of non-initial mutation affecting /ɓ, ɗ, ƴ, x/ in certain lexically-specific roots (see section 2.3.7) must also be the result of analogy. Recall that these become /ƥ, ƭ, ƈ, q/ in deverbal nouns which appear in classes that trigger grades II or III. There is no phonetic reason why these consonants should have been subjected to change. Rather, they mutate to /ƥ, ƭ, ƈ, q/ in analogy with the same consonant alternations seen for root-initial consonants when appearing in grades II and (with the exception of /q/) III. It seems that these consonants, or rather the alternation between these grade I and II/III consonants, has become such a conspicuous mark of nominalization into a grade II or III noun class that it has been overapplied to consonants that would not have been subject to the relevant sound changes. This overapplication is not particularly surprising, but the fact that only the implosives and /x/ are affected is rather interesting. The voiced and voiceless implosives as well as /x/ and /q/ do contrast underlyingly in lexical roots in non-initial position, so these non-initial mutations do result in the loss of lexical contrasts (e.g. *a-tiƈale* from either *diƈ* 'set down' or *diƴ* 'harvest millet.') Perhaps it is the fact that these consonants never appear in grade I that associates them particularly strongly with mutation to a grade other than I. This could also be said of the

[33] No longer exists as a verb root in Sereer; cf. Fula *taf* 'forge.'

prenasalized stops, so perhaps it is relevant that the voiceless implosives appear in both grades II and III, whereas prenasalized stops appear only in grade III. This explanation still cannot account for the mutation of non-initial /x/, but recall that only a small minority of non-initial tokens of /x/ alternate with /q/. Whatever the case, /ƥ, ƭ, ƈ/ and to lesser extent /q/ have become so strongly associated with mutation to grades II and III that these alternations have been extended to non-initial environments, where they are not the result of regular sound change.

4.9 Analogical changes in Fula

4.9.1 Voiceless stop-initial roots

As noted in section 2.2.4, non-borrowed voiceless stop-initial roots are rare in Fula. Initial voiceless stops are functionally dispreferred because they exhibit no overt mutation, which is useful in determining morphological information (e.g. singular vs. plural). For this reason, some voiceless stop-initial roots have been reanalyzed as continuant-initial.

sg.	pl.	innovated sg.	
fayan-de	payan-e		'cooking pot'
putt-ere	putt-e	futt-ere	'fart/lie'
heew	keew		'be many/full'
keer	keer	heer	'delimit'

Figure 88: Analogized forms of voiceless stop-initial roots

While the Firdu dialect exhibits the presumably original voiceless stop-intial root in 'fart/lie,' and the Adamawa dialect retains the k-initial singular form of 'delimit,' other dialects have reanalyzed these roots as continuant initial, in analogy with words like 'be many/full' and 'cooking pot.' This same process is commonly applied to loanwords, e.g. *humis ~ kumis* 'start' from French *commenser*. Presumably, some roots that appear as voiceless continuant-initial in all dialects were once stop-initial, though I have found no such cases with Sereer cognates.

The voiceless coronal stop /t/ is exempt from this reanalysis, as there is no corresponding voiceless coronal continuant in the language. Thus, the oft-remarked-upon "strength" of /t/ in Fula is in a way a historical accident. The preponderance of t-initial roots is simply due to the fact that there was no corresponding continuant in PFS or Fula, and thus no naturally-occurring mutation series in which /t/ alternates with another consonant.

In fact, there are a number of historically voiceless stop-initial roots at other places of articulation that have remained unchanged— they are simply "hiding" in nasal grade classes. Any basic class that takes nasal grade (e.g. *ngu, ndi*) has a corresponding plural that takes fortis grade. For this reason, historically voiceless stop- and continuant-initial roots in these classes both exhibit initial voiceless stops in the singular and plural. We know from comparison with Sereer that a number of these nouns are historically stop-initial (e.g. *puccu/pucci* "horse(s)" = Sereer *pis*), but as they are indistinguishable from continuant-initial roots in these noun classes, there is no analogy to be made, and no mutation can be introduced.

4.9.2 Changes involving *ɣ

The merger of *ɣ with /w/, /y/ and /ʔ/ in different environments has created many opportunities for analogy. As seen in Figure 42, some dialects (e.g. Niger) have reanalyzed all /w/'s which were historically derived from *ɣ as labial /w/'s, participating in the w~b~mb mutation series. Conversely, other dialects (e.g. Gombe) have reanalyzed certain labial /w/'s as velar, as in the noun class suffix *-wa/-ga/-nga* (compare Pulaar *-wa/-ba/-mba*).

PFS contained a number of *ʔ-initial (or perhaps vowel initial) roots, which developed into ʔ-initial roots in both Sereer and Fula. In Fula dialects which regularly developed a ʔ~g~ng mutation series from *ɣa-initial roots (e.g. Pulaar, see section 2.2.5), all *ʔa-initial roots were reanalyzed as undergoing this mutation.

Sereer sg.	Sereer pl.	Pulaar sg.	Pulaar pl.	
’and	’and	’and	ngand	‘know’
’adoox	’adoox	’adaa	ngadaa	‘be first’
’at	’at	’add	ngadd	‘bring’

*Figure 89: Reanalysis of *ʔa-initial roots in Pulaar*

In analogy with ʔa-initial roots that had developed naturally from *ɣa-initial roots (e.g. *’as* ‘dig,’ *’ar* ‘come’), these historically *ʔa-initial roots are now treated as *ɣa-initial, showing /ng/ in the plural form of the verb. Of course, in dialects where *ɣa developed to /wa/, this reanalysis did not occur, e.g. Niger *’and~’and* ‘know’, *’andal* ‘knowledge’ vs. Pulaar *’and~ngand, gandal* (from the root **ʔand*). These dialectal differences have been recognized since Klingenheben (1927) as resulting from the divergent development of *ɣ[34].

4.10 The Proto-Fula-Sereer consonant inventory

		labial	coronal	palatal	velar	uvular	glottal
egressive stop	voiceless	p	t	c	k		ʔ
	voiced	b	d	j	g		
continuant	voiceless	f		s	h	x	
	voiced	w	r	y	ɣ		
implosive stop		ɓ	ɗ	ƴ			
nasal		m	n	ñ	ŋ		
lateral continuant			l				

Figure 90: Consonant inventory of Proto-Fula-Sereer

The reconstructed consonant inventory of Proto-Fula-Sereer is given in Figure 90. Note that there are no voiceless implosives— these arise in Sereer from geminate implosives. Furthermore, there are no prenasalized stops. We have seen that all cases of initial MB arise from interactions between a nasal and a following oral consonant. While many instances of root-final MB can be reconstructed, there is no reason to consider these as mono-phonemic, as opposed to a sequence of M + B. The glottal stop is not necessarily phonemic— it may have simply been inserted in vowel-initial or -final roots to fulfill the minimum CVC root requirement. There is no evidence for reconstructing *q, as Sereer /q/ practically never appears root-initially except as the fortition of /x/, and finally can also be the result of certain *Cx sequences (e.g. **dulx* > *duq* ‘touch,’ cognate with Fula *dulk*). A phonemic inventory with a single uvular /x/ is found elsewhere in the area, as in earlier Wolof and the Mande language Susu (Houis 1963), as well as Proto-Cangin.

[34] Klingenheben is sometimes erroneously cited as claiming that /ɣ/ still exists in Fula (e.g. in Pyatt 1997: 424). In fact he only reconstructs it for his *Urful* (Proto-Fula), and finds it in no modern dialect.

It is probable that the phonetic realization of some of these phonemes was not exactly the same as their modern reflexes. Being phonologically palatal, *s was likely [ʃ], and it is apparently still sometimes pronounced as such word-initially in the Firdu dialect of Pulaar (Swift 1965: 7). This later developed to [s] in both languages, perhaps due to the typological and areal preference for [s] over [ʃ] as a language's lone sibilant. Its voiced counterpart *y was likely [ʒ]. It is perhaps unlikely that prenasalized [y] would develop into [y] in Sereer and [nj] in Fula, rather than ˣ[ñ]. However, these sounds would not be surprising as the outcome of prenasalized [ʒ] (with [nʒ] > [ʒ] > [y] paralleling [nʃ] > [ʃ] > [s] in Sereer). Furthermore, the fortition changes [ʃʃ] > [c] and [ʒʒ] > [j] seem somewhat more plausible than [ss] > [c] and [yy] > [j], though changes of this sort are not unattested cross-linguistically. Dialectal variants in Fula such as *lesdi* ~ *leydi* 'earth' and *kosngal* ~ *koyngal* 'leg' are more easily explained as voicing of [ʃ] to [ʒ] (generally before a voiced sound, though note also *ngaska* ~ *ngayka* 'hole in ground,' from the root **ɣas* 'dig'). The voiced labial continuant *w may have been [v]. It is pronounced as such in the Adamawa dialect of Fula, and would be a more symmetrical voiced counterpart to *f. This would perhaps explain Fula dialectal variants such as *nofru* vs. *nowru* 'ear' and *deftere* vs. *dewtere* 'book' more easily.

Finally, a bit of speculation regarding phoneme frequency. We have seen that root-initially, underlying voiceless stops are rare in Fula, and underrepresented in Sereer compared to both their voiced and continuant counterparts. While this is in part due to analogical change (see section 4.9.1), it is quite likely that voiceless stops were underrepresented in the proto-language, despite being typologically most "basic." In fact, in non-initial position, there is practically no evidence at all for reconstructing singleton *p, *c, *k in PFS (I know of only *ɓiic 'screech,' cf. Sereer *ɓiic*, Fula *ɓiic*), though *t and geminate voiceless stops are common enough. Much the same situation is found in modern Wolof, where singleton /p, c, k/ appear only word-initially (most often from earlier †/mp, nc, nk/) or after another consonant. Similarly, Kobiana singleton voiceless stops appear only word-initially, where they are found mainly in prefixes, and only rarely begin lexical morphemes. It is quite possible that a similar situation held in PFS, but crucially there is no evidence to support the idea that original voiceless stops underwent any sort of historical change at the PFS stage or later.

5 Morphemes inducing verbal mutation

We can now turn to the question of the identity of the preposed morphemes which triggered the two processes of fortition and nasalization. In the verbal system, the answer is immediately apparent. The majority of plural pronouns in both languages are nasal-final, while the singular pronouns are mainly vowel-final. This generalization holds true completely for first and second person pronouns.

	Sereer:			Fula:	
	sg.	pl.		sg.	pl.
1st	mi	in	1st	mi	en, min
2nd	wo	nuun	2nd	'a	on
3rd	ten, *a	den, *a	3rd	'o, mbo, ɗum, ...	ɓe, ɗumen, ...

Figure 91: Pronouns in Sereer and Fula

If we assume that the order subject pronoun-verb was most common in PFS, as it is in both modern languages, the source of nasalization in plural verb forms is clear. The final nasal of the plural pronoun would have induced nasalization in the following root, while the final vowel of the singular pronoun would have no effect. In Sereer, there is evidence that the final nasal of the pronoun truly became incorporated into the root-initial consonant, as the obligatorily-occurring plural agreement markers lack a final nasal, while the corresponding free pronouns (which appear in object or focus position) retain the nasal.

	Strong[35] agr. paradigm:		Free pronouns:		Historical source:	
	sg.	pl.	sg.	pl.	sg.	pl.
1st	m ret	i ndet	mi	in	*mi ret	*en ret
2nd	o ret	nu ndet	wo	nuun	*wo ret	*noon ret
3rd	te (a) ret	de (a) ndet	(o-)ten	den	*ox-den (a) ret	*ɓe-den (a) ret

Figure 92: Sereer "strong" agreement paradigm for ret *'go' and its possible historical source*

Note that Figure 92 assumes that the mid vowels of the Fula plural pronouns are original, and were peripheralized in Sereer due to being in a phonologically weak position. Of importance is the fact that 3rd singular *(o-)ten* corresponds with *te=*, which does *not* condition nasalization. Furthermore, the "weak" 3rd person agreement marker *a=* is used with both the singular and plural verbs, but co-occurs with nasalization if the subject is plural. We know that the now-defunct pronoun from which this agreement marker *a=* developed must have been **a* and not ˣ**an*, as evidenced by the copular forms *a-xe* (sg.) and *a-we* (pl.) (importantly not ˣ*an-we* or ˣ*a-mbe* in the plural). Thus, we have one singular pronoun **ox-den* which appears to not cause nasalization, and one plural pronoun **a* which appears to cause nasalization.

The likely historical explanation for these exceptional developments is that *ten* did once trigger nasalization in Sereer (e.g. **te ndet* 'he goes'), and *a* did not, even with plural subjects (e.g. **a reta* 'they go'), but the verb paradigms were leveled along singular/plural lines. The functional usefulness of the mutation distinction that regularly evolved in the first and second person forms was such that the extension of this pattern to the third person, which must have at one time contained grade I and III forms for both numbers, was almost inevitable. In Fula, with its large inventory of third person pronouns (many inflected for noun class), it is unclear which mutations would have arisen naturally in the third person, but the same sort of analogical leveling would have easily aligned the verbs with third person agreement with the pattern established in the first and second person.

The Fula relative verb forms in grade III (e.g. *nde **ng**aru mi* 'when I came') can be attributed to the existence of a relative marker with a final nasal at some earlier stage of the language. This morpheme can likely be equated with the Sereer relative marker, which surfaces as a verbal suffix *-na* in most cases (e.g. *ye te gar-**na*** 'when he comes'). It may be that the PFS relative marker was **na*, and was reduced to **n* in Fula, inducing nasalization of the following verb, or else it may be that the Sereer relative marker is in fact historically bimorphemic (*-n-a*), with the original relative marker simply being **n*.

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[35] This "strong" paradigm is found for example in subordinate clauses (e.g. *a buga m ret* 'he wants me to go') and affirmation-seeking questions (e.g. *m yer?* 'may I drink?'). The Siin dialect shows *ta* and *da* (contractions of *te a* and *de a*) for *te, de*. In some unspecified dialect described in Crétois (1972: 119), vowel-initial verb roots preserve the historical final *n of the plural agreement markers and *ten*, e.g. *in/nun/ten/den anda* 'we/you/he/they know(s),' where all other dialects would have a root-initial glottal stop, e.g. *i 'anda* 'we know'.

6 Morphemes inducing nominal mutation (noun class markers)

As nominal mutation in both languages is determined by noun class, the source of these mutations must be the noun class markers. In this section we will identify the historical form of these noun class markers, and importantly the identity of their final segments, in order to understand their effect on following consonants.

6.1 How to reconstruct the noun classes

We can begin with the observation that some of the noun class prefixes in Sereer bear a striking resemblance to certain noun class suffixes in Fula. For example, the Sereer augmentatives *ga-* and *gi-* are suspiciously similar to the Fula augmentatives *-wa/-ga/-nga* and *-yii/-gii/-ngii*. Furthermore, these markers trigger grade III in both languages. The singular personal noun class marker contains the vowel /o/, and triggers grade II in both languages. More speculatively, Fula has a number of class suffixes ending in /l/, which may be somehow related to the fact that multiple Sereer articles contain /l/ (*le, ole, ale*). Based on these similarities, we can hypothesize that the Sereer prefixes and the Fula suffixes are cognate; i.e. there exist pairs of a Sereer prefix and a Fula suffix which descend from the same morpheme in PFS (which we will see must have been pre-nominal).

6.1.1 Evidence from overt class markers

Evidence for the phonological shape of the proto-class-markers can be found in each language. In Sereer, the most obvious source of evidence is the nominal prefixes themselves. The other source of evidence is the determiners. Recall that the determiners in Sereer agree with the noun in class, and consist of two morphemes (e.g. *ol-e, ol-aa, k-e, k-aa*). The second morpheme is the true determiner, and the first is a class agreement prefix. The determiners are thus a crucial source of evidence because all determiner morphemes are vowel-initial, as opposed to all nominal roots, which are consonant-initial. For this reason, if a proto-class-marker contains a final consonant, it may be preserved before the vowel-initial determiners, while being lost before the actual nominal roots. It is reasonable to assume that the prefix on nominal roots and the corresponding determiner prefix were once identical, and thus evidence from the prefix as it appears on nouns, adjectives, and determiners can all be used in conjunction to help determine the shape of the class marker in PFS.

The Sereer noun class markers presented in Figure 45 are from the Saalum and Siin dialects. The noun class markers of the Ñominka dialect (Renaudier 2012: 31) are markedly different, and of clear importance for historical reconstruction.

Ñominka:			Siin/Saalum equivalent:		
sg. n. prefix	det. prefix	grade	sg. n. prefix	det. prefix	grade
o-	ox-	II	o-	ox-	II
fa-	**fan-**	III	fa-	f-	III
gi-	l-	I	Ø-	l-	I
gi-	n-	III	Ø-	n-	III
go-	ol-	I	o-	ol-	I
fo-	ol-	I	fo-	ol-	I
ga-	al-	II	a-	al-	II
ga-	al-	III	a-	al-	III
o-	ong-	III	o-	ong-/onq-	III
pl. n. prefix					
Ø-	w-	I	Ø-	w-	I
Ø-	k-	II	Ø-	k-	II
a-	ak-	II	a-	ak-	II
xa-	ax-	II	xa-	ax-	II
fi-	w-	I	—	—	—
fi-	n-	III	fo-	n-	III

Figure 93: Noun class markers of Sereer Ñominka

Where other dialects have singular *o-* and *a-* for the *ole* and *ale* classes, Ñominka has *go-* and *ga-*. In the *le* and *ne* classes, it has a nominal prefix *gi-*, absent in other dialects. It has the determiner prefix *fan-* where other dialects have simply *f-*, (though *fan-* is rarely encountered in Saalum). The diminutive plural prefix is *fi-III* rather than *fo-III*. Finally, it has an augmentative plural class marked with *fi-I* and *w-* on determiners, not present in other dialects. A 17th century wordlist found in D'Avezac (1845) seems to represent a Ñominka dialect, with its noun class system differing only in the use of *gu-*, *u-*, *i-*, and Ø in place of modern *gi-* (see section 6.4).

Pichl (1963) (as cited in Storch 1995: 32-35) describes a dialect labeled as "Siin" with class prefixes that are somewhat intermediate between Ñominka and standard Siin. This variety lacks /g/ on prefixes, but has *i-* as the prefix for the *ne* and *le* classes. The diminutive plural is *fi-III* as in Ñominka. Pichl does not list the *axe* class, giving *ake* as the plural of *ole* and *onge*[36]. Crétois (1972: 87) notes that in the Baol dialect, *aqe* is used for both *ake* and *axe*. Crétois (1972: 86, 110) gives three plural classes marked with *po-*, *pa-*, and *ta-* used in the Petite Côte region (seemingly following the chart given in Pichl 1963). The first two of these simply represent nouns in the singular *fe* and liquid *fo-* classes in which the prefixes *fa-* and *fo-* have been reinterpreted as part of the root, and thus are subject to regular mutation to /p/ (e.g.

[36] Pichl (1963) is available to me only through Storch (1995), so I do not know exactly what dialect is represented, nor how widespread this *i-* prefix is. No other authors mention this prefix, including Fal (1980), W. C. Faye (1980), S. Faye (1985, 2013), McLaughlin (1994), or Crétois (1972) in his pan-dialectal dictionary. Oddly, Storch (1995) cites numerous examples from S. Faye (1985) and adds a prefix *i-* where none in present in the source, but we must assume that this prefix is indeed found in Pichl (1963). Recall that the Sereer language as a whole is sometimes referred to "Sereer-Sine" in the literature, and so there is no guarantee that the dialect found in Pichl (1963) is in fact a Siin dialect. Crétois (1972: 87) notes that the lack of plural *axe* is a feature of the dialect spoken in the Petite Côte region.

fosis ole / *posis ke* 'milk(s)' vs. Siin *fo-sis ole* / *sis ke*). The prefix *ta-* is found in a single plural noun, *tangon (ke)*, the plural of *fangon (fane)* 'death' from *xon* 'die' (*fanqon fe(e)* / *qon ke* in other dialects which have a plural for this noun). None of these three markers should be taken as true class prefixes, as they show agreement in the *ke* class, and as such the supposed prefix is in fact part of the noun stem synchronically. The origin of *tangon* 'deaths' in this single dialect is entirely unclear, and its existence has not been noted in other sources[37].

The noun class prefixes on determiners in the Njagañaaw (Diaganiao) dialect as given by Crétois (1972: 92) differ from other dialects in a few crucial places.

Njagañaaw	Other dialects
g-	k-
ag-	ak-
r-	l-
an-	f(an)-

Figure 94: Divergent noun class prefixes on determiners in Njagañaaw Sereer

The use of *r-* in particular will be important in reconstructing the historical shape of this class marker. The shapes of the nominal prefixes are the same as in Saalum, including the lack of a liquid *fo-* class, with the single exception of *fu-III* for the diminutive plural *fo-III*.

The evidence from Fula is the shape of its noun class suffixes. Unlike in Sereer, the determiner does not provide additional evidence, as it is identical to the nasal grade form of the suffix, with the important exception of the singular personal class (*'o* vs. *-ɗo*). Dialectal differences exist, but simply involve the presence or absence of certain noun classes. The only cross-dialectal phonological discrepancy is for the *mba* class (see section 4.9.2).

6.1.2 Evidence from mutation

The other important source of evidence from both languages is the mutations triggered by each noun class. We know that when a class marker triggers grade III, there must have been some nasal-final morpheme which preceded the root and triggered nasalization of its initial consonant (compare the pronouns in section 5). When grade II is triggered, this pre-root morpheme must have ended in some other consonant, tentatively represented as X. In Sereer, it is reasonable to connect the overt prefix with this mutation-triggering segment. Thus, the Sereer augmentative prefix *ga-*, which triggers mutation grade III, must have at some point been something like **gaN*, where N is some nasal segment. Even without evidence from Fula, we can use internal reconstruction to identify earlier forms of the Sereer nominal prefixes, and ascertain the identity of these class-marker-final consonants.

ndol ndan n-e	<	*n-dol n-ran n-e	'the white rabbit'
a-pamb a-tan ak-e	<	*ak-famb ak-ran ak-e	'the white drums'
a-liim a-tan al-e	<	*al-liim al-ran al-e	'the white fog'
xa-βox xa-tan ax-e	<	*xax-ɓox xax-ran xax-e	'the white dogs'

Figure 95: Internal reconstruction of Sereer noun class prefixes

[37] D'Avezac's 17th century wordlist (see section 6.4) gives <*rangon*> 'death' and so it seems *tangon* is the regular plural of this form. Still the prefix *ran-* in this word is unexplained.

In these examples, by assuming that the markers on the noun, adjective, and determiner were once identical and prefixed to the underlying noun roots (in grade I), we identify *n as triggering nasalization, and *l,*k, and *x as triggering fortition.

The more intriguing question is whether the Fula suffixes ought also to be directly associated with these mutation-inducing consonants. The answer to this question is undoubtedly yes. Despite the obvious implausibility of a suffix directly triggering changes in only the initial segment of its base, we can identify certain connections between the mutation grade of the root and the phonological form of the suffixes that are unlikely to be coincidental. Firstly, every l-final suffix triggers grade II. Second, every suffix that triggers grade I is vowel-final. This connection between the final segment of the suffix and the initial segment of the root is explainable if the Fula suffixes were in fact prefixes at one point, as they are in Sereer. After the sound changes responsible for mutation, these prefixes must have somehow become suffixes in Fula. For more discussion of this phenomenon, see section 6.7. In Sereer, these same original prefixes remained in position, but must have undergone a certain amount of phonological erosion.

6.1.3 Fula suffix grades

The suffix grades in Fula present certain problems for reconstruction (see footnote 15). The historical origin of these suffix grades is clearly the interaction between the final segment of the noun stem and the initial segment of the class suffix. Because these changes must have happened only after Fula developed noun class suffixes, there is no reason to believe that any of these alternations existed in PFS. The nasal suffix grade was originally induced by nasal-final stems (e.g. *ñiinde (nde)* 'tooth' c.g. Sereer *ñiiñ*), and certain other stem-final consonants caused the deletion or total assimilation of the suffix-initial consonant (e.g. /l/ in *mbaalu (ngu)* 'sheep' cf. Sereer *mbaal*). The original form of the marker-initial consonant must be represented by either the continuant grade or the stop grade forms (for which consistent historical environments cannot be easily found), but it is not completely clear which. Because the initial consonant of the class marker is often eroded in Sereer, and because *g and *ɣ merge to /g/ in Sereer, the question of whether the Fula stop or continuant is original is of crucial importance in determining the initial consonant of PFS noun class markers. In the following reconstructions, the Fula suffix-initial continuant, as opposed to the stop, is assumed to be original in almost all cases. The reason for this assumption is that there is no evidence whatsoever for any intervocalic lenition of stops to continuants in Fula, whereas there is ample evidence of continuants hardening to stops in certain environments (e.g. see Figure 69). An original continuant may also be more consistent with the fact that most of these marker-initial consonants are eroded in the Sereer noun class prefixes.

However, the idea that the consonants seen in the stop grade suffixes might be in some cases historically original cannot be dismissed. A rather odd alternation exists for five different Fula noun class suffixes in which /j/ appears in the continuant grade, and /ɗ/ in the stop and nasal grade. This alternation is seen nowhere else in the language. In the case of two of these classes (the plural *ɗi* and *ɗe*), we have evidence that /ɗ/ must in fact be original, with the continuant grade /j/ being a secondary development. Thus, it is possible that in some cases the PFS class markers reconstructed with an initial *ɣ, *r, or *h in fact contained an initial stop *g, *d, or *k, though for the reasons given above, the continuants have been chosen in the reconstructions throughout section 6.2.

6.1.4 Determining class cognacy

There are two important considerations when determining if a Sereer noun class and a Fula noun class are cognate, i.e. descended from the same PFS noun class. The first is the phonological compatibility of the noun class affixes. If two noun classes are truly cognate, the Sereer prefix and the Fula suffix must be descended from the same morpheme. There must be a reasonable explanation for how the reconstructed morpheme developed into the modern class markers in each language, and caused the appropriate mutation to be triggered in each language. Sound correspondences between the Sereer prefix and Fula suffix ought to exist elsewhere in the language. However, because of the phonologically weak position of the Sereer prefix, it is subject to phonological erosion in many cases. Thus, allowances will be made for "irregular" deletions and rarely lenitions in Sereer noun class markers which might not be witnessed elsewhere in the language.

The second consideration is that if the classes are truly cognate, we should be able to find cognate nouns in each language which appear in the appropriate cognate noun class. Of course, in other Niger-Congo languages individual nouns are known to be reassigned to different noun classes, so we should not expect every cognate noun between the two languages to appear in cognate noun classes. Nonetheless, if we propose that a Sereer class A and a Fula class B are cognate, we would expect to find that of all the class A nouns for which a cognate noun can be found in Fula, the majority of these cognates should appear in class B.

In a few cases, we will find that this second criterion is met, while the first is clearly not; i.e. cognate nouns appear consistently in the same class in Fula and Sereer, but the two class markers cannot be cognate. In these cases, we can assume that one of these classes was lost in one language, and the nouns reassigned to an existing class; or else that one language innovated a noun class, and assigned all or a subset of nouns from an existing class into the new class.

6.2 Reconstructed Proto-Fula-Sereer noun classes

6.2.1 Clear cases

The following noun classes can be reconstructed with a high degree of confidence. For each proto-class, the modern Sereer nominal and determiner prefixes, as well as the stop and continuant grade forms of the Fula suffix are listed, along with a Ø, X, or N depending on which mutation grade they trigger (I, II, III respectively). The reconstructed class marker is given, and when there is any uncertainty as to its phonological form, the alternative possible reconstruction is given. A representative set of cognate nouns from the modern classes is given, along with a reconstruction of the noun in PFS. Note that in many cases, there is ambiguity as to which root-initial consonant should be reconstructed, due to the neutralizations caused by consonant mutation. For example, a root which appears with an initial *mb* in grade III and *b* in grade II could represent an original *b or *w. In these ambiguous cases I have used a capital letter representing the relevant voicing and place of articulation features (B = *b or *w, D = *d or *r, G = *g or *ɣ, K = *k or *h, X = unidentifiable consonant).

6.2.1.1 *fan

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
faN-	f(an)-	N- -wa	N- -ba	*fan- (or *wan-)

Sereer		Fula		PFS
fa-mbe	'goat'	mbee-wa	'goat'	*fan-Be
fa-ñiig/-ñiik	'elephant'	ñii-wa	'elephant'	*fan-ñiiɣ
fa-noox	'crocodile'	nood-a	'crocodile'	*fan-nooX
fa-ngool	'snake'	ngowl-a[38]	'snake species'	*fan-Gowl

It must first be noted that the *fe/fane* class in modern Sereer consists mainly of loanwords and proper nouns, which do not take the prefix *fa-*, though all adjectives agreeing with them do. There are very few nouns which display the overt prefix *fa-*. A few are animals, and most of the rest are deverbal nouns: *fa-lay* 'speech' (*lay* 'speak'), *fa-nqon* 'death' (*xon* 'die'), *fa-ŋas* 'game' (*ŋas* 'play', *fa-ndim* 'birth' (*rim* 'give birth'), *fa-ngen* 'household' (*gen* 'live'). Crétois (1972) gives a few additional nouns: *fa-njaq* 'roan antelope,' *fa-naqad* 'sorrow' (borrowed from a Wolof root), *fa-ndaa* 'moment,' *fa-ndetar* 'so-and-so,' *fa-njamcooli* 'couscous with bran,' and *fa-mbuq~fa-mbup* 'lower abdomen.' Originally these took plurals in *ke* with no prefix, as found in Crétois for the Siin dialect (*qon ke*, *ñiik ke*, and *noox ke* for 'death,' 'elephant,' and 'crocodile'). In other dialects, including Siin as recorded in McLaughlin (1994), the prefix has been reanalyzed as part of the stem in all but *fa-lay* (plural *lay*), as evidenced by the plural forms (e.g. *pambe* 'goats,' *pañiik* 'elephants'). All four of the animal nouns have cognates in Fula, while none of the deverbal nouns do. In Fula, the cognate *mba* class contains some other large animals (e.g. *koob-a* 'roan antelope' and *lell-a* 'gazelle') and a variety of other nouns (e.g. *tuub-a* 'pants,' *nges-a* 'farm'). The four cognates are all straightforwardly related except 'crocodile,' which shows an unexplained discrepancy in the final consonant of the root.

Phonologically, the Sereer nominal prefix suggests **faN-*, and the determiner prefix *fan-* makes it clear that this nasal must be *n. The Fula suffix agrees regarding the labial continuant, /a/, and final nasal. The only discrepancy is in the voicing of the labial continuant. Recall that there is a seemingly regular correspondence between Sereer /f/ and Fula /w/ in roots (see Figure 62), which is also exhibited by this noun class marker. Until the origin of this sound correspondence is understood, it is impossible to decide whether to reconstruct **fan* or **wan* as the noun class marker. Due to the use of classes of the shape *fa-* containing animals in other Atlantic languages (Cangin **f-*, Tenda **fa-*, Bainunk-Kobiana-Kasanga **fa-*), the reconstruction **fan-* is preferred. However note also Wolof *w-* and Biafada-Pajade **waŋ-* which also contain animals like 'goat.'

[38] Found in the Maasina dialect as 'python' and the Volta dialect of Burkina Faso.

6.2.1.2 *ɣun

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
N-	n-	N- -wu	N- -gu	*ɣun-

Sereer		Fula		PFS
mol	'foal'	mol-u	'foal'	*ɣun-mol
pis	'horse'	pucc-u	'horse'	*ɣun-pVs
βook	'mosquito'	ɓow-ngu	'mosquito'	*ɣun-ɓook
mbaal	'sheep'	mbaal-u	'sheep'	*ɣun-Baal
liβ	'fish'	lin-ngu	'fish'	*ɣun-liɓ

Many animals appear in the *ne* class in Sereer, and those with Fula cognates appear in the *ngu* class, which also contains many animals. Phonologically, the mutations in both languages attest to a final nasal, and the Sereer determiner shows that it must be *n. The initial consonant and vowel are eroded in Sereer, but the Fula forms suggest **ɣun*. A late 17th century Sereer wordlist seems to preserve the prefix of some **ɣun* nouns, e.g. *<goupis>* for *pis ne* 'horse' (see section 6.4 for more).

6.2.1.3 *rin

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
N-	n-	N- -ri	N- -di	*rin

Sereer		Fula		PFS
ndaw	'ash'	ndoo-ndi	'ash'	*rin-Daw
βuj	'bullock'	ɓuj-iri	'bullock'	*rin-ɓuj
ngand	'brain'	ngaa-ndi	'brain'	*rin-Gaand
ngaaf	'millet'	ngaw-ri[39]	'millet'	*rin-Gaaf

Sereer cognates of Fula words in the *ndi* class appear in the *ne* class. There does not seem to be any identifiable semantic generalization for either class.

Both languages attest to a final nasal, and the Sereer determiner shows that it must be *n. The initial consonant and vowel erode in Sereer, but the preponderance of r-initial forms of this suffix (rather than d-initial) in Fula, often accompanied by an epenthetic /i/ (*-iri*), solidify the reconstruction of **rin*. A late 17th century Sereer wordlist seems to preserve the vowel of the prefix on a few **rin* nouns, e.g. *<indau>* for *ndaw* 'ash' (see section 6.4 for more).

The *ne* class in Sereer is thus a falling-together of the **ɣun* and **rin* classes due to the erosion of the initial consonant and vowel of each marker.

[39] Form from the Fuuta Jaloo dialect. Other dialects have *gaw-ri*, perhaps due to the influence of the plural form.

6.2.1.4 *ox

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
oX-	ox-	X- -jo/wo	X- -ɗo/ko	*(ʔ)ox-

Sereer		Fula		PFS
o-koor	'man'	gor-ko gor-ɗo (Gombe dialect)	'man'	*ox-ɣoor
o-tew (pl. rew)	'woman'	debb-o (pl. rew-ɓe)	'woman'	*ox-rew
o-kay naak	'cowherd'	gaynaa-ko	'cowherd'	*ox-ɣay naak
o-siid	'twin'	ciwt-aa-ɗo	'twin'	*ox-siwd

The personal classes in Fula and Sereer are clearly cognate. In both languages, they contain almost exclusively people, though in Fula many non-personal loanwords are assigned to this class (but with no suffix).

Phonologically, both contain the vowel /o/, and trigger mutation grade II. The Sereer determiner suggests that the final consonant which triggered fortition is /x/[40]. The /ɗ/ present in most instances of the Fula suffix would at first lead us to reconstruct **ɗox*, with the initial consonant eroding in Sereer. However, there is reason to believe that this /ɗ/ is not original. First, recall that the Fula article is *'o*, and not ˣ*ɗo*, being the only article to differ from the nasal grade form of the suffix. Consider also that both Fula and Sereer do not tolerate hiatus. Were the pre-nominal vowel-initial **ox* to become a suffix, such cases of hiatus would arise. Furthermore, in environments where all other class suffixes have an initial consonant, *-*ox* would have none. Thus, even in cases where *-*ox* did not result in vowel hiatus, the noun was phonotactically irregular. To remedy this phonological irregularity, various consonants were co-opted to fill this initial consonant position. /ɗ/ was employed in many cases, perhaps due to its being the suffix-initial consonant with the highest token frequency, as it appears in both non-personal plural classes (**ɗik* and **ɗak*). In agentive nouns with the derivational suffix *-oo*, a glide /w/ was inserted (e.g. *goll-oo-wo* 'worker'). In other cases[41], a /k/ was inserted. The origin of this /k/ is particularly interesting— it seems that it would have occurred originally in only one word, *gaynaako* 'cowherd,' where it was the final consonant of the word **naak* 'cow.' As most Fula were (and to a large extent still are) migratory cow herders, this is an extremely common Fula word. After the root for 'cow' was reinterpreted as *nag-* (in the noun **naak-ge* > *nag-ge*, the final /k/ assimilated to the suffix, and the vowel shortened before the resulting

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[40] As far as I know, no Sereer dialect distinguishes /x/ and /h/ except in root-initial position. For example, all of the examples of non-initial /h/ given in Crétois (1971: 29) are of reduplicated agentive nouns, like *o-kaahap* 'estimator' from *hap* 'estimate,' and elsewhere in the dictionary virtually the only words with non-initial /h/ are from the Ñominka dialect in which /h/ develops regularly from /g/ in intervocalic and final position. There is a single word *nahik~nahak* 'four' which is consistently given with /h/ in Crétois and other sources on the Siin dialect, but this is the only evidence for a synchronic distinction between /h/ and /x/ in non-initial position. Thus it is conceivable that this prefix could be reconstructed as **oh*. However it is not at all certain that there was truly a merger of non-initial /h/ and /x/— it is entirely possible that earlier *h was lost non-initially. It may be that all instances of Fula non-initial /h/ are from earlier *x, and that even in PFS *h only appeared root-initially. Since the Sereer marker-final consonant is phonetically uvular, it is more parsimonious to reconstruct a uvular for the PFS marker, while acknowledging the possibility that it was in fact velar if there was a merger of earlier *h and *x in non-initial position.

[41] This suffix form *-ko* is in fact extremely rare. The only notable noun other than *gaynaako* 'cowherd' is *gorko* (pl. *worɓe*) 'man,' which in some dialects (e.g. Nigerian) is *gorɗo*. In Seydou's (2014) >20,000 entry dictionary of the Maasina dialect, only three nouns have this personal suffix *-ko*, with the third being *caayaako* 'jewler.'

geminate), *gay-naak-o* could no longer be analyzed as containing a morpheme *naak*. The word for 'cowherd' was reanalyzed from **gay-naak-o* to *gayn-aa-ko*, which explains both the existence of the suffix variant *-ko*, and the fact that the verb root for 'herd' is *'ayn-* rather than the historically expected *'ay* < **ɣay* (cf. Sereer *gay*). This reanalyzed *-ko* was then extended to a few other personal nouns replacing earlier **-o*. The article, facing no pressure to avoid internal hiatus, remained *'o* (with initial epenthetic glottal stop).

It is possible that the original marker was in fact **ʔox* with an initial glottal stop, but this is mainly a question of the phonemic status of *ʔ. However, the fact that *ɗ, *k, *w and the mysterious *j were all co-opted to fill the expected initial consonant slot of the suffix indicates that there was almost certainly no underlying consonant there to begin with.

6.2.1.5 *ɣal

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
(g)aX-	al-	X- -wal	X- -gal	*ɣal-

Sereer		Fula		PFS
a-saaw	'guinea fowl'	jaaw-ngal	'guinea fowl'	*ɣal-saaw/-yaaw
a-tud	'vulture'	dut-al	'vulture'	*ɣal-Dud
a-soocoor	'toothpick'	coccor-gal	'toothpick'	*ɣal-soXc-oor
a-'un	'pestle'	'unu-gal	'pestle'	*ɣal-ʔun
a-fat	'road/way'	ɗat-al	'road/way'	*ɣal-ɗat
a-kaaβaar	'jaw'	gaɓɓu-gal	'jaw'	*ɣal-GaXɓ-
a-qoos	'shin'	kos-ngal	'leg/foot'	*ɣal-xoos

Most Sereer cognates of Fula words in the *ngal* class appear in the *ale* class. Sereer *ale* and Fula *ngal* are the classes of non-passeriform birds in their respective languages. In Fula, *ngal* contains long body parts and some abstract verbal nouns, and in Sereer any non-stative verb root can productively be nominalized by putting it in this class. In both languages it is used for long rigid objects. It is a very large class in both languages, containing a variety of nouns that do not fall into the above categories.

Phonologically, both languages independently suggest a reconstruction **ɣal* or **gal*. As *ɣ regularly develops to /g/ in Sereer, the Ñominka prefix *ga-* confirms the initial voiced velar, but provides no clues as to its continuancy. Both languages attest the final /l/, which triggers fortition. It is noteworthy that the final *l remains in the Fula class marker after triggering fortition, unlike in Sereer where it is preserved only pre-vocalically. In the case of final *n and *x, we saw that the consonant was "swallowed up" when it triggered the appropriate mutation, so that by the time the prefixes became suffixes in Fula, the historical presence of *n and *x (and *k, see section 6.2.1.9) was identifiable only through their effect on the root-initial consonant, and thus they were no longer analyzable as part of the class marker. In contrast, /l/ triggered fortition without being deleted. This fact is not particularly disturbing, as gemination without deletion in consonant contact situations is attested in cases such as the West Germanic gemination sound change, in which consonants geminated before the glide *j*, without any deletion (e.g. Proto-Germanic **bidjan* > Old Saxon *biddian*). Alternately (and perhaps more likely), *l may have simply caused following continuants to harden in Fula, without any intermediate gemination. Recall from section 4.7.2 that the Fula applicative suffix *-r* hardens to *-d* after /l/, with the /l/ remaining in tact. In Sereer there is no reason to suppose that the final *l of *ɣal developed any differently than other fortition-inducing consonants; that is, it simply assimilated to the root-initial consonant, forming a geminate.

6.2.1.6 *ɣol

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
(g)o-	ol-	X- -wol	X- -gol	*ɣol-

Sereer		Fula		PFS
o-maar	'braid'	mor-gol	'braid'	*ɣol-mVr
o-gef	'crack'	gew-ol	'crack'	*ɣol-Gef
o-ƥaak[42]	'rope'	ɓogg-ol	'rope'	*ɣol-ɓVK
o-ñaay	'forest fire'	jay-ngol	'fire'	*ɣol-yaay/-ñaay
o-goon	'sap'	gon-gol	'tear'	*ɣol-Goon
o-goon-iit	'tear'			

Most Sereer cognates of Fula words in the *ngol* class appear in the *ole* class. Fula *ngol* contains many long flexible objects, and any verb can be nominalized by putting it in the *ngol* class. It serves as the infinitive marker in the Gambian, Liptaako-Dori, and Fuuta Jaloo dialects (De Wolf 1995: lxxii). Sereer *ole* contains most fruits. Many other types of nouns appear in this class in both languages. The deverbalizing function of Fula *ngol* at first appears to have no cognate function in Sereer, but the Sereer non-finite marker *o* (e.g. *bugaam* ***o ret*** 'I want **to go**') may very well simply be a verb root put in the **ɣol* class historically (though see also section 6.2.2.2 on **ɣo*, used in some other Fula dialects).

Both languages independently support a reconstruction **ɣol* or **gol*. However, while the phonologically similar **ɣal* triggered fortition in both languages, **ɣol* triggers fortition only in Fula, and has no mutating effect in Sereer. This discrepancy is quite puzzling. It may be that the /l/ was simply deleted in Sereer, perhaps by a regular sound change *l > Ø / o_C, in which the rounding of the *o led to the gliding of *l to [w] before another consonant, with subsequent deletion. Support for this proposal comes from the development of the extended forms of *jol* 'pass'— **jol-t > joot* and **jol-n > joon* (see Figure 81), in which the *l exhibits the expected behavior of *w in this position (loss with compensatory lengthening). Alternatively, the triggering of grade I rather than II may have been due to the influence of the **ɣo* class which fell in with Sereer *ole* (see section 6.2.2.2), though this seems doubtful due to the rarity of **ɣo* nouns and the frequency of **ɣol* nouns.

An additional complication involves the Sereer *fortis ole* class. There is a productive derivational process forming degree nouns in the *ole* class from verbs, and these nouns unexpectedly take grade II mutation along with the suffix *-el*.

[42] The exceptional voiceless implosive is perhaps due to influence from ƥaak 'baobab,' the bark of which is used to make rope.

verb		fortis ole noun	
jigid	‘be long’	o-cigdel	‘length’
fariƴ	‘be ugly’	o-paryel	‘degree of ugliness’
xeq	‘be bitter’	o-qeqel	‘degree of bitterness’
raβ	‘be short’	o-taβel	‘height (degree of shortness)’
ɓuuɓ	‘be cold’	o-βuuɓel	‘temperature (degree of coldness)’
ɗom	‘hurt’	o-fomel	‘pain’

Figure 96: Deverbal fortis ole *nouns in Sereer*

There are some other *ole* nouns which seem to show root-initial fortition when compared with a related root, and two nouns beginning with /q/, which is unambiguously in grade II.

o-βaak	‘rope’ (cf. *βaak* ‘baobab’)
o-cuucuɗ	‘oven’ (der. *juɗ* ‘grill/roast’)
o-faaɗ	‘dream’ (der. *ɗaaɗ* ‘dream (v)’)
o-faan	‘sleep’ (der. *ɗaan* ‘sleep’)
o-kumnoor	‘belt (for a woman)’ (der. *hum* ‘tie’)
o-tim	‘matriclan’ (der. *rim* ‘give birth to’)
o-qir	‘whip’
o-qol	‘field’

Figure 97: Other potential fortis ole *nouns in Sereer*

In all cases, agreeing adjectives take grade I, though this could be a regularization based on the normal behavior of *ole* nouns. It is possible that these *fortis ole* nouns represent a regular fortition after **ɣol*, in which case the normal *ole* class might indeed be descended from **ɣo*. However this scenario seems unlikely, as almost all Fula cognates of Sereer normal *ole* nouns are in the *ngol* class, rather than *ngo*. A more likely explanation for the *fortis ole* degree nouns in *-el* is that grade II was introduced in analogy with the most productive and common strategy for forming deverbal nouns, namely placement into the *ale* class, which regularly enforces grade II. The remaining *ole* nouns which seemingly take grade II are also mostly deverbal, though *o qir* ‘whip’ and *o qol* ‘field’ are particularly mysterious. For this second word there is a potential Fula cognate *kolangal* ‘field/brush,’ which is compatible with a reconstructed root **xol*.

6.2.1.7 *re

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
Ø-	l- (r-)	Ø- -(e)re	Ø- -de	*re-

Sereer		Fula		PFS
saax	‘town/land’	saa-re	‘town’	*re-saax
xoox	‘head’	hoo-re	‘head’	*re-xoox
ñiiñ	‘tooth’	ñii-nde	‘tooth’	*re-ñiiñ
xeeñ	‘heart/lung/liver’	heeñ-ere	‘liver’	*re-xeeñ
ɓaak	‘baobab fruit’	ɓoh-re	‘baobab fruit’	*re-ɓVK

Sereer cognates of Fula words in the *nde* class mostly appear in the *le* class. Fula *nde* contains most fruits, and in both languages this class has a good number of round objects the size of a head or smaller. However for the most part this class is rather heterogeneous in both languages.

Both languages support reconstructing a vowel-final prefix, as both classes trigger no mutation. However, they seem to disagree on the consonant, with Fula suggesting *r, and Sereer *l. There do exist a number of cognates in which one language has /r/ where the other has /l/ (e.g. Sereer *hul*, Fula *huur* 'to cover'), but these are exceptional, and I do not believe that any systematic correspondence between /l/ and /r/ can be identified. Nonetheless, it is clear that in one or both languages, there were instances of /r/ becoming /l/, or vice versa. Even among Fula dialects a root can differ in containing /l/ vs. /r/ (e.g. *liil* (Maasina dialect) vs. *liir* (Pulaar, Nigerian, Adamawa dialects) 'dry in sun'). Thus, this irregular correspondence is not much of a hurdle in establishing the cognacy of the *nde* and *le* classes. Luckily, an answer to the question of whether to reconstruct **re-* or **le-* can be found in the Njagañaaw dialect of Sereer (see Figure 94). Here, the form of the determiner is *re*, the expected outcome of **re-e*, with vowel deletion as the regular repair for word-internal hiatus. It must be that in other dialects this article was later influenced by the other common articles *ole* and *ale*, and became *le*. There is no similarly plausible explanation for why Njagañaaw would change an original *le* to *re*, and in fact this form *re* is found in the 17th century Sereer wordlist which seems to represent a Ñominka dialect (see section 6.4).

6.2.1.8 *ɓe

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
Ø-	w-	Ø- -ɓe	Ø- -ɓe	*ɓe-

Sereer *we* and Fula *ɓe* are the personal plural classes; each cognate that can be given for the **ox* class can be given in the plural for this class.

Both languages agree on a final vowel for the prefix, as no mutation is triggered in either language. However, the consonant cannot be straightforwardly reconstructed— Sereer has /w/ and Fula /ɓ/. It is clear that Fula /ɓ/ is conservative, not only because Sereer prefixes are prone to erosion, but also because personal plural prefixes of the form /ɓV/, as well as free pronouns of the same form are found all throughout Atlantic and more broadly Niger-Congo (see section 6.8.1). It must then be that the nominal prefix eroded in Sereer, and the article **ɓe* (from **ɓe-e*), being an unstressed functional word, underwent irregular lenition to *we*, avoiding the more effortful implosive segment[43]. These sorts of irregular developments in frequently uttered functional words are of course well attested cross-linguistically—see Schiering (2010), who proposes that erosion, including phonetic simplification, should target clitics in stress-languages (Sereer *we* fits the bill perfectly), so this development is not particularly troubling. In Fula there is a nominal suffix *-'en* with the meaning 'the people of...' which is sometimes cited as a continuant suffix grade form of the *ɓe* class (eg. *halpulaar'en* 'speakers of Pulaar'). This analysis may be possible synchronically in some dialects, but this suffix is not traditionally a noun class marker. Rather, it is a suffix equivalent in meaning and usage to Sereer *-iin* and Wolof *-een*, most often employed with proper nouns (e.g. Fula *Ali-'en* 'Ali and company' (McLaughlin 2015: 436), Sereer *Aliw Saar-iin* 'Aliw Saar and his people').

[43] This is also the likely explanation for the irregular sg./pl. pair *o-kiin / wiin* 'person/people,' from **ox-ɣiin / *ɓe-ɣiin*, in which the modern /w/ developed irregularly from *ɓ.

6.2.1.9 *ɗik and *ɗak

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
X-	k-	X- -ji	X- -ɗi	*ɗik-

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
aX-	ak-	X- -je	X- -ɗe	*ɗak-

The two basic non-personal plural classes in Fula are *ɗi* and *ɗe*. In Sereer, there are three such classes: *ke*, *ake*, and *axe*. To determine which of these are cognate, we can assemble a list of all of the basic (not diminutive or augmentative) non-personal cognate singular noun classes, and examine what their plural classes are in each language.

PFS sg.	Fula sg.	Fula pl.	Sereer sg.	Sereer pl.
*ɣe	nge	ɗi	le	ke
*ɣun	ngu	ɗi	ne	ke
*rin	ndi	ɗi	ne	ke
*fan	mba	ɗi	fane	ke
*re	nde	ɗe	le	ake
*ɣal	ngal	ɗe	ale	ake
*ɣol	ngol	ɗi	ole	axe
*ɣo	ngo	ɗe	ole	axe
*han	ka	ɗe	aN- ale	ke

Figure 98: Cognate Fula-Sereer noun classes and their plurals

The first thing to note is that the plural class for each singular noun class is arbitrary in both languages; that is, it cannot be determined based on phonological or semantic properties of the singular class. Thus, it cannot be a coincidence that wherever a Sereer singular noun class has *ke* as its plural, the cognate Fula noun class has the plural *ɗi*, and wherever Sereer has *ake*, Fula has *ɗe*. The only exception is for the **han* class (see section 6.2.2.1), which is very tentatively reconstructed, and supported by only one cognate pair. Furthermore, it appears that Sereer *axe* is not cognate with any Fula class (see section 6.2.4.4), so it must have either been lost in Fula or innovated in Sereer. Thus, for the criterion of shared cognates, there is a preponderance of evidence in favor of the cognacy of *ɗi* and *ke*, and of *ɗe* and *ake*.

Phonologically, the *ɗi = ke* class marker can be straightforwardly reconstructed. The Sereer determiner shows that it must have had a final consonant *k, which triggered fortition in both languages (the Njagañaaw form *ge* must be considered an irregular lenition, cf. **ɓe- > w-* above). The initial consonant and vowel have been eroded in Sereer, but Fula attests to initial **ɗi-*, so that the full form of the PFS prefix would be **ɗik*. Unlike in the case of **ox*, the initial /ɗ/ seen in Fula can be taken as original, as it does not idiosyncratically alternate with other consonants like /k/ and /w/[44]. The fact that this prefix is identical in form to the PFS word

[44] I have no explanation for the j~ɗ alternation seen in all ɗ-initial suffixes. It may simply be due to a lenition of /ɗ/ to /j/ intervocalically, though there is no support for this process elsewhere in the language.

**ɗik* 'two' cannot be coincidence. It suggests that this marker was grammaticalized from the numeral[45].

The reconstruction of the class marker for the *ɗe = ake* class is somewhat problematic. While we can once again reconstruct an initial *ɗ and final *k, the quality of the vowel is unclear, being /e/ in Fula and /a/ in Sereer. The discrepancy between /a/ and /e/ is seen in some other cognates, e.g. Sereer *xas* = Fula *hes* 'new' and Sereer *yer* = Fula *yar* 'drink,' but this correspondence is not regular. At this point it will be useful to consider the Sereer system of numeral ablaut.

we class	*ke* class	*ake* class	*axe* class	
ɗik	ƭik	a-ƭak	xa-ƭak	'two'
daduk	tadik	a-tadak	xa-tadak	'three'
naxuk	naxik	a-naxak	xa-naxak	'four'
ɓetuk	βetik	a-βetak	xa-βetak	'five'

Figure 99: Sereer numerals 'two' through 'five' in each basic plural class

Sereer numerals exhibit a system of ablaut seen nowhere else in the language. This ablaut system is not phonologically explicable by either the modern or reconstructed PFS noun class system, and thus is likely an archaism. If we can indeed trace the Sereer *ƭik~ƭak* alternation back to the proto-language, we can identify **ɗak* with this noun class prefix, in the same way that **ɗik* 'two' corresponds with the prefix form **ɗik-*. Further evidence for this association comes from the Baol dialect, in which *ake* is *aqe*, just as *-ƭak* has a free variant *-ƭaq* in most dialects. There are two reasons to prefer **ɗak-* over **ɗek-* (guided by the Fula vowel). First, prefix /e/ regularly erodes in Sereer, while /a/ does not (see section 6.5). Second, if **ɗek-* were original, it would mean that all of the vowels in the final syllables of the Sereer numerals in Figure 99 would have changed from /e/ to /a/, which while possible, seems less likely than a change from /a/ to /e/ in a single morpheme in Fula. A third somewhat less likely possibility is that **ɗik-*, **ɗak-* and **ɗek-* all existed in PFS, and **ɗek-* and **ɗak-* were collapsed to **ɗek-* in Fula, and **ɗak-* in Sereer.

[45] This account also explains the form of the Fula word for 'two' *ɗiɗi*, which is conspicuously reduplicated, and lacks the final /k/ of the Sereer *ƭik/ɗik*.

	gemination		prefix > suffix		cluster simplification
*ɗik-ɗik >	ɗi-ɗɗik	>	ɗɗik-ɗi	>	Fula ɗi-ɗi
	gemination		erosion		geminate devoicing
*ɗik-ɗik >	ɗi-ɗɗik	>	ɗɗik	>	Sereer ƭik

Being an adjective, **ɗik* 'two' would have taken the plural noun class prefix **ɗik-* when agreeing with most plurals. This proto-form **ɗik-ɗik* evolved by regular processes in each language, yielding Fula *ɗiɗi* and Sereer *ƭik*.

6.2.1.10 *ɣin and ɣan

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
giN-	al-	N- -yii	N- -gii	*ɣin-

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
(g)aN-	al-	N- -wa	N- -ga	*ɣan-

The Sereer augmentatives *gi-* and *ga-* (simply *a-* in the Siin dialect) are clearly cognate with the Fula augmentative *ngii* (Firdu dialect) and *nga*. Both trigger nasal grade, and thus must be reconstructed with a final nasal. As there is evidence that marker-final *m and perhaps also *ñ are preserved in Fula (see section 6.2.4.6), this final nasal is most likely *n for both classes (though it could be *ŋ). The vowel length in *ngii* (as reported in Gamble et al. 1993) is unexpected, but it should be noted that Fula vowel-final suffixes are often transcribed with a long vowel (as in McLaughlin 1994: 182). The determiners used in Sereer for these augmentatives are presumably a replacement, or else the augmentatives were originally used without determiners, and *ale* was co-opted at some later time from the **ɣal* class. It is unclear if the use of Sereer *ga-* and *gi-* for the plural augmentative is an innovation or a retention, though the former seems more likely. Fula uses *ko* as the augmentative plural.

6.2.2 Less clear cases

There are three possible cognate class pairs which involve classes with few members in one or both languages, and are supported by only one cognate pair each.

6.2.2.1 *han

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
aN-	al-	N- -ha	N- -ka	*han-

Sereer		Fula		PFS
a-ngas	'well'	ngas-ka	'hole in ground'	*han-ɣas

The *nasal ale* class in Sereer (not to be confused with the variant *aN-* of the augmentative, from which it is distinguished by its plural form) contains less than ten nouns. One of these has a Fula cognate in the *ka* class. Both are derived from the verb **ɣas* 'dig' (Sereer *gas*, Fula *'as*), and thus if these noun classes are indeed cognate, this nominalization can be reconstructed to PFS.

Phonetically, the affixes in each language present no obstacle for reconstruction. Both suggest a vowel *a and a final nasal *n (or perhaps *ŋ). The Fula suffix suggests an initial *h— it is likely not *x, as initial *xa- is conserved in the Sereer prefix *xa-* (see section 6.5). The Sereer adjective concord marker (*aX-*) and determiner are co-opted from the much more common *ale* class. We can be relatively sure that the Sereer *nasal ale* class is in fact distinct from the augmentative *(g)aN-* or the *ale* class, as the plural of *nasal ale* nouns are in the *ke* class (e.g. *a-ngas ale / kas ke*), a pattern that could not have been extended from either of these other classes. However, the fact that the plural of *nasal ale* is *ke* is potentially evidence against cognacy with Fula *ka*, as the plural of *ka* is *ɗe*, and not *ɗi* (see section 6.2.1.9). There is one Sereer *nasal ale* noun with an *ake* plural (*a-ngid / a-kid* 'eye(s)'), but the Fula cognate is in the *nde* class (*yitere / gite*). It should be noted that in the Ñominka dialect, the nominal prefix for the *nasal ale* class is *gaN-III*, which would seem to argue against cognacy with Fula *ka*. However, this prefix could have been influenced by singular *gaX-* from **ɣal*.

6.2.2.2 *ɣo

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
(g)o-	ol-	Ø- -wo	Ø- -go	*ɣo-

Sereer		Fula		PFS
o-maag	'river/sea'	maay-o/maaw-o	'river'	*ɣo-maaɣ

The Fula *ngo* class contains relatively few members, of which only 'river' has an identifiable cognate in Sereer. It is used as the infinitive marker in the Gombe, Adamawa, Sokoto, and Nigerian dialects (De Wolf 1995: lxxi). This use of *ngo* may well be cognate with the Sereer infinitive particle *o* (but see section 6.2.1.6 on **ɣol*, used in many other dialects).

Both the Sereer and Fula class markers contain a vowel /o/ and trigger no mutation. Ñominka has an initial /g/, lining up with Fula /w, g/. If these classes are truly cognate, the Sereer determiner must have been extended from the much more common *ole* class, as the nominal prefix of both **ɣol* and **ɣo* developed naturally to *(g)o-*. Thus, Sereer *o-maag* might be thought of as being reassigned to the phonologically similar *ole* class. This reassignment is similar to the case of Latin nouns in the relatively uncommon 4th declension (ending in *-u(s)*) which were reassigned to the much more common 2nd declension (ending in *-us*) due to the phonological similarity of the class markers.

6.2.2.3 *ɣe

Sereer n.	Sereer det.	Fula cont.	Fula stop	PFS
Ø-	l-	Ø- -ye	Ø- -ge	*ɣe-

Sereer		Fula		PFS
naak	'cow'	nag-ge	'cow'	*ɣe-naak

The Fula *nge* class has few members, but most are relatively common nouns (e.g. *naange* 'sun' and *nagge* 'cow'). Only one *nge* noun 'cow' has a Sereer cognate.

The lack of mutation in Fula suggests a vowel-final class marker **ɣe-*. Once this marker eroded in Sereer, the few nouns in the **ɣe* class would have been indistinguishable in the singular from nouns in the far more common *le* class, from which the determiner was extended (presumably replacing earlier **ge*). However, the plural of *naak le* is *naak ke*, rather than ˣ*a-naak ake* as would be regular for a true *le* class noun. As the plural class for *nge* is *di* in Fula, we can be rather confident in attributing the irregular plural form of Sereer *naak* to its earlier membership in the **ɣe* class.

6.2.3 Class reassignment

In a number of cases a cognate noun appears in non-cognate classes between languages, suggesting that the noun was reassigned to a different class in one language. In two cases, a class that survives in Fula seems to have been lost entirely in Sereer when all of its members were reassigned to other classes.

6.2.3.1 *ru

Sereer		Fula		PFS
nqol ne	‘finger’	hon-ndu (pl. koll-i)	‘finger’	*ru-xol
nof ne	‘ear’	nof-ru	‘ear’	*ru-nof
feen ne	‘breast’	’en-du[46]	‘breast’	*ru-ɗeen
ngeñ ne	‘wind’	hen-ndu	‘wind’	*ru-heñ
a-keñ ale	‘wind’			
faaɓ le	‘frog’	fam-ru (pl. paaɓ-i)	‘frog’	*ru-faaɓ
a-mbeel ale	‘lake’	wee-ndu (pl. beel-i)	‘lake’	*ru-weel

The Fula *ndu* class contains many round things, but otherwise contains all sorts of nouns. Many Sereer cognates exist for Fula *ndu* nouns, most of which appear in the *ne* class.

Phonologically, it is impossible to connect Fula *ndu* and Sereer *ne*. The nasalization triggered by *ne* and lack of mutation triggered by *ndu* cannot be reconciled. Rather, this seems to be a case of an original noun class being lost in Sereer, with members reassigned to other classes. The reason why most ended up in *ne* is unclear. Of course, in some of these cases the Fula noun may have been reassigned to the *ndu* class, but there is certainly no reason to believe that the class itself is an innovation of Fula. We can tentatively reconstruct **ru-* as the PFS marker. A late 17th century Sereer wordlist seems to preserve the vowel of the prefix on some **ru* nouns, e.g. *<oudein>* for *feen* ‘breast’ (see section 6.4 for more).

6.2.3.2 *hiX

	Sereer		Fula		PFS
	βaak ne	‘baobab tree’	ɓok-ki	‘baobab tree’	*hiX-ɓVK
	laβ ne	‘sword’	laɓ-i	‘knife’	*hiX-laɓ
?	sooβ ne	‘tamarind tree’	jaɓɓ-i (root yaɓɓ-)	‘tamarind tree’	*hiX-{y/s}oxɓ
?	o-naapan ole	‘armpit’	naaw-ki	‘armpit’	*hiX-naaf
?	(f)o-suun ole	‘smoke’	cuur-ki	‘smoke’	*hiX-suu{r/n}
?	teex ne	‘medicine’	lekk-i	‘medicine’	*hiX-reex ?

All trees appear in the Fula *ki* class. This class also contains a relatively small number of other nouns. All trees in Sereer appear in the *ne* class. Some of the more common non-trees in the *ki* class have potential cognates in Sereer, though most are not completely secure, due to irregular sound correspondences.

It is impossible to connect Fula *ki* and Sereer *ne* etymologically. Fula *ki* triggers fortition, whereas *ne* triggers nasalization. Fula *ki* likely represents an original PFS noun class of the form **hiX* or **xiX* (with some final consonant causing fortition) which was lost in Sereer. The trees were reassigned to the *ne* class, and other nouns were reassigned to various other classes. There is no reason to believe that *ki* was a Fula innovation, and it has potential cognates in Cangin (**ki-rik* ‘tree’) and Bainunk (e.g. Gujaher *ki~ci-* for trees).

6.2.3.3 Other reassignments

In Fula, fruits appear in the *nde* class, whereas in Sereer, most appear in the *ole* class. There are however a few common fruits that appear in the *le* class (e.g. *ɓaak le* ‘baobab fruit’ and *daaf le* ‘Kajoor apple’). These facts point to **re* as being the PFS class for fruits, with

[46] The lack of /ɗ/ in Fula is unexplained.

most being reassigned to *ole* in Sereer, likely on semantic grounds (*ole* is used for most round objects in Sereer). Other sporadic cases of reassignment can be identified, e.g. Fula *njum-ri* = Sereer *yuum fe* 'honey,' Fula *ñaa-nde* = Sereer *ñaal ne* 'day,' but there are no other clear cases of mass reassignment that do not involve the loss of a class in one language.

6.2.4 Classes found in only one language

Besides the Fula classes *ndu* and *ki* discussed above, there are some other classes in each language which seem to have no cognate in the other. Most of these were probably present in the proto-language and lost in one of the daughter languages, though at least Sereer liquid *fo-* is likely an innovation.

6.2.4.1 Fula liquid *ɗam*

Many liquids appear in the Fula *ɗam* class (triggering grade III). Some examples:

ndiy-am	'water'
kos-am	'buttermilk'
lam-ɗam	'salt'
nebb-am	'oil'
ƴiiƴ-am	'blood'

While this class has no cognate in Sereer, it is somewhat phonologically similar to the *ma-* liquid classes that appear pervasively throughout Atlantic and Niger-Congo more broadly. For this reason, it seems desirable to reconstruct it to PFS (as **ɗam-* or **am-*). The final /m/ is perhaps responsible for the nasalization, but without being deleted (a reconstruction of ˣ**ɗamn-* seems unlikely). It is unclear whether the initial /ɗ/ is original as in **ɗik* (section 6.2.1.9) or was inserted, as in **ox* > *-ɗo* (section 6.2.1.4). Alternately, the form of the PFS marker may have been **man* (more in line with other Atlantic languages), with the *m and *a becoming metathesized for some reason when the marker became a suffix in Fula. Against a reconstruction of **(ɗ)am* is the fact that the only other two m-final noun class suffixes in Fula, neuter *ɗum* and diminutive *ngum* (not found in Pulaar), trigger grade II rather than III— but these classes may very well be later innovations of Fula.

6.2.4.2 Sereer liquid *fo-*

In the Siin and Ñominka dialects, many liquids appear in the *fo-* class. Saalum and Njagañaaw do not have this class. We must then determine whether this class was lost in some dialects, or innovated in others. For the most part, Siin liquid *fo-* nouns appear in the *ole* class in Saalum with the regular prefix *o-* for this class, but there are numerous exceptions. Note that even in Siin, the *fo-* liquid class uses the determiner *ole*.

Siin	Saalum	
fo-sis ole	o-sis ole	'milk'
fo-soow ole	o-soow ole	'buttermilk'
fo-suun ole	o-suun ole	'smoke'
fo-yiir ole	o-'iir ole	'palm oil'
fo-neer ole	a-neer ale	'fat/grease'
foo-f(i) ole	foof(i) le	'water'
fo-'oy ole	fo'oy fe/le	'blood'
fo-raf ole	o-foraf ole	'dirty washwater'
fo-saaβ ole	mbasaaβ ne	'hibiscus drink'
fo-deex ole	fudeex le	'*Moringa oleifera* leaves'

Figure 100: Sereer Siin words in the fo- *liquid class and their Saalum equivalents*

First, if Fula *ɗam* is to be traced back to PFS as the liquid class, reconstructing something which became Siin *fo-* would require two liquid classes in the proto-language, which seems unlikely. Furthermore, whereas /f/ was not eroded in the determiner of the *fe/fane* class, it would have to be idiosyncratically deleted in the *fo-* class to yield *ole*. Most importantly, words in the *fo-* class in Siin do not consistently correspond with *ole* nouns in Saalum, as would be expected if these liquid nouns simply eroded an earlier /f/ in Saalum. Some in fact contain a stem-initial /f/, and at least *a-neer* 'grease' is in the *ale* class. For 'hibiscus drink,' the initial syllable of the Saalum root has been replaced with the class prefix *fo-* in Siin (cf. Wolof *bisaap*, suggesting that this root-initial syllable is in fact original). Finally, a geographical argument can be made for *fo-* being an innovation. Njagañaaw is to the north of Siin, and Saalum to the south of it, with Ñominka being spoken to the west along the coast; thus, Siin and Ñominka are geographically contiguous while Saalum and Njagañaaw are not. A single innovation which spread from the geographically central location is more likely then two independent innovations on the part of Saalum and Njagañaaw. For these reasons, it seems that *fo-* was an innovation of certain Sereer dialects, rather than a retention from PFS. When liquids were put into the *fo-* class, the prefix *fo-* replaced the existing prefix, or in some cases the initial syllable of the stem.

Where then did this *fo-* prefix come from? The most likely answer is that it was extended from *foofi* 'water.' Historically, *foofi* was probably not polymorphemic, since prefixes with a long vowel do not exist, and neither do vowel-initial roots. From this noun, an initial /f/ may have been abstracted out as a noun class marker and applied to liquids in the *ole* class like *o-neew > fo-neew* 'cream' and *o-suun > fo-suun* 'smoke.' It was then further extended to nouns in other classes, replacing the initial syllable of some polysyllabic stems. The form of the word *fo'oy* 'blood' in Saalum may have been borrowed from Siin.

6.2.4.3 Fula *ko*

The Fula *ko* class contains mainly grasses and leaves. Some examples:

huɗ-o	'grass'
kaa-ko	'leafage'
yaɓɓ-o	'tamarind tree leaves'
ɓok-ko	'baobab tree leaves'

A possible connection could be made with Sereer fruits, which appear in the *ole* class, but this is doubtful. I have found no Sereer cognates to any *ko* noun (Sereer *maalo fe* and Fula *maar-o ko* 'rice' are borrowings). This class is likely reconstructable to PFS as **ho-* or **xo-*.

6.2.4.4 Sereer *axe*

The Sereer *axe* class (nominal prefix *xaX-*) is the plural of *ole* and most non-diminutive *onqe* nouns. Through internal reconstruction, we can assume a proto-form **xax-* (though see footnote 40 regarding the possibility of final *h). In Fula this class was eliminated. While it is possible that this class is a Sereer innovation, there is no clear source of grammaticalization, and no reason to assume it did not exist in the proto-language. **xax* was likely the plural of **ɣol* in PFS, and was replaced by the more frequent *ɗi* when it was eliminated in Fula.

6.2.4.5 Sereer *onqe*

Sereer *onqe* is primarily a diminutive class, but a number of nouns exist in this class by default which are not semantically diminutive, and which take a plural in the *axe* (or rarely *ke*) class rather than the *foN-* diminutive plural. Some examples:

o-mbec	'dance'
o-mbiñ	'place'
o-ndaf	'sitting by the fire'
o-nqok	'*Dactyloctenium aegyptium* grass'
o-nqooc	'nape'
o-nqool	'moon'

Some nouns in this class were originally diminutives (e.g. *o-mbote* 'baby goat/sheep' and *o-ndeɓ* 'child'), but others such as *o-nqool* 'moon' and a number of deverbal nouns are likely not. It is unclear whether this class should be reconstructed to PFS. If so, the form of the marker would be difficult to determine. The prenasalized uvular should only be possible from an *Nx sequence, but this would be the only marker with a final cluster. The fact that this class triggers grade III (nasalization) means that this potential cluster would have to be simplified to a purely nasal realization before consonants, which seems entirely plausible. Alternately, the mergers and general confusion regarding /ŋ/, /nq/ and /ng/ in different Sereer dialects allow for the possibility of *ŋ at the end of the original marker. As for the initial segment of the marker, all we can say is that if one were present, it was not /ɣ/ or /g/, as this would have been preserved in the 17th century wordlist (found in D'Avezac 1845), but instead we find *o-* on these nouns rather than ˣ*go-*.

6.2.4.6 Assorted diminutives and augmentatives

There are a number of diminutive classes found only in one language, often in only certain dialects. In Fula: diminutive singular *ngel, kal, kun,* and *ngum*, diminutive plural *koñ/kon*, and augmentative plural *ko*; in Sereer: the aforementioned diminutive singular *onge*, diminutive plural *foN~fuN~fiN-* and in Ñominka augmentative plural *fi-*. For most of these classes, there is no way of determining whether it should be reconstructed for the proto-language. In the case of Fula *kun* (Gombe dialect), we can be fairly certain that it is an innovation, as any PFS marker with a final *n should lose it in the process of nasalization. The diminutive plural *koñ* (Pulaar) may be original, but only assuming that final *ñ caused nasalization of the following consonant without itself deleting, and it cannot be original in the form *kon* seen in many other dialects. An identification with Sereer dim. pl. *foN- ne* is unlikely, as neither the initial consonant nor the final nasal agree in place of articulation.

The fact that so many different diminutive classes exist and vary to such an extent between dialects and languages is characteristic of diminutives from a typological perspective. Compare Western Romance:

Italian	French	Spanish	Portuguese
-etto	-et(te)	-ito	-inho
-otto	-ot	-cito	-zinho
-ino	-on	-ín	
-ello	-ou	-zuelo	
-uccio		-itito	
-icchio			

Figure 101: Some diminutive suffixes in Western Romance languages

Even among these rather closely related languages, the diminutive markers exhibit a great deal of variety. Some can be traced back to a common source in Late Latin, but others are innovations of individual languages or dialects. For PFS, we can be reasonably sure that at least one diminutive class existed, but how many and of what shape cannot be determined with any degree of certainty. Recall that two augmentative singular classes **ɣan* and **ɣin* can be reconstructed with confidence (section 6.2.1.10).

6.3 The Sereer Ñominka prefixes

The highly variant prefix shapes of the Ñominka dialect of Sereer (see Figure 93) can be explained in some cases as retentions where other dialects have eroded the original prefix, and in other cases as innovations. The initial /g/ of the nominal prefixes of the *ole* and *ale* classes (*go-* and *ga-*) are retentions from earlier **ɣol-* and **ɣal-*. So too is the shape of the determiner *fane* (*fe* or *fee* in other dialects), from **fan-*. The prefix *gi-* on *ne* class nouns is not original. One possible explanation for this *gi-* is that it is a "compromise" between the two original markers of the classes that fell together to form the *ne* class: **rin-* and **ɣun-*, but this development would be somewhat unexpected. The *gi-* present on *le* class nouns is also not original. It was perhaps extended from the *ne* class by a sort of cross-dialectal analogy; where other dialects have Ø- Ñominka has *gi-* (in the *ne* class), and so where other dialects have Ø- elsewhere (in the *le* class), Ñominka inserts a *gi-* as a sort of marker of dialect identity. Perhaps in both classes, the prefix originated as a semantically-bleached augmentative *gi-* which was co-opted due to the desire to have an overt noun-class prefix (note that Ñominka conspicuously does not use *gi-* for augmentatives in the modern language). Dialect awareness would also play a role in this scenario. Due to natural sound change, Ñominka has *ga-* and *go-* where other dialects have *a-* and *o-*; thus, there may have been a desire to use the augmentative *gi-* forms of *ne* and *le* to reinforce the tendency for Ñominka to have a marker-initial /g/ where other dialects have nothing. The origin of the augmentative plural *fi-* is unclear.

As for the dialect described by Pichl (1963), the prefix *i-* on *ne* and *le* nouns likely has the same origin as Ñominka *gi-*. However, as we will see in the next section, the use of a prefix *i-* on *ne* nouns (from **rin*) is in fact older than the use of *gi-*, and so it is possible that this divergent prefix is not in fact reduced from earlier *gi-* in the same way that *o-* and *a-* are reduced from *go-* and *ga-* in the *ole* and *ale* classes. It might even be that the *i-* on *le* nouns is a regular development of the historic prefix **re*. Whether this prefix was once present in other dialects cannot be known, but it is important to note that prefixes in the *le* and *ne* classes are (or at least were) not exclusive to Ñominka.

6.4 Evidence from the 17th century wordlist

The earliest written record of the Sereer language is an anonymous wordlist from circa 1670, edited and published in D'Avezac (1845). The list of ~1000 words was collected by an early French explorer for a number of Senegalese languages, including Fula and Sereer. While there are many issues with the list, most notably its highly inconsistent and underspecified orthography, it does present some valuable information regarding Sereer noun class prefixes (there is nothing particularly revelatory in the Fula list). The dialect represented is either Ñominka or a nearby variety of Siin[47], and like modern Ñominka it preserves *ga-* and *go-* on *ale* and *ole* nouns. The situation for *ne* and *le*[48] nouns is more complicated. All of the modern *ne* and *le* nouns found in the list are given in Figure 102. Note that the wordlist gives no indication of noun class agreement outside of a few noun-adjective and noun-article collocations.

[47] This assessment is based on certain lexical choices (e.g. *suum* for 'honey' rather than *yuum*., the use of *lemb* 'say'), as well as some phonological properties. Voiceless implosives are with few exceptions transcribed as voiced stops, which is characteristic of Ñominka, and in two words 'lion' and 'door' (see Figure 102), intervocalic /g/ is /h/, which is characteristic of at least some modern Ñominka dialects.
[48] More accurately *re*, as we find <*nakre*> 'the cow,' showing the etymologically original article *re* rather than *le*, as in the Njagañaaw dialect (see section 6.2.1.7).

D’Avezac	modern *ne* noun	
dahar	ndaxar	‘tree’
babam	βaaɓaan	‘animal’
befal	mbaafaal	‘antelope’
guelempe	ngeeleem	‘camel’
mous	muus	‘cat’
bedelle	mbiɗel	‘flour’
gaylem	njelem	‘iron’
guiohe	njogoy	‘lion’
dide	ndiiƒ	‘bird’
baimbay	mbaambaañ	‘fingernail’
nof	nof	‘ear’
batan	batand	‘east’
libe	liβ	‘fish’
lahaben	laxaaβ	‘bridle’
omballe	mbaal	‘sheep’
oudol	fool	‘skin’
oudein	feen	‘breast’
omguiguen	njik	‘purchasing’
ongongor	nqol ngoor	‘thumb’
ondous	nduus	‘razor’
oussapal	sapal	‘flatfish’
ombague	mbaj	‘sail’
ondaigeul	ndigil	‘truth’
indau	ndaw	‘ash’
inguiangande	njangand*	‘church’
hiquionque	njong	‘bed’
imis	miis*	‘communal hunt’
gouballe	βaal	‘louse’
goulap	laβ	‘sword’
gousouque	suk	‘boat’
goupis	pis	‘horse’
gongalem	nqol (um)	‘finger’
gongangue	ngang	‘chest’
gongayche	ngiic	‘jujube tree’
gonguel	nqil*	‘snore (n)’
gonguers	nqeex	‘hunger’
gondol	ndol	‘hare’
gombinde	mbind	‘house’
goubinte	mbind	‘house’
gouterhe	teex	‘medicine’
goubougue	buƈ	‘fly’
goupaye	pay	‘pagne (dress)’
goubayhaha	begax	‘door’

D’Avezac	modern *le* noun	
naque, nak	naak	‘cow’
kaguainne	gaagaañ	‘coal’
cagaye	gaagaañ	‘coal’
khaigne	xeeñ	‘heart’
nigne	ñiiñ	‘tooth’
nigno	ñiiñax	‘ant’
ak	’aak	‘scar’
yok	yok	‘shade’
savou	saafu	‘soap’
gaile	wil	‘hair’
groulle	ruul	‘pig’
groulgourer	ruul rew	‘female pig’
kfoude	fuƒ	‘butt’
gouyifée	yiif	‘mind’
gouobahak	ɓaax	‘axe’
goudade	daaƒ	‘grass’
gougon	gon	‘name’
gouguen	gin	‘egg’
goussaha	saax	‘country’
gotongoul	dumbul	‘chair’
goufamme	famb	‘drum’
gouhok	xoox	‘head’
goukode	xoɗ	‘calf (of leg)’

*hypothetical forms, regularly derived from verbs

Figure 102: Sereer ne *and* le *class nouns in the 17th century wordlist*

We find that the majority of *ne* and *le* nouns are prefixed, but the pattern is rather different from that found in modern Ñominka where all of these nouns have *gi-*. First, a sizeable minority are not prefixed at all. Many of these words are repeated throughout the list, and while their spelling sometimes differs, the form and presence of the prefix is almost always consistent[49]. Secondly, the form of the prefix is never *gi-*, but either *gu-*[50] or for some *ne* nouns a vocalic prefix *u-* (with *o-* likely being the same prefix mistranscribed) or *i-* [51]. In this variety, it seems that about a third of modern *ne* nouns were prefixed with *gu-*, another third with *u-* or *i-*, and another third were unprefixed. For modern *le* nouns, somewhat more than half were prefixed with *gu-*, and the rest were unprefixed. Furthermore, it seems likely that these different patterns of prefixation on the noun represented synchronically distinct agreement classes, as we find *gu-* on an agreeing adjective in *gu-ruul gu-rew* 'female pig.' Of the modern *ne* nouns which are unprefixed in the list, it is conspicuous that none are written with prenasalization (the author writes prenasalization rather consistently for Wolof). This suggests that at least some of them were not in the *ne* class at all at this time. Recall that the modern *ne* class carries on **ɣun* as well as **rin*, and furthermore when **ru* was lost, most of its nouns were reassigned to *ne*. This provides a rather neat explanation for the three prefix forms on modern *ne* nouns in the list:

*ɣun	> gu-III	> Ø-III
*rin	> i-III	> Ø-III
*ru	> u-(I~III)	> Ø-III (or assigned to other classes)

examples:

*ɣun-pis	> gu-pis	> pis (ne) 'horse'	= Fula puccu (ngu)
*rin-daw	> i-ndaw	> ndaw (ne) 'ash'	= Fula ndoondi (ndi)
*ru-ɗeen	> u-ɗeen	> feen (ne) 'breast'	= Fula 'endu (ndu)

Figure 103: Possible origin of unique prefixes in D'Avezac's Sereer wordlist

There are however cases where we do not find the etymologically expected prefix when compared to the Fula cognate— for example **ɣun-baal* 'sheep' is <*omballe*> and **ru-nof* 'ear' is <*nof*>. It seems that already at this time these prefixes had eroded in certain words (*gu-* > *u-*, and *u-* > Ø) — a process paralleled in a number of *ale* and *ole* nouns given with *a-* and *o-* rather than *ga-* and *go-* (e.g. <*atodoque*> for *a-toodook ale* 'rafter' and <*onio*> for *o-ñoow ole* 'life').

The reason for the presence of *gu-* on modern *le* nouns is less clear. First note that none of these noun stems appear to be in grade III, so they are not simply nouns that have been reassigned to **ɣun* in this dialect. Based on comparison with Fula cognates, the source for Sereer *le* is **re-*. For example, **re-saax* 'town' gives Fula *saare (nde)* and Sereer *saax (le)*, but in D'Avezac's list we find <*goussaha*>. Technically, it is possible that a class **gul* existed that could have been lost in Fula, and merged with **re-* as *le* in Sereer. However, the existence of this additional proto-class seems unlikely, given the highly conservative nature of Fula's class system when compared with Sereer's. Rather, this variety likely represents an intermediate stage in the propagation of the Ñominka *gi-* prefix which now appears on all *ne*

[49] The only possible exception is for 'finger,' where we find <*gongalem*> (modern *nqol um* 'his finger') but later <*ongongor*> (modern *nqol ngoor* 'thumb'). However, this second entry may be a diminutive form, which we would expect to be *o nqol o ngoor*, explaining the lack of <g>.

[50] Or less often *go-*, which presumably represents this same prefix. The list often confuses /u/ and /o/ in all positions.

[51] These vocalic prefixes are almost certainly real, and not an orthographic convention to preserve the initial prenasalized stop— note that there is no such motivation for 'breast' and 'flatfish,' and furthermore the author never uses a prothetic vowel in transcribing initial prenasalized stops for Wolof or Fula.

and *le* nouns. As discussed in the previous section, a sort of cross-dialectal analogy could have encouraged the use of a prefix in nouns where none was present before. Noting that in many words, other dialects had Ø where Ñominka had *gu-*, the prefix was spread to nouns which never contained the prefix, including nouns in the *le* class. Nouns with a determiner *ne* could be prefixed with either *gu-*, *u-*, or *i-*, but these were eventually levelled to *gi-*, possibly under the influence of the augmentative *gi-*. Note also that diminutive plural *fu-III* of the Njagañaaw dialect is *fi-III* in Ñominka, possibly suggesting a general change of /u/ to /i/ in prefixes.

The data from this wordlist is important in that it helps to confirm the cognacy of Fula *nde* and *ngu* with Sereer *ne*, as well as the connection between Fula *ndu* and Sereer *ne* (through class-reassignment). Furthermore, it corroborates the idea that Ñominka *gi-* is an innovation, arising from the alteration of *gu-* (from **ɣun*) through the influence of either *i-* (from **rin*), augmentative *gi-*, or both, which was then spread to all nouns taking the determiners *ne* and *le*, many of which were at one point unprefixed.

6.5 The regularity of phonological erosion in Sereer

For many of the noun classes examined in section 6.2, we concluded that the prefixes had been eroded to some extent in Sereer. It must be noted that there is a degree of regularity to this erosion. Original *a and *o in prefixes are never eroded, while *i, *e and *u are consistently deleted. Whenever a vowel is deleted, so too is the preceding consonant. When the vowel is not deleted, an initial *ɗ or *h is always deleted, *f and *x are never deleted, and *ɣ is deleted in most dialects, but preserved in Ñominka. There are no exceptions to these generalizations in Siin, but in Saalum the augmentative *ga-* and *gi-* are exceptionally preserved. This is perhaps due to the fact that these augmentative prefixes retain a very specific meaning, as opposed to most other class prefixes which have become semantically bleached to some extent, and thus are more prone to phonological erosion. An alternative would be to propose that the augmentative *ga-* and *gi-* are descended from an initial stop *g, while *ale* and *ole* are descended from an initial *ɣ (**ɣal*, **ɣol*, **ɣo*), which was regularly lost. However, this idea does not resolve the issue of why the vowel in augmentative *gi-* is retained, and only serves to complicate matters for Fula, and thus is likely not the right explanation.

6.6 Overview of noun class cognates and markers

<u>semantics</u>	<u>Fula</u>		<u>Sereer</u>	<u>semantics</u>	<u>reconstruction</u>
			oN- onqe	dimin. (and others)	
			foN- ne	dimin. pl.	
			xaX- axe	pl. of o- ole	(*xax)
person	X- -ɗo		oX- oxe	person	*ox
people	-ɓe		we	people	*ɓe
	-nde		le		*re
	-nge	?			*ɣe
	N- -ngu		N- ne		*ɣun
	N- -ndi				*rin
	-ndu				(*ru)
trees	X- -ki				(*hiX)
	X- -ngol		o- ole		*ɣol
	-ngo	?			*ɣo
	X- -ngal		aX- ale	includes deverbal nouns	*ɣal
	N- -ka	?	aN- ale		*han
	N- -mba		faN- fe/fane		*fan/wan
augment.	N- -ngi		giN- ale	augmentative	*ɣin
augment.	N- -nga		(g)aN- ale	augmentative	*ɣan
pl.	X- -ɗi		X- ke	pl.	*ɗik
pl.	X- -ɗe		aX- ake	pl.	*ɗak
liquids	N- -ɗam		fo- ole	liquids	(*(ɗ)am)
leaves	-ko				(*ho)
dimin.	X- -ngel				
dimin.	X- -kal				
dimin.	X- -kol				
dimin.	X- -ngum				
dimin. pl.	N- -koñ				
aug. pl.	N- -ko				

Figure 104: Cognate noun classes in Fula and Sereer, with PFS reconstructions

Figure 104 summarizes the proposals of section 6.2. Cognate classes are connected by solid lines, and classes which contain many cognates, but only due to class reassignment are connected with dashed lines. Classes whose cognacy is supported by only one cognate noun pair are indicated with a question mark preceding the solid line. A capital N or X indicates that the affix triggers nasalization or fortition respectively.

sg.	pl.	semantics
*(ʔ)ox	*ɓe	people
*fan/wan	*ɗik	(large animals)
*ɣun		animals
*rin		
(*ru)		(round things)
(*ho)		grasses/leaves
*ɣe		
*re	*ɗak	(fruits, round things)
*ɣo		
(*hiX)		(trees)
*ɣal		(birds, long rigid things)
*ɣol	(*xax)	(long flexible things)
*han	?	
(*(ɗ)am/*man)		liquids
*ɣin	?	augmentative
*ɣan	?	augmentative
+ diminutive class(es)		

Figure 105: Reconstructed noun class system of Proto-Fula-Sereer

Figure 105 gives the reconstructed noun classes of PFS, with singular-plural pairs indicated by lines. Classes which are supported by evidence from only one language are given in parentheses. Semantic generalizations about the members of each class are given, with those that apply to only a portion of the reconstructed nouns in that class given in parentheses. PFS likely contained a number of additional classes that we lack sufficient information to reconstruct.

6.7 The position of the Proto-Fula-Sereer noun class marker

6.7.1 Variable position in PFS?

The PFS noun class markers must have appeared before the noun in order to trigger the processes of nasalization and fortition that resulted in the modern mutation systems. These same preposed class markers must have somehow become postposed in Fula. To change an entire class of prefixes into suffixes is a rather unexpected change. Yet the facts are clear: every noun class marker in Sereer is a prefix, with no hint at all of any earlier suffixing, and all of the cognate morphemes in Fula are suffixes, with the only trace of their earlier pre-nominal position being the initial mutations on the nominal root. As early as 1919, Harry Johnston off-handedly made the suggestion that the Fula suffixes were once prefixes, suggesting that a parallel case could be found in a much more familiar language:

> "Change suffixes into prefixes—a revolution which may take place somewhat quickly in a language (as witness the difference between Tudor English and Victorian English) in the placing of prepositions—and you would have in Fula a form of speech very reminiscent of the Bantu Family." [In a footnote]: "Teutonic English, like modern German and Dutch, was largely prefixal in its qualifying prepositions. Our ancestors said 'uprise,' 'uptake,' 'understand,' 'offset,' 'enfold,' where we, especially during the

nineteenth century, would prefer the more analytical locution of 'rise-up,' 'take-up,' 'set-off,' and 'fold in,' &c." (Johnston 1919: 22)

While an intriguing parallel, the English case is not a particularly good comparison for a number of reasons. These "particle verb" constructions do not represent a straightforward change from prefixes to suffixes. For an overview of the facts and historical analyses, see Fischer et al. (2000) Chapter 6. Even in Old English, the post-verbal position for particles was rather common in main clauses, and at no point have these post-verbal particles been analyzed as suffixes. Even the pre-verbal particles do not behave like other prefixes, such that Fischer et al. do not commit to calling them "prefixes." If any comparison is to be made with English particle verbs, the important points to keep in mind are that the particles in question were overall less tightly bound to the verb than a normal affix, and that the later emergence of the post-verbal construction was only made possible by its earlier existence in Old English. A much better parallel can be found in Bangla, for which Bhatacharya (1999) reports that under certain conditions, the noun classifier can either precede or follow the noun. Since noun class affixes are generally assumed to be grammaticalized from these sorts of syntactically freer classifiers, a similar variability in classifier position in the history of Fula-Sereer might be able to explain the class marker's difference in position between Fula and Sereer.

We must then seriously entertain the hypothesis that the class markers of PFS were not truly prefixes, but less tightly-bound classifiers which could in some circumstances appear post-nominally. A crucial comparison is to be made with the pronominal system. There exist constructions in both Fula and Sereer that require the subject markers or pronouns to appear pre-verbally, and others that require them to appear post-verbally (only the 1st and 2nd singular markers in Sereer).

Sereer:						
o = ga'	a = bug-u			muus	ne	**ga'-o**
2s see	3s want-FOC		VS.	cat	DET	see-2s
'he wants you to see'				'you see the cat'		
um	**ga'**	a = bug-u		muus	ne	**ga'-um**
1s	see	3s want-FOC	VS.	cat	DET	see-1s
'he wants me to see'				'I see the cat'		
Fula (from De Wolf 1995: xl; Gombe dialect):						
mi =	**war-ii**			nde	**ngaru**	**= mi**
1s	come-PERF		VS.	when	come	1s
"I have come"				'when I came'		

Figure 106: Sereer and Fula constructions with pre-verbal and post-verbal subject markers

The variable pre- or post-verbal position of the pronoun across different verb forms is a common phenomenon in the area, found in Bainunk, Kasanga, and most robustly in the Tenda languages. Might it not also have been the case that in some constructions, the usually pre-nominal noun class markers could appear post-nominally? Of course, the fact that initial nominal mutation takes place in all syntactic contexts indicates that the preposed position must have been overwhelmingly more common, but this was also true of the English particle verbs mentioned above. For as of yet unidentified reasons, the hypothetical post-nominal position may have become preferred in Fula at some time after mutation had taken place, leading to the modern pattern.

However, if the apparent shift from prefix to suffix in Fula was indeed the result of the variable placement of the noun class marker at an earlier stage of the language, there is a very specific set of stages that the language must have passed through.

Stage 1: Marker is generally pre-nominal, but rarely post-nominal
ɣun = baal ~ baal = ɣun (rarer) 'sheep'
Stage 2: Mutation sound changes take place
ɣu = mbaal ~ baal = ɣun (still rarer)
Stage 3: Allomorphs are leveled to the much more common forms
ɣu = mbaal ~ mbaal = ɣu (still rarer)
Stage 4: The post-nominal marker becomes preferred
— mbaal = ɣu > mbaal-u 'sheep'

Figure 107: A possible pathway for Fula developing class suffixes

Without stage 3, in which the allomorphs in the noun-classifier construction were leveled to those of the more common classifier-noun construction, we cannot explain why Fula exhibits initial consonant mutation, or why the marker-final consonants *n, *k, and *x are lost from the noun class marker. Overall the story sketched in Figure 107 seems somewhat unlikely, since it requires the completely regular application of two processes of analogical leveling (for both noun roots and the class markers), but it cannot be discounted entirely.

Another possibility is that there was an intermediate stage in Fula in which the noun was marked with both a prefix and a segmentally identical suffix. Sometime after the development of mutation, the suffix became preferred, and the prefix was dropped in all cases. There are two ways in which these suffixes could have developed. The first is that they were determiners of some sort. It is true that in some noun class languages, the class "prefix" can be used as a freestanding word; e.g. in Bainunk Guñaamolo (Bao Diop 2013: 68-69) and Kobiana, this is the form of the relative pronoun. However there are a number of reasons to disprefer this determiner scenario. Most importantly, the class suffix is completely obligatory in all contexts in Fula, which is usually not the case for class suffixes that have developed from determiners (e.g. in the Cangin languages). Additionally, this scenario would not explain the loss of the final segments *n, *k, and *x in the Fula class markers. The second possibility is that these suffixes were originally the prefixes of following agreeing elements, which were reinterpreted as belonging to the noun. This can be illustrated with the hypothetical development of the noun phrase *mbaal-u kes-u* 'a new sheep' in the *ngu* class.

Stage 1: Pre-nominal determiner on the noun and following adjective
ɣun = baal ɣun = hes
Stage 2: Mutation sound changes occur
ɣu = mbaal ɣu = kes
Stage 3: Marker on the adjective reinterpreted as being on the noun
ɣu = mbaal = ɣu kes
Stage 4: Pre-nominal marker is dropped in favor of the post-nominal one
mbaal = ɣu kes
Stage 5: Agreement is reintroduced on the adjective
mbaal = ɣu kes = ɣu
Stage 6: Sound changes occur between the root and suffixed class marker
mbaal-u kes-u 'a new sheep'

Figure 108: An alternate pathway for Fula developing class suffixes

Hoffmann (1967) outlines a similar proposal for how noun class suffixes can develop from prefixes, based on evidence from the Nigerian language Dakarkari. In this language, the prefix on the noun is dropped when it is modified, with the only prefix occurring on the post-nominal modifier. The loss of the noun prefix under modification is also found in Aghem and nearby Grassfields Bantu languages (Larry Hyman, p.c.). From this state, Hoffmann argues, it would be rather simple to reinterpret the original prefix on the modifier as a suffix on the noun. For Proto-Fula-Sereer, there is certainly no evidence that the class marker on the noun itself was ever dropped under modification, but this is certainly a possible development in the history of Fula, equivalent to Stage 4 in Figure 108.

Regardless of the exact pathway by which Fula developed noun class suffixes, we can be sure that at one point in time these markers appeared before the noun, and then at some point these same markers began to appear after the noun.

6.7.2 Alternate analyses

There are a number of possible alternatives to the two analyses sketched above. One is that the proto-language had exclusively noun class suffixes. This is obviously unsatisfactory, as it fails to account for the initial consonant alternations. A more reasonable suggestion is that PFS noun classes were marked by a system of both prefixes and suffixes. In Sereer, the suffixes would be lost, and in Fula the prefixes. However, this analysis cannot be seriously entertained. For one, there is absolutely no residue of earlier suffixes in Sereer. As we know from Fula, noun class suffixes trigger certain changes at the right edge of the nominal stem, and yet no such changes can be found in Sereer. There are no neutralizations or restrictions on stem-final sounds whatsoever, nor any element that at all resembles the Fula suffixes anywhere at the right edge of noun stems in Sereer. There is furthermore no residue of prefixes in Fula except for the initial mutations, which heavily suggests that the class marker did indeed move from initial position, rather than eroding from initial position. We have seen that in Fula, final *d regularly devoices to /t/, and this takes place even where in the modern form a noun class suffix follows the root (see Figure 61), indicating that there must have been no suffix present at the time of this sound change. Finally, as we know that the class markers are phonologically cognate in Fula and Sereer, this suffix + prefix analysis would require that the suffix and prefix present on each noun be phonologically identical, save for some final consonants which could be absent on the suffix, or initial consonants absent on the prefix. While this situation is conceivable, it is notable that of the Atlantic languages that use both prefixes and suffixes in noun class marking (e.g. Mbulungish and Baga Mboteni (Sapir 1971: 96)), the suffixes bear no resemblance at all to the prefixes.

A final hypothesis is that PFS had noun class prefixes, and enclitic articles or determiners of some sort which grammaticalized in Fula to become the noun class suffixes. Beyond the aforementioned problems with assuming prefix erosion or deletion in Fula, this account requires that the Sereer determiners and Fula suffixes be cognate. As discussed above, any post-nominal element that disappeared in Sereer would be expected to leave some sort of indication of its earlier existence. Thus, in this theory, the only candidates in Sereer for the reflexes of the hypothetical PFS enclitic determiners are the modern Sereer enclitic determiners. As the PFS determiners are in this theory grammaticalized as suffixes in Fula, it assumes that the Sereer determiners and Fula suffixes are cognate. Because the Sereer determiners preserve the final consonant of the class marker, which in most cases is not preserved in the Fula suffixes (despite having no constraint on final consonants), the cognacy of these elements cannot be maintained. Furthermore the Sereer determiners all have obligatory determiner roots (e.g. *-e*, *-aa*) which are not found on the Fula class suffixes.

6.8 Noun class in Atlantic and Niger-Congo

6.8.1 Looking for cognate noun classes

One seemingly obvious source of evidence for the reconstruction of PFS noun class markers is the noun class systems of the related Northern Atlantic languages. Unfortunately, these are so distantly related to Fula and Sereer that they provide essentially no additional information for reconstructing PFS noun class morphology. While the relation between these languages' noun class systems will be discussed more comprehensively in chapter 6, this section will specifically examine to what extent connections can be made with the reconstructed PFS markers.

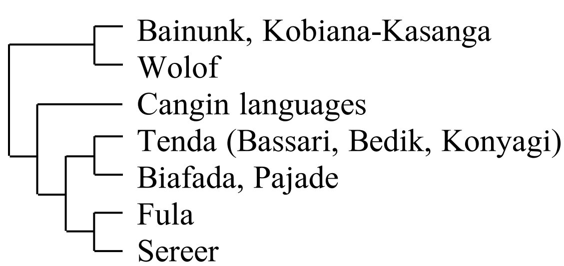

Figure 109: Part of Segerer's (2010) genetic classification of Atlantic languages

Two of the languages identified by both Sapir (1971) and Segerer (2010) to be most closely related to Sereer and Fula are Bedik and Biafada. As in Fula and Sereer, these languages make use of a three-grade initial consonant mutation system, in which grade II contains hardened consonants, and grade III contains many prenasalized consonants.

prefix	grade	determiner	note
a-	I	ale	sg. personal class
ga-	III	aŋ	sg. plants, augmentative
Ø (ɓə-, jə-)	I/II	le	sg.
e-	II	ed	sg.
ge-	III	eŋ	sg.
go-	III	oŋ	sg.
gə̟-	III	ə̟ŋ	sg.
ña-	III	ñaŋ	sg. diminutive
ña-	I	ñaŋ	mainly viscous liquids
o-	I	od	pl. of some e-II, sg.
ma-	III	maŋ	pl. of Ø, some e-II. liquids
ma-	I	maŋ	pl. of many e-II
ma-	II	maŋ	pl. (rare)
ɓə-	I	ɓəle	pl. of a-I personal
ɓa-	III	ɓaŋ	pl. of ga-III
ɓe-	III	ɓeŋ	pl. of ge-III
ɓo-	III	ɓoŋ	pl. of go-III
ɓə̟-	III	ɓə̟ŋ	pl. of ña-III

Figure 110: Noun class system of Bedik (adapted from Ferry 1991)

In Bedik we find a few class prefixes which are similar to a PFS prefix in form and meaning. The first is the plural personal class prefix *ɓə-* (cf. PFS **ɓe*). There are in addition four other *ɓ*-initial plural non-personal noun class prefixes, historically formed from stacking *ɓə-* on the singular noun. Second is the liquid class prefix *ma-III* (cf. PFS **(d)am*). Both markers share an /a/ and /m/, but in different orders. A reasonable connection could be drawn between Bedik *e-II* (from Proto-Tenda **er-*) and PFS **re*, both used for fruits. The prefix *ga-III* (**gaŋ*) is a large class, the major semantic domain of which is trees and other plants. However it is also used as the augmentative class, which invites a comparison with the PFS augmentative **ɣan*. The *go-III* class is semantically disparate, but does contain a few animals, which allows for a possible connection with PFS **ɣun*. For Proto-Tenda we can reconstruct a class **fa-* (found in Konyagi as *fæ-I*) used for a small number of animals, cf. PFS **fan*.

singular classes:			plural classes:		
prefix	grade	semantics	prefix	grade	semantics
u-	I	person	bə-	I	people
Ø	II/III		ma-	III	liquids
Ø	I		bwa-	I	
bee-	I	'cooked rice'	gə-	I	
bu-	I		maa-	I	
bwa-	I		ma-	II	
faa-	I	'road'	ña-	I	
gə-	I		saa-	I	
ga-	III		ba- +	sg. pfx.	
gu-	III	'bird,' insects			
ha-	II	'sea'			
jə-, ji-	I	'dog, monkey'			
lə-	I	'pus'			
nə-	III	diminutive			
ña-	I				
sa-	II	'house'			

Figure 111: Noun class system of Biafada (Wilson 1993)

There are also very few similarities to be found with the Biafada noun class system. We again find a potential connection to the personal plural class marker, *bə-*, and the liquid class marker *ma-*, which as in Bedik triggers the nasal grade III. We again find a *gaN-* (cf. PFS **ɣan*) but with no semantic connection to the PFS class, as well as a *guN-* (c.g. PFS **ɣun*), but this contains mainly insects and some other small animals, as opposed to the mainly larger animals in the PFS class.

In Wolof, the noun class system has been reduced to 10 classes marked by a single consonant on determiners. We again find the liquid class marked by *m-*, and also a class marked with *w-* which may be related to PFS **fan/wan*, as both contain large animals, as well as the nominalization of the verb 'to speak' (Sereer *fa-lay fane*, Wolof *làkk wi*). The remaining eight classes do not appear impressionistically to be related to any PFS class.

The Cangin languages (see Morgan (1996) for Ndut, Soukka (2000) for Noon), have a similarly eroded noun class system, being marked only by fossilized initial consonants or CV prefixes on certain nouns, as well as on the post-nominal determiner as in Wolof. The *f-* class contains some large animals (horse, goat), suggesting a connection with PFS **fan/wan*, and we once again find the liquid *m-* class, and a personal plural *ɓ-* class (though this is also fossilized in a few singular personal nouns, e.g. **ɓ-o* 'person,' **ɓe-reɓ* 'woman'). The word **ki-rik* 'tree/ medicine' may be cognate with Fula *lekki* 'medicine' and its class with the Fula tree class *ki*.

Kobiana, Kasanga, and the Bainunk languages exhibit the largest inventory of noun classes (close to 40 in Kobiana), with the CV(N)- markers showing little evidence of erosion. Even so, there are extremely few classes which can be identified with a PFS class, even purely on the grounds of phonetic resemblance. There is liquid *ma-* in Kobiana, and a small class **fa-* with a few animals (cf. PFS **fan*). There is a Bainunk class **ki-* for trees which may be related to the Fula *ki* tree class. A class **kaN-* exists in Bainunk and Kobiana which might be compared with PFS **han*, but the semantics of both classes are difficult to identify. A few g-initial class markers bear some resemblance to PFS markers, e.g. Kobiana *gu-I* and *ga-I* (a plural class), but these are semantically completely incompatible with PFS **ɣun* and **ɣal* or **ɣan*, and based on their enforced mutations must have been originally vowel-final in Kobiana, rendering even the phonological association highly doubtful. A connection between the PFS singular/plural pair **ɣol* / **xax* and the Bainunk pair *gu- / ha-* may seem promising a first, but does not hold up semantically or phonologically. The PFS class pair is used for flexible objects like 'rope' and in Sereer for round objects, whereas the Bainunk class is used for long rigid objects. The final consonant of both the singular and plural PFS class marker finds no parallel in either Bainunk class prefix, where we would expect an original oral consonant to trigger grade II in Proto-Bainunk-Kobiana-Kasanga, but instead we have Kobiana *gu-I*, and no evidence of fortition from either class marker in Bainunk. Otherwise, most markers begin with /s, ñ, n, p, t, b, j/ within this subfamily— consonants which are not reconstructed for any PFS noun class.

Of course, without knowing the expected sound correspondences between all these languages, or even understanding exactly what the nature of their relation to each other is, it is impossible to make any conclusive assessment as to the cognacy of particular markers. Nonetheless, a surface comparison suggests that there are indeed a few good candidates for cognates to PFS noun classes elsewhere in Atlantic, but that overall the systems are remarkably distinct genealogically.

Comparisons with languages farther afield show potential cognates for the personal plural and liquid class (e.g. Proto-Bantu **ba-* and **ma-*), and **re* might be reasonably identified with Bantu class 5 **di-/i̧-* (also used for fruits), but any further proposed connections would be rather speculative. Looking at the modern languages, one might be tempted to equate Fula *ndi* (nominal suffix *-di/-ri*) with the Bantu class 5, or even Sereer *oxe* (nominal prefix *o-*) with Bantu class 1 (**mu-*), but when we consider the PFS forms with their final consonants, such connections seem completely unfounded. We could force a comparison between PFS **ru* and Bantu class 11 (**du-*), but these do not line up at all semantically. Attempts such as Pozdniakov (1988) to match each Fula and Sereer noun class with a cognate class in Bantu and other Niger-Congo families seem overly optimistic, when even among the Atlantic languages few clear cognates of PFS noun classes can be found.

6.8.2 The PFS noun class system in the context of Niger-Congo

We have established that Proto-Fula-Sereer had an inventory of noun class markers of the shape CV(C) which appeared before the noun and adjective, but may have rarely appeared in post-nominal position. PFS innovated at least two noun classes, the plural **ɗik* and **ɗak* (grammaticalized from the numeral 'two'), and it may well have innovated others. One possibility is that the personal singular **ox* is related to the nominal root **xoox* 'head.' An extreme, but not necessarily outlandish assessment could be that the PFS noun class system is an almost complete innovation, with hardly any holdovers from a putative Proto-Niger-Congo. Perhaps the original noun class system died out completely and was replaced due to areal pressure with a new one, evolving from an earlier classifier system. A less drastic account is that the basic structure of the Proto-Niger-Congo noun class system was inherited along with some noun class markers, but with a great deal of innovation, including the formation of new classes and elimination of old ones. Regardless of which scenario is closer to the truth, what we know about the PFS noun class system indicates that any account of the development of noun classes in Niger-Congo must consider the innovation and replacement of noun classes in various languages or subgroups, perhaps even on a large scale. It may even be that the original

Niger-Congo noun class system consisted not of prefixes, but of a set of less tightly-bound classifiers, the membership of which was somewhat fluid.

7 A synchronic analysis of mutation

An overview of synchronic analyses of Fula mutation is found in Churma (1988). Other noteworthy analyses include Paradis (1986), McLaughlin (1994), and Elzinga (1996). The only full synchronic analysis of Sereer mutation of which I am aware is McLaughlin (1994, 2000). Paschen (2018) includes a treatment of Sereer mutation in the agentive reduplication construction. Pozdniakov and Segerer (2006) present an overview of the synchronic functions of Sereer mutation, but do not take a stance on the phonological analysis of mutation. What follows is not intended to serve as a complete synchronic analysis of each language's mutation system, but rather a basic set of historically-informed assumptions that, it is hoped, can help to simplify and unify synchronic treatments of mutation in Fula and Sereer.

7.1 The underlying grade

One important distinction between various analyses of Fula mutation is whether the continuant grade (I) or stop grade (II) is taken as underlying. Most analyses take the continuants as underlying (e.g. Anderson 1976, Churma 1988, Paradis 1986), while others take the stops as underlying (Skousen 1972, McLaughlin 1994, and Elzinga 1996). Others, such as Lieber (1983) treat root-initial consonants as underspecified for the features [continuant] and [nasal], with the values for these features being supplied by the noun class prefixes. McLaughlin's analysis of Sereer divides the mutation system into two patterns, voicing mutation and continuant mutation.

Voicing mutation:

	lab.	cor.	pal.	vel.	implosive		
Voiced	b	d	j	g	ɓ	ɗ	ƴ
Voiceless	p	t	c	k	ƥ	ƭ	ƈ
Nasal	mb	nd	nj	ng	ƥ	ƭ	ƈ

Continuant mutation:

	lab.		cor.	pal.	vel.	uvu.
Continuant	w	f	r	s	h	x
Stop	b	p	t	c	k	q
Nasal	mb		nd	nj	ng	nq

Figure 112: McLaughlin's analysis of Sereer consonant mutation

In the voicing mutation pattern, she takes the voiceless stops as underlying, and in the continuant mutation pattern, she takes the continuants as underlying.

In a historically-informed analysis of both languages, the question of which segments are underlying (continuants or stops) is avoided altogether. We know that historically, all segments except for prenasalized stops and voiceless implosives must be taken as underlying, in that they exist synchronically in environments where they were never mutated historically (grade I environments). Crucially, in a historically-informed analysis, grade I includes all voiced and voiceless egressive stops, as opposed to modern analyses which exclude voiceless stops (for Sereer) or exclude stops altogether (for Fula) from grade I. Furthermore, the continuants are never the result of any featural changes or phonological processes. The historically-organized grades presented in Figure 64, reproduced below, can be taken as the synchronic mutation grades without modification.

Sereer:													
unmutated	p	t	c	k	b	d	j	g	f	s	h	x	
fortition	p	t	c	k	p	t	c	k	p	s/c	k	q	
nasalization	p	t	c	k	mb	nd	nj	ng	mb	s/nj	ng	nq	
unmutated	w	r	y		ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	ʔ
fortition	b	t	y		ƥ	ƭ	ƈ	m	n	ñ	ŋ	l	ʔ
nasalization	mb	nd	y		ƥ	ƭ	ƈ	m	n	ñ	ŋ	l	ʔ
Fula:													
unmutated	p	t	c	k	b	d	j	g	f	s	h		
fortition	p	t	c	k	b	d	j	g	p	c	k		
nasalization	p	t	c	k	mb	nd	nj	ng	p	c	k		
unmutated	w	r	y	*ɣ	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)
fortition	b	d	j	g	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)
nasalization	mb	nd	nj	ng	ɓ	ɗ	ƴ	m	n	ñ	ŋ	l	(ʔ)

Figure 64: Mutation grades of Sereer and Fula organized historically

The major advantage of this analysis for Fula is that there is no need to lexically specify whether a root is fully- or partially-mutating. If the initial root consonant is a continuant in grade I, it will exhibit the fully-mutating pattern, and if it is a stop underlyingly, it will exhibit the partially-mutating pattern. For Sereer, this analysis allows us to propose one single pattern of mutation (as opposed to McLaughlin's two), and by including the voiceless stops in grade I, the numerous voiceless stop-initial roots do not have to be considered exceptional, as they must be by McLaughlin.

The one advantage to assuming that only stops are underlying in Fula is that it more easily accounts for the two mutation series y~g~ng and w~g~ng (this is the primary motivation for both Skousen's and McLaughlin's analyses). If these are taken as underlyingly continuants, there is no way to predict whether /y/ and /w/ will alternate with velar or labial/palatal consonants in other grades (before certain vowels). However, this issue can be avoided by recognizing the historical origin of these mutation series; namely *ɣ. We can specify that roots which participate in the series w~g~ng, y~g~ng, and ʔ~g~ng underlyingly begin with /ɣ/ (taken as an underspecified archiphoneme), which surfaces in grade I as [w], [y] or Ø (with epenthesis of [ʔ]) depending on the following vowel. This exact analysis of these facts is adopted by Paradis (1986). This bit of abstraction allows us to completely avoid any sort of diacritic marking on roots, which seems a desirable trade-off.

7.2 The nature of the alternations

In many analyses of Fula (e.g. Skousen 1972), and in McLaughlin (1994, 2000) and Paschen's (2018) analyses of Sereer, the mutations themselves are based on phonological processes that change the featural specification of a root-initial consonant in consistent ways. Thus, in McLaughlin's analysis of Sereer, grade III attaches a feature [nasal] to the initial consonant. These featurally-based analyses are problematic for a number of reasons, especially in Sereer. For one, the desire for featural consistency is the primary motivation behind McLaughlin's splitting the Sereer mutation system into two separate patterns, which is a complication best avoided if possible. Additionally, a featurally-based analysis requires various undesirable stipulations such as: a nasal feature can be hosted by a voiceless continuant, but not a voiceless stop (cross-linguistically unattested); a nasal feature hosted by an implosive causes devoicing (highly unnatural)[52]; the feature [voice] is exceptionally never lost by /w/, but is by every other consonant.

A historically-informed analysis can note that these unexpected patterns are the result of often telescoped natural sound changes, but need not (and should not) actively incorporate these sound changes into the synchronic analysis[53]. Rather, we can simply make reference to the grades themselves as being abstract systems of alternation, which are internalized by all speakers and retained for their morphological usefulness, but need not be consistent with regards to phonological features. This conception of the grades as abstract series of alternating consonants is consistent with Mortensen's (2006) idea of logical scales. We can conceive of each mutation series as a logical scale, the members of which are not necessarily linked by consistent featural processes, but which happen to share certain features for historical reasons. Such a conception can much more easily account for cross-dialectal and even cross-linguistic variation without requiring any significant modification of the model. For example, the fact that many Nigerian dialects have [ʃ] rather than [c] can be modeled simply by replacing /c/ with /ʃ/ in the logical scale. A featurally-based account would have trouble accounting for a series s~ʃ~ʃ made up of all continuants, in which mutation is manifested exceptionally as a change in place of articulation.

In summary, our historically-informed analysis of the synchronic mutation systems of Fula and Sereer takes grade I as the underlying, unmutated grade, which contains all consonants in the language except prenasalized stops and voiceless implosives (and perhaps also /q/ in Sereer). Mutation series are not motivated by featural processes, but rather exist as a set of logical scales. As such, there is no need to be concerned about a series such as s~ʃ~ʃ in Nigerian Fula, or the fact that /r/ devoices to /t/ in Sereer grade II, while /w/ remains voiced. Furthermore, rather than claiming that certain sounds are immutable or "exempt" from phonological processes, they simply exist in a series that contains three identical phonemes.

8 Conclusion

The observed mutation patterns of Fula and Sereer can be explained historically by two sets of sound changes which operated in each language: fortition (resulting from gemination in most if not all cases) and nasalization. The environments in which fortition operated yielded the set of grade II consonants, while nasalization yielded grade III. Grade I is the result of environments in which neither process operated. Importantly, lenition played no part at all in the history of Fula and Sereer mutation— all continuants are unmutated. The distinct development of certain consonants under the influence of fortition and nasalization indicates that categorical mutation could not have existed in the proto-language, but rather must have

[52] McLaughlin (1994) avoids this particular problem by positing the voiceless implosives as underlying.
[53] Paradis goes so far as to explain fortition as gemination synchronically, as geminate continuants are seen to harden elsewhere in the language. Though this is motived by synchronic and not historical evidence in Paradis's analysis, it certainly fits in well with the historical facts. However, as McLaughlin (1994: 189) notes, geminate continuants are in fact attested in modern Fula, so this analysis is not completely satisfying.

arisen separately in each language. Certain quirks of each language's mutation system are explained by analogical change, notably the presnasalization of voiceless stops in Sereer diminutives and augmentatives.

The preposed morphemes that conditioned these mutation sound changes were pronouns for verbs, and CV(C) noun class markers for nouns and adjectives. The noun class system of Proto-Fula-Sereer can be reconstructed with some degree of certainty, and we find that nasal-final (or at least *n-final) noun class markers, as well as nasal-final pronouns caused nasalization of the following root, while noun class markers ending in certain non-nasal consonants caused fortition (via gemination). Vowel-final noun class markers and pronouns did not result in any sound change in the following consonant.

Finally, our understanding of the historical origins of mutation can help inform our analysis of the synchronic mutation systems. By including all sounds that were historically unmutated in grade I, we eliminate the need for any lexical specification for different mutation patterns.

Chapter 3: Kobiana and Kasanga

The closely related languages Kobiana and Kasanga make use of a three grade system of root-initial consonant mutation in both the nominal and verbal systems. Some examples from Kobiana:

má-**pp**égi	'I see'	a-**dd**éemǝna	'lemon'	tá-**kk**uh	'house'
à-**f**égi	'he sees'	ga-**l**éemǝna	'lemons'	já-**h**uh	'houses'
mà-**f**ègii(l)	'I don't see'	u-**nd**éemǝna	'lemon tree'		

In the nominal system, each noun class enforces a particular mutation grade on the stem. In the verbal system, mutation is determined by a combination of subject agreement, aspect, focus, and polarity. This chapter presents a historical account of how these mutation systems arose in Kobiana and Kasanga. Section 2 examines mutation synchronically, as well as some relevant characteristics of the Bainunk languages, being the closest relatives of Kobiana-Kasanga. Sections 3 through 6 will then present a proposal for how these systems came to be, which will involve a reconstruction of the Proto-Bainunk-Kobiana-Kasanga (PBKK) noun class system, as well as the relevant features of its pronominal system and system of verbal morphology. Finally, section 7 will examine how our historical understanding of Kobiana-Kasanga mutation can help to inform a synchronic analysis.

While the modern mutation systems of Kobiana and Kasanga share many properties with those of Fula and Sereer as discussed in chapter 2, the history of these systems differs in some notable ways. Already in PBKK there was a two-grade mutation system exploited in the nominal domain, in which singletons in grade I alternated with geminates in grade II. This basic mutation system coupled with the allophonic lenition of some singleton consonants resulted in some rather phonetically distant alternations already in the proto-language. Nasal mutation did not operate at this stage, but developed later in Proto-Kobiana-Kasanga from earlier prefix-final nasal segments. Mutation was lost altogether in Bainunk with only a few traces in the modern languages, while its role expanded in Kobiana-Kasanga. In the nominal domain, the modern mutation patterns are for the most part directly attributable to the historical final segment of the noun class prefix. However in the verbal domain, the application of mutation has been altered quite drastically by analogical pressures.

1 Sources

My source for Kobiana is fieldwork carried out primarily in Ziguinchor, Senegal and also in the Kobiana village of *bu-niháa(n)* in the summer of 2016 (recordings and field notes are available in the California Language Archive at UC Berkeley). One of the results of this fieldwork is a lexicon with just over 1,400 entries which will be referenced in various places throughout this chapter. Work on Kobiana has also been carried out recently by Voisin, resulting in a chapter on the language's noun class morphology (Voisin 2015), which seems to represent the same variety as that spoken by my consultants. A slightly different variety is represented in Doneux (1975, 1991). Kasanga data is unfortunately very limited. It comes from the work of W. A. A. Wilson, in the form of a three page section in his 2007 book on the Atlantic languages of Guinea Bissau, as well as a 530 word list available in the online RefLex database, both based on fieldwork carried out many years earlier. Wilson (2007) also provides an equally short description of Kobiana and Bainunk Gujaher, both of which contain somewhat preliminary phonological and morphological data when compared to other sources (e.g. lack of some phonemic distinctions for both consonants and vowels, lack of tonal information, and an incomplete list of noun classes). It is unclear to what degree the Kasanga data suffers from these same shortcomings. Lüpke (p.c.) has also provided a short Kasanga wordlist.

The Bainunk family is very much underdescribed, but here we are lucky to have excellent sources for two languages in different branches of the family. Cobbinah (2013) presents a grammatical description of Gubëeher, followed by a targeted study of noun classification and verbal nouns. He has been kind enough to provide me with his lexical database for Gubëeher consisting of over 3,600 entries (Cobbinah 2017). Bao Diop (2013) gives a grammatical description of Guñaamolo, and a lexicon by the same author is available online in the RefLex database (also cited as Bao Diop 2013). Gujaher data comes primarily from Lüpke, who has kindly provided me with her lexical database from fieldwork carried out in the town of Agnack. Additional information on Gujaher comes from the short description in Wilson (2007) as well as a wordlist available in the RefLex database from the same author's fieldwork. Gujaher forms from Wilson's wordlist are cited with a raised (w). A few Gujaher forms have also been taken from Bühnen's (1988) wordlist, and these are indicated with a raised (b). Information on the noun class system of Gufangor comes from Quint (2015). Finally there is a wordlist with just short of 1,000 entries found in D'Avezac (1845), notable for being the first sizeable source of information on any Bainunk language. This is part of a larger set of wordlists that was collected around the year 1670 (according to Gamble 1992) for 11 languages of Senegambia and Guinea Bissau, and discovered in the French Royal Library many years later. The author is anonymous, but Segerer and Flavier's RefLex database speculates that the author may be someone by the name of La Courbe. The orthography used is based on French, but with the peculiar convention of using <qu> and <gu> for the palatal stops, though they often represent velar stops as well. Though this orthography represents the language very imprecisely, it is clear enough to signal some important differences with other documented varieties. Cobbinah reports that in De Lespinay's edition of this wordlist, he speculates that it represents a now-extinct Northeastern Bainunk variety. Impressionistically, it seems very close to Gujaher in all respects, with just a few phonological differences which could easily be accounted for by over 300 years of change. It also has borrowings from Manjak/Mankanya (e.g. <*daly*> 'cat'), which are spoken in the same area as Gujaher but not the Northeastern varieties. There are a few other short wordlists available for the Bainunk languages as well as Kobiana and Kasanga, but these are extremely preliminary, and quite short. A few comments on Gubelor, Gutobor, and Gufangor are based on Bühnen's (1988) wordlist. Because Gubëeher is currently the best documented Bainunk language, it will serve as the principle representative of this family throughout this chapter. Wherever a form is given as simply "Bainunk," it is a Gubëeher form.

The contact languages discussed in this chapter are primarily the Joola languages and Manjak. Data from Joola Eegimaa comes from two dissertations, Sagna (2008) and M. Bassene (2012), and a wordlist found in A-C. Bassène (2006). Joola Fonyi data comes from Sapir's (1965) grammar and (1970) dictionary, and Coly et al.'s (2008) dictionary. Manjak data comes primarily from Buis (1990), containing a short grammatical description and lexicon, as well as Karlik's (1972) grammar. Doneux (1975b) is a Manjak lexicon with some information on different dialects, as well as the closely related languages Manyanya and Pepel.

Examples will be clearly marked with their language, and (except for Kobiana), the page number at which they can be found in the source. For Gubëeher this is always Cobbinah (2013), for Guñaamolo Bao Diop (2013), and for Kasanga Wilson (2007).

2 Synchronic background

Kobiana (*gu-bóy*) is spoken in six villages just south of the Cacheu river in Guinea Bissau by around a thousand speakers. These villages comprise an area known collectively as *ka-bóy*, the source of Portuguese *Cobiana*, used to refer to both the area and the language. Outside of *ka-bóy*, Lüpke (2016) reports that Kobiana is also spoken in a number of villages near the Senegal-Guinea Bissau border, adjacent to Kasanga villages. Kasanga (*gu-haja*) is spoken nearby in an area just south of the border. Dimmendaal and Voeltz (2007) report that it is critically endangered, with perhaps only a few remaining speakers. Lüpke (2016) corrects this assessment, noting that multiple Kasanga villages remain, and the language is still transmitted to children in some villages. In others there has been a shift to Bainunk Gujaher, in which most Kasanga are fluent. A number of Kasanga villages have been abandoned in recent years due to urbanization. Kobiana speakers in *ka-bóy* are not in contact with Kasanga or Bainunk speakers.

The closest relatives of Kobiana and Kasanga are the Bainunk languages, spoken in the western Casamance region of Senegal and over the border in Guinea Bissau. A family tree of Bainunk is given by Cobbinah (2013: 34), which has been modified to include Gufangor in the Western, rather than Southern branch (Lüpke, p.c.):

Bainunk	West	Gutobor Guñaamolo Gufangor
	South	Gubëeher Gubelor
	†Northeast	(once spoken in the NE of the Casamance and into Gambia)
	East	Gujaher

Figure 113: Bainunk family tree

The Western and Southern groups are quite similar to each other when compared to Gujaher, and could probably be said to form a subgroup. Gujaher, the only variety spoken historically in Guinea Bissau as well as Senegal, is by far the most similar of the Bainunk languages to Kobiana-Kasanga, both lexically and grammatically. The Northeastern varieties are apparently no longer spoken (Cobbinah 2013: 32).

In the literature the terms *Banhum* and (more often in recent years) *Nyun* or *Ñun* are sometimes used to refer to either individual Bainunk languages, or the family as a whole. These (as well as *Bainunk*) are based on a term of the form *-ñuuñ* found in many surrounding languages (e.g. Kobiana *gu-ñúuñ*) which is apparently an exonym, used to refer to any Bainunk people or language. Bainunk languages themselves do not have a term referring to all Bainunks as a whole. Kobiana is sometimes known as *Boy* or *Buy* in the literature (from Kobiana *gu-bóy* 'Kobiana'), and this term is also sometimes applied to the Kobiana-Kasanga subgroup. The term *Buy-Nyun* has been used to refer to the subgroup formed by Bainunk and Kobiana-Kasanga, and more recently *Nyun* is used in both Cobbinah (2013) and Pozdniakov and Segerer (2017) to refer to this larger subgroup. To avoid all of this terminological confusion, I will use only the terms "Bainunk," "Kobiana-Kasanga" (KK), and "Bainunk-Kobiana-Kasanga" (BKK) to refer to each of these subgroups.

2.1 Phoneme inventories and basic phonology

2.1.1 Kobiana

The consonant inventory of Kobiana is as follows:

<table>
<tr><th></th><th>labial</th><th>coronal</th><th>palatal</th><th>velar</th></tr>
<tr><td>vl. stop</td><td>p</td><td>t</td><td></td><td>k</td></tr>
<tr><td>vl. continuant</td><td>f</td><td>h</td><td>s</td><td>h</td></tr>
<tr><td>gem. vl. stop</td><td>pp</td><td>tt</td><td>cc</td><td>kk</td></tr>
<tr><td>prenas. vl. stop</td><td>mp</td><td>nt</td><td>nc</td><td>nk</td></tr>
<tr><td>vd. stop</td><td rowspan="2">b~β</td><td>d</td><td>j</td><td rowspan="2">g~ɣ</td></tr>
<tr><td>vd. cont</td><td>l</td><td>z[54]</td></tr>
<tr><td>gem. vd. stop</td><td>bb</td><td>dd</td><td>jj</td><td>gg</td></tr>
<tr><td>prenas. vd. stop</td><td>mb</td><td>nd</td><td>nj</td><td>ng</td></tr>
<tr><td>nasal</td><td>m</td><td>n</td><td>ñ</td><td>ŋ</td></tr>
<tr><td>glide/resonant</td><td>w</td><td>r</td><td>y</td><td></td></tr>
</table>

Figure 114: Consonant inventory of Kobiana

Note the following deviations from the IPA: <j> = [ɟ], <ñ> = [ɲ], <y> = [j], and all prenasalized stops are homorganic (these conventions are also used for Kasanga and Bainunk below). [h] is a glottal fricative, included with the coronal and velar consonants because it alternates with the voiceless stops at both of these places of articulation. [s, z] are phonetically alveolar, but behave as palatal phonologically. These are the basic consonant phones, though certain phonemic analyses might treat some of them as allophones. [b~β] and [g~ɣ] are pairs in free variation, and must certainly be treated as allophones of /b/ and /g/. Whether the continuant or the stop is produced is influenced mainly by speech rate and whether the sound is intervocalic, but regardless of the environment, either sound in each pair is possible. These will be represented as <b> and <g> throughout.

It is important to establish that there is a contrast between the voiced geminates /bb, gg/ and their singleton counterparts. These contrast in all positions except word-initially. The most obvious difference phonetically is that the singletons can be pronounced as fricatives [β, ɣ], whereas the geminates cannot. When realized as a stop, the singletons can be rather difficult to distinguish from the geminates, but a difference in closure duration does exist. Compare the closure durations in five tokens of *a-**bb**arsíl* 'grain of corn' and *ga-**b**arsíl* 'grains of corn,' as spoken in isolation by a single speaker:

a-**bb**arsíl	ga-**b**arsíl
80 ms	28 ms (fricative)
85 ms	63 ms
93 ms	86 ms
95 ms	87 ms
97 ms	71 ms

Figure 115: Closure duration of Kobiana root-initial /bb/ and /b/ in a singular/plural pair

[54] Wilson (2007) gives this sound as [ð, z̩] and Doneux (1991) as [z̩], which must be a dialectal difference.

With the stop tokens there is some overlap for these two categories, but especially in free speech where the fricative realizations of /b, g/ are more common, the distinction is clearer.

The singleton voiceless stops as well as [j] and [d] appear only word-initially[55]— note that singleton [c] never occurs. Four other sounds, [h, z, r, l] generally do not appear word-initially[56], but this is true only if a particular verbal construction is analyzed as a single word (e.g. *má-ngó-zúpp* 'I'll speak' as opposed to *má-ngó zupp* as two words; see example (33) in section 2.2.1). Thus, [j~z], [d~l], [t~h], and [k~h] could be analyzed as single phonemes /j/, /d/, /t/, and /k/ based on the complimentary distribution of these phones. Some of these are supported by alternations (not to be confused with true consonant mutation) like the singular/plural pairs *dii(n) / ga-líina* 'year(s)' and *táandi / ga-háandi* 'clay(s).' Furthermore, it would be possible to treat [d~r] as allophonic based on the distribution of these sounds, though no alternations exist. It would even be possible to have a phoneme /p/ with two allophones [p~f], alongside /f/ with a single allophone. These questions of phonemic analysis are not actually all that important to the issue of consonant mutation, as the singleton stops are not involved in mutation. The orthography used here is rather surface-based, employing all of the above symbols except <β, ɣ>.

Another issue is the analysis of the voiceless geminate stops. The only environment in which the voiceless geminate and singleton stops contrast is word-initially, and if the part of speech is known, even this contrast is predictable (geminates in verbs, singletons for all others). For example, there is a word *á-ddett* 'ash,' but there could be no contrasting word ˣ*á-ddet*. Because there is no contrast, an acoustic measurement of closure duration would not be able to conclusively answer the question of whether non-initial voiceless stops should be considered geminates. While these stops are certainly of a longer duration than initial singleton stops, we cannot assume that the closure of initial and non-initial stops should be the same. Thus, it would be possible to analyze non-initial voiceless stops as either singletons or geminates. It is true that geminates in Kobiana are impressionistically not particularly long, and Wilson (2007) writes most stops as singletons outside of a few words[57]. However, I believe that the geminate analysis is greatly preferable for a number of reasons. First, it is already necessary to posit the voiced geminates /bb/ and /gg/ in all positions, as they clearly contrast with /b/ and /g/, and so there is no reason to avoid positing the typologically less marked voiceless geminates. Secondly, these non-initial voiceless stops all derive from geminates historically. Perhaps most importantly, the voiceless geminates pattern with other complex consonants (prenasalized stops and voiced geminates) phonologically, in that word-final complex consonants allow an all-low tone pattern that other final consonants do not allow; e.g. *ka-mpɔ̀tt* 'pothole,' but there could be no ˣ*ka-mpɔ̀h*.

Final nasals except /ñ/ are commonly deleted before a consonant or phrase boundary, but whether this deletion occurs is lexically-specific. This deletion also targets a few instances of /l/ and /r/. When a final consonant is subject to deletion, it will be written in parentheses, e.g. *sá-bu(n)* 'cold' as opposed to *a-bbún* 'potash,' in which /n/ never deletes.

The vowel inventory of Kobiana is as follows:

[55] And in the case of /t/ also after a consonant, e.g. *ña-mtá* 'shoes.' Clusters are extremely rare, and I have no examples of these other consonants in post-consonantal position.
[56] There are in fact a very few non-alternating l-initial verbs, and one optionally non-alternating h-initial verb.
[57] Voisin (2015) writes geminates in mutation environments, and singletons elsewhere. Doneux (1991) uses singleton stops in his orthography, but notes that they are phonetically geminates.

i, ii		u, uu
e, ee		o, oo
ɛ, ɛɛ	ə	ɔ, ɔɔ
	a, aa	

Figure 116: Vowel inventory of Kobiana

There is no system of ATR (advanced tongue root) harmony in Kobiana, and it is possible for any two vowels to co-occur within a word or root[58]. The lower-mid vowels are considerably less common than the upper-mid vowels, and /ə/ is rather uncommon in monosyllabic roots.

Kobiana is a tonal language, contrasting low and high tones. On non-verbs, each word carries a single high tone (H) which may be hosted by any syllable. This H spreads rightward to the end of the word, and is indicated by an acute accent mark on the relevant syllable, e.g. *pú-leŋ* [púléŋ] 'nape,' or *si-núf* [sìnúf] 'ear.' Monosyllabic words have the H on the only available syllable, and are written with no accent mark. Words which end in a complex consonant (prenasalized stop or geminate) may additionally have an all-low pattern, written with a grave accent over the final syllable, e.g. *gu-bèend* [gùβèend] 'door.' Tonal patterns are assigned irrespective of whether the word contains a noun class prefix— a prefix is treated in the same way as any initial syllable. For verbs, the stem is all-high in affirmative forms, and all-low in negative forms, written with an acute or grave accent respectively over the first syllable of the stem. The tone of the subject prefix may be high or low, and is determined by a combination of polarity, aspect, and the identity of the prefix. There is a rare falling tone, found underlyingly only in the 3rd person plural pronoun/subject marker *náà(n)* / *náà-*. Finally note that there is a boundary low tone, such that the utterance-final syllable is phonetically low.

2.1.2 Kasanga

Wilson (2007) lists the following consonants for Kasanga:

	labial	coronal	palatal	velar
vl. stop	p	t	c	k
(vl.) continuant	f	r	s	h
prenas. vl. stop	mp	nt	nc	nk
vd. stop	b	d	j	g
prenas. vd. stop	mb	nd	nj	ng
nasal	m	n	ñ	ŋ
vd. continuant	w	l	y	

Figure 117: Consonant inventory of Kasanga

It must be noted that Wilson does not list any geminate stops for Kasanga (though he writes a few in his data), and only /bb/ and /dd/ for Kobiana, which in fact has a full series of geminate stops. Thus, it is unknown whether Kasanga truly lacks geminates. Lüpke records most tokens of /s/ as [ʃ]. The vowel inventory is given as /i, e, a, o, u/, all contrasting for length. However,

[58] Doneux (1991) gives a rather peculiar analysis of the vowel system, proposing that all vowels before stops are -ATR, and all vowels before continuants are +ATR. His claim is that -ATR vowels induce gemination and hardening of the following consonant. It may be that he detected a sort of closed-syllable laxing, but it is certainly not the case that vowels have an underlying ATR contrast.

as this is the same inventory Wilson gives for Kobiana, it is possible that Kasanga also has more contrasts in the mid vowels. Kasanga is a tonal language, but Wilson does not record tone.

2.1.3 Bainunk languages

The following consonant sounds are found in the Bainunk languages:

	labial	coronal	palatal	velar	glottal
vl. stop	p, pp	t, tt	c, cc	k, kk	
vl. continuant	f		s	x	h
prenas. vl. stop	mp	nt	nc	nk	
vd. stop	b, bb	d, dd	j, jj	g, gg	
prenas. vd. stop	mb	nd	nj	ng	
nasal	m, mm	n, nn	ñ, ññ	ŋ, ŋŋ	
vd. continuant	w	r	y		
lateral		l, ll			

Figure 118: Consonant inventory of the Bainunk languages

The geminates are found in Guñaamolo, and only rarely in Gujaher and Gubëeher. In Guñaamolo, the geminates are not found word-initially or root-initially. Guñaamolo has only /h/ and not velar /x/, and in Gujaher the two sounds are in free variation in a number of words (Wilson gives only /x/). In Gubëeher, /x/ always becomes /k/ after a nasal.

The vowel inventory for all Bainunk languages is essentially the same (though at least Gufangor (Quint 2015) lacks the +ATR low vowel):

high	+ATR	i̟, i̟i̟		u̟, u̟u̟
	-ATR	i, ii		u, uu
mid	+ATR	e̟, e̟e̟		o̟, o̟o̟
	-ATR	e, ee		o, oo
low	+ATR		a̟, a̟a̟	
	-ATR		a, aa	

Figure 119: Vowel inventory of the Bainunk languages

There are two symmetrical sets of 5 vowels, +ATR and -ATR, which can all be long or short. The +ATR low vowel is described as [ə] or [ɘ]. With one exception, all vowels within a word must share the same ATR specification[59]. The exception is that it is possible for -ATR /a/ or /aa/ to appear with a +ATR vowel, though all prefixes containing /a/ alternate predictably[60]. For this reason, it is only necessary to specify the ATR value once per word, and also for non-prefixal low vowels. A tradition used by many authors for Bainunk and the Joola languages (which use essentially the same vowel system) is to mark +ATR on the first vowel of the root. The symbol in this system for +ATR is an acute accent mark, but often <ë> for the +ATR

[59] Not confirmed for Gujaher. Note that in Lüpke's list, /u̟/ and /i̟/ are quite rare, and Wilson does not note any ATR distinction. Furthermore some instances of Gujaher /a̟/ seem to be reduced vowels which historically lacked a +ATR specification. Though these have fully merged with +ATR /a̟/ in the modern language, they do not have an effect on other vowels in the word.
[60] Prefix /a/ → /a̟/ is regular in Gubëeher, but Bao Diop (2013: 49) notes that in Guñaamolo it varies by speaker.

low vowel, following Wolof orthography. I will adopt this basic strategy of ATR marking on the first vowel, but to avoid confusion with Kobiana tone marking, will use a plus sign below the vowel rather than diacritics above the vowel. Thus, *ba-ku̟ni* 'shade' represents [ba̟ku̟ni̟]. To my knowledge no Bainunk language has been recorded as tonal.

2.2 Kobiana mutation

Kobiana makes use of a three grade mutation system resulting in alternations in the initial consonant of the root in both nouns and verbs. Grade I contains continuants (and /b, g/ which can be realized as continuants or stops), grade II contains geminate stops, and grade III contains voiceless geminates and voiced prenasalized stops, along with /dd/.

Grade I (continuant)	f	h	s	h	b	l	r	z	g
Grade II (geminate)	pp	tt	cc	kk	bb	dd	dd	jj	gg
Grade III (nasal)	pp	tt	cc	kk	mb	nd	dd	nj	ng

Figure 120: Kobiana initial consonant mutation system

Nasals and /w, y/ are immutable. Unlike in some other mutation systems such as those of Fula and Sereer, there is no underlying or "default" mutation grade. However, it is notable that grade III is the only grade to preserve all possible contrasts. Certain nouns with a grade III initial consonant have a prenasalized voiceless stop instead of a voiceless geminate, but these are an extreme minority (see sections 2.2.2.3, 4.2).

2.2.1 Verbal mutation

Alternations in the verbal system make use of only grades I and III. Mutation is determined by the specific cell in the verbal paradigm, which takes into account subject, polarity, aspect, and focus. The enforced mutation grade (along with the subject prefix and tone on the stem) for each cell of the non-focus paradigm are given below, with the grade I cells shaded:

	Perfect				Imperfect			
	Affirmative		Negative		Affirmative		Negative	
	sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.
1	má-III-H	ngée-III-H	mà-I-L	ngée-III-L	má-I-H	ngée-III-H	mà-I-L	ngèe-III-L
2	á-III-H	káa-III-H	à-I-L	káa-III-L	á-I-H	káa-III-H	à-I-L	kàa-III-L
3	à-I-H	náà-III-H	Ø-III-L	náà-III-L	à-III-H	náà-III-H	Ø-III-L	náà-III-L
NP	Ø-III-H		Ø-III-L		Ø-III-H		Ø-III-L	

Figure 121: Basic verbal paradigm of Kobiana

"NP" in this chart indicates the form of the verb used with an overt 3rd person subject (always immediately pre-verbal), whereas the listed 3rd person forms are used when no overt NP is present. Imperative forms are unprefixed and exhibit grade III and high tone. Negative imperatives (prohibitives) are prefixed with *akka-* and exhibit grade I for singular subjects and grade III for plural subjects, always with high tone. The paradigm for *-feg~ppeg* 'see' is given in Figure 122, with *wal* '(the) child' used as the subject for the "NP" cells.

	Perfect			
	Affirmative		Negative	
	sg.	pl.	sg.	pl.
1	má-ppégi	ngée-ppégi	mà-fègii(l)	ngée-ppègii(l)
2	á-ppégi	káa-ppégi	à-fègii(l)	káa-ppègii(l)
3	à-fégi	náà-ppégi	ppègii(l)	náà-ppègii(l)
NP	wal ppégi		wal ppègii(l)	

	Imperfect			
	Affirmative		Negative	
	sg.	pl.	sg.	pl.
1	má-féga	ngée-ppéga	mà-gù-fega	ngèe-gù-ppega
2	á-féga	káa-ppéga	à-gù-fega	kàa-gù-ppega
3	à-ppéga	náà-ppéga	gù-ppega	náà-gù-ppega
NP	wal ppéga		wal gù-ppega	

	Imperative			
	Affirmative		Negative	
	sg.	pl.	sg.	pl.
1	—	ppégettoo	ákka-feg	ákka-ppeg
2	ppége(tt)	ppégettii		
3	—			

Figure 122: Paradigm of Kobiana -feg~ppeg *'see'*

Subject focus forms all take grade III:

	sg.	pl.
1	mée-ppégəni	ngéena-ppégəni
2	ée-ppégəni	káana-ppégəni
3	áma-ppégəni	náàná-ppégəni
NP	wal ppégəni	

Figure 123: Perfect affirmative subject focus forms of Kobiana -feg~ppeg *'see'*

The subject focus suffix *-ən* is very rarely absent in these forms. Negative subject focus forms do not exist. While imperfect focus forms are sometimes possible, they are rare and usually deemed ungrammatical, and thus are omitted from this chart. Where they do appear, they lack the suffix *-ən*.

There exists a construction in which the verb *-go~ngo* 'be,' acting as an auxiliary, precedes an unprefixed and uninflected main verb in grade I, with a future interpretation.

(33) *má-ngó-zúpp* 'I'm going to speak' (Kobiana)
à-gó-ɦéeh 'he's going to laugh'

The second verb in this construction is always in grade I. I have chosen to analyze this construction as a single word, with the verb *-go~ngo* being grammaticalized as a prefix. This analysis is motivated in part by the fact that historically consonants did not lenite word-initially, but did intervocalically within a word. However, note that even in the negative, which uses the consonant-final negative form of 'be' *-gùl~ngùl*, the main verb takes grade I mutation:

(34) *mà-gùl-gòott* 'I'm not going to come' (Kobiana)

Finally, there is a verbal prefix *hi~kki-* 'to do again' which shows the expected stem-initial mutation, but after which the verb root also shows the same mutation grade:

(35) *má-kkí-ppeg wal* 'I saw the child again' (Kobiana)
à-hí-feg wal '(s)he saw the child again'

Verb roots can be nominalized in a number of ways, most notably in infinitive formation. These nominalizations all involve being placed into a noun class, and undergoing the appropriate mutation. As such, it is possible for many verb roots to appear in grade II along with grades I and III, but this is an instance of nominal mutation that will be discussed in section 2.2.2.

A small number of verbs begin with a grade I consonant (mostly /f/) but never mutate:

-faaf	'cut fruit'	
-far	'push'	Joola *far*
-fas	'exit'	
-faw	'be very white'	Intensifier *faw*
-fɛɛkk	'deshell (peanuts)'	
-fɛf	'peel'	cf. Joola *feeful* 'strip bark'
-fiir	'need'	Manjak *fiər*
-fil	'throw'	Mankanya *fəl*
-fokkəs	'shave'	Manjak, contains Manj. separative *-əs*
-foogaar	'drown'	Portuguese *afogar*
-fɔɔb	'tie scarf on'	
-fum	'overturn'	
-hakka-hakka	'stutter'	Ideophonic
-labəha	'pant'	Manjak *labat͡r̥a* 'be badly wounded'?
-leyer	'read'	Portuguese *leer* (modern *ler*)
-lɛs	'remember'	Manjak *lɛs*
-saal	'sow'	Manjak *saal* (but note inf. *ká-saal* or *bá-**cc**aal*)
-siih	'rub'	
-siint	'move/shake'	Manjak *sint͡r̥*
-səcc	'be very black'	Intensifier *səcc*
-sɔɔkk	'point'	(but note *a-kkúnum á-**cc**ɔɔkkeh* 'index finger')

Figure 124: Kobiana non-mutating verbs

These are probably all borrowed, or else derived from an intensifier. In some, mutation is optionally permitted (*ppokkəs*, *ppɔɔb*, *kkakka-kkakka*, *ccɔɔkk*), but these forms are uncommon.

2.2.2 Nominal mutation

2.2.2.1 Noun class inventory

Mutation in the nominal system (nouns and adjectives, including infinitive verb forms) is triggered by noun class, marked by a prefix along with a particular mutation grade. The class inventory of Kobiana is given in Figure 125. Each class is either singular/collective, which takes singular verbal agreement, or plural, taking plural verbal agreement. Singular classes are connected with a line to their corresponding plural class. A few sg./pl. pairings with only a single member are not indicated. Classes without a plural are collective classes. Those connected to a plural class with a dashed line are collective classes in which some members can be pluralized, e.g. *di-hínd* 'millet,' *di-hínda* 'millets (different piles/types).' The number of nouns collected in my own fieldwork is given for each class in the "count" column, providing a rough indication of its size. The diminutive and augmentative classes are recorded by Doneux (1975, 1991). These are either dialectal or no longer in use, being unknown to my consultants and also absent in Voisin (2015).

sg./coll.	sg./coll. agr.	pl.	pl agr.	count	note
a-I	a-I	ga-I	ga-I	6	
a-II	a-II			107	
ba-I	ba-I			9	vegetable collective
bu-I	bu-I			32	
bu-III	bu-III			1	*bú-kkaab* ‘bed’
ja-I	ja-I			10	plant, etc. collective
pu-	pu-III			19	
(t-)	ti-III			1	*táandi* ‘clay’
si-II	si-III			1	*sí-ggəh* ‘eye’
pa-III	pa-III	ba-I	ba-I	18	single grain/bead, etc.
gu-III	gu-III	ŋa-III	ŋa-III	4	
ka-III	ka-III			24	
ka-?	ka-III	(ma-)	ma-I	1	*ká-maafe(n)* ‘fish’
gu-I	gu-I	ŋa-I	ŋa-I	139	long + rigid, misc.
si-?	si-III			1	*si-núf* ‘ear’
ji-I	ji-I			4	‘hand, slap, left, right’
Ø	a-I	-a	ga-I	56	
†ba-II	a-I			8	
†ja-III	a-I			24	insects
†ji-I	a-I			9	animals
ba-III/I	ba-III			7	
di-I	di-III			3	millet collect., ‘dirt’
fa-I	fa-III			4	
(k-)	ku-III			1	*kooh* ‘fire’
ta-I/III	ta-III	ja-I	ja-I	5	
ta-II	ta-II			2	*tá-ppe(r)* ‘foot’
u-I	u-I	i-I	i-I	1 +	*ú-li* ‘person’
		(b-)	bi-I	1	*wal / beel* ‘child(ren)’
na-	a-I	ja-I	i-I	37	people (2 *na-* nouns)
ku-I	ku-I	ku-I	ku-I	6	*koñ* ‘thing,’ etc.
sa-III	sa-III	ña-III	ña-III	45	flat, misc.
si-III	si-III	ñi-III	ñi-III	27	mostly long + flexible
u-III	u-III	da-III	da-III	17	trees
u-	a-I	ŋu~ngu-	ŋu~ngu-III	56	borrowings
tu-	tu-	ni-I	ni-I		diminutive
da-I, fa-III	da-I, fa-III	di-III	di-III		augmentative
ba-II	ba-II			3	deverbal
gu-I	gu-I			13	languages
i-	a-I			1	‘cola nut’ collective
ka-III	ka-III			2	‘tomato’ collective
ma-I	ma-I			10	liquid
ma-III	ma-III			1	‘manioc’ collective
mu-I/III	mu-III			3	‘marrow, brain’
nu-III	nu-III			1 +	*nú-na* ‘place’

Figure 125: Kobiana noun class system

Taking into account only agreement marking, there are 31 singular/collective classes, and 15 plural classes. 5 of these plural classes are identical in form to a singular/collective class. There are no irregularities or exceptions in the assigned mutation grade of agreement markers. If we take into account the form of the marker and its assigned mutation on the noun as well as in agreement, there are 38 or more singular/collective classes, and 17 plural classes. There are a number of mismatches between the mutation grade assigned by the agreement prefix and the grade of the consonant on the noun itself. Some cases simply involve a few lexical exceptions, but for some entire classes the mutation grade assigned to the noun is different from that assigned in agreement. These will be discussed in detail in sections 6.10.1 and 6.10.2. A sizeable number of nouns are unprefixed, and take 'default' *a-I* agreement. Three singular classes, indicated with † above, are synchronically treated as unprefixed, but clearly contain a fossilized noun class prefix. Examples of these nouns are:

†ba-II nouns		†ja-III nouns		†ji-I nouns	
bakkáar	'chicken'	jambítt	'grasshopper'	jíbooñ	'horse'
báttiir-ttiir	'weaverbird'	jandattóol	'wasp'	jigáaz	'panther'
baccáañaali	'porcupine'	jákkoo(n)	'bedbug'	jiwós	'elephant'
baddúkkend	'palm rat'	jaŋέccεcc	'millipede'	jinéel	'antelope'

Figure 126: Kobiana nouns with fossilized prefixes ba-II, ja-III, *and* ji-I

Doneux (1975: 52) reports that the historical prefix is replaced when these nouns are assigned to a diminutive or augmentative class, e.g. *fa-ngaaz* 'big panther.' Unprefixed nouns as well as a few other singular classes form their plural with a suffix *-a*; e.g. *jaahél / jaahéla* 'guinea fowl(s).' This suffix does not replace the singular class marker if one is present, e.g. *tá-ppooh / tá-ppooha* 'flower(s).' A few nouns form their plural with a prefix (usually *ga-*) along with the suffix *-a*, but these are usually "coerced" plurals, often for nouns which would not normally appear in the plural.

Class prefixes of the form *Cu-* (*bu-*, *gu-*, *pu-*, *mu-*, *ŋu-*) change /u/ to /i/ in the following environments:

before /y, ñ, nj, nc/:	gí-yaana	'game'
	pí-yɔɔngi	'hammock'
	gí-ñaahə(m)	'jaw'
	gí-njaab	'honey'
	mi-ncélelekk	'kaldu (sauce sp.)'
before /h/ + front vowel:	ŋi-hέlεm	'floating reeds'
	bi-hídd	'liver'
	pí-heenk	'fishnet'
before /gi/:	bi-gíis	'face'
	gí-giseh	'tooth-scrubbing stick'

Figure 127: Change of /u/ to /i/ in Kobiana noun class prefixes

The prefix *u-* never undergoes this alternation, and I have no relevant data for *ku-* or *nu-*. This same basic /u/ → /i/ alternation is seen in Bainunk Gufangor (Quint 2015) and Joola Eegimaa

(Sagna 2008) noun class prefixes. In none of these cases does the *Ci-* prefix represent a separate noun class.

Prefixes of the form *ba-*, *ga-*, *ja-*, and *da-* have allomorphs with /e/ before some lexically-specified roots, notably the 'default' root *-́ro~ddo* (see Figure 188 for the use of this root). The form *de-* is especially common for the plural of trees.

je-gé(n)	'hair'	jé-ndekka	'to walk'
bé-gər	'pepper'	gé-na(ŋ), bé-na(ŋ)	'two'
gé-gəh	'eyes'	bé-ro	'beads'
jé-fəra	'cloths'	dé-ddo	'trees'
dé-mbaaz	'baobab trees'	bé-ddo	'powder'
dé-mbon	'*Cola cordifolia* trees'	jé-ro	'hay'
de-ndéeno	'kapok trees'	gé-ro	'animals'
je-rúgeli	'kapok seed pod'	BUT gá-ro	'bottles'

Figure 128: Change of /a/ to /e/ in Kobiana noun class prefixes

The form of the demonstrative (normally the marker with a lengthened vowel) is for these classes *bee*, *gee*, *jee*, *dee*. Allomorphs with /e/ are not possible for any other marker containing /a/, even when they precede one of these triggering roots. These forms with /e/ are secondary developments from original markers with /a/, and certainly do not represent separate classes at any stage in history. They were probably triggered by original +ATR roots, and retained only in some particularly common nouns[61].

In addition to their use on noun roots, noun class prefixes are used to form infinitives or "verbal nouns" from verb stems. There are multiple infinitive classes, most of which are also used on noun roots.

inf. class	count[62]	use
a-II	56	*-a* 'anticaus.,' *-əndəna* 'recip.,' 'hunt, paddle, line-fish, fight, etc.'
ba-I	3	'laugh, clap, be big'
bu-I	many	"default" (most commonly used class) for verbs with an object
ba-II	many	default for verbs without an object, misc.
ga-I	4	'run, open mouth, be embarrassed, have missing tooth'
gu-I	20	bodily functions, misc.
ja-III	3	'dance, run, walk'
ka-I	10	'be strong, be cowardly, be short.' other qualities, 'sow, shave'
ka-II	1~2	'be big'
ka-III	1~2	'burn'
ma-I	9	bodily functions involving liquids, 'swim, fly'
pa-	1	'be cowardly'
sa-I	1	'be hot'
si-I	1	'be old'
si-III	3	'dream, sleep, be co-wives'

Figure 129: Kobiana infinitive prefixes

[61] All identifiable Bainunk cognates of the roots in Figure 128 are +ATR: 'hair, eye, kapok tree, seed pod, walk.'
[62] Counts are from the ~500 verbs collected in my own fieldwork.

The class used with each verb stem is lexically specific, though some classes have a clear semantic motivation, and certain derivational verbal suffixes require the use of a particular class. Most verbs can appear in multiple infinitive classes. Some infinitives require the addition or deletion of a suffix, e.g. *á-ñaamta* from *-ñaam* 'eat,' and at least one is entirely suppletive: *ga-léew* from *-gil~ngil* 'run.' Infinitives are only very rarely modified by an agreeing element, and as such the mutation grade assigned by each class can usually only be determined by its effect on the verb stem itself. The classes *bu-I* and *ba-II* are by far the most common, and the majority of unsuffixed verb stems can appear in one (in fact usually both) of these classes. For transitive verbs, *bu-I* is used when an object is present, and *ba-II* when no object is present. However, it must be noted that the less common classes generally contain common verbs, and so their token frequency within a corpus would be rather higher than the above chart might suggest.

verb		infinitive(s)
-f~ppa(l)	'go'	bá-ppa(l), bú-fa(l)
-s~ccupp	'pound'	bú-supp, bá-ccupp
-r~ddeenda	'coat self (w/ oil, etc.)'	a-ddénda
-s~ccaamaal	'hunt'	a-ccáamaal
-h~ttib	'be tasty'	ba-ttíb
-h-ttedd	'make pottery'	gí-hedd, bí-hedd, bá-ttedd
-g~ngil	'run'	ga-léew, ja-ngíla
-b~mbɛɛ	'swim'	má-be, á-bbɛɛ (*e-a > ɛɛ)
-g-nges	'vomit'	má-ges, bá-gges
-h~kkeeh	'laugh'	bá-heeh
-r~ddiimool	'lack tooth'	ga-ríimool
-l~ndekk	'walk'	jé-ndekka
-z~njupp	'talk'	gu-zúpp
-f~ppoo(n)	'cry'	gú-foo(n), bú-foo(n)
-z~njeh	'be smart'	ká-zeha
-l~ndeb	'burn'	ka-ndéb
-l~nde	'be big'	ká-dde, bá-le, bú-le
-ñon	'be cowardly'	pá-ñon, bá-ñon, ká-ñon
-l~ndebə(n)	'be hot'	sá-lebə(n)
-l~ndef	'be old'	si-léf, ba-ddéf, bu-léf
-f~ppeendə(n)	'be co-wives'	sí-ppeend
-g~ngeeb	'dream'	si-ngéeb

Figure 130: Kobiana verbs in their various infinitive noun classes

2.2.2.2 Effects of nominal mutation

Mutation in the nominal system is manifested in two ways. First, nouns within any given class appear with only those initial consonants contained in the mutation grade specified by that class (as well as any immutable consonant). This principle is illustrated by the following nouns in the *gu-I*, *a-II*, and *sa-III* classes.

gu-I		*a-II*		*sa-III*	
gu-fɔ́ɔm	'wave'	á-ppuus	'bile'	sa-ppɛ́cc	'fly-swatter'
gú-haaguba	'plank'	á-ttang	'palm fruit'	(sá-ntufa)[63]	'leaf'
gu-sɛ́h	'name'	a-ccàng	'nest'	sa-ccíipp	'comb'
gú-hɔɔla	'cola nut'	a-kkáng	'shin'	sá-kkudd	'large clay pot'
gú-beppa	'eel'	a-bbún	'potash'	sa-mbáaba	'firewood cover'
gu-lɛngə́tt	'log'	a-ddém	'chin'	sá-ndefe	'old person'
gu-répp	'rafter'	a-ddéefaañ	'braid'	sá-ddo	'chaff'
gu-zóol	'hip'	a-jjíiz	'cooking stone'	sa-njíingəl	'fork in road'
gú-guuza	'needle'	a-ggíddeg	'wild/bush'	sa-ngòokk	'crab'
gú-naafəmeh	'*hilaire*'	a-négg	'meat'	sá-nafara	'hat'
gú-yo	'oyster'	á-yeddeh	'stool'	sá-yɛf	'gizzard'

Figure 131: Three Kobiana noun classes enforcing different mutation grades

There are some exceptional nouns in which the initial consonant is not within the class's assigned mutation grade (see section 6.10.2), but these are relatively rare, and mostly borrowed.

Secondly, the effects of mutation can be seen when the same root is placed in multiple different classes which assign different mutation grades. One common source of these alternations is changes between a singular and a plural or collective class. The following pairings involve a change in grade from one number to the next:

sg.	pl.	coll.	sg.	pl.	coll.	
a-II	ga-I	ba-I	a-ddaasɛ́ɛ	ga-laasɛ́ɛ	ba-laasɛ́ɛ	'watermelon'
a-II	ga-I	di-I	a-kkínd	ga-hínd	di-hínd	'millet'
a-II	ga-I	ma-III	a-ddɛ́ɛko	ga-lɛ́ɛko	ma-ndɛ́ɛko	'manioc'
sa-III	ña-III	ja-I	sa-mbáakka(n)	ña-mbáakka(n)	ja-báakka(n)	'tobacco (leaf)'
a-II	ga-I		a-jjécc	ga-zécc		'heel'
bu-III	ga-I		bú-kkaab	gá-haab		'bed'
pu-III	ga-I		pú-ttan	gá-han		'corral'
pa-III	ga-I		pá-ccoo(n)	gá-soo(n)		'bean'
pa-III	ba-I		pá-kkajju	bá-hajju		'cashew apple'
ta-II	ja-I		tá-bbambeh	já-bambeh		'child-carrying cloth'
ta-III	ja-I		ta-kkúh	ja-húh		'house'

Figure 132: Number-based mutation alternations in Kobiana nouns

By far the most common of these is the *a-II/ga-I* pair. There are many other cases in which a noun root can appear in multiple classes— for example, a root can appear in the *u-III* tree class, or the *a-II* class to refer to the fruit of that tree:

u-III		*a-II* (sg.)	*ga-I* (pl.)	
ú-mbaaz	'baobab'	á-bbaaz	gá-baaz	'baobab fruit'
ú-mbon	'*Cola cordifolia*'	á-bbon	gá-bon	'cola fruit'
u-ndéemәna	'lemon tree'	a-ddéemәna	ga-léemәna	'lemon'

Figure 133: Trees and their fruits in Kobiana

[63] The regular grade III consonant for the voiceless coronal series is /tt/, but a few have /nt/, see section 2.2.2.3.

The diminutive (sg. *tu-*, pl. *ni-I*) and augmentative (sg. *da-I* or fa*-III*, pl. *di-III*) classes would have also shown robust mutation alternations, as any noun root could be placed into these classes. Adjectives can appear in any class to agree with the preceding noun, and as such show robust mutation alternations. Mutation alternations are also commonly triggered on verb stems by infinitive prefixes. Most verbs can take the infinitive prefix *ba-II*, and many can take *a-II*, including all verbs with the anticausative suffix *-a*. Compare the initial consonants of the following verbs when used as *bu-I* and *ba-II* infinitives:

<u>*bu-I*</u>	<u>*ba-II*</u>	
bú-faz	bá-ppaz	'boil'
bí-hii(n)	bá-ttii(n)	'weave'
bú-suupp	bá-ccuupp	'pound (in mortar)'
bí-hirəkk	bá-kkirəkk	'sift'
(gu-bó)	ba-bbó	'suck'
bú-lubbəh	bá-ddubbəh	'break/cut'
bú-repp	bá-ddepp	'hit/winnow'
bu-záah	ba-jjáah	'be fast'
bu-góott	ba-ggóott	'come'

Figure 134: Kobiana bu-I *and* ba-II *infinitives of the same verb stems*

As such, most verb roots can appear in grade II as an infinitive, in addition to exhibiting grades I and III in the verbal system.

2.2.2.3 Voiceless prenasalized stops

The voiceless prenasalized stops are rather rare in all positions, and the large majority are found in borrowings.

pí-heenk	'fishnet'	Manjak *pə-t͡r̥ɛnk*
pú-lanka(n)	'public square'	Manjak *pə-lanka*
ka-mpɔ̀tt	'mud pit'	Manjak *bə-mpat* 'mud'
ná-ntəhi	'old person'	Manjak *na-ntʌi*
ú-nceemaañ	'parrot'	Manjak *u-nciman*
ntáaza	'ten'	Manjak *u-ntaja*
ú-ntab	'village'	Manjak *u-ntab*
ú-ntunda	'hill'	Manjak *u-ntunda*
-siint	'move/churn'	Manjak *sint͡r̥*
pa-mentéŋ	'tomato'	Mandinka *ménteŋ*
pántappe	'kick'	Portuguese *punta pé*
ú-moontər	'watch'	French *montre*

Figure 135: Kobiana voiceless prenasalized stops in borrowings

Stem-initially, these sounds never appear in verbs, and in nouns many are in the *u-* class which contains almost exclusively borrowings. However, there do exist some seemingly non-borrowed words with voiceless prenasalized stops. Root-initially in nouns, all of these appear in classes assigning grade III.

-s~ccamənt	'build'	-h~kkaant	'stand up'
pá-ntoŋ	'cashew'	sá-ntufa	'leaf'
ka-ntúppalis	'dust' (Manj. *ka-ndəpandəp*)	sa-ntíira	'headscarf'
si-ncáaw	'intestine'	mi-ncélelekk	'kaldu (sauce sp.)'
si-ncɛ́l	'rod'	sa-ncáañ	'crab sp.'

Figure 136: Kobiana voiceless prenasalized stops in roots without a clear borrowing source

These are most likely the result of dialect borrowing/mixture (section 4.2).

2.3 Kasanga mutation

The Kasanga mutation system is extremely similar to that of Kobiana.

Grade I (continuant)	f	r	s	h	b	l	d	j	g
Grade II (stop)	p	t	c	k	b	d	d	j	g
Grade III (nasal)	p	t	c	k	mb	nd	d[64]	nj	ng

Figure 137: Kasanga initial consonant mutation system

Recall that Wilson does not record geminates for either Kobiana or Kasanga[64], so it is possible that the grade II and III stops are in fact geminates. Otherwise, the differences with Kobiana are the use of /r/ rather than /h/ as the grade I correspondent of /t(t)/, and the lack of voiced continuants other than /l/ alternating with the voiced stops, having /b, d, j, g/ rather than /b~β, r, z, g~ɣ/. Just as in Kobiana, grade III of the voiceless series are plain stops (not prenasalized), and grade III of /d/ is not prenasalized, cf. Kobiana /r~dd~dd/. The same consonants are immutable in each language: nasals and /w, y/. Wilson also lists Ø along with /g/ in grade I of the voiced velar series, but does not give any examples of this purported Ø~g~ng series. Historically, intervocalic *g deleted in Kasanga, but only in stem-internal position, so the deletion of a stem-initial /g/ would not be regular.

In Wilson's presentation of the Kasanga mutation system, he lists /mp, nt, nc, nk/ as the grade III members of the voiceless series. This is highly misleading, as these consonants are not found in the majority of mutation environments. In nouns, grade III classes condition voiceless stops as in Kobiana:

[64] Wilson does in fact have a very few words with non-root-initial geminates in Kasanga, of which most have /dd/. Furthermore, his only use of a geminate in root-initial position is in the word *u-ddo* 'medicine,' appearing the in *u-III* noun class, and equivalent to Kobiana *ú-ddo*. This suggests that /dd/ is distinct in Kasanga, and may be the grade III alternate of /d/.

Kasanga		class	Kobiana
sa-ced	'skin'	sa-III	sá-ccedd
sa-kes	'roof'	sa-III	sa-kkás
sa-kun	'scorpion'	sa-III	sa-kkún
sa-pec	'broom'	sa-III	sa-ppέcc
sa-poor	'flower'	sa-III	tá-ppooh
si-kind	'rope'	si-III	si-kkínd
ta-kur	'compound'	ta-III	tá-kkuh
ti-keeñe	'sand'	ti-III	(gi-heeñí)

Figure 138: Kasanga voiceless stops in grade III nouns

In fact, voiceless prenasalized stops are essentially absent in almost all positions, even where one is exceptionally found in the Kobiana cognate.

Kasanga	Kobiana	
-s~cimt	-s~ccamənt	'build'
sa-tufa	sá-ntufa	'leaf'
si-caw	si-ncáaw	'intestine'
tupoŋ	támpɔŋ	'bat (animal)'
bu-kombe	ú-nkɔmbɛ	'seashell' (borr. Joola *e-kombe*)

Figure 139: General lack of voiceless prenasalized stops in Kasanga

In verbs, subject prefixes which trigger grade III also condition voiceless stops; e.g. *ma-pogi* 'I see' = Kobiana *má-ppégi*. The voiceless prenasalized stops are found only in 3rd person verbs, where Kobiana has normal grade III consonants.

(36)	u-lien **mp**uli	'the man left'[65]	(Ka.: 92)
(37)	ja-lien **mp**uli	'the men left'	(Ka.: 92)
(38)	**mp**og me	's/he saw me'	(Ka.: 93)
(39)	**ng**a ama bisen	's/he's at home'	(Ka.: 90)

These seemingly unprefixed 3rd person verb forms are somewhat more common than in Kobiana, since in the singular they are used even in the absence of a 3rd person NP subject (examples (38) and (39) above), instead of using *à-* as in Kobiana. It would be possible to list a "grade IIIb" with the voiceless prenasalized stops, employed only by these unprefixed verb forms. The alternative, which Wilson actually employs in his glossing, is to treat the initial nasal of these verb forms as a segmentable 3rd person prefix *N-*, which removes the voiceless prenasalized stops from the mutation system altogether.

Nominal mutation in Kasanga seems to function just as in Kobiana. Based on the (perhaps incomplete) list of classes given in Wilson (2007), the inventory and form of the class markers is extremely similar to those of Kobiana, with the following differences[66]:

[65] These first two sentences are modified from ones given by Wilson using *mbilee* 'fell' in order to show the voiceless prenasalized stop. Given the documented behavior of verb-initial voiceless consonants, these must be correct, but it should be noted that they do not actually appear in Wilson (2007).

Kasanga	Kobiana	
di/du-III	da-III	pl. of tree class
ti-II	tu-	diminutive sg.
ñi-I	ni-I	diminutive pl. class
ko-III	—	diminutive (?) sg. (based on *ko-mbol* 'baby')
ko-I	—	locative ? (based on *ko-jeed* 'place')
ha-II, hu-II	—	sg. classes listed by Wilson, but with no nouns given
ju-I, ñu-I	—	pl. classes listed by Wilson, but with no nouns given
—	u-, ŋu-III	borrowing class in Kobiana
—	pu-III, pa-III	

Figure 140: Differences between Kobiana and Kasanga class markers

There are also some cases of a prefix /a/ becoming /o/ before a round vowel (e.g. *bo-wuc* 'wind'), which is also very common in Lüpke's list. A number of somewhat rare Kobiana prefixes (*mu-III*, *di-III*, *fa-I/III*, and the augmentative classes) are not given by Wilson for Kasanga, but this may be due to the small amount of collected data.

In the verbal system, all prefixed verbs take grade III mutation. The subject markers are much the same as in Kobiana, except for the lack of 3rd singular *à-*, using *N-* instead.

	sg.	pl.
1	ma-III	gee-III
2	a-III	kaa-III
3	N-	naa-III
NP	N-	

Figure 141: Kasanga subject markers

Unlike in Kobiana, no negative verb forms make use of grade I mutation, nor do any imperfect forms.

	Kasanga (p. 93):	Kobiana:	
(40)	ma-**p**og-iid a	mà-**f**èg-iil-a	'I didn't see him' (perfect negative)
(41)	ma-**p**og-a-a̰	má-**f**ég-a-a	'I'll see him' (imperfect affirmative)
(42)	me-ngee-**p**og-a-a̰	mà-gù-**f**eg-a-a	'I won't see him' (imperfect negative)

The only verb forms that do not make use of grade III are imperatives, which use grade I; e.g. *jing-t a* 'look at him,' and some relative forms. Relative verb forms appear to mutate based on the class of the relative marker, which is a prefix on the verb.

(43)	baajed	a-k	a-fog	me	(Ka.: 92)
	cow	NC-DEM	REL.NC-see	1sO/1sS	

'the cow that saw me' OR 'the cow that I saw'

[66] There are also a number of differences in the reported mutation grade of each class, however Wilson's criteria are somewhat flawed. Most importantly he seems to have considered any instance of a voiceless stop as being grade II, even though these are regular in grade III as well.

(44)	u-wuc	u-k	u-mpog	me	(Ka.: 93)
	NC-oilpalm	NC-DEM	REL.NC-see	1sS	
	'the oilpalm that I saw'				

Example (43) uses the class *a-I*, whereas (44) uses *u-III*. Note the use of the voiceless prenasalized stop in (44), as opposed to the normal grade III /p/. This will be explained in section 5.4.

2.4 Bainunk background

None of the Bainunk languages make use of consonant mutation. However, they exhibit some phenomena which are relevant to Kobiana-Kasanga mutation. Like Kobiana-Kasanga, Bainunk languages have a large inventory of noun classes, marked by prefixes (see Figure 186 in section 6 for the inventory of Bainunk classes). They also mark subject by means of pronominal prefixes (and suffixes), as in Kobiana-Kasanga. Class markers as well as subject markers can contain a final homorganic nasal segment, represented as *N* throughout this chapter. Thus, there is a distinction between the class marker *si-* and the class marker *siN-*, representing two entirely separate classes. In Gubëeher, 10 class markers have a final nasal, versus 22 without (ignoring homophonous markers). In the verbal system, various prefixal subject pronouns are nasal final (1st pl. inclusive *iN-* and 3rd pl. *aN-* in Gubëeher), as well as the subject focus marker *iN-*. The realization of this nasal differs somewhat by language. Before a stop or a nasal, all languages realize it as a homorganic nasal. Before the continuants /f, s, h, w, l, r, y/, the nasal is deleted in Gubëeher (Cobbinah 2013: 185), but realized as vowel nasalization in Guñaamolo (Bao Diop 2013: 40). For Gujaher, Lüpke records the nasal in almost all cases, while in Wilson's wordlist they are generally absent before continuants. In Gubëeher, the nasal hardens a following /x/ to /k/ (Guñaamolo and Gujaher have /k/ where Gubëeher has root-initial /x/). Vowel-initial roots are rare, but in the case that a nasal-final class marker precedes a vowel, the nasal does not surface (e.g. Gubëeher *mu-ọog* 'baobab trees' in the plural *muN-* class).

The issue of geminate consonants is also relevant, and differs by language. In Guñaamolo geminate stops, nasals, and /ll/ are by no means uncommon (though /ll/ is somewhat rare). However, they never appear word- or stem-initially (with a couple of exceptions). In Gubëeher, geminates of all types are extremely rare. Many of those that do exist are borrowings, and it is likely that the remaining ones were borrowed from another Bainunk language. Certain Guñaamolo geminates are much more frequent than others.

	p(p)	t(t)	c(c)	k(k)	b(b)	d(d)	j(j)	g(g)
singleton:	10	24	4	27	47	3	18	51
geminate:	15	16	19	21	8	16	3	1

Figure 142: Frequency of non-root-initial stops in unique roots in Bao Diop (2013)

First note that singleton /c/ and /d/ and geminate /jj/ and /gg/ are extremely rare. Second, while the voiced geminates are all somewhat rare compared to their singleton counterparts (except /dd/), the voiceless geminates are roughly as common as their singleton counterparts (except /c/). Singleton voiceless stops are disproportionately common in polysyllabic roots, and when these are ignored the prevalence of the geminate voiceless stops is even more pronounced. These facts are perhaps unremarkable from a synchronic perspective, but historically the existence of both singleton and geminate voiceless stops in Guñaamolo is rather puzzling, since both are reflexes of original geminates.

While Gubëeher and Guñaamolo do not allow geminates in stem-initial position, it seems rather likely that the variety recorded in D'Avezac (from c. 1670) did in fact preserve a distinction between stem-initial geminates and singletons. The wordlist contains many instances of doubled consonants, and it seems at first that the anonymous author uses these entirely haphazardly. There are even cases where the same word is written once with a doubled consonant, and once with a single consonant, e.g. <*battouba*> 'braies' and <*batouba*> 'coulotte,' giving the same word for 'pants' twice. However, on closer inspection there is a remarkable asymmetry in stem-initial consonants in the *ba-* class versus other classes. Recall that in Kobiana-Kasanga, *ba-II* is one of the only classes which enforce grade II mutation. Of the 23 nouns and infinitive verbs in the *ba-* class, 9 are recorded with a doubled consonant (in addition to one <ll> which can only represent singleton [l] in <*ballouf*> 'sew'[67]), and of the 13 orthographic singletons, only 3 are stops. Compare this with the only 3 out of 58 nouns in the *bi-/bu-* classes spelled with a doubled consonant. Of course we should not draw any definitive conclusions based on this source, but it does seem unlikely that this asymmetry is entirely coincidental, and thus we must seriously entertain the possibility that geminates were preserved in stem-initial position in this variety, and that the *ba-* class contained many geminate-initial roots, while other classes did not.

The final point from Bainunk is nothing more than a minor curiosity from a synchronic standpoint, but is extremely important in confirming the nature of consonant mutation in the history of Bainunk-Kobiana-Kasanga. Cobbinah notes three verbs in Gubëeher which change their initial consonant from /x/ to /k/ when used in the *ba-* infinitive class. All other forms, including the *bu-* infinitive forms, have /x/ (though /x/ always hardens to /k/ after a nasal).

verb		*bu-* infinitive	*ba-* infinitive
-xeec	'write'	bu-xeec	ba-keec
-xur	'thread beads'	bu-xur	ba-kur
-xu̟l	'remove'	bu-xu̟l	ba-ku̟l 'remove tree'

Figure 143: /x/ becoming /k/ in Gubëeher ba- *infinitives*

Cobbinah gives only two x-initial verbs which can appear in the *ba-* infinitive class and do not show this alternation. Thus, it could even be said that the regular behavior of /x/ is to harden in the *ba-* infinitive class. Note that both Guñaamolo and Gujaher have /k/ root-initially where Gubëeher has /x/, as only Gubëeher lenited singleton *k historically in this position. As such, these alternations do not exist in other Bainunk languages.

3 Historical background

Bainunk and Kobiana-Kasanga form a very clear genetic unit. The Bainunk languages are quite closely related, with the Romance languages perhaps being a good point of comparison. Gubëeher and Gujaher can be taken as two extremities of the family, and Cobbinah (2013: 31) reports that they are not mutually intelligible. They have 65% cognate terms on the Swadesh 100 word list based on my own count (cf. 59% between Spanish and Romanian from Dyen et al. (1992) for a 200 word list). It would of course be a mistake to consider all of the Bainunk varieties dialects of a single language, but some varieties do seem

[67] If this stem were truly geminated, it would be /ba-ttuf/, being from *-*ɽ̥uf*, cf. Kobiana *bá-ttuf*.

to exist in a sort of dialect continuum (e.g. Gubëeher-Gubelor). Speakers of different Bainunk languages are generally not in contact with each other. Cobbinah writes that “The Baïnounk language areas are like small islands scattered across a sea of populations speaking Joola languages and Mandinka” (2013: 30). Kobiana and Kasanga are extremely similar to each other, but I have encountered no impressions of their mutual intelligibility (I suspect that they are not). While the Bainunk group is quite clearly their closest relative, this relation is quite distant. Kobiana and Gubëeher have 30% cognate terms on the Swadesh 100 list by my count.

Language contact in the Casamance and Guinea Bissau is extremely prevalent (see Lüpke and Storch 2013), and an important part of understanding the history of any language of the area. The main contact languages of Bainunk are the Joola languages, which have also had a noticeable influence on Kobiana-Kasanga. We will see that these two families were probably already in contact at the Proto-Bainunk-Kobiana-Kasanga stage. In modern times, Gubëeher is in extremely close contact with Eegimaa and Kujireray, both part of the Joola Banjal dialect group, and Guñaamolo is in contact mainly with Fonyi. As Joola noun classes will be referenced in a number of places, the system of Eegimaa is given in Figure 144 for reference.

a-	e-	personal class
	bug-	‘person’
fu-	gu-	many round things, all fruits
bu-, ba-	u-	plants, trees, misc., also less common augmentative
ga-		misc., also augmentative (and derogatory) (few pls. in gu-)
ñu-, ña-		misc. (rare)
e-	su-	“default” class
ju-	mu-	diminutive
ba-		collective class
fa-		insect collective
mu-		liquid
ma-		abstract concepts (rare)
t-, d-		locatives
n-		temporal

Figure 144: Noun class system of Joola Eegimaa (adapted from Sagna 2008)

The class system of Joola Fonyi (Sapir 1965) is quite similar, but notably has /k/ where Eegimaa has /g/. The main contact languages of Kobiana (other than Portuguese Creole) are Manjak (*gu-ríppəhaa(n)*) and to a lesser extent Joola Felup (*gu-sukkíi(n)*). Manjak influence is particularly pronounced, supplying many borrowings and having an appreciable effect on Kobiana’s noun class system (see section 6.9). Outsiders are sometimes unaware that the Kobiana people are not Manjak. For reference, the Manjak noun class system is given in Figure 145.

sg.	indef pl.	def pl. (if different)	
na-	ba-		personal
a-			family relations
u-	ngə-		
ka-	i-		
m(ə)-		ngə-	liquid
bə-	mə-	ngə-	mainly trees
pə-		kə-	
ndə-			diminutive
u-			collective
t͡r̥ə-			mainly locative

Figure 145: Noun class system of Manjak (Buis 1990)

The system of the closely-related Mankanya is essentially the same, though /ə/ is not written, and *ngə-* is *ŋ-*.

The remainder of section 3 will lay out the regular sound changes that have taken place in each BKK language. These will be important in understanding the development of mutation, as well as for establishing cognates between languages. Finally there will be a brief discussion of the influence of Joola languages, which demonstrates the areal nature of much of the historical phonology of the BKK languages.

3.1 Sound correspondences and sound changes

3.1.1 Vowels

The phonemic ATR vowel distinction seen in Bainunk must be reconstructed to Proto-BKK, as the distribution of +ATR and -ATR roots in Bainunk is entirely unpredictable.

*i̟, i̟i̟	*u̟, u̟u̟
*i, ii	*u, uu
*e̟, e̟e̟	*o̟, o̟o̟
*e, ee	*o, oo
*a, aa	

Figure 146: Vowel inventory of Proto-Bainunk-Kobiana-Kasanga

It is probably impossible to say whether the proto-language had a system of ATR harmony, though the phonemic distinction certainly existed. The ATR distinction was lost in Kobiana-Kasanga. There is no evidence that an ATR distinction existed in grammatical morphemes—only lexical roots. It seems that the +ATR low vowel /a̟, a̟a̟/ is an innovation in Bainunk. Roots with /a̟/ are rather common in Gubëeher, but most of these correspond to /e̟/ or /o̟/ in other Bainunk languages.

Gubëeher	Guñaamolo	
-da̟ak	-de̟k	‘go’ (Guj. *-dek~da̟k*, Ko. *-ndekk* ‘walk’)
-ba̟an	-be̟n-	‘fear’ (Guj. *-boon*)
-ba̟n	-be̟nn	‘let’
gu-ba̟n	gu-bo̟on	‘dust’
-ba̟nk	-be̟nk	‘fear’
u-ba̟r	u-ba̟r (pl. im-be̟reŋ)	‘child’
bu-da̟ab	bu-do̟ob	‘neck’ (Guj. *bu-do̟of*)
u-da̟an	u-do̟nkaay	‘sibling sp.’ (Guj. *i-do̟on*)
a-ba̟n	a-bo̟n	‘animal’ (Guj. *a-ba̟n*)
a-ta̟ar	a-te̟er	‘soul’
gu-fa̟ar	gu-fe̟er	‘winnowing basket’
ga̟agen	de̟egen	‘yesterday’ (Guj. *je̟egen*)
gu-ja̟nd	gu-ge̟nd	‘hair’ (Guj. *cin-ja̟n*, *je-gen*, Ko. *je-gé(n)*)
-ña̟aj	-ñe̟j	‘wash laundry’ (Ko. *-nejj*, cf. Manjak *nɪɟ*)
-na̟ar	-ne̟er	‘give’

Figure 147: Innovated /a̟/ in Gubëeher

There are an appreciable number of words in which both Gubëeher and Guñaamolo have /a̟/, however if a Gujaher or Kobiana cognate can be found, these usually contain another vowel.

Gubëeher	Guñaamolo	
-ba̟ax	-ba̟ah	‘pull’ (Guj. *-bo̟ox*)
ba̟ab	ba̟ah	‘father’ (Guj. *boob*)
-xa̟ab	-ka̟b	‘chew/eat’ (Guj. *-ka̟b*, Ko. *-kkobb*)
-xa̟aj	-ha̟ja	‘hang up’
bu-xa̟ar	bu-ka̟ar	‘fence/garden’ (Guj. *bu-kund*)
-ya̟ab	-ya̟ab	‘float’
-la̟am	-la̟am	‘be tired’
-ha̟ama̟la	-ha̟amul	‘yawn’ (borr. Joola, e.g. Fonyi *ka-ha̟amul*)
bu-ga̟ar	bu-ga̟ar	‘corpse’
gu-ba̟ar	gu-ba̟ar	‘wing’ (Guj. *gu-ba̟nd*)

Figure 148: Innovated or borrowed /a̟/ in Gubëeher and Guñaamolo

There are lexical roots with /a̟/ in Gujaher like *ba-ka̟r* ‘chicken’ and ‘wing’ above, but these are rarer than in Gubëeher and Guñaamolo. In Gufangor, /a̟/ seems to not exist at all, with Quint (2015: 423) reporting that [ə] is a marginal vowel sound, resulting from the reduction of other underlying vowels. The few instances of /ə/ in Kobiana roots are also innovations.

Kobiana	Kasanga	Gujaher	Gubëeher	Guñaamolo	
básə(n)	basa	ram-basa	ram-basa	ram-basaŋ	‘sitting mat’
sí-ggəh	si-gir	ci-gil	si-ji̟l	si-gi̟l	‘eye’
gu-ñíkkə(n)	gu-ñikən	gu-ñankin	gu-cind	ñan-kindeŋ	‘nose’
bé-gər	ba-gil	ba-jil			‘pepper’
maanə́(m)		maanum	maano		‘rice’
jaarə́(m)	jaalumb				‘tongue’
báarə(ŋ)				bu-baariŋ	‘relative’
pú-fər (borr. Manjak *pə-fər*)					‘room’

Figure 149: Innovated /ə/ in Kobiana

It seems that a sort of centralization affected some words with +ATR mid vowels in some of Bainunk, with Gubëeher being most affected, and Guñaamolo to a lesser extent. An unrelated change reduced some (mainly high) vowels in non-initial syllables to schwa in Kobiana. While the reason that certain words were targeted by these processes and not others is unexplained, it is quite likely that /a̟/ in Bainunk and certainly /ə/ in Kobiana are innovations, and were not present in PBKK.

With few exceptions, Bainunk /i, u, e, o/ and /i̟, u̟, e̟, o̟/ correspond straightforwardly to Kobiana /i, u, e, o/. The Kobiana lower-mid vowels /ɛ, ɔ/ are somewhat of a mystery. They are much less common than /e, o/, but are by no means rare. Many of them appear in borrowings, and some instances of long /ɛɛ, ɔɔ/ are the result of monophthongization of /ia, ai, ea, ua, au, oa/, but there are plenty of seemingly non-borrowed roots with /ɛ, ɔ/. It is conspicuous that only 3 such roots can be found with Bainunk cognates, with inconsistent vowel correspondences:

Kobiana	Gubëeher	Guñaamolo	
-mɛn		-min	‘lick’ (Guj. *-men*)
jakkɔ́cc	a-koos	a-koos	‘tick’
-mɔpp	-maapun	-mappun	‘touch/feel’

Figure 150: Bainunk cognates of Kobiana words with rare /ɛ/ and /ɔ/

It is unclear what to make of Kobiana /ɛ, ɔ/, but it should be stressed that they are not the standard reflexes of PBKK -ATR **e* **o*. These merged with +ATR **e̟* **o̟* as Kobiana /e, o/.

In most cases Bainunk and Kobiana cognates agree regarding vowel length, but there are a good number of inconsistencies. Even among Bainunk languages, one often has a long vowel where another has a short vowel.

Gub.	Guñ.	Guj.	Ko.	Ka.	
ba-ka̟r	ba-ka̟r	ba-ka̟r	bakkáar	bakaad	‘chicken’
u-di̟igen	u-di̟igeen	u-dige̟en	ú-ligee(n)	u-lien	‘man’
-da̟ak	-de̟k	-dek~da̟k	-l~ndekk	-l~ndek	‘do/walk’
ji-fek	ji-fekk	ji-fek	jifèekk	jifeeh	‘pig’
ja-moot	ba-mott	ja-mot	ja-móott		‘cotton (threads)’[68]
gu-heen	gu-yenn	ba-yen	gí-yeen		‘charcoal/ember’
gu-tuma	ka-tu̟uma		á-ttuuməha	-r~tumura ‘tell’	‘story’
-xa̟ab	-ka̟b	-ka̟b	-h~kkobb	-h~kob	‘chew/eat’
-ña̟aj	-ñe̟j	-ñic	(-nejj)	(-nej)	‘wash clothes’
-ye̟eg		-yeg	-yeg	-yeg	‘hear/understand’
-cex	-keeh	-ceex	-h~kkɛkk		‘castrate’
-wor	-wor	-wor ‘lay’	-woos		‘drop’
	-niir		-nis	-nis	‘die’
-xur		-kur	-h~kkuus		‘thread beads’
-wooj		-woj	-woz		‘dig’

Figure 151: Vowel length discrepancies within Bainunk-Kobiana-Kasanga

The explanation for these discrepancies is unknown. There are additionally a number of roots with differences in vowel quality, but none of these are supported by more than one or two cognates.

Kasanga vowels generally line up with those of Kobiana (though based on Wilson’s transcription we cannot be sure whether /ɛ, ɔ/ existed as distinct from /e, o/). The only notable difference is that many Kasanga words have /o/ where Kobiana has /e/ or /a/.

Kasanga	Kobiana	Bainunk	
a-jof	a-jjéf	Gub. bu-jof	‘forest’
u-nom	ú-nam	Gub. u-nam	‘king’
bu-no	bu-négg	Gub. bi-ne̟g	‘day/sun’
-f~pog	-f~ppeg	Guñ. bu-fe̟g	‘see’
gu-joon	gu-zén	Guj. gu-ja̟nd	‘truth’ (Joola Fonyi *ma-joon*)
-r~toot	-h~ttaatt	Gub. -toot	‘pick up’
u-lof	u-léf	-def ‘be old’	‘older sibling’
-j~njor	-z~njeh	Guj. -jor	‘be smart’ (Guj. borr. Ka.?)
ko-mbol	wal		‘child’
a-dom	a-ddém		‘chin’
gu-rofo	gu-háf		‘foot’ (and Ko. *a-ttáfo* ‘palm’)
furop	frepp		‘pigeon’[69]
-b~mbog	-b~mbeg		‘do’
-mok	-makk		‘paddle’

Figure 152: Kasanga /o/ for Kobiana /e/ or /a/

[68] This is a *Wanderwort* in the region, and the Guñaamolo form must be borrowed, since native Bainunk word-final /t/ is /r/ in Guñaamolo (see Figure 167).

[69] Probably borrowed from Joola, cf. Kasa *e-leh* (/h/ < *f), Kwaataay *hu-le̟eban*.

The evidence from Bainunk cognates is inconclusive. No totally regular environment can be found for these correspondences, though there is usually an adjacent labial consonant, suggesting an assimilatory change in Kasanga to /o/ in most of these words.

3.1.2 Consonants

The reconstructed consonant inventory of PBKK is given below, along with the regular outcomes of each sound in Kobiana, Kasanga, and Bainunk Gubëeher (# indicates a word boundary, to note regular outcomes in initial or final position).

PBKK				Kobiana			
*p~ɸ	*t~r̥	(*c~ʃ)	*k~x	#p, f	#t, h	(s)	#k, h
*f		*s	*h	f		s	w, y, Ø
*pp	*tt	*cc	*kk	pp	tt	cc	kk
*b	*d	*j	*g	b	#d, l	#j, z	g
*w	*l *r	*y		w	l r	y	
*bb	*dd	*jj	*gg	bb	dd	jj	gg
*m	*n	*ñ	*ŋ	m	n	ñ	ŋ

Kasanga				Gubëeher			
#p, f	#t, r	(s)	#k, h	#p, f?	#t, l	(s)	#k, x
f		s	w, y, Ø	f		s, r#	h
p	t	c	k	p	t	c	k
b	#d, l	j	#g, Ø	b	d, r#	j	g
w	l d	y		w	l r	y	
b	d	j	g	b	d	j	g
m	n	ñ	ŋ	m	n	ñ	ŋ

Figure 153: Proto-Bainunk-Kobiana-Kasanga consonants and their reflexes

It is quite possible that a series of geminate nasals and *ll also existed, based on their occurrence in Guñaamolo. There would have also been voiced prenasalized stops, though these could be considered consonant clusters. Voiceless prenasalized stops (NT) were probably rare. Tautomorphemic NT is rare in Bainunk as well as Kobiana (and practically absent in Kasanga), and found most often in borrowings. Note however that sequences of a prefix-final nasal and a following obstruent would have been quite common.

3.1.2.1 Voiceless stops and their lenited allophones

The development of the voiceless stop series is of particular interest. There is evidence that these phonemes were realized as stops word- and in some cases stem-initially, and fricatives elsewhere. This allophony can be most clearly seen in the coronal phoneme *t~r̥. Word-initially, a stop realization [t] can be reconstructed for two noun class markers. In all other positions, there is a correspondence set /l:h:r/ for Bainunk, Kobiana, and Kasanga respectively. It is clear from synchronic alternations in Kobiana-Kasanga, as well as comparison with other Atlantic languages[70], that this represents earlier [t], which was lenited non-initially.

PBKK *t~r̥	Gub.	Guñ.	Guj.	Ko.	Ka.	
*ta-	ta-	ta-	(w)ta-	ta-I	ta-	NC prefix
*tiN-	tiN-	tiN-		ti-III	ti-	NC prefix
*-r̥ak(k)	si-lax	si-lah	ci-lax	ji-hákk	ji-rek	'hand'
*-r̥ax	-lax	-lah	-lax	-h~ttah		'take/grasp'
*-r̥ax	-lax		(b)-lax	-h~ttah		'forge'
*-r̥iin	-liin		-liin	-h~ttii(n)		'weave'
*-r̥im	-lim		-lim	-h~ttim	-r~tim	'rain'
*-r̥ox	-lox			-h~ttoh		'be much'
*-r̥uf	-luf	-luf	-luf	-h~ttuf	-r~tuf	'sew'
*-r̥uf	gu-luf	gu-luf	cil-luf	sá-ntufa	sa-tufa	'leaf'
*-r̥ar̥	ha-lall	ha-lall	(b)ha-lal	ku-héh	-raar	'three'
*-kVr̥	-ciil	-kiil	(b)-kil	-h~kkeeh	-h~keer	'laugh'
*-fir̥	-fil			-f~ppih		'carve'
*si-ggi̟r̥	si-ji̟l	si-gi̟l	ci-gil	sí-ggəh	si-gir	'eye'
*-ur̥	-ul	-ul	-ul	-əh	-r	'reversive'
*ku-Vr̥	kuul	kuul		kooh	hoor	'fire'
*-ñiir̥	-ñiil	-ŋiil		-ñiih		'blow nose'
*-nuumur̥	-nuumul	-nuumul	-numul	-nuuməh		'breathe'
*-ŋar̥	-ŋal		-ŋal	-ŋah	-ŋar	'bite'
*-wu̟r̥u(n)d	a-wu̟lur	a-wu̟lul	a-wulund	jóohund	jawurund	'fly (insect)'
*gu-r̥igVn	gu-lihan		gu-lige̟n	gi-híge(n)	gu-rien	'firewood/stick'
*ji-har̥V	ji-hala			jéeho		'monitor lizard'

Figure 154: Proto-Bainunk-Kobiana-Kasanga *t~r̥

The lenited realization of this phoneme was likely a liquid, based on the Bainunk and Kasanga reflexes, but could not have merged with *l or *r, which have different reflexes. The most likely candidate would seem to be a voiceless rhotic [r̥], which could also easily develop to [h] in Kobiana. Support for this phonetic reconstruction comes from Manjak borrowings with /t͡r̥/. These have /h/ in modern Kobiana, e.g. Manj. *bə-fɛ́t͡r̥ar* 'friend' → Kob. *bu-fɛ́hɛr*, Manj. *u-wɛjət͡r̥* 'mind' → Kob. *u-wɛ́zah*, which would be natural when Kobiana still had a pronunciation [r̥] for this phoneme. In Kasanga this sound is borrowed as /r/, e.g. Manj. *-buət͡r̥* 'fish with line' → Kas. *-b~mboor*, Kob. *-b~mbooh*, probably borrowed into Proto-Kobiana-Kasanga as **-b~mboor̥*. The PBKK root **-r̥ax* 'forge' is a Manjak borrowing, cf. modern *-t͡r̥ak*, which can be reconstructed for Proto-Manjak-Pepel-Mankanya with the same form. The development of a voiceless rhotic is an areal feature of the region south of the Casamance river. Besides being found in Manjak, it is found in in the closely related Mankanya and Pepel, for which (Pepel) Doneux transcribes [r̥s], a "dental affricate with voiceless apical closure"

[70]

PBKK	Other Atlantic	
*si-ggír̥	Wolof gët	'eye(s)'
*-ñiir̥	Ser. ñiit-oox	'blow nose'
*-ŋar̥	Ser. ŋat	'bite'
*-r̥ar̥	Fula tati	'three' (Bantu *tátù)

(1975b: 4). Wilson (2007: 48) reports that Joola Felup has "an unvoiced retroflex fricative with a flap release" which developed from earlier [t], and Joola Eegimaa has a sound transcribed as [ȶ] or [ʈ] as the lenited allophone of /t/ which likely represents something similar. In the Bijogo language of Guinea Bissau, Segerer (2000: 19) identifies the phoneme /ʈ/ as a voiceless prepalatal retroflex occlusive that evokes English /tɹ/. The lenition of [t] to [ɾ̥] can also be reconstructed for Proto-Tenda (see chapter 5). The realization of PBKK *t~ɾ̥ after a nasal is not entirely clear. The sequence *N-t develops to grade III /tt/ in Kobiana-Kasanga, suggesting that it was realized as a stop post-nasally. However, no Bainunk language shows a post-nasal /l/ → /t/ alternation as would be expected if *t had remained a stop after a nasal (cf. Gubëeher post-nasal /x/ → /k/). Thus, it is likely that the lenited allophone was used even after nasals, and re-hardened in Kobiana-Kasanga.

Velar *k~x exhibited a similar alternation, though in this case the stop realization must have been retained in stem- as well as word-initial position, like in modern Guñaamolo and Gujaher[71]. In Gubëeher as well as Kobiana-Kasanga, all post-vocalic tokens of *k eventually spirantized. The spirant allophone became [h] in Guñaamolo and Kobiana-Kasanga, but in Gubëeher and Gujaher it remained [x]. In Gubëeher and Gujaher [x] remains distinct from [h], the unchanged reflex of original *h.

PBKK *k~x	Gub.	Guñ.	Guj.	Ko.	Ka.	
*kaN-	kaN-	kaN-	kaN-	ka-III	ka-III	NC prefix
*ran-kund	a-kund	ran-kund	ran-kund	sa-kkún	sa-kun	'scorpion'
*ran-kulunx	ran-kuluux	ran-kulu	bu-kulunk		sa-kulunk	'rooster'
*-kǫbb	-xa̧ab	-ka̧b	-ka̧b	-h~kkobb	-h~kob	'chew/eat'
*-kụdd	-xụd	-kụdd	-kud	-h~kkudd		'cover'
*-ku(u)s	-xur		-kur	-h~kkuus		'thread beads'
*-ke(e)cc	-xeec 'write'				-h~kec 'carve'	
*gu-kunum	gu-xunum	gu-kunum	gu-kunumb	a-kkúnu(m)	gu-hulumb	'finger'
*-dox	-dox	-doh	-dox	-l~ndoh	(-l~ndog)	'be short'
*doxo	bu-doxo	doho	doxo	(dogó(n))	doho	'work'[72]
*-ɾ̥ax	-lax	-lah	-lax	-h~ttah		'take/grasp'
*-ɾ̥ax	-lax		(b)-lax	-h~ttah		'forge'
*-ɾ̥ox	-lox			-h~ttoh		'be much'
*gu-yaxum			(w)gu-yaxum	gi-yáhəm	(gu-yagm)	'thorn'
*-bax		bu-bah	bu-bax	a-bbáh		'leg'[73]

Figure 155: Proto-Bainunk-Kobiana-Kasanga *k~x

In Gubëeher /x/ hardens to /k/ after a nasal (e.g. *bu-xa̧ab* 'chew,' *sin-ka̧ab* 'eat'), or more accurately never lenited. It must be noted that the Bainunk variety recorded in D'Avezac seems to have stops in all positions for this phoneme (e.g. <*callac*> 'forge' vs. Gub. *ka-lax*). However, the author also records original *h as a stop (e.g. <*haquar*> 'meat' vs. Gub., Guñ.

[71] There are however two instances of root-initial *k that correspond to Guñaamolo /h/ rather than /k/: Guñ. *-ha̧j* = Gub. *-xa̧aj* 'hang,' and Guñ. *-hị̧ir* 'fly' = Gub. *-cị̧r* 'jump.' These are greatly outnumbered by Guñaamolo /k/-initial roots from *k. In general, Guñaamolo root-initial /h/ can derive only from *h, and corresponds to Gubëeher /h/.
[72] Borr. Manding, cf. Mandinka *doo*.
[73] Guñaamolo 'calf,' Gujaher 'thigh.'

a-har), and also often for Wolof and Sereer uvular [χ]. Thus the realization of original *k in this variety may well have been a back fricative in non-initial position, or else all back fricatives were hardened regardless of their origin.

The phonetic realizations of the labial voiceless stop are more difficult to reconstruct with certainty. There was a distinction between *f and *p which existed at least in word-initial position, as in all of the modern languages. In non-initial position, *p most likely had a spirantized allophone, in parallel with the coronal and velar stops. Some evidence for this lenited realization is that non-initial *p developed to *f in Kobiana-Kasanga, as singleton [p] no longer exists in Kobiana except initially. However, it is impossible to know for certain whether this allophony existed in the proto-language, since any correspondence set containing [f] in all languages could simply be traced back to *f rather than *p. It is nonetheless suspicious that a number of roots which seemingly contain *f can be reconstructed for PBKK, while not a single root containing singleton *p can be reconstructed.

PBKK *f/*ɸ	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-fu̟d	-fu̟r	-fu̟rap	-fur	-f~ppul	-f~pul	'leave'
*ji-fe(e)kk	ji-fek	ji-fekk	ji-fek	jifèekk	jifeeh	'pig'
*-fuus	-fuur		-fuur	-f~ppuus	-f~puus	'be bitter'
*gu-fVgVC	gu-fi̟geet	gu-feger	gu-figu	gu-fíigaal	gu-fial	'horn'
*-feg		-feg		-f~ppeg	-f~pog	'see'
*-fubb			$^{(w)}$fub-ax	-f~ppubb	-f~pubb	'pour'
*-fir̥	-fil			-f~ppih		'carve'
*-def	-def	-def	-def	-l~ndef		'be old'
*bV-gof	bu-gof	bi-gof	bu-gof	bu-góf	bu-gof	'head'
*-jof	bu-jof	bu-jof	bu-jjof	a-jjéf	a-jof	'forest'
*-keefur̥	-keeful	-kuuful		-h~kkeefəh		'peel'
*-r̥uf	-luf	-luf	-luf	-h~ttuf	-r~tuf	'sew'
*-r̥uf	gu-luf	gu-luf	cil-luf	sá-ntufa	sa-tufa	'leaf'
*-naaf	-naaf		-naaf	-naaf		'cultivate'

Figure 156: Proto-Bainunk-Kobiana-Kasanga *f *or* *ɸ

Furthermore, the relatively low frequency of /p/-initial noun roots in Gubëeher is similar to that of /t/- and /k/-initial roots when compared to the frequency of /f, l, x/-initial roots (see section 4.1.4). This would suggest that *p, like *t (and in Gubëeher and Kobiana-Kasanga *k), was subject to spirantization in non-word-initial position. The spirantized allophone may have simply been [f], merging with *f, but might very well have remained distinct at first as [ɸ], just as in modern Joola Eegimaa (see Figure 171), before eventually becoming [f]. The existence of *p as distinct from *f in word-initial position is confirmed by the unrelated Kobiana class markers *pa-* and *fa-*. There are certainly many tokens of /p/ in Bainunk, but most if not all of these could be from *pp.

The status of *c is even less certain than that of *p. It is possible that it did not even exist, as in Kobiana. There is not a single reconstruction with singleton *c, nor any prefix in one of the modern languages that obligatorily contains /c/. In Gujaher however there are prefixes of the form *ci-* and *ciN-* (sometimes *ki-* and *kiN-* in Bühnen and Wilson's lists). These same prefixes appear as *si-* and *siN-* in other Bainunk languages and Kobiana-Kasanga, suggesting that these prefixes already optionally palatalized in the proto-language (see section

6.1.8 for more on these particular prefixes). There is also the cognate for 'tick' which may contain *c~ʃ: Kobiana *jakkɔ́cc* = Gub., Guñ. *a-koos*. Like some other cognates, there appears to be a discrepancy in both consonant and vowel length, which could be explained by an original form **-konc* [-konʃ] in which the nasal was lost with compensatory lengthening of the vowel in Bainunk. The final consonant could not have been *s, as this develops to /r/ word-finally in Bainunk. If *c did exist, its fricative allophone was likely [ʃ] (just as in Joola Eegimaa). Of course it is unsatisfying to reconstruct a phoneme on the basis of a single cognate, and the fact that the Kobiana form of 'tick' contains /ɔ/ suggests that it may be a borrowing (though there is no obvious source). Furthermore, if [ʃ] did exist in the proto-language and developed to Bainunk /s/, we would expect to find word-final s:s correspondences between Bainunk and Kobiana-Kasanga, but these do not exist. Setting aside 'tick,' it may simply be that *c did exist (pronounced as [ʃ]), and merged with *s in all environments.

3.1.2.2 Geminates

Original geminate stops remain stops in all of the modern languages. They degeminated in Gubëeher, Gujaher, and perhaps Kasanga, as well as Guñaamolo in root-initial position. In other positions, Guñaamolo seems to show inconsistent gemination. Gubëeher and Gujaher also have geminates in certain words, but these are rare. In Gubëeher vowels are lengthened before an original voiced geminate in some words.

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-mVpp	-maapun	-mappun		-mɔpp		'touch'
*-sapp			$^{(w)}$-sap	-s~ccapp		'drip'
*sim-mo(o)tt	sim-moot	si-mott		si-móott		'cotton thread'
*-ett	-(V)t	-Vr~ri	-t	-ett	-t	'venitive suffix'
*-ett	(-Vti)	-Vr	-t	-e(tt)	-t	'imperative'
*ba-wucc	ba-wuc	ba-wuc	ba-wuc	buucc	bo-wuc	'wind'
*-hucc	ra-wuc		ci-huc	u-wúcc	u-wuc	'palm tree'
*-wacc			$^{(w)}$ci-wac	si-wácc		'pond/spring'
*-de̟kk	-da̟ak	-de̟k	-dek~da̟k	-l~ndekk	-l~ndek	'go/walk'
*u-dikkaam	u-dikaam	u-dikaam	u-dikaam	ú-likkaa(m)	u-likaam	'woman'
*ji-fe(e)kk	ji-fek	ji-fekk	ji-fek	jifèekk	(jifeeh)	'pig'
*-ko̟bb	-xa̟ab	-ka̟b	-ka̟b	-h~kkobb	-h~kob	'chew/eat'
*-hu̟bb	-hu̟b	-wu̟bb	(-wobun)	-wubb	-wub-n	'bury'
*-fubb			$^{(w)}$-fub-ax	-f~ppubb	-f~pubb	'pour'
*ba-ggi̟dd	ba-ji̟d	da-gi̟d	ba-jid	bajjídd	ba-jid	'girl'
*-ŋo̟dd	-ŋood-un	-ŋo̟dd		-ŋudd	-ŋodd	'bend/fold'
*-se̟dd		ba-se̟dd	gu-ced	sá-ccedd	sa-ced	'skin'
*-wu̟dd		bu-wu̟dd	-wud(d)	á-wudd	-wudd	'abscess/swell'
*-ku̟dd	-xu̟d	-ku̟dd	-kud	-h~kkudd		'cover'
*-ñe̟jj	-ña̟aj	-ñe̟j	(-ñic)	(-nejj)	(-nej)	'wash clothes'
*bV-ne̟gg	bi-ne̟g		bu-na̟g	bu-négg	(bu-no)	'sun'

Figure 157: Proto-Bainunk-Kobiana-Kasanga geminate stops

The only sources of non-initial voiceless stops in Kobiana-Kasanga are geminate stops. This is also true in Gubëeher for /t, k/, and probably also for /p, c/. In Guñaamolo and Gujaher, /k/

can also be traced to singleton *k in root-initial position, but otherwise geminates are the only regular source of non-initial voiceless stops. The reason for the only sporadic retention of gemination in Guñaamolo (and to a much lesser extent Gubëeher and Gujaher) is unclear. Recall from Figure 142 that the singleton reflexes [c] and [d] are very rare, as are the geminate reflexes [bb, jj, gg], but for [p, pp], [t, tt], and [k, kk], there is a somewhat even split. Perhaps the best explanation is dialect mixture. It would I think be unwise to assume that these split reflexes necessitate the reconstruction of more contrasts in the proto-language.

There are a number of roots where languages seem to disagree on whether a final consonant is geminate or singleton. In general it is Bainunk that has the singleton reflex.

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-r̥ak(k)	si-lax	si-lah	ci-lax	ji-hákk	ji-rek	‘hand’
*-kaak(k)	gu-xaax			-h~kkaakk		‘mucus/expectorate’
*-se̟t(t)	mu-se̟l		mun-saal	ma-sétt	ma-seta	‘urine’
*-di̟t(t)	-di̟l	-di̟l	-dil	-l~nditt		‘fart’
*-yi̟d(d)	-yi̟r		-yir	-yíddəha		‘be dry’
*ji-fe(e)k(k)	ji-fek	ji-fekk	ji-fek	jifèekk	jifeeh	‘pig’

Figure 158: Bainunk-Kobiana-Kasanga discrepancies in consonant gemination

Discrepancies of this sort could be due to dialectal or free variation for some roots in the proto-language. Similar discrepancies are witnessed in the development of certain nasal-consonant sequences (see Figure 169).

3.1.2.3 *d, *l, and *r

Sound correspondences involving the voiced coronal sounds [d, l, r] are somewhat complicated, and require the reconstruction of three separate phonemes. The most common of these three is *d. This phoneme remains a stop word-initially, and in Bainunk stem-initially. In Kobiana-Kasanga, it develops to /l/ in all other positions, and in Bainunk to /r/ word-finally[74] (and perhaps also root-internally).

[74] This sound seems to remain /d/ in D’Avezac’s Bainunk: <*hoquoud*> ‘star,’ <*facquidi*> ‘monkey,’ <*hiffody*> ‘leave.’ However, final *r also appears as /d/ in this variety, and so final *d probably had developed to /r/ in all Bainunk before changing to /d/ in this variety.

PBKK *d	Gub.	Guñ.	Guj.	Ko.	Ka.	
*di̟in	di̟in	di̟in	diin	dii(n)		'year/rain/sky'
*doxo	bu-doxo	doho	doxo	dogó(n)	doho	'work'[72]
*di-	di-	di-	di-	di-I	di-	NC prefix
*diN-	diN-	diN-		di-III		NC prefix
*-de̟kk	-da̟ak	-de̟k	-dek~da̟k	-l~ndek	-l~ndekk	'walk/go'
*-def	-def	-def	-def	-l~ndef		'be old'
*-di̟g	-di̟g	-di̟gum		-l~ndigəm		'forbid'
*u-di̟(i)geen	u-di̟igen	u-di̟igeen	u-dige̟en	ú-ligee(n)	u-lien	'man'
*u-dikkaam	u-dikaam	u-dikaam	u-dikaam	ú-likkaa(m)	u-likaam	'woman'
*-di̟t(t)	-di̟l	-di̟l	-dil	-l~nditt		'fart'
*-dox	-dox	-doh	-dox	-l~ndoh	-l~ndog	'be short'
*-du̟g	-du̟g	-du̟gi	-dugu	-l~ndugu	-l~ndu	'steal'
*u-bad	u-ba̟r	u-ba̟r		wal	ko-mbol	'child'
*-gi̟d	-ji̟r	-gi̟r	-jir	-g~ngil		'run'
*-ki̟d	-ci̟r	-hi̟ir	-cir	-h~kkil	-h~kil	'fly'
*-ki̟d	fa-ci̟r	fa-kki̟r	fa̟kr	bɛɛl	behil	'monkey'
*-hVd		gu-huur	gu-hoor	a-wóol	gu-wol	'star'
*-fu̟d	-fu̟r	-fu̟rap	-fur	-f~ppul	-f~pul	'leave'
*u-d(i̟)	wu̟r	wu̟r	wur	ú-li	u-liŋ	'person'

Figure 159: Proto-Bainunk-Kobiana-Kasanga *d

The initial d:d and non-initial r:l sound correspondences are assumed to derive from the same original phoneme simply because they are in complementary distribution (and neither can be from *r or *l).

A separate phoneme *r is attested both stem-initially and non-initially, remaining unchanged in all languages but Kasanga, where it develops to /d/[75].

[75] Also apparently in D'Avezac's Bainunk: <*guiomoucodou*> 'lion,' <*baccod*> 'chicken,' <*boudonto*> 'ash.'

PBKK *r	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-rukkVnd	bu-rukand	ko-rikend	ba-dukondo	baddúkkend		'palm rat'[76]
*-ru̟gel-		a-ru̟gel	ci-ruga̟l	je-rúgeli		'(kapok) seeds'[77]
*-rVnr̥	bu-rot	bu-door	bu-dont	á-ddett		'ash'[78]
*ba-kka(a)r	ba-ka̟r	ba-ka̟r	ba-ka̟r	bakkáar	bakaad	'chicken'
*ji-muk(k)oor	ji-muxoor		ji-mukor	jimúkkoor	jimukoor[79]	'lion'
*-ur	-ur	-ur		-ər		'benefactive'
*-baariŋ		bu-baariŋ		báarə(ŋ)		'relative'
*u-laaCer		u-laamer		u-laaber	u-laabed	'elder/adult'
				=roo	=doo	'3rd sg. poss.'
				á-ro	a-do	'animal'
				gu-ŋúru	gu-ŋud	'fingernail'
				tá-ppe(r)	te-ped	'foot/leg'
				baazé(r)	baajed	'cow'
				-ñuru	-ñud	'be black'
				góorung	kodung	'front'
				-z~njer	-j~njed	'tie'
				-g~ngur	-g~nguud	'hide'

Figure 160: Proto-Bainunk-Kobiana-Kasanga *r

The class marker **raN-* which was lost in Kobiana-Kasanga suggests that this phoneme could appear also word-initially. It is conspicuous that outside of **-ru̟gel-*, the only unambiguous stem-initial **r* appears in a borrowing. It seems that **r* was rare in this position.

The third phoneme *l could also appear both stem-initially and non-initially, and remains unchanged in all languages.

[76] This root is probably borrowed from Joola (Eegimaa *e-rixinol*).

[77] 'Seed' in Guñaamolo and Gujaher, 'kapok seed pod' in Kobiana. The basic meaning of the root is 'seed' and receives its more specific meaning in Kobiana from the class prefix. *ja-* is the collective class for fibers/plants, and the kapok seed pod matures into a bundle of cotton-like fibers.

[78] The root initial consonant in all but Gubëeher derives from *dd, the gemination of *r, triggered by the original class of this noun *a^X-. When it was reassigned to *bu-* in Bainunk, the grade II consonant was retained from its original class. In Gubëeher, the initial consonant was eventually altered to /r/, as /d/ is not a regular initial consonant for the grade I class *bu-*. Thus this root should not necessarily be taken as historically *r-initial, since *dd is also the gemination of the more common *d. Nonetheless it is odd that Gubëeher chose /r/ rather than /l/ < *d as the innovatively regularized consonant. See section 4.1.4, especially Figure 178 for more on the development of root-initial geminates in Bainunk.

[79] The final /r/ is exceptional in Kasanga, so this is perhaps borrowed from Bainunk. While this word is found in Joola (Fonyi *ji-múkoor*, Kujireray *ji-muxoor*), this must be a borrowing from Bainunk, as *ji-* is a diminutive class in Joola, and a class for animals in Bainunk. This is the argument made by Cobbinah (2013: 467) for why Joola Eegimaa *ji-gaj* 'panther' must also be borrowed from Bainunk.

PBKK *l	Gub.	Guñ.	Guj.	Ko.	Ka.	
*ba-laas	ba-laar		ba-laar	bá-laas		'applause'
*-ladd	gu-laar	bu-ladd		ji-làdd		'clap/slap'
*ran-kulunx	ran-kuluux	ran-kulu	bu-kulunk		sa-kulunk	'rooster'
*-sankVl-	si-sankil		ci-sankạli	u-ccákkala		'kinkeliba'
*u-laaCer		u-laamer		u-laaber	u-laabed	'elder/adult'[80]
*gu-saal		gu-saal	(w)gu-sal	gú-saal	gu-saal	'side/rib'
*u-gVnaal	(u-jịnaer 'neighbor'?)		u-jinaal	ú-gunaal	u-jinaal	'guest/stranger'
*ba-gil ?			ba-jil	bé-gər	ba-gil	'pepper'
*ñungul			-ñungul	-ñungəl	-ñungul	'be dirty'

Figure 161: Proto-Bainunk-Kobiana-Kasanga *l

The evidence for *l is weaker than for *d or *r, as at least one of these roots is a borrowing ('elder' and perhaps 'kinkeliba'), and some show irregular correspondences ('guest, pepper'). Nonetheless its existence in Proto-BKK seems more likely than not, as the rest of these roots are solidly reconstructable, though few in number. There is no evidence that *l could have appeared word-initially except in an unprefixed verb.

In addition to *d, *l, and *r, the phonemes *t~r̥, and in Bainunk *s regularly develop to /l/ or /r/ in certain environments depending on the language, and geminate *dd always becomes /d/ or /dd/. Furthermore Bainunk word-final /t/ becomes /r/ in Guñaamolo. The sources of modern /d, l, r/ in each language can be summarized as follows:

	Word-initially:			Stem-initially:			Word-finally:		
	/d/	/l/	/r/	/d(d)/	/l/	/r/	/d(d)/	/l/	/r/
Bain.	*d	—	*r	*d, dd	*l, r̥	*r	*dd	*l, r̥	*s, d, r[81]
Ko.	*d	—	—	*dd	*l, d	*r	*dd	*l, d	*r
Ka.	*d	—	—	*dd, r	*l, d	*r̥	*dd, r	*l, d	*r̥

Figure 162: Sources of modern /d/, /l/, *and* /r/ *in Bainunk, Kobiana, and Kasanga*

3.1.2.4 Other consonant changes

The singleton voiced stops *b, *j, *g are unchanged in Bainunk, and thus generally merge with *bb, *jj, *gg. In Kasanga intervocalic /g/ is regularly deleted when not root-initial.

Kobiana	Kasanga	
ú-ligee(n)	u-lien	'man'
-l~ndugu	-l~ndu	'steal'
gu-fíigaal	gu-fial	'horn'
jigáaz	jiyaaj	'panther'

Figure 163: Deletion of intervocalic *g *in Kasanga*

[80] This root is a borrowing, possibly into Proto-BKK (cf. Bedik *lāɓàr*). However the irregular consonant correspondence suggests separate borrowings into Guñaamolo and Kobiana-Kasanga.
[81] Also *tt, *nr̥ in Guñaamolo

*b and *j apparently merge with *bb and *jj as in Bainunk. In Kobiana *b and *g are essentially unchanged, though often realized as fricatives [β, ɣ]. *j becomes /z/ in all but word-initial position.

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*ji-gaaj	ji-gaaj		ji-gaj	jigáaz	jiyaaj	'panther'
*-wo(o)j		-wooj	-woj	-woz	-woj	'dig'
*-kooj		-kooj 'strangle'		-h~kkooz		'be tight'
*-ŋeejah		-ŋeeja		-ŋeeza		'bend down'
*-saaj		-saaj	-saaj	-s~ccaazə(n)	-s~caaj	'heal/cure'
*gu-je̟nd			gu-ja̟nd	gu-zén	(gu-joon)	'truth'

Figure 164: Kobiana *j > z

Kobiana retains original geminates, and so none of these merge with the singleton voiced stops.

Nasals, *w, and *y are unchanged in all languages.

The back fricative *h was deleted or developed to /w/ or /y/ (depending on the following vowel) in Kobiana-Kasanga. It remained essentially unchanged in Bainunk, though in Gujaher it may have merged with /x/ in some words.

PBKK *h	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-haam	-haam		-haam/xaam	-waamóo(n)	-wamoon	'new'
*-heen	-heen	-heen	-heen	-yeen		'be wet'
*-hooŋ	-hooŋ	-hooŋ	-xooŋ	-woo(ŋ)		'cry'
*-hu̟(n)d	bu-hu̟ur	bu-hu̟ur	bu-hund	a-wúnd	bu-wund	'pestle'
*bu-hVVn	bu-huun		bi-huun	bu-wóo(n)	bu-woon	'back'
*-hVd		gu-huur	gu-hoor	a-wóol	gu-wol	'star'
*ji-har̥V	ji-hala			jéeho		'monitor lizard'
*-hucc ?	ra-wuc		ci-huc	u-wúcc	u-wuc	'palm tree'
*-hu̟bb ?	-hu̟b	-wu̟bb	(-wobun)	-wubb	-wub-n	'bury'
*gu-heen ?	gu-heen	gu-yenn	ba-yen	gí-yeen		'charcoal/ember'
*-ah	-ah	-aa	-ah	-a	-a	'anticausative/reflexive'

Figure 165: Proto-Bainunk-Kobiana-Kasanga *h

This change may have operated sporadically in Bainunk, as a few words have an /h/ vs. /w/ or /y/ discrepancy between Bainunk languages ('palm tree,' 'bury,' and 'charcoal').

In Bainunk, word-final *s becomes /r/.

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*-koos	bu-koor	bu-koor	bu-koor	a-kkóos	a-koos	‘country/village’
*bV-gi̟is	bi-ji̟ir	bi-gi̟ir	(w)bi-jiir	bi-gíis	bu-giis	‘face’
*-fuus	-fuur		-fuur	-f~ppuus	-f~puus	‘be bitter’
*bu-gu̟s	bu-gu̟r	bu-gu̟r	bu-gur	pu-gús		‘granary’ (Guj. ‘room’)
*gu-Cuus	gu-huur	gu-huur		gú-huuso		‘elbow’
*-wo(o)s	-wor	-wor	-wor ‘lay’	-woos		‘drop’
*-kas	ba-kar			-h~kkas		‘remove grass’
*ba-laas	ba-laar		ba-laar	bá-laas		‘applause’
*-ku(u)s	-xur		-kur	-h~kkuus		‘thread beads’
*gu-(C)o̟s-	gu-go̟or			góosu(n)		‘spoon sp.’
*-ni(i)s		-niir		-nis		‘die’

Figure 166: Word-final *s > r *in Bainunk*

As such there are no s:s correspondences word-finally between Bainunk and Kobiana-Kasanga[82]. There are many s-final words in modern Bainunk languages, and though many are identifiable as borrowings, most are of uncertain origin.

Bainunk word-final /t/ is /r/ in Guñaamolo. This change has affected /t/ arising from *tt as well as *nr̥ (‘feather, ash,’ see Figure 169).

Gubëeher	Guñaamolo	Gujaher	
bu-lu̟ut	bu-lu̟ur	bu-lu̟ut	‘termite mound’
bu-rot	bu-door	bu-dont	‘ash’
-put	-pur	-put	‘rot’
-teet	-teer	bu-teetum	‘(make) noise’
gu-ji̟it	gu-gi̟ir	gu-jiit, (w)gu-jint	‘feather’
gu-xa̟ba̟at	gu-ka̟ba̟la̟ar	gu-ka̟baat	‘jaw’
ja-ri̟it	sin-di̟ir	cin-di̟it	‘intestine’
gu-fi̟geet	gu-fe̟ger		‘horn’
-du̟ut	-du̟ur		‘faint’
bu-li̟it	bu-li̟ir		‘piece of cloth’
gu-ma̟nga̟at	gu-ma̟nga̟ar		‘door’
gu-xoyot	gu-koyor		‘fingernail’
ja-raat	ja-raar		‘grease/fat’

Figure 167: Bainunk word-final /t/ = Guñaamolo /r/

As such, final /t/ is rare in Guñaamolo, and seems to always be the result of borrowing. However note that imperative *-Vr* from **-ett* becomes *-t* after a nasal, and venitive *-Vr~ri* from **-ett* becomes *-ti* in this environment.

Velar stops are palatalized before front vowels in Gubëeher with few exceptions, and also usually in Gujaher (though not in Bühnen’s wordlist). Note that when palatalization takes place, it prevents the spirantization of root-initial *k in Gubëeher. Palatalization also seems to

[82] There are two such correspondences between a Gujaher and Kobiana-Kasanga word: Guj. *ran-kas*, Ko. *sa-kkás*, Ka. *sa-kas* ‘roof’; Guj. *gu-fas*, Ko. *gú-fas* ‘brush (high grass)’. The fact that these do not appear in other Bainunk languages suggests that they were borrowed in Gujaher from Kasanga, or perhaps both were borrowed from some other source.

have occurred in at least one word in Kobiana-Kasanga, ‘girl’ (Gutobor, Gufangor, and Gubelor (Bühnen 1988) all have /g/ in addition to Guñaamolo).

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*sin-keem	sin-ceem		bu-ceem	si-kkéem	-h~keem	‘sleep’
*-kVr̥	-ciil	-kiil	ciil	-h~kkeeh	-h~keer	‘laugh’
*sin-kind	sin-cind	sin-kind	cin-cind	si-kkínd	si-kind	‘rope’
*-ki̟d	-ci̟r	-hi̟ir	-cir	-h~kkil	-h~kil	‘fly’
*-ki̟d	fa-ci̟r	fa-kki̟r	fa̟kr	bɛɛl	behil	‘monkey’
*gu-ñan-kind	gu-cind	ñankindeŋ	gu-ñankin	gu-ñíkkə(n)	gu-ñikən	‘nose’
*bV-gi̟is	bi-ji̟ir	bi-gi̟ir	(w)bi-jiir	bi-gíis	gu-giis	‘face’
*si-ggi̟r̥	si-ji̟l	si-gi̟l	ci-gil	sí-ggəh	si-gir	‘eye’
*-gi̟d	-ji̟r	-gi̟r	-jir	-g~ngil		‘run’
*ja-ge̟nd	ja-ja̟nd	ja-ge̟nd	je-gen, cin-ja̟n	je-gé(n)	je-gen	‘hair’
*ba-ggi̟dd	ba-ji̟d	da-gi̟d	ba-jid	bajjídd	ba-jid	‘girl’
*-kiina	-ciina	-kiina	-ciina	-s~cciina		‘beg’
				génde(ŋ)	jendeen	‘night’
BUT						
*-ke(e)cc	-xeec~keec ‘write’				-h~kec ‘carve’	
*-keefur̥	-keeful	-kuuful		-h~kkeefəh		‘peel’
*-je̟gen	je̟geneŋ	je̟geneŋ	jegen		á-jjege(n)	‘(in the) middle’
*u-di̟(i)geen	u-di̟igen	u-di̟igeen	u-dige̟en	ú-ligee(n)	u-lien	‘man’

Figure 168: Velar stop palatalization in Bainunk

While a very common change cross-linguistically, velar palatalization is otherwise not found in the Northern Atlantic languages outside of Bak (and perhaps Biafada-Pajade). It is found in a number of Joola languages, including Fonyi and Eegimaa.

Final prenasalized stops develop somewhat irregularly. In some cases they are unchanged in all languages, but in others the final stop is lost (most often in Gujaher and Kobiana-Kasanga). In still others, Gubëeher and Guñaamolo lose the nasal, generally with compensatory lengthening of the vowel. Similarly, there were some sequences of a nasal followed by a voiceless obstruent (tentatively reconstructed with their continuant allophones) which underwent loss of the nasal with compensatory lengthening in Gubëeher and Guñaamolo, while regularly forming geminates in Kobiana-Kasanga, and (often) prenasalized stops in Gujaher. There is one root ‘dark’ that suggests a proto-sequence **nr*.

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*sin-kind	sin-cind	sin-kind	cin-cind	si-kkínd	si-kind	‘rope’
*-bamb	-bomb	-bamb	-bamb	-b~mbamb		‘carry child’[83]
*-ning		-ning	$^{(w)}$-ning	sa-níngəneh	‘mirror’	‘look at’
*ran-kund	a-kund	ran-kund	ran-kund	sa-kkún	sa-kun	‘scorpion’
*(ku-)ho-nj	honj	honj	honj	koñ	honj	‘thing’
*ja-ge̟nd	ja-ja̟nd	ja-ge̟nd	je-gen, cin-ja̟n	je-gé(n)	je-gen	‘hair’
*-ñan-kind	gu-cind	ñankindeŋ	gu-ñankin	gu-ñíkkə(n)	gu-ñikən	‘nose’
*-hu̟(n)d	bu-hu̟ur	bu-hu̟ur	bu-hund	a-wúnd	bu-wund	‘pestle’
*-wu̟r̥u(n)d	a-wu̟lur	a-wu̟lul	a-wulund	jóohund	jawurund	‘fly (insect)’
*-mi̟(n)d	-mi̟ir	-mi̟ir		-minda		‘resemble’
*ji̟(n)g	ji̟ig		$^{(w)}$anjing	jíngaɲe	jing	‘this year’
*-wu̟(n)g		a-wu̟ug	a-yuŋ	joong	jowung	‘mosquito’
*-ko̟(n)j		gu-ko̟oj	gu-konj	a-kkónj	a-konj	‘calabash’
*-kV(n)d	bu-xa̟ar	bu-ka̟ar	bu-kund			‘fence/garden’
*gu-bV(n)d	gu-ba̟ar	gu-ba̟ar	gu-ba̟nd			‘wing’
*ran-kulunx	ran-kuluux	ran-kulu	bu-kulunk		sa-kulunk	‘rooster’
*ran-gVnx	ran-gu̟ux		ran-guux	sa-ngòokk		‘crab’
*-di̟nx	si-di̟ix	si-di̟ih	ci-dix	a-ddíkk	bi-lik	‘leg’ (KK ‘thigh’)
*-rVnr̥	bu-rot	bu-door	bu-dont	á-ddett		‘ash’
*-gi̟nr̥	gu-ji̟it	gu-gi̟ir	gu-jiit, $^{(w)}$gu-jint			‘feather’
*-konʃ	a-koos	a-koos		jakkɔ́cc		‘tick’
*-munr(-ur̥)	-mundiin	-murul		-muddəh	-mudd	‘be dark’

Figure 169: Development of Proto-Bainunk-Kobiana-Kasanga prenasalized consonants

D’Avezac’s list records <*quidinqui*> ‘leg,’ which confirms the nasal in this word.

3.1.3 Joola influence

The Joola languages are spoken in much the same area as Bainunk, Kobiana, and Kasanga, in the Western Casamance region of Senegal and in northwestern Guinea Bissau. Though traditionally both classified as “Atlantic,” these two families are at best extremely distantly related, with Joola being part of the larger Bak group including Balanta and the Manjak cluster, and BKK being most closely related to Wolof, though even this relationship is very distant. Throughout the history of Bainunk, Kobiana, and Kasanga, the Joola languages have exerted an extremely strong influence (and perhaps vice versa), and these languages have come to share many linguistic features. Knowledge of one or more Joola languages is normal for speakers of BKK languages. Cobbinah (2013: 52) reports that Gubëeher speakers are proficient from childhood in both Joola Kujireray and Joola Eegimaa (both part of the larger Banjal group). Many Kobiana speakers have knowledge of Joola Felup (aka Ejamat), though in recent history the influence of Joola has been less than that of Manjak. It is reasonable to

[83] Likely borrowed, cf. Manjak *bamb*

assume that multilingualism has been the norm in this area for a very long time, perhaps even at the stage of PBKK.

There are a sizable number of borrowings between Joola and BKK languages, including a number of borrowings into PBKK.

J. Eegimaa	Joola Fonyi	Gubëeher	Guñaamolo	Kobiana	
ba-ccam	ba-caam	ba-caam	ba-caam	ba-ccáa(m)	'money/payment'
-pu̟r	-pu̟r	-fu̟r	-fu̟rap	-f~ppul	'leave'
-boñ	-boñ	-bu̟ñ		-b~mbuñ	'send'
-may	-may	-may		(Ka. -may)	'left' (also Manjak)
e-tuxun		tukund	tuhun	á-ttuu(n)	'turtle'
fu-ñal	ju-ñaal	a-ñaal		ú-ñal	'earthworm' (&Manj.)
	e-ñal	a-ñal	ku-ñaala		'intestinal worm'
e-mu̟nduŋo	e-mu̟nguno	mu̟ndum	mu̟dum	muddú(m)	'hyena'
pe	pe	pe		pɛ	'all'
-um (V→N)	-um	-um (V→V)	-um	-ə(m)	'instrumental (appl.)'
	-ceek	-cex	-keeh	-h~kkɛkk	'castrate'
	-ŋaaŋ	-ŋaaŋun		-ŋaaŋ	'open mouth wide'
fu-boŋ	fu-boŋ	bu-bong	bu-boŋ		'thigh'
ga-moy	ka-moy	gu-moy	gu-moy		'eyelash'
-lob	-lob	-lo̟b	-lo̟b		'speak'
-ssaw		-saw	-saw		'hunt'
bu-nunux		si-nunuxen			'tree'
ga-tegel	ka-tekel			ka-ttɛkkál	'basket'
	e-kombe			ú-nkɔmbɛ	'seashell'

Figure 170: Borrowings between Joola languages and Bainunk-Kobiana-Kasanga

While the overall percentage of borrowed vocabulary in any given language is never remarkably high, the words that are borrowed often include basic vocabulary items like body part terms, in addition to more expected loans like cultural terminology. In the noun class system, phonologically similar classes across the two families sometimes share functions (*ba-* as a collective class, *gu-* as the class for languages), and a few Joola noun classes (*fu-* and *e-*) have even been borrowed into Gubëeher.

Similarities in the phonological domain are especially noteworthy, as they show that many of the properties discussed in sections 3.1.1 and 3.1.2 are areally-influenced. The vowel systems of Gubëeher and Guñaamolo are essentially identical to that of Joola Fonyi and Eegimaa, having 5 +ATR and 5 -ATR vowels, long and short (though Joola Eegimaa lacks vowel length). ATR harmony operates across the entire word in all of these languages. The similarities in the consonant systems are particularly relevant to this study. The consonant inventory of Joola Eegimaa (Sagna 2008: 72, 85-94) is presented below alongside the reconstructed inventory of PBKK (with the geminate nasals and *ll based on Guñaamolo evidence).

Joola Eegimaa				Proto-Bainunk-Kobiana-Kasanga			
p~ɸ	t~ƫ[84]	c~ʃ	k~x	*p~ɸ	*t~r̥	(*c~ʃ)	*k~x
pp	tt	cc	kk	*pp	*tt	*cc	*kk
b~β	d~r	j~ʝ	g~ɣ	*b	*d	*j	*g
bb	dd	jj	gg	*bb	*dd	*jj	*gg
f	s			*f		*s	*h
ff	ss						
w	l	y		*w	*l, *r	*y	
ww	ll	yy			*ll		
m	n	ñ	ŋ	*m	*n	*ñ	*ŋ
mm	nn	ññ	ŋŋ	*mm	*nn	*ññ	*ŋŋ

Figure 171: Similar consonant inventories of Joola Eegimaa and PBKK

Prenasalized stops could also be included for each language. These systems are quite strikingly similar. Two features are of particular importance: the allophonic realization of singleton stops as fricatives, and the full set of geminate consonants. In Joola Eegimaa, the fricative allophones are found post-vocalically (Bassene 2012: 118), which means in effect that the stop allophones are found only word-initially and post-nasally, as other clusters are in general not permitted. This is the same situation reconstructed for the PBKK voiceless stops, though they were probably lenited even post-nasally, and *k was still a stop in root-initial position. While the voiced stops did not have lenited allophones in PBKK, these developed in Kobiana, and *d became /r/ word-finally in Bainunk (and /l/ post-vocalically in Kobiana-Kasanga). In Eegimaa, geminates as well as singletons can appear root-initially. There are no alternations between singletons and geminates, and the presence of geminates is not conditioned or even statistically influenced by any morphological factor like noun class. Gemination was certainly a feature of earlier stages of Joola, and while the history of singleton lenition is not as clear, it is far from exclusive to Eegimaa. It certainly seems that that there is an areal tendency for two sets of stops, one geminated, and one lenited.

One final feature of interest is one that has played a crucial role in the development of the phonological systems of languages not only in the Casamance region, but more broadly in all of the Northern Atlantic languages. Joola languages in general do not tolerate consonant clusters with the exception of nasal-stop sequences. One particular phenomenon which serves to preserve this restriction is consonant assimilation or deletion in reduplication. In Eegimaa, a final voiced consonant (but not /y, w/) will assimilate to the following root-initial consonant, creating a geminate. In the case of a nasal preceding a voiced stop, a prenasalized stop will result. Other preceding consonants simply delete.

[84] It is unfortunately not made clear in either Sagna (2008) or Bassene (2012) what the phonetic realization of this lenited allophone is. Sagna, who uses the symbol [ƫ], only mentions that it is the "lenited form of the voiceless alveolar stop" (85), and Bassene gives no special comment, but treats all lenited allophones as the outcome of spirantization. The symbol < ƫ > is commonly used in Manjak and Mankanya to represent the sound [t͡r̥], though its pronunciation varies by dialect, being sometimes [ts, tʃ, s]. Interestingly, in Egimaa this sound becomes [l] root-finally before a vowel (Bassene 2012: 131-133), recalling the change *r̥ > l in the history of Bainunk.

n-a-ɸu̟r-ɸur	→	naɸu̟ppur	'(s)he went out'
n-a-βer-βer	→	naβebber	'(s)he laughed'
n-a-ral-ral	→	naraddal	'(s)he threw'
n-a-xam-xam	→	naxakkam	'(s)he chased'
n-i-βoñ-βoñ	→	niβomboñ	'I sent'
n-a-rem-rem	→	narendem	'(s)he drank'
n-a-ɸaɸ-ɸaɸ	→	naɸaɸaɸ	'(s)he dusted'
n-a-xox-xox	→	naxoxox	'(s)he tied'
n-a-βoy-βoy	→	naβoβoy	'(s)he defecated'

Figure 172: Joola Eegimaa cluster simplification in reduplication (Sagna 2008: 95-97)

In Fonyi (Sapir 1965: 16-17), most root-final consonants are simply deleted before another consonant, while nasals assimilate in place to a following stop or nasal. Taken as diachronic changes, we will see that the processes seen in Figure 172 parallel very closely the origin of grade II and III mutation in the history of Kobiana-Kasanga, down to the development of voiceless geminates from *NT sequences. We saw in chapter 2 that the same sorts of changes were responsible for the development of mutation in Fula and Sereer, and we will see that the same is true for the Tenda languages in chapter 5. The Joola phenomenon exemplifies an areal tendency towards simplification of consonant clusters which often results in geminates and prenasalized stops. It is exactly these changes that gave rise to the Atlantic mutation systems.

4 Historical account of mutation

While operating as a unified three-grade system synchronically, the development of grade II and grade III mutation in Kobiana-Kasanga are completely distinct. Grade II mutation (gemination) already existed in Proto-Bainunk-Kobiana-Kasanga, being triggered by a few noun class prefixes. Grade III mutation arose in Kobiana and Kasanga from morpheme-final nasal segments present in PBKK. Section 4.1 will examine grade II mutation, its status in the proto-language, and why it was lost in Bainunk. Section 4.2 will then explore the development of grade III mutation in Kobiana and Kasanga.

4.1 Grade II mutation (gemination)

4.1.1 Grade II in Proto-Bainunk-Kobiana-Kasanga

As discussed in section 3.1.2, PBKK had a series of geminate stops (both voiced and voiceless) which contrasted with singleton stops in all positions except word-initially. In general, neither nominal nor verbal roots could begin with a geminate. However, just as in modern Kobiana, certain noun class prefixes required that the root-initial segment be geminated. Recall that the triggers of grade II mutation in Kobiana are exclusively noun class prefixes, namely *a-II* (a very common singular class), *ba-II* (a productive infinitive class and rare nominal class), *ta-II* (a very small class including *tá-ppe(r)* 'foot'), and seemingly *tu-* (the diminutive singular class) in some cases. In addition, the noun *sí-ggəh* 'eye' contained a geminating prefix *si-II* historically, though modern agreement is with *si-III*. At least these five prefixes would have already induced gemination in PBKK. In reconstructions, the geminating force of these prefixes will be indicated with a raised letter X, e.g. *ba^{X}-. The rather basic mutation system of PBKK would have looked something like the following:

Grade I	*p~ɸ	*t~r̥	(*c~ʃ)	*k~x	*b	*d	*j	*g	*f	*s	*r
Grade II	*pp	*tt	(*cc)	*kk	*bb	*dd	*jj	*gg	*pp	*cc	*dd

Figure 173: Possible Proto-Bainunk-Kobiana-Kasanga mutation system

It is hard to make too many concrete assumptions about the nature of this system, as evidence comes almost exclusively from Kobiana and Kasanga, in which various sound changes and analogical changes may have taken place since PBKK. The grade I stops would have all certainly alternated with their geminate counterparts, but the status of other sounds is not so certain. Based on their presence in Guñaamolo, there were probably geminate nasals, and it is likely that the singleton nasals would have geminated in grade II. However, nasals degeminated in all other languages, as well as root-initially in Guñaamolo, so their status in PBKK cannot be known for certain. It is possible that the grade II counterparts of the continuants *f, *s, *r were simply *ff, *ss, *rr, which could have then hardened in Proto-Kobiana-Kasanga. It is also possible that mutation was introduced into *f- and *s-initial roots in KK in analogy with originally *p- and *c-initial roots. Alternately, it is entirely possible that *p and *c had merged with *f and *s already in PBKK except in word-initial position. The status of *l is especially unclear. This consonant seems to have been very rare root-initially in PBKK, being reconstructed for only 'clap' and 'slap.' If it did participate in mutation, it might have become either *dd or *ll in grade II. The form *bá-laas* 'applause/to clap' in Kobiana (Gub. *ba-laar*) perhaps suggests that *l never hardened in grade II. The consonants *w, *y, and *h have left no trace of earlier mutation, and so probably did not mutate in PBKK. At most, they were geminated and subsequently degeminated without any hardening in the daughter languages.

For a number of reasons, it is clear that these grade I~II alternations already existed in PBKK, and were not innovations of Kobiana and Kasanga. The most important is the existence of /k/~/x/ alternations in Gubëeher, where /k/ is triggered by the infinitive prefix *ba-*, historically **ba*^{X}*-*.

verb		*bu-* infinitive	*ba-* infinitive	
-xeec	'write'	bu-xeec	ba-keec	(Ka. *-h~kec* 'carve')
-xur	'thread beads'	bu-xur	ba-kur	(Ko. *bú-huus*, *bá-kkuus*)
-xu̟l	'remove'	bu-xu̟l	ba-ku̟l 'remove tree'	

Figure 174: /x/ becoming /k/ in Gubëeher ba- *infinitives*

As established in section 3.1.2, /x/ is the regular reflex of singleton *k, and /k/ of geminate *kk. There would be no motivation for innovating this alternation in Gubëeher, and thus these forms must be inherited from the proto-language. Less clear evidence comes from the Bainunk wordlist in D'Avezac (from c. 1670), which seems to indicate that the *ba-* class still triggered gemination in this variety (see section 2.4). As a nominal class, **ba*^{X}*-* was rather small, but the nouns that can be reconstructed for this class have grade II consonants where possible:

PBKK	Gub.	Guñ.	Guj.	Ko.	Ka.	
*ba-kka(a)r	ba-ka̟r	ba-ka̟r	ba-ka̟r	bakkáar	bakaad	‘chicken’
*ba-ccaam	ba-caam	ba-caam		ba-ccáa(m)	ba-caam	‘money/payment’
*ba-ggi̟dd	ba-ji̟d	(da-gi̟d)	ba-jid	bajjídd	ba-jid	‘girl’
*ba-wucc	ba-wuc	ba-wuc	ba-wuc	buucc (*bu-I*)	bo-wuc	‘wind/air’

Figure 175: Reconstructed nouns in the BKK *ba^{X}- *class*

The ultimate origin of grade II gemination in PBKK must have been the presence of final consonants on the class markers in question, which then assimilated to the following consonant, just as in Fula-Sereer (chapter 2) and Tenda (chapter 5). However, these marker-final consonants had already been lost in PBKK, and there are unfortunately no clues as to what these specific consonants would have been at an earlier stage. Comparison with other Atlantic languages does not reveal any obvious cognates for any of the five grade II-triggering markers (except in Wolof where there are possible cognates for **ba^{X}*- and **si^{X}*-, but here there is also no trace of these marker-final consonants). Furthermore, there does not seem to be any environment in which these final consonants were preserved. It is likely that all PBKK roots were consonant initial, and thus there would be no pre-vocalic environment for these markers. Roots which appear to be vowel-initial in a modern language probably were *h-initial, e.g. Kobiana *baazé(r)* ‘cow’ (earlier **ba-hajer*, perhaps related to Bainunk *a-hay*), which must have been in the **ba^{X}*- class used for some other animals. Historically, the final consonant of the precursor of **ba^{X}*- may have simply deleted before *h. A number of demonstratives in the modern languages appear to be formed from a vowel-initial base prefixed by the class marker, or with the class marker in word-final position. However, even nasal-final markers lose this nasal in the demonstrative forms, and these nasals were present long after the other marker-final consonants in question. There is one marker for which we can reasonably hypothesize the identity of the lost final consonant. The Kobiana diminutive prefix is according to Wilson (2007) *ti-II* (Doneux 1991 has mainly *tu-*), appearing also in Kasanga as *ti-II*[85]. In a number of nearby languages, the word for ‘small’ has a form resembling *tVt* with a high vowel: Wolof *tuut(i)*, Gubëeher *-tilit*, Guñaamolo *-tiir*, Biafada *-tiiti*, Joola Eegimaa *-titti*, Joola Fonyi *-tiiti*. Thus the origin of this prefix is almost certainly something like **tuut(t)* or **tiit(t)*, in which the final *t assimilated to the root-initial consonant, resulting in gemination.

4.1.2 Gemination in other environments

As gemination in the nominal system had already developed by the time of PBKK, it is impossible to say when exactly the sound change(s) that led to this phenomenon took place. Nonetheless, we might expect to find some traces of gemination elsewhere in the language, namely where certain consonants came into contact historically. Importantly, consonant clusters are generally banned in roots in all BKK languages (excluding prenasalized stops), and are often avoided at morpheme boundaries, while geminates (or their reflexes) are permitted. We also find some alternations resulting in the hardening of consonants, though it is probable that some or even all of these arose well after the sound changes that originally gave rise to grade II initial mutation.

There are at least two verb pairs in Kobiana that involve a suffix of the form *-(ə)C* which causes the hardening of a word-final /l/:

[85] Wilson lists only one word with this prefix, *ti-piir* (pl. *ñi-fiir*) ‘younger sibling,’ but gives a prefix *ti-II* in his list of prefixes.

(45)	-f~ppa(l) 'go'	+	-(ə)r 'ben. appl.'	=	-f~ppadd 'bring/go for'	(Kobiana)
	-f~ppul 'leave'	+	-(ə)n 'causative'	=	-f~ppudd 'remove'	

Guñaamolo has *-fu̟nn* for this last word, from **fu̟l-n*. The Kobiana clitic *roo* '3rd sg. possessor' forms /dd/ with a preceding /l, r/, and hardens after a nasal:

(46)	jifèekk	'pig'	jifèekk roo	'his pig'	(Kobiana)
	wal	'child'	wáddoo	'his child'	
	baazé(r)	'cow'	baazéddoo	'his cow'	
	saa(n)	'body'	sáandoo	'his body'	

The Kobiana benefactive applicative suffix *-(ə)r* hardens to [dr] after /n/ or /l/ (e.g. *má-njúppəl-ər-ee wal* [mánjúppə̀ldrée wàl] 'I greeted the child for you'), though this is certainly not a particularly old alternation.

In Gubëeher, suffixes beginning in /r/ harden after /r/ or /n/:

(47)	mir-r-Vŋ	→	mirdeŋ 'doesn't resemble'	(Gub.: 173)

Consonants often delete before other consonant-initial suffixes, indicating a continued dispreference for consonant clusters. Suffixes with an initial /h/ change this to /k/ after certain consonants. Cobbinah (2013: 239) notes for the future suffix *-hVrVh* that this /h/ is in free variation with /x/, and /x/ must be the original consonant in all of these suffixes, which lenited in these common grammatical morphemes. The possessive suffixes have /k/ after /r, f, x/ and nasals, and the future suffix *-hVrVh* has /k/ after certain consonants, in both cases with deletion of non-nasal consonants.

(48)	gu-wox-hVnVm	→	gu-wokonom	'his sacrifice'	(Gub.: 240)
	a-nen-et-hVrVh	→	a-nenekerex	'it will fall down'	(Gub.: 240)

Historically this can be seen as the assimilation of the first consonant to the following *k, creating a geminate *kk.

The avoidance of consonant clusters has been and continues to be strongly preferred not only in the BKK languages, but in most of the surrounding languages. It has shaped the general phonotactics of words, and this same tendency towards cluster simplification (often resulting in geminates) has given rise to initial consonant mutation in a number of languages due to the historical presence of final consonants on grammatical prefixes.

4.1.3 Why mutation was lost in Bainunk

If mutation (in the form of gemination) was indeed a productive process affecting most if not all initial consonants in PBKK, the question naturally arises of why this system no longer exists in the Bainunk languages. The most concise answer is that by far the most common trigger of grade II was the class **a*^{X}-, and this class was lost entirely in Bainunk (see section 6.1.3), with its nouns reassigned to different classes, mainly *bu-*.

The full inventory of reconstructed class markers which triggered grade II mutation is: **a*^{X}-, **ba*^{X}- (used as an infinitive marker and on some nouns), *si*^{X}- (with one member **si-ggir̥* 'eye'), **ta*^{X}- (with one member **ta-pper* 'foot'), and diminutive **tu*^{X}*/ti*^{X}-. Of these, all were lost in Bainunk except **ba*^{X}- and **si*^{X}-, and since *gg developed to /g/, no alternation could survive for 'eye.' Even for **ba*^{X}-, the only possible alternations would be for verb roots, since for *ba^X- nouns the plural is formed by use of the suffix *-*aŋ* rather than by a change in prefix. While *ba^X- is a productive infinitival prefix in Kobiana, it has only limited use in Bainunk. Of the 826 verbs recorded by Cobbinah (2017), only 44 can use a *ba-* infinitive. Thus, only a miniscule portion of the original triggers of grade II have survived in Bainunk. Even for these few verbs using *ba-* infinitives, it must be noted that a rare infinitive prefix *ba-I* exists in Kobiana alongside the more common *ba-II* (e.g. in *bá-heeh* 'laugh,' *bá-le* 'be big'). This is likely a use of the collective *ba-I* noun class. Thus, *ba-* infinitives which fail to mutate might simply be members of this original class **ba-* rather than *ba^X-.

There is an even further reason why mutation has not survived in Bainunk, relating to the regular development of the grade I and II consonants. Note the regular reflexes of these original grade I~II pairs:

PBKK grade I:	*p~ɸ	*t~r̥	(*c~ʃ)	*k~x	*b	*d	*j	*g
Bainunk reflex:	f (?)	l	s (?)	k/x	b	d	j	g
PBKK grade II:	*pp	*tt	(*cc)	*kk	*bb	*dd	*jj	*gg
Bainunk reflex:	p	t	c	k	b	d	j	g

Figure 176: Reflexes of PBKK grade I and II consonants in Bainunk

Of the stop phonemes, only the voiceless ones could be expected to show any synchronic alternation, as the voiced singleton and geminate stops have merged in all Bainunk languages (except perhaps the variety in D'Avezac). Furthermore, in all varieties but Gubëeher, *kk and *k have merged as /k/ in stem-initial position. Regarding *p, it probably lenited to /f/, but there is no way to be sure, as any modern /f/ could be from *f. Singleton *c may not have even existed as distinct from *s. For the continuants *f, *s, and *r, it may be that their grade II counterparts were *pp, *cc, and *dd, as hypothesized in Figure 173. If so, roots beginning with these consonants could potentially show alternations in modern Bainunk. However, it may also be that they were *ff, *ss, and *rr (cf. Joola Eegimaa /ff/ and /ss/), which then hardened in Kobiana-Kasanga. If this is the case, these geminate continuants may have simply merged with the singletons in Bainunk. So in total, the only grade I consonants that should have definitely left traces of mutation are original *t~r̥ and *k~x (and this second one only in Gubëeher). Furthermore, *p~ɸ, *c~ʃ, *f, *s, and *r might be expected to show synchronic alternations, but only if certain assumptions are made about their original grade II counterparts and their regular reflexes in Bainunk.

In summary, the number of mutation alternations that would have regularly developed in Bainunk would have been very small. They would only occur in verbs with *ba-* infinitives, and only for certain root-initial consonants— perhaps only /l/~/t/ and in Gubëeher /x/~/k/. The few alternations that did arise could be easily leveled. In Gubëeher the regular post-nasal /x/ → /k/ change likely reinforced the acceptability of the /x/~/k/ alternation, preserving it in a few verbs with *ba-* infinitives.

4.1.4 Modern distribution of grade II consonants in Bainunk

The existence of a two-grade mutation system in PBKK makes certain predictions about the distribution of consonant phonemes in modern Bainunk. Because grade II consonants could only appear root-initially when preceded by certain class markers, and all but *ba^X- were lost in Bainunk, it ought be that noun roots do not begin with the reflexes of grade II consonants unless they are in the modern *ba-* class. The first thing to note is that *ba^X- as a class on nouns was very rare, and the nominal collective class **ba-* was much more common. The only purely nominal members of *ba-II* in Kobiana are some animals, 'girl,' and (historically) 'money.' There may also have been a less common non-collective *ba-* class without mutation (see section 6.1.4) based on a few Kobiana words. Thus, there should be no expectation that modern *ba-* condition the reflexes of grade II consonants on Bainunk noun roots. There is however an expectation that in all other classes, only the reflexes of grade I consonants, and not grade II consonants, should appear. In effect, this means that /f, l[86], s, x/ should be found, but not /p, t, c, k/ (disregarding /x, k/ in languages other than Gubëeher) — all other consonants are possible reflexes of both grade I and II consonants. The frequency of these noun-root-initial consonants in Cobbinah's Gubëeher lexicon is as follows[87]:

f: 70	l: 95	s: 58	x: 77
p: 28	t: 45	c: 29	k: 23

Figure 177: Freq. of historically grade I and II root-initial consonants in Gubëeher nouns

In aggregate, the reflexes of the singletons are more common than the reflexes of the geminates by a factor of 2.41. In comparison, in non-initial position, /f, l, s, x/ are more common than /p, t, c, k/ by a factor of only 1.44. The disproportionately low occurrence of /p, t, c, k/ in root-initial position is expected if their precursors in PBKK could only appear in classes enforcing grade II, of which only **ba*^{X}- survived in Bainunk.

While the voiceless stops arising from earlier grade II consonants are underrepresented root-initially in Bainunk nouns, the fact that they exist at all demands some explanation, given that the only surviving Bainunk class which originally assigned grade II is **ba*^{X}-. There are a number of reasons why modern Bainunk nouns could begin with /p, t, c, k/. The most obvious is borrowing. A good number of these voiceless stop-initial nouns are identifiable as borrowings. Identifying all borrowings within the lexicon is for now not feasible, and as such it is hard to know to what extent borrowing can explain the occurrence of these roots. However it is notable that of the 85 cognate nouns so far identified between Gubëeher and Kobiana, only 7 have a root beginning with a voiceless stop in Gubëeher (excluding post-nasal /k/, and /c/ arising from palatalization, which are reflexes of singleton *k). Thus it seems that for the nouns that can clearly be identified as non-borrowed, these exceptional roots are extremely rare. In fact, the initial stop of all seven of these nouns can be explained:

[86] It is true that /l/ is also the reflex of *l in addition to *r̥, which could skew this data somewhat. However, *l seems to have been a somewhat rare phoneme, especially word-initially where it is reconstructed for only 'clap' and 'slap.' On the other hand, root initial *r̥ is extremely common, and would be by far the most common source of modern /l/, especially in root-initial position.

[87] This count ignores nouns in nasal-final classes, in which the nasal could have a hardening effect. Keep in mind that /c/ can also arise from singleton *k when palatalized, so some instances of /c/ in this chart in fact represent an earlier singleton *k rather than geminate *cc.

Gubëeher	Kobiana		note
ba-ka̟r	bakkáar	‘chicken’	*ba^X- class
ba-caam	ba-ccáa(m)	‘money/payment’	*ba^X- class (and likely borr. Joola)
bu-koor	a-kkóos	‘country/village’	*a^X- class
bu-kum	a-kkúm	‘bladder/lower abdomen’	*a^X- class
gu-tuma	á-ttuuməha	‘story’	*a^X- class
a-kund	sa-kkún	‘scorpion’	**raN*- class
a-koos	jakkɔ́cc	‘tick’	**jaN*- or *a^X- class ?

Figure 178: Kobiana cognates of Gubëeher nouns with historically grade II consonants

The first two seemingly exceptional Gubëeher nouns are in the *ba-* class, which assigned grade II historically. The next three are found in the *a-II* class in Kobiana. As this class was lost in Bainunk, the nouns originally in *a^X- were reassigned to other classes. However, it seems that the grade II consonant was retained even when the root was assigned to another class. For the last two, ‘scorpion’ is in the *raN-* class in all other Bainunk languages, and thus it must have been moved to the *a-* ‘insect’ class in Gubëeher. Original *ran-kund* would naturally have /k/, being post-nasal, and this consonant was retained after the class reassignment. For ‘tick,’ the Kobiana noun appears in the historical **jaN-* class, and so the same explanation given for ‘scorpion’ could be given. However it is also possible that ‘tick’ is one of a few surviving *a^X- nouns in Gubëeher. This phenomenon of class reassignment without changing the initial consonant could be a major source of /p, t, c, k/-initial noun roots in Bainunk. Going by its size in Kobiana, *a^X- would have been a rather large class in PBKK, and so when it was lost in Bainunk a great number of nouns with grade II initial consonants would have been placed into other classes. In some cases the root was altered to use its grade I consonant, e.g. Ko. *á-ddugg* ‘pumpkin’ = Guj. *bu-lug* (note that the grade I form would have already been used in the plural of all *a^X- nouns), but in other cases the grade II consonant was retained. Reassignment from a nasal-final class could yield further /k/-initial roots in Gubëeher, though perhaps only for this consonant, as it seems that other voiceless consonants were lenited even after a nasal (cf. Guñaamolo *sin-lo̟dd* ‘wall’ from **sin-r̥o̟dd*).

In verbs we would also generally expect to find only grade I consonants, and indeed we find a large asymmetry between reflexes of grade I and grade II consonants. For example, in Cobinnah’s lexicon 16 verb roots are /p/-initial (excluding obvious borrowings), while 52 are /f/-initial. Here, a simple explanation for the voiceless stops is readily available— *ba^X- was one of the two most common infinitive prefixes in PBKK (and *a^X- was perhaps the third most common).

In summary, the distribution of Bainunk /p, t, c, k/, which arose from geminates historically, is consistent with the existence of a grade I~II mutation system in PBKK. As expected, these sounds are under-represented root-initially in nouns, and those that are found are either borrowings, members of a class originally assigning grade II, or could have been moved from a class originally assigning grade II.

4.2 Grade III mutation (prenasalization)

Grade III (nasal) mutation arose in Kobiana and Kasanga when prefix-final nasals which were still present in PBKK interacted with following root-initial consonants. These changes took place some time after the split of Bainunk and Kobiana-Kasanga, but before the split of Kobiana and Kasanga. At this stage (“early PKK” in Figure 179), the lenited realization of *p and *c had likely merged with *f and *s, if they had not already done so in PBKK. Stem-initial *d and *k had also probably lenited to *l and *x, though these may have remained stops post-nasally.

early PBKK	*m-ɸ	*m-f	*n-r̥	*n-ʃ	*n-s	*n-k	*n-d	*n-l	*n-r
early PKK	*m-f		*n-r̥	*n-s		*n-x	*n-l		*n-r
modern KK	pp		tt	cc		kk	nd		dd

Figure 179: Development of grade III mutation in Kobiana-Kasanga

The development of grade III /mb, nj, ng/ from *m-b, *n-j, *n-g is straightforward, and did not truly involve any change at the phonetic level.

These changes could not have taken place in PBKK, as these nasal + continuant sequences are retained in Bainunk, with the nasal still being part of the grammatical prefix, and the continuant remaining un-hardened. This can be seen in individual nouns in nasal-final classes, e.g. Guñaamolo *sin-lo̟dd* 'wall' from *-*r̥o̟dd* 'build' in the *siN-* class (cf. Kobiana grade III *-ttedd* 'build'), Gubëeher *mu-se̟l* 'to urinate' from *-*se̟t(t)* in the *muN-* class (cf. Kobiana grade III *-ccett* 'urinate'). More broadly, the behavior of prefix-final nasals in Bainunk makes it clear that they were still independent segments in PBKK. In Gubëeher they delete before continuants, whereas in Guñaamolo they surface as nasalization on the prefix vowel. These realizations would not be possible if the nasal had already fused in some way with the stem in PBKK. Furthermore, before a nasal-initial stem, the prefix-final nasal is retained, e.g. Gub. *sim-moot* 'cotton thread.' Whereas true geminate nasals were all degeminated (even in Guñaamolo in root-initial position), these sequences of a prefix-final nasal and a root-initial nasal are retained, as the two nasals are still contained within different morphemes synchronically. Even within a single morpheme, it seems that no general post-nasal hardening rule existed in PBKK. Tautomorphemic sequences of a nasal and a consonant other than a voiced stop were rare in PBKK, but in those that exist, the post-nasal consonant was likely a continuant, based on the Gubëeher and Guñaamolo reflexes.

PBKK	Gub.	Guñ.	Guj./D'Av.	Ko.	Ka.	
*ran-kulunx	ran-kuluux	ran-kulu	ba-kulunk		sa-kulunk	'rooster'
*ran-gVnx	ran-gu̟ux		ran-guux	sa-ngòokk		'crab'
*-di̟nx	si-di̟ix	si-di̟ih	<quidinqui>	a-ddíkk	bi-lik	'leg' (KK 'thigh')
*-konʃ	a-koos	a-koos		jakkɔ́cc		'tick'
*-munr(-ur̥)	-mundiin	-murul		-muddəh	-mudd	'be dark'
*-rVnr̥	bu-rot	bu-door	bu-dont	á-ddett		'ash'
*-gi̟nr̥	gu-ji̟it	gu-gi̟ir	(w)gu-jint			'feather'

Figure 180: Post-nasal continuants in Proto-Bainunk-Kobiana-Kasanga

In the case of *nr, this sequence must have existed as separate from *nd in order to yield the nd:dd correspondence between Gubëeher and Kobiana in 'dark.' Tautomorphemic *nr̥ is less clear, and may have been [nt].

The Kobiana-Kasanga sound changes are rather straightforward. For the voiceless consonants, the eventual outcome of a hardened stop with no nasal component is paralleled by the development of NT sequences in Sereer, Fula, Tenda, and Wolof (root-initially). At one point these voiceless grade III consonants would have almost certainly been prenasalized, with the nasal later assimilating to the following stop. The rare instances of Kobiana voiceless prenasalized stops (see Figure 136) may have been borrowed from a dialect that retained the nasal component for longer. The development of *nr to /dd/ is perhaps less expected, and was almost certainly [rr] before hardening. It could not have been [nd] at any point, as it remains distinct from /nd/ as the outcome of *n-d and *n-l. The few Kobiana non-mutating verb roots with /f, s, l, h/ (see Figure 124) seem to all be borrowed, and so there is no reason to suspect that any of the original PBKK obstruents did not naturally develop grade III alternates through regular sound change[88].

The ultimate identity of the nasals that triggered these changes can be determined in some cases, but not others. For some subject prefixes which trigger grade III, free forms with a final /n/ exist in Kobiana. However for some other verbal prefixes and all noun class prefixes, the nasal was already homorganic with no pre-defined place in PBKK. As with the prefixes triggering grade II, there is no prevocalic environment which saves this nasal in any language, and thus no evidence of its original place of articulation. This homorganic nasal will be reconstructed as *N. It seems that already in PBKK, *N was deleted word-finally and before a vowel, just as in the modern determiners, relative markers, and the rare vowel-initial roots in Bainunk.

Finally, recall that in Kasanga there is a homorganic nasal prefix *N-* marking 3rd person subjects, equivalent to the use of grade III without a prefix in Kobiana. This must be a later development, probably from an NV- prefix which lost its vowel (see section 5.1).

5 Origin of mutation in the verbal system

Mutation in the verbal system involves only grades I and III, and as such arose in Kobiana-Kasanga after it split from Bainunk, which retains these nasals with no effect on the root-initial consonant. In some verb forms, grade III arose due to a historically-present prefix-final nasal, with grade I arising naturally when no nasal was present. However the choice of grade I or III in many forms is due to analogical pressures in Kobiana. We unfortunately do not have a full picture of the Kasanga verbal system, but it seems that analogy also played a role in shaping its verbal mutation system.

5.1 Verbal mutation in perfect affirmative and subject focus forms

The source of grade III mutation is most straightforward in the perfect affirmative forms.

	Kobiana perfect:		Kasanga:		Kobiana free pronouns:	
	sg.	pl.	sg.	pl.	sg.	pl.
1	má-III	ngée-III	ma-III	gee-III	me	ngee(n)
2	á-III	káa-III	a-III	kaa-III	ay	kaa(n)
3	à-I	náà-III	N-	naa-III	ú-maloo(n), etc.	náà(n)
	NP	Ø-III	NP	N-		

Figure 181: Kobiana and Kasanga subject markers in perfect affirmative forms

[88] The only *l-initial roots that can be reconstructed for PBKK are 'clap,' 'slap,' and perhaps 'elder' and all have /nd/ in Kobiana grade III (*-ndaas*, *-ndadd*, *-ndaaber*). Nonetheless it is conceivable that *l might not have hardened originally, with mutation to /nd/ being introduced analogically based on *d-initial roots which naturally developed an /l~nd/ alternation.

The Bainunk subject markers in affirmative forms are as follows, with the Manjak system (Buis 1990) given for comparison (Guñaamolo is nearly identical to Gubëeher):

	Gujaher:		Gubëeher:		Manjak perfect:	
	sg.	pl.	sg.	pl.	sg.	pl.
1incl	maN-	N- -min	i-	iN- -o	màn	gə
1excl				i- -min		uənda
2	fuN-	kaN-	u-	u- -Vŋ	m	da, ind
3	a-	aN-	a-	aN-	a	bu, ...

Figure 182: Bainunk and Manjak (perfect) subject markers

Subject prefixes in the BKK languages are quite transparently grammaticalized from free pronouns in most cases. This can be most clearly in seen in the plural prefixes in Kobiana and Kasanga, which are nearly identical to the free pronouns, but without the final /n/. This final /n/ is of course the source of grade III mutation in these forms. The 2nd pl. **kaan* can be traced back to PBKK, as it appears in the Gujaher prefix (other Bainunk varieties have replaced this with the 2nd sg. form followed by the plural suffix *-Vŋ*, though the free pronoun in Gubëeher is *inkaan*). The 1st pl. pronoun is perhaps borrowed from Manjak *gə ~ ngə*, and the 3rd pl. *náà(n)* could be cognate with Bainunk *aN-*. The fact that all of these pronouns were n-final is perhaps a coincidence, but the end result is that grade III mutation came to be very strongly associated with plural subjects— so much so that every verb form with a plural subject must take grade III mutation without exception, even (as we will see in the following sections) in forms which historically were not immediately preceded by the pronoun.

The singular subjects are somewhat more complicated. For the 1st sg. form, the earlier pronoun was clearly **man*, found as a prefix in Gujaher, but also as the free pronoun in Wolof (*man*), the closest relative of PBKK, and as *màn* in Manjak. The 3rd sg. prefix *à-I* in Kobiana is found as a prefix or pronoun *a* throughout Niger-Congo, including in Sereer, Manjak, and most importantly Bainunk. This *a* presumably existed in PBKK and had no final consonant, which naturally gave rise to grade I mutation in Kobiana. The 2nd sg. *á-III* has no clear correlate in other languages, but it is perhaps notable that the Gujaher 2nd singular prefix is nasal-final.

The Kasanga 3rd sg. form uses a homorganic prefix *N-*. This nasal prefix is distinct from normal grade III mutation in that it surfaces as a nasal before even voiceless stops (e.g. *m-pogi* 'he saw' vs. *ma-pogi* 'I saw' using grade III). In Kobiana this is equivalent to the verb forms that appear with a 3rd person NP subject, and these take normal grade III mutation:

(49) Kobiana: *wal ppeg me* 'the child saw me'
Kasanga: *m-pog me* 'he saw me'

This prefix *N-* must have existed as such even after the initial development of grade III mutation in Kobiana-Kasanga, since it does not yield regular grade III voiceless consonants in Kasanga. Either it was innovated after the development of grade III, or else was of the form NV- at this time, with the vowel being lost later. The original identity of this N(V)- 3rd sg. marker is uncertain, but it could be the prefix *mu-* seen in Bainunk as an allomorph of the personal class prefix, and/or *no-* being an allomorph of the default agreement class *a-* (cf. the

Guñaamolo relative markers *mu* and *no* for these classes)[89]. While in Kasanga this nasal prefix remains distinct, it resulted in regular grade III mutation in Kobiana, presumably because the NT > TT change postdated the loss of the vowel in this prefix.

5.2 Verbal mutation in the subject focus forms

In Kobiana, subject focus forms appear almost exclusively in the perfect, and have only affirmative forms. They make use of somewhat different subject prefixes than the non-focus perfect affirmative forms, and take grade III without exception. These are shown in Figure 123 for the verb *-feg~ppeg* 'see,' reproduced below.

	sg.	pl.
1	mée-ppégəni	ngéena-ppegəni
2	ée-ppégəni	káana-ppegəni
3	áma-ppégəni	náàná-ppégəni
NP	wal ppégəni	

In Gubëeher, subject focus is marked with a prefix *iN-* which comes between the subject prefix and the verb stem. The prefix **iN-* must have been present in PBKK, and is the origin of the Kobiana 1st and 2nd singular subject focus forms. The prefixes *mée-III* and *ée-III* would have developed regularly from **má-iN-* and **á-iN-*[90]. The other focus forms seem to have a different origin. The plural forms are transparently made up of the subject pronoun, followed by some element *a-*, followed by the verb stem. Applying this same structure to the 3rd singular form, we would have a pronoun *am-*, followed by this *a-*, and then the verb stem. This pronoun *am-* is found nowhere else in Kobiana-Kasanga, but has a clear cognate in Gubëeher, being *amu*, the proximal demonstrative for the personal class— roughly 'this person.' As for the prefix *a-* that appears in these forms, we would at first assume that it had an earlier form **aN-*, since the following verb stem takes grade III in all cases. However it is far from clear that this is the case. There is in fact an extremely likely origin for this subject focus *a-* as the Kobiana particle *a* used in non-subject focus constructions. Some examples of this construction are given below:

(50) jufáah a má-ppég-i (Kobiana)
dog FOC 1sS-see-PERF
'I saw *a dog*'

(51) a-négg a á-hóbb-a (Kobiana)
NC-meat FOC 2sS-eat-IMPERF
'you'll eat *meat*'

In this construction the focused phrase is fronted, and followed immediately by *a* and then the verb. In the subject focus forms in question, there is essentially the same structure— the

[89] We might also reference Wolof *mu*, used as the pre-verbal 3rd person subject marker/pronoun, e.g. *mu dem* 'he went (narrative).'

[90] The lack of a nasal at the end of the two pronouns is not in fact irregular. It seems that already in PBKK, final homorganic nasals of grammatical morphemes deleted before vowels and word-finally, as seen in modern Bainunk and Kobiana pronouns and demonstratives. Note that the free pronouns in Kobiana are *me* 'I' and *ay* 'you,' and these might have alternatively preceded *iN-*, as they could have also yielded *mée-III* and *ée-III*.

subject is fronted, and immediately followed by *a-* and then the verb, which naturally lacks a separate subject marker since the subject has been fronted. There is however no evidence that this focus particle *a* ever had a final nasal. It is true that Kobiana regularly deletes most final tokens of /n/, and many of /m/ and /ŋ/, but these are always present underlyingly, and saved by a following vowel-initial word. No such underlying nasal is present synchronically for the focus particle *a*. Why then is grade III employed in all of these subject focus forms? It may simply be a sort of a holdover from when *iN-* was more widely used. As the use of the focus particle *a* appears only in Kobiana, it is probably an innovation, and was not used in PBKK (at least for subject focus). The original paradigm was likely the same as that found in modern Gubëeher, in which **iN-* was used for all subjects. Thus, before the introduction of the focus construction with *a*, all subject focus forms would have been marked with grade III mutation in Kobiana. Once the innovative construction with *a-* arose, it must have existed alongside the original *iN-* construction for at least a time. At this time, grade III could be easily seized upon as a marker of subject focus, and extended to the *a-* focus forms.

5.3 Verbal mutation in negative and imperfect forms

Mutation in Kobiana negative and imperfect forms is somewhat remarkable in that the singular forms "switch" the mutation grades used in the perfect affirmative paradigm, which can be taken as the default TAM category. Figure 121 is reproduced below to demonstrate this fact, with the cells assigning grade I shaded.

	Perfect:				Imperfect:			
	Affirmative:		Negative:		Affirmative:		Negative:	
	sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.
1	má-III-H	ngée-III-H	mà-I-L	ngée-III-L	má-I-H	ngée-III-H	mà-I-L	ngèe-III-L
2	á-III-H	káa-III-H	à-I-L	káa-III-L	á-I-H	káa-III-H	à-I-L	kàa-III-L
3	à-I-H	náà-III-H	Ø-III-L	náà-III-L	à-III-H	náà-III-H	Ø-III-L	náà-III-L
NP	Ø-III-H		Ø-III-L		Ø-III-H		Ø-III-L	

Noting first that the plural subject forms and the overt NP subject forms always use grade III, we see that where the perfect affirmative uses grade III for 1st and 2nd sg. forms and grade I for 3rd sg. forms, the negative and imperfect use grade I for 1st and 2nd sg. forms, and grade III for 3rd sg. forms. We can begin by examining the negative paradigm. Bainunk and Kobiana use a cognate marker for the perfect negative, being *-ii(l)* in Kobiana and *-ir* in Bainunk (harmonizing to *-ur* in Guñaamolo before a round vowel and being reduced to *-r* in Gubëeher). However the subject marking in these negative forms is quite different. The affirmative and negative perfect paradigms of Gubëeher are given in Figure 183.

	Affirmative: (p. 235)		Negative: (p. 237)	
	sg.	pl.	sg.	pl.
1incl	i-STEM-i	iN-STEM-e	STEM-r-i	STEM-r-e
1excl		i-STEM-imin		STEM-r-imin
2	u-STEM-i	u-STEM-eŋ	STEM-r-o	STEM-r-oŋ
3	a-STEM-i	aN-STEM-i	STEM-r-Vŋ	STEM-r-VŋVŋ

Figure 183: Gubëeher perfect affirmative and negative paradigms

While the affirmative forms have the subject marker before the verb, the negative forms use post-verbal subject markers, which are of a somewhat different shape from the prefixal markers used in the affirmative forms[91]. Since subject markers grammaticalized from free pronouns in PBKK, this suggests a scenario for PBKK in which pronouns preceded the verb in affirmative forms, and followed the verb in negative forms. If this held true at the time of the development of grade III mutation in Proto-Kobiana-Kasanga, the negative forms would naturally have not developed grade III mutation, retaining their unmutated grade I forms. At some later time, the negative paradigm was "regularized" with respect to subject marking by simply co-opting the more common prefixal markers found in the affirmative forms. However, even as the segmental markers were changed to be like those of the affirmative forms, the mutation grade in the negative forms did not change. By this point grade I mutation had come to be associated with the negative, and the change in grade would have been functionally quite useful in signaling the change in polarity. With regards to the 3rd person singular negative form, there are two possibilities. The most obvious is that the marker *N(V)-* was used instead of *a-*, just as in the full NP subject forms. However it is also possible that the change from affirmative to negative came to truly be seen as triggering a switch in the mutation grade, such that grade I in the 3rd sg. perfect affirmative was switched to grade III in the negative form. The lack of a prefix in this negative form is paralleled elsewhere in Atlantic: in Sereer the affirmative 3rd sg. form is marked with *a=*, where the negative has no marker; in Wolof, negative forms never use any overt 3rd sg. marker, whereas many affirmative forms use *mu*. Regardless of the explanation, the end result is that in the singular, the mutation for all three forms ended up changing between the affirmative and negative forms. In the plural forms, the pressure to always use grade III mutation won out.

In Kasanga it appears that mutation does not change from affirmative to negative, based on an example given in Wilson presented below alongside its equivalent in Kobiana.

	Affirmative		Negative		
Kasanga:	ma-pog a	'I saw him'	ma-pog-iid a	'I didn't see him'	(Ka.: 93)
Kobiana:	má-ppég-a	'I saw him'	mà-fèg-iil-a	'I didn't see him'	

Thus it seems that in Kasanga, the mutation as well as the pre-verbal subject markers were extended from the affirmative forms. In fact, in Kasanga more broadly, every verb form with a subject prefix takes grade III mutation.

For the Kobiana imperfect forms we are unfortunately forced to speculate, as there do not appear to be any cognate forms in Bainunk. These do exist in Kasanga, but simply take grade III like all prefixed verb forms. As the modern mutation grades are the same as for the perfect negative, it may well be that pronouns followed these verb forms as well[92]. In these imperfect forms it is particularly clear that a change in mutation was seen as marking the opposition between perfect and imperfect, since the form of the prefixal subject markers are otherwise entirely identical. There is no good explanation for why the 3rd person sg. prefix *à-* should trigger grade III unless the change in mutation itself was seen as a mark of imperfect

[91] Essentially the same phenomenon is found in Wolof, e.g. *ma dem* 'I go (narrative),' *dem-u-ma* 'I haven't gone.'
[92] Some areal/typological support for this alternation comes from Bassari (Winters and Winters 2004: 46), where perfect and imperfect forms are distinguished by the position of the pronoun, though here it is pre-verbal for imperfect forms, and post-verbal for perfect ones.

verb forms[93]. As in the perfect negative forms, grade III mutation was extended to all plural forms. In the imperfect negative forms, a prefix *gù-* directly precedes the imperfect verb stem. This prefix is a reduced form of *-gùl~ngùl*, the negative form of the copula *-go~ngo*. Since this prefix *gù-* would have directly preceded the stem in all cells of the paradigm, we would expect grade I mutation throughout. In fact we find the same mutation patterns as seen in the perfect negative and imperfect affirmative forms. This is a particularly clear case of analogical extension, attributable to the influence of these other two paradigms.

5.4 Verbal mutation in relative forms

Mutation in relative forms is quite different in Kobiana and Kasanga. The form of the relative marker in both languages is segmentally identical to the noun class marker itself, agreeing in class with the head of the relative clause. In Kobiana non-subject relatives, the relative marker precedes a regularly inflected verb form with a subject prefix or full NP subject, and the mutation is the same as in a non-relative form. However in Kasanga, there is no subject prefix on the verb, with the subject (expressed as a pronoun or full NP) following the relative verb:

(52) ú-ligeen (wo-kk) u má-ppég-i (Kobiana)
NC-man NC-DEM REL.NC 1sS-see-PERF
'the (/this) man that I saw'

(53) u-lien wo-k u-fog me (Ka.: 92)
NC-man NC-DEM REL.NC-see 1sS
'the man that I saw'

In subject relative forms, the structure is essentially the same in both languages, other than the obligatoriness of the demonstrative *-k* in Kasanga. By necessity all subject relatives have 3rd person NP subjects. No subject prefix is present on the verb, with the verb being directly preceded by the relative marker, and any object immediately following the verb.

(54) ú-ligeen (wo-kk) u ppeg me (Kobiana)
NC-man NC-DEM REL.NC see 1sO
'the (/this) man that saw me'

(55) já-ligeen (i-kk) i ngíl-a (Kobiana)
NC.pl-man NC-DEM REL.NC run-IMPERF
'the (/these) men who run'

(56) u-lien wo-k u-fog me (Ka.: 92)
NC-man NC-DEM REL.NC-see 1sO
'the man that saw me'

[93] It is I suppose conceivable that the pronoun **ámu* > *ám-* was used in this imperfect form, seen elsewhere only in the subject focus form, but this seems rather unlikely. Besides, the tone on *à-* is low in both the perfect and imperfect forms, whereas the tone on *ám-* is high.

(57)	ja-lien	ii-k	ja-bilee	(Ka.: 92)
	NC.pl-man	NC-DEM	REL.NC-fall.PERF	
	‘the men who fell’			

Note that on the surface, Kasanga non-subject relatives are identical to subject relatives, such that examples (53) and (56) are homophonous in Kasanga. The crucial difference regarding mutation is that in Kobiana, mutation on the verb is always grade III, as characteristic of verb forms with a 3rd person NP subject, whereas in Kasanga the mutation seems to be dependent on the noun class of the relative marker itself. This is also the case in Kasanga non-subject relatives, as seen in example (53) above. Thus, Kasanga has a contrast in the following examples, where the relative marker differs in noun class, being *a-I* in (58), and *u-III* in (59).

(58)	baajed	a-k	a-fog	me	(Ka.: 92)
	cow	NC-DEM	REL.NC-see	1sO/1sS	
	‘the cow that saw me’ OR ‘the cow that I saw’				

(59)	u-wuc	u-k	u-mpog	me	(Ka.: 93)
	NC-oilpalm	NC-DEM	REL.NC-see	1sS	
	‘the oilpalm that I saw’				

Note especially the fact that the consonant used in (59) is /mp/, and not the normal grade III /p/. There is unfortunately no more data given for this construction, but it seems that classes which enforce grade III condition the appearance of a nasal before mutating verb roots in Kasanga.

We might at first assume that the Kasanga situation is original, as we know that these class prefixes were nasal-final historically. However comparison with Bainunk reveals that the Kasanga mutation pattern is in fact innovative. In Guñaamolo, as in Kobiana and Kasanga, the relative marker is the bare noun class prefix (though exceptionally *mu* for the personal singular *u-* class and *no* for the *a-* singular class). However, all nasal-final prefixes lack this nasal when used as the relative marker.

(60)	ran-kub-o	ra̟	Si̟idi	a-fe̟g-ne	(Guñ.: 81)
	NC-crab-DEF	REL.NC	Sidy	3sS-see-DEP	
	‘the crab that Sidy saw’				

In example (60), we see that the relative marker of the *raN-* class is simply *ra*. This holds true for all nasal-final prefixes. Recall that in Guñaamolo, the nasal on the noun class prefix is retained in all phonological contexts before a noun stem, being realized as vowel nasalization before a continuant. The lack of a nasal in these relative markers can be reconstructed to PBKK, and is part of a larger pattern by which marker-final nasals did not surface before a vowel or word-finally. It should be stressed that the relative markers are syntactically free words, and must have been so in PBKK. In Kasanga it appears that the relative marker always immediately precedes the verb, which allows it to be analyzed as a verbal prefix. This is because in non-subject relatives, the subject follows the verb. However in both Guñaamolo and Kobiana, the relative marker directly precedes the pre-verbal subject in non-subject relatives, and as such can appear before a noun, pronoun, or verb with a subject marker. (61) is an example from Kobiana that shows that the relative marker is not a verbal prefix, and (62) gives another example from Guñaamolo.

(61)	gú-siiraal	gu	wal	ppég-i	(Kobiana)
	NC-clod	REL.NC	child	see-PERF	
	'the clod that the child saw'				

(62)	wol	mu̟	di̟-kinem	a-te̟eja	bu-jof-o	(Guñ.: 232)
	child	REL.NC	house-3s.POSS	3sS-be.near	NC-forest-DEF	
	'a child whose house is near the forest'					

Furthermore, both Guñaamolo and Kobiana agree that the verb was preceded by a subject marker in all relative forms (including subject relatives), if we recall that word-initial grade III mutation in Kobiana is the result of the earlier 3rd person prefix *N*-.

(63)	a-hay-o	no̟	**a**-fe̟g-ne	u-di̟geen-o	(Guñ.: 229)
	NC-cow-DEF	REL.NC	3sS-see-DEP	NC-man-DEF	
	'the cow that saw the man'				

(64)	wal	u	**n**gil-a	(Kobiana)
	child	REL.NC	run-IMPERF	
	'the child who runs'			

In contrast, Kasanga appears to show no pre-verbal subject marker in relative forms.

Based on Bainunk evidence, we can be quite sure that the Kobiana mutation pattern in relative verbs is inherited. The relative marker originally had no final nasal in any class, and the relative verb was always preceded by a subject marker. Thus the Kasanga pattern must be the result of an analogical change. A clue to the nature of this change is the fact that we find a voiceless prenasalized stop in a form like (59), repeated here:

(59)	u-wuc	u-k	u-**mp**og	me	(Ka.: 93)
	NC-oilpalm	NC-DEM	REL.NC-see	1sS	
	'the oilpalm that I saw'				

Recall that a voiceless prenasalized stop is *not* the outcome of grade III mutation, but can only be due to the 3rd person nasal prefix *N*-. The presence of this nasal, as well as the ultimate development of the Kasanga pattern, can be understood if we consider what the subject and object relative forms would have been at a time before any analogical change took place. In the subject relatives, the verb would be preceded by the 3rd person subject marker *N*-, just as attested in Kobiana. In the non-subject relatives, we can assume that the Kasanga placement of the subject after the verb was already in effect, and thus there would be no subject marking before the verb as in Kobiana and Guñaamolo. Presumably the 3rd person nasal prefix remained pre-verbal because, being nasalization rather than a full syllabic prefix, it was no longer thought of as a segmentable subject marker. Example (65) shows the relevant (hypothetical) relative constructions from earlier Kasanga.

(65) a)	*sa-kun sa-k sa m-pog me	'the scorpion that saw me'	(subject relative)
b)	*sa-kun sa-k sa fog me	'the scorpion that I saw'	(object relative)
c)	*sa-kun sa-k sa n-jing me	'the scorpion that looked at me'	(subject relative)
d)	*sa-kun sa-k sa jing me	'the scorpion that I looked at'	(object relative)
e)	*baajed a-k a m-pog me	'the cow that saw me'	(subject relative)
f)	*baajed a-k a fog me	'the cow that I saw'	(object relative)
g)	*baajed a-k a n-jing me	'the cow that looked at me'	(subject relative)
h)	*baajed a-k a jing me	'the cow that I looked at'	(object relative)

At this time, the noun class of the relative marker would have had no effect on the initial consonant of the verb. However, a reanalysis occurred starting in (65c), by which the prenasalized stop was interpreted as an effect of the class prefix *sa-III*, rather than the 3rd person subject marker *N-*. After this reanalysis, the prenasalized stop could be spread to the corresponding object relative (65d). The same reanalysis could take place in (65a) with a voiceless initial consonant, and the prenasalized stop spread to (65b). With the identity of the verb-initial consonant now attributed to the preceding relative marker, the change in (65e-f) is rather natural. Being a grade I class, *a-I* should be followed by a grade I consonant, and thus the grade I consonant originally found in the object relatives (65f) and (65h) was generalized to the subject relatives (65e) and (65g). This reanalysis was made possible in Kasanga because of the post-verbal position of the subject in non-subject relatives, which ensured that the verb stem was always immediately preceded by the relative marker. It would be interesting to know what happens after a relative marker of a grade II class, but unfortunately this information is not available.

In summary, subject relative forms in Kobiana always take grade III mutation, this being the result of the earlier 3rd person subject prefix *N-* which was present in this construction. In Kasanga, the mutation in relative forms is determined by the noun class of the relative marker, due to a reanalysis of the 3rd person nasal subject prefix as grade III mutation triggered by grade III noun class markers. Kasanga relative markers of grade I noun classes are now followed by a grade I consonant, which is historically an innovation in subject relative forms. Relative markers of grade III noun classes are followed by a prenasalized stop, which is in fact a retention of the historical 3rd person subject marker *N-* in subject relatives, but an analogical extension in non-subject relatives.

5.5 Mutation in other verb forms

Imperative forms are unprefixed in both Kobiana and Kasanga. In Kobiana the initial consonant takes grade III, whereas in Kasanga it takes grade I.

	Kobiana 'help him!'		Kasanga 'look at him!' (p. 93)	
	sg.	pl.	sg.	pl.
1	—	mbáabən-ett-ooŋ-a		?
2	mbáabən-ett-a	mbáabən-ett-iiŋ-a	jing-t a	jing-t-iiŋ a

Figure 184: Kobiana and Kasanga imperative forms

The Bainunk forms use a cognate suffix, and are unprefixed. It seems clear that the grade III forms in Kobiana are not due to the historical presence of a nasal, as no such nasal exists in the cognate imperative forms. Thus, the use of grade III in Kobiana is an innovation, for which there are two quite plausible explanations. The first is that the only other unprefixed verb forms are those which appear with a 3rd person NP subject. These forms take grade III mutation due to the earlier presence of the subject prefix *N-*, and are extremely common. It could be that grade III became associated more generally with unprefixed verbs, and spread to the imperative forms. The other explanation involves the fact that word-initially, stops never lenited at any point in Kobiana's history. Thus, while an unprefixed verb could technically be said to have grade I mutation, it would have a stop where other grade I forms would have a continuant. For example, the expected pronunciation of the inherited imperative form of *-hii(n)~ttii(n)* 'weave' from **-r̥iin* would be [tiinett], rather than ˣ[hiinett], showing a stop rather than a lenited initial consonant[94]. It could be that the naturally-occurring word-initial voiceless stops in imperative forms were reinterpreted as grade III geminate stops, since voiceless stops are characteristic of grades II and III, and never I. The choice of III over II would have been due to the fact that only grades I and III are found in verbal mutation. Once these voiceless stops were reanalyzed as grade III, the use of grade III could be applied to all imperative forms, resulting in voiced prenasalized stops where no nasal existed historically.

The negative imperative (prohibitive) forms use a prefix *akka-* in Kobiana and *aha-* in Kasanga.

Kobiana 'don't run!'		Kasanga 'don't look at him!' (p. 93)	
sg.	pl.	sg.	pl.
ákka-gil	ákka-ngil	aha-njing a	aha-kaa-njing a

Figure 185: Kobiana and Kasanga prohibitive forms

In Kobiana, there was presumably never any prefix between *akka-* and the root. These forms are in fact somewhat nominal, as they can be used as the subject of a sentence, just like an infinitive form: e.g. *ákka-fubb mbúni* 'to not throw is good.' The singular form has grade I mutation as expected, and the plural has grade III, which is an analogical extension of the use of grade III for plural subjects in all other verb form. The use of grade III in Kasanga is due to the presence of the subject marker between the prefix *aha-* and the root, though the singular prefix is no longer segmentable[95]. Both the 2nd sg. prefix *a-* and the 2nd pl. prefix *kaa-* naturally induce grade III due to the earlier presence of final nasals in these morphemes.

In Kobiana there are a few CV- verbal prefixes which come between the verb root and the subject marker, for example *ma-* 'do habitually.' Only one of these has a mutable consonant, *-hi~kki* 'do again.'

(66) má-kkí-ngo áma ja-ngíla (Kobiana)
1sS-AGAIN-be at NC-run
'I'm running again'

(67) má-kkí-ppeg wal (Kobiana)
1sS-AGAIN-see child
'I saw the child again'

[94] There is unfortunately no data for Kasanga on the realization of initial voiceless consonants in imperative verb forms. Wilson gives only the example with *-jing~njing* 'look at' and one with *-ŋej* 'ascend.'

[95] So from **aka-aN-jing a* in this case. This makes the prediction that a verb like *-pog* 'see' would have the form *aha-pog* rather than ˣ*aha-mpog*, but there is unfortunately no relevant data.

(68) à-hí-feg wal (Kobiana)
3sS-AGAIN-see child
's/he saw the child again'

The mutation on this prefix is like on any verb-initial consonant. Interestingly, the consonant of the root also shows the appropriate mutation. Of course historically the root was not immediately preceded by the subject marker in these forms, and thus the mutation is entirely due to analogical extension.

The Kobiana future construction with *-go~ngo* 'be' mentioned in section 2.2.1 example (33) (repeated below) always uses grade I on the lexical verb root.

(33) *má-ngó-**z**úpp* 'I'm going to speak' (Kobiana)
*à-gó-**h**éeh* 'he's going to laugh'

This construction can be analyzed as a single word synchronically, which avoids having to allow grade I consonants in word-initial position, attested nowhere else. Historically the use of lenited grade I consonants in these verb forms is natural, as they are preceded by a vowel. However it should be noted that the negative form of this construction uses the normal negative form of 'be' *-gùl~ngùl*, which is and has always been consonant-final.

(34) *mà-gùl-**g**òott* 'I'm not going to come'

The use of grade I here is perhaps not even noteworthy, as the grammaticalization of this construction happened long after final consonants could trigger grade II, and thus grade I is probably to be expected.

6 Origin of mutation in the nominal system: Noun classes

In the nominal system mutation is triggered by noun class, specifically the noun class prefixes, which historically could end in a homorganic nasal or a vowel in PBKK. Of those that ended in a vowel, some assigned grade II mutation already in PBKK, realized as gemination, and these markers can likely be traced back to earlier consonant-final markers at some stage before PBKK. In this section we will examine the noun classes of the modern BKK languages, and reconstruct the noun class system of PBKK. Bainunk, Kobiana, and Kasanga are remarkable even among African noun class languages for having a rather large number of classes. Furthermore, the semantic force of each class is in general stronger than in other languages, being identifiably based on shape, animacy, or other factors[96]. A preliminary comparison of the noun classes of Bainunk and Kobiana reveals a number of classes with similar semantic content and with phonologically-similar class markers. Figure 186 presents the classes of Bainunk (Gubëeher except where noted) and Kobiana, arranged by potential cognacy. The counts given for nouns in each class are from Cobbinah's lexical database for Gubëeher, and my own fieldwork for Kobiana, and are intended to give a rough idea of the size of each class.

[96] See Cobbinah (2018) for more on the semantics of noun class in Atlantic languages.

Gub.	count	semantics	Kob.	count	semantics
a-	79	insects, animals, misc.; large agr. class	a-I	6	‘animal, star,’ large agr. class
			a-II	107	small round things, misc.
ba-	34	some animals, misc., ‘girl’	(†)ba-II	11	animals, misc., ‘girl,’ deverbal nouns
bi-	42	round, misc.	bu-I	32	misc., some round
bu-	243	round, misc.			
di-	9	collective of fruits in bu-, ‘dirt’	di-I	3	collective of millet, ‘dirt’
fa-	18	animals, esp. fish	fa-I	4	a few animals
gu-	290	long rigid things, languages, misc.	gu-I	139	long rigid things, languages, misc.
ho-	3	‘thing,’ diminutive of mass nouns	ku-I	6	‘thing’
hu-	1	‘thing’			
ja(N)-	18	misc. (some animals)	†ja-III	24	insects, animals, misc.
ji-	43	mostly animals, neg. humans, few misc.	†ji-I	9	animals
ka-	13	fish, misc.	ka-	1	‘fish’
kaN-	13	misc., locative nouns	ka-III	24	misc.
kuN-	6	‘fire, nape, gifts, mortar’	ku-III	1	‘fire’
muN-	4	liquids, ‘marrow’	mu-III	3	‘brain, marrow, kaldu (sauce sp.)’
raN-	26	crabs, ‘scorpion (Guñ, Guj),’ misc.	sa-III	45	leaves, crabs, ‘scorpion’
si-	1	‘eye’	si-II	1	‘eye’
si-	3	‘hand, foot’ (‘ear’ in Guj, Guf, Gut)	si-	1	‘ear’
siN-	20	string/rope-shaped	si-III	27	string/rope-shaped
ta-	8	cloth, misc.	ta-I/III	5	cloth, misc.
tiN-	5	saps, ‘wax’ (Guñ. ‘foam’)	ti-III	1	‘clay’
u-	60	human	u-I	37	human
da-	4	augmentative sg., ‘day, heat, dust’	da-I		augmentative sg.
diN-		pl. of da- augmentative	di-III		pl. of fa-III and da-I augmentative
ha-		pl. of gu-	ŋa-I		pl. of gu-I
i-		pl. of bu-, bi-	ga-I		pl. of bu-I, a-I, a-II
iN-		pl. of u- human (adjs, 6 common nouns)	i-I		pl. of u-I (human) agr., ‘people’
(ja-)		pl. of ‘person, child’ in Guñ.	ja-I		pl. of u-I (human), a few pl. agr.
ñaN-		pl. of siN- (string), u- (human), raN-, kaN-	ñi-III		pl. of si-III (string)
			ña-III		pl. of sa-III
ba-	16	collective (many vegetables, fruits)	ba-I	9	collective of vegetables, seeds
ja-	41	collectives (grass/leaves, fish, etc.), pl. of ta-	ja-I	10	‘hay, cotton, straw, chaff,’ pl. of some ta-
(guN-)	—	Gujaher only, ‘honey, palm wine’	gu-III	4	‘palm wine, hunger, feces, bathing place’
e-, fuN-	5, 8	misc. (both borr. Joola)	—		
ko-	15	diminutive sg.	—		
pi-	1	‘tobacco’	—		
(paN-)	—	Gufangor only; ‘rice bran’	—		
si-	138	trees	—		
muN-		pl. of si- (trees)	—		
ño-		pl. of ko- (diminutive)	—		
bi- (ti-)		collective of insects in a- (ti- in Guñ)	—		
—			ba-III	7	misc.
—			bu-III	1	‘bed’ (noun borr. Manjak)
—			fa-III		augmentative sg.
—			ji-I	4	‘hand, slap, right, left’
—			ma-I	10	liquid
—			nu-III	1 +	locative nouns
—			na-	2	‘orphan,’ ‘old person’ (borr. Manjak)
—			pa-III	18	small, bead/seed-shaped
—			pu-	19	large, empty things, misc. (borr. Manjak)
—			ta-II	2	‘foot’
—			tu-		diminutive sg.
—			u-	56	borrowings (a-I agr.) (borr. Manjak)
—			u-III	17	trees
—			bi-I		pl. of ‘child’
—			da-III		pl. of u-III (trees)
—			ni-I		pl. of tu- diminutive
—			ŋa-III		pl. of gu-III, ka-III
—			ŋu-III		pl. of u- borrowing class (borr. Manjak)
—			ka-III	2	collective of ‘tomato’
—			ma-III	1	collective of ‘manioc’
—			i-	1	collective of ‘cola nut’ (borr. Manjak)

Figure 186: Noun classes of Bainunk and Kobiana

To more concretely establish the cognacy of classes and reconstruct the original PBKK class, the best source of evidence is cognate noun roots which appear in cognate noun classes between the daughter languages. However, in many cases cognate noun roots are hard to come by, especially for the smaller classes. A further source of evidence is then the semantic content of the class. While it is certainly possible for the semantics of a class to change through time, the fact that these languages' classes generally have one or more clearly identifiable meanings makes comparison based on semantic content quite valuable. For example, if a small class containing only fish is found in each language, and with a seemingly cognate class marker, this is probably sufficient to establish the classes as cognate, even in the absence of any cognate noun roots between these classes. Scholars of the languages of the Casamance and Guinea Bissau often emphasize the rather strong semantic contribution of the prefix in nouns when compared to the lexical root. Cobbinah presents many sets of words like the ones in Figure 187 below (2013: 320, 331), in which a single root combines with a multitude of prefixes to derive nouns with different meanings.

si-	rac	'mangrove plant'	u-	liin	'weaver'
gu-		'mangrove fruit'	sin-		'spiderweb'
bu-		'mangrove bush'	a-		'spider'
ja-		'mangrove sticks'	ran-		'to weave cloth'
ba- -aŋ		'mangrove grove'	bu-		'to weave'
ja- -aŋ		'grove of little mangroves'	ta-		'cloth (plain white)'

Figure 187: Nouns containing the roots -rac *and* -liin *in Gubëeher*

Based on this and other evidence, he paints a picture of the Gubëeher nominal system in which the prefix and root often contribute equally to the meaning of the noun. Karlik (1972: 256) calls into question the idea of a "grammatical" prefix and a "lexical" root for Manjak. We can imagine a spectrum with lexical compounding at one end, and purely grammatical affixation of a declension class marker at the other. At one end, the semantic contribution of each component is roughly equal, and at the other it comes entirely from the sole lexical root. Noun class assignment in Bainunk-Kobiana-Kasanga comes closer to the compounding end of this spectrum than perhaps any other class system in Africa.

A phenomenon which illustrates the particularly strong semantic force of noun classes is the use of the "default root." All BKK languages, as well as other languages of the area make use of a semantically vacuous root, which receives its interpretation only when placed in a particular noun class (cf. Bantu **-ntù*). This root is thus quite useful in revealing the basic meaning of the various classes, though it can appear in only a subset of classes in each language. The default root in various classes is given in Figure 188 for Gubëeher, Kobiana, and Manjak.

Kobiana *́-ro~ddo*:

sg.	pl.	
á-ro	gé-ro	‘animal’
gú-ro	ŋá-ro	‘stick’
ú-ddo	dé-ddo	‘tree’
á-ddo	gá-ro	‘round bottle-like container’
bé-ddo		‘powder’
pá-ddo ~ pa-bé-ro	bé-ro	‘bead’
pú-ddo	pú-ddo-a	‘jug’
jé-ro		‘hay’
sá-ddo	ñá-ddo	‘chaff’
sí-ddo	ñí-ddo	‘rope/string’

Gubëeher *-no* (Cobbinah 2013: 333):

sg.	pl. (coll.)	
bu-no	i-no (di-no)	‘fruit’
si-no	mun-no	‘tree’
a-no	(bi-no)	‘insect’
ran-no	ñan-no	‘bad person’
ta-no	ñan-no	‘bird’
kun-no		‘palm wine’
gu-no	ha-no	‘thing’
ja-no		‘grass/organic material’

Manjak *-kɔ* (Karlik 1972: 256):

sg.	indef. pl., def. pl.	
na-kɔ		‘person’
u-kɔ	ngə-kɔ	‘animal’
kɔ	ngə-kɔ	‘thing’
ka-kɔ	i-kɔ	‘object’
pə-kɔ	mə-kɔ, kə-kɔ	‘stick’ or ‘bead’
bə-kɔ	mə-kɔ, ngə-kɔ	‘tree’
ndə-kɔ	mə-kɔ, ngə-kɔ	‘little thing’
t͡r̥ə-kɔ		‘place’

Figure 188: The “default root” in Bainunk, Kobiana, and Manjak

Karlik remarks that for these Manjak nouns, “it is not easy to decide which part of the noun is ‘grammatical’ and which is ‘lexical’ since the root *-ko* merely appears to have the meaning of ‘entity’ while the main lexical load, namely the definition of the kind of entity represented by the term, is supplied by the prefix which is purportedly a grammatical item” (1972: 256).

One effect of the rather strong semantics of each class is that when a foreign root is borrowed, it is generally placed in the same class as the existing native root (especially for older borrowings). The following nouns have been borrowed from Joola into a Bainunk language, but use the same noun class as the non-borrowed noun seen in other BKK languages.

Gubëeher	Other	Joola Eegimaa	
si-nunuxen	Guñ. sin-no	bu-nunux	'tree'
a-wux	Guñ. a-wu̟ug	e-βux	'mosquito'
gu-moy	Ko. gú-haf	ga-moy	'eyelash'
fe̟ebi (fa- agr)	Guñ. fa-jaamen	e-jjamen	'goat'
ran-gu̟ux	Guñ. ran-kub	e-xuβ	'crab'
u-raagof[97]	Ko. ú-li	a-rafuxow	'person'

Figure 189: Bainunk nouns with the root borrowed from Joola but the prefix unchanged

Thus, even when the roots themselves are not related, when two nouns with the same meaning are found in class A in one language, and class B in another, this can be evidence for the cognacy of classes A and B. Another explanation for this phenomenon is the use of the genitive/relational construction, which employs the noun class marker of the head noun as a prefix on the possessed/related noun. This genitive/relational prefix may or may not replace the class marker on the possessed noun. The head noun may then be (and often is) omitted entirely. Cobbinah (2013: 342-350) describes this phenomenon in detail for Bainunk, showing how it can lead to unrelated noun roots with the same meaning appearing in the same class across Bainunk languages. Similar examples can be found in Kobiana:

(sí-ddo) sí-ji-hákk	'bracelet' (sí-ddo 'string,' ji-hákk 'hand')
(a-ttóola) á-ggu-lúna	'breakfast' (a-ttóola 'rice/meal,' gu-lúna 'morning')
(di-hínd) dí-ndikkaa(m)	'millet for women' (di-hínd 'millet,' ú-likkaa(m) 'woman')
(??) ja-kkúnu(m)	'ring' (a-kkúnu(m) 'finger')

Figure 190: Kobiana nouns derived from the genitive/relational construction

This phenomenon can be seen already in PBKK for a number of nouns, most notably 'nose' which has the following forms in the daughter languages:

Gub.	Guñ.	Guj.	Ko.	Ka.	
gu-cind	ñan-kindeŋ	gu-ñankin	gu-ñíkkə(n)	gu-ñikən	'nose'

This was morphologically **gu-ñan-kind* or simply **gu-kind* in the proto-language, with **ñaN-* being a common plural class. This may have originally been the second word in a phrase of the form **gu-NOUN gu-ñan-kind* perhaps meaning 'NOUN of nostrils' (note also the plural suffix *-eŋ* in Guñaamolo). The original head noun in the **gu-* class (used for long objects) was perhaps some more general term for body parts, or may have simply meant 'nose' but was homophonous with another common noun. The result is that a new root of the form **-ñankin* meaning 'nose' came to replace an unrelated root meaning 'nose' (or something more general) while appearing in the same noun class.

In the following sections we will examine each class that can be reconstructed for PBKK using the criteria described above. We will then examine the remaining classes from each language that do not have cognates, and assess whether they were innovated or inherited. For each class marker, we are especially interested in whether it can be reconstructed with a final nasal, and (if vowel final) whether it triggered grade II geminate mutation in PBKK.

[97] Semi-calqued: Gubëeher *bu-gof,* Joola Eegimaa *fu-xow* 'head.' Gubëeher also has *wu̟r,* cognate with Ko. *ú-li.*

6.1 Singular classes

6.1.1 *gu-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
gu-	gu-	ha-	gu-I	gu-I	ŋa-I

Same class-cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
gu-fi̟geet	gu-fe̟ger	gu-figu	gu-fíigaal	gu-fial	'horn'
gu-jo̟nd		gu-jend	gu-zàand		'branch'
gu-huur	gu-huur		gú-huuso		'elbow'
	gu-saal	(w)gu-sal	gú-saal	gu-saal	'side (of body)/rib'
gu-lihan ?		gu-lige̟n	gi-híge(n)	gu-rien	'firewood'
		gu-yax	gi-yáhəm	gu-yagm	'thorn'
gu-yi̟n	(gu-ki̟m)	((w)ba-yin)	gi-yín	(ba-yin)	'song' (Joola F. ka-ci̟m)
gu-cind	ñan-kindeŋ	gu-ñankin	gu-ñíkkə(n)	gu-ñikən	'nose' (*gu-ñan-kind)

Same class, same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
gu-huun	gu-huun	gu-xunum	gu-máab	gu-maab	'bone'
gu-ji̟it	gu-gi̟ir	gu-jiit	gú-lung	gu-lung	'feather'
gu-lihan	gu-malum	gu-no	gú-ro		'stick'
gu-moy	gu-moy (Joola E. *ga-moy*)		gú-haf		'eyelash'
gu-lo̟b	gu-lo̟b	gu-leb	gu-zúpp		'language/speech'
gu-bi̟il	gu-bil	gu-bil	gu-mál	gu-fiñol	'lip'[98]

Bainunk: This is the most common noun class, and contains many miscellaneous nouns. However, there is a strong tendency for long, rigid objects to be in this class, and as such it can be taken as the semantic center of the class. It contains all leaves. This is also the class for all languages, e.g. *gu-riin* 'Joola Eegimaa,' as well as the word meaning 'word/speech/language.' The plural of *gu-* is *ha-*.

Kobiana: *gu-I* is also the most common noun class in Kobiana, and has basically the same semantic profile as Bainunk *gu-*, though leaves are in *sa-III*. The plural of *gu-I* is *ŋa-I*.

PBKK **gu-* presents no particular difficulties, as it has remained essentially unchanged in all daughter languages. It likely did not contain all leaves originally, with many being reassigned to this class in Bainunk with the loss of **saN-* (section 6.1.7). It is notable that Joola languages also use a noun class of the form *gu-* (Fonyi *ku-*) for languages, e.g. Eegimaa *gu-bainukkay* 'Bainunk' (Sagna 2008: 270), despite being otherwise semantically rather different (*gu-* is plural and mainly contains round objects). It is possible that this use of **gu-* in BKK was adopted from Joola, though the fact that the word for 'language/speech' also appears in this class in BKK and not Joola suggests the opposite direction of borrowing (though the root *-lo̟b* itself was borrowed from Joola). The plural was originally **ha-*, developing to *ŋa-I* in KK, probably due to a resegmentation involving the plural suffix **-aŋ* (see section 6.3).

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98 Joola Fonyi *bu-bil*, Manjak *u-maal*

6.1.2 *bu-/bi-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
bu-	bu-	i-	bu-I	bu-I	ga-I
bi-	bi-	i-			

Same-class cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
bu-gof	bi-gof	bu-gof	bu-góf	bu-gof	‘head’
bi-ji̟ir	bi-gi̟ir	(w)bi-jiir	bi-gíis	bu-giis	‘face’
bu-huun		bu-huun	bu-wóo(n)		‘back’
bi-ne̟g		bu-na̟g	bu-négg	(bu-no)	‘day/sun’
	bu-gaanig	bugaana̟	bu-gáanegg		‘afternoon’

Bainunk: *bu-* is one of the two most common noun classes (along with *gu-*), and has rather broad semantics. It is notable for having many round things, including almost all fruits. *bi-* is much less common, though certainly not rare. It has basically the same semantic characteristics (or lack thereof) as *bu-*. Nouns often differ between Bainunk languages in being in *bu-* vs. *bi-*. The plural of both classes is *i-*.

Kobiana: *bu-I* is also one of the more common classes in Kobiana, though much less so than in Bainunk. While it does contain some round objects like *bu-bín* ‘breast, *bú-leeh* ‘pot,’ and ‘head,’ ‘face,’ ‘sun,’ this is more the semantic domain of the *a-II* class. The semantic membership of *bu-I* is very broad. There are forms with *bi-* rather than *bu-*, but these are due to a regular phonological alternation dependent on the form of the root, which also affects most other class prefixes with /u/ (see Figure 127). Thus there is no distinction between a *bi-* and *bu-* class in Kobiana. The plural of *bu-I* is *ga-I*.

We can reconstruct **bu-* for the proto-language. Whether this was a very large class as in Bainunk is not entirely clear, however it seems that when *a^X- was lost (at least for the most part) in Bainunk, most of the nouns of that class were reassigned to **bu-*, including most fruits. This reassignment was likely influenced by the existence of a number of round objects in **bu-* to begin with. As there is no obvious phonological explanation for the distribution of *bu-* and *bi-* across Bainunk, **bi-* probably also existed in the proto-language. It is quite possible that it had already begun to fall together with **bu-* at this stage. The plural of both classes was likely **i-*, which was lost in Kobiana-Kasanga and replaced by *ga-I*, originally the plural of the *a-II* class.

6.1.3 *a-, *a^X-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
a-	a-	-Vŋ	a-I	a-I	ga-I
			a-II	a-II	ga-I

Bainunk: This class contains most insects: *a-ga̟k* ‘grasshopper,’ *a-bu̟j* ‘caterpillar,’ etc. There are some miscellaneous other nouns, some common ones being *a-yi̟r* ‘cow’ (Guñ. *a-hay*) and *a-har* ‘meat.’ This class has an even wider usage as an agreement marker. The singular classes *ji-* and *ja(N)-* (as well as *a-*) and all unprefixed nouns take *a-* agreement. There are some irregularities to *a-* agreement. In Guñaamolo, the agreement marker is *no-* in certain forms, such as the relative marker *no*, and the proximal demonstrative *in-no*. In Gubëeher, the proximal demonstrative is *amu* rather than expected $^{\times}$*ama*. The plural is formed by affixation of *-Vŋ* to the singular noun: *a-reep / a-reep-eŋ* 'tsetse fly/flies.' In Guñaamolo, the plural/collective of insects in *a-* is instead *ti-*: *a-meh / ti-meh* 'termite(s)' (cf. the insect collective *bi-* in Gubëeher).

Kobiana: *a-I* is a marker on very few nouns, most notably *á-ro* 'animal' and *a-wóol* 'star.' However, *a-I* is an extremely common agreement marker, being used by the noun classes *u-* (the borrowing class), †*ba-II*, †*ja-III*, †*ji-I*, as well as all unprefixed nouns. *a-II* is a very large class, second only to *gu-I*. It contains many small round objects (including almost all fruits and seeds) as well as many miscellaneous nouns: *á-ccih* 'mouth,' *a-bbòong* 'stone,' *á-ddib* 'dew,' *a-jjóom* 'war,' *á-kkidd* 'hurricane,' *á-ttang* 'palm fruit,' etc. The demonstrative for both classes is the highly irregular *aɲe* (cf. *sii* for *si-III*, *buu* for *bu-I*). The plural of both *a-I* and *a-II* is *ga-I*.

Despite their formal resemblance, there are no same-class cognates between Bainunk *a-* and Kobiana *a-I* or *a-II*. The insects in Bainunk *a-* correspond in Kobiana to †*ja-III* (see section 6.1.12).

Gub.	Guñ.	Guj.	Ko.	Ka.	
a-yum	a-yom	a-yom	joom	jowum	'bee'
(a-wux)	a-wu̟ug	a-yuŋ	joong	jowung	'mosquito'
a-wu̟lur	a-wu̟lul	a-wulund	jóohund	jawurund	'fly'
a-koos	a-koos	(a-koon)	jakkɔ́cc		'tick'
a-xaranga	a-karanga	(a-fen)	jakkɔ́rngɔ		'louse' (borr. Mande)
(a-di̟g)	a-ñuuñ	a-ñuñ	jáñuuñ		'ant'

Figure 191: Insects in Bainunk a- *and Kobiana* †ja-III

The Bainunk cognates for most Kobiana *a-II* nouns are in *bu-*.

Gub.	Guñ.	Guj.	Ko.	Ka.	
bu-jof	bu-jof	bu-jjof	a-jjéf	a-jof	'forest'
bu-koor	bu-koor	bu-koor	a-kkóos	a-koos	'country/village'
bu-niin	bu-niin	bu-niin	a-níi(n)	a-niin	'egg'
	bu-diin	bu-di̟in	a-ddíi(n)	a-ddiin	'well'
(bu-tu̟k)		bu-lug	á-ddugg		'pumpkin'
bu-wu̟dd		a-wud	á-wudd		'abscess'
	bu-bah 'calf'	bu-bax 'thigh'	a-bbáh 'leg/foot'		

Figure 192: Bainunk cognates of Kobiana-Kasanga a-II *nouns*

Fruits in Bainunk are in *bu-*, compared to Kobiana *a-II*. Being such a large and overall semantically permissive class, it is perhaps possible that Bainunk *a-* and Kobiana *a-II* are indeed cognate, but the lack of cognate nouns is particularly suspicious given the size of these classes. It is more likely that Kobiana *a-I* is the only true cognate class to Bainunk *a-*, falling out of use for the most part in Kobiana nouns, with *a^X- falling out of use in Bainunk. Recall from section 4.1.4 that some *bu-* nouns in Bainunk show evidence of having been in *a^X- historically, as their root-initial consonant is the reflex of a grade II consonant.

We must certainly reconstruct *a- as an agreement marker, having essentially the same distribution in all languages. It was likely also used as a marker on nouns, though perhaps only a few as in Kobiana. It is probably impossible to say whether **a*- or **jaN*- was the original class for bugs. We can also reconstruct a separate *a^X- class triggering gemination in the proto-language, as it seems unlikely that this class was innovated in Kobiana-Kasanga. *a^X- may continue on as *a*- in a few Bainunk words, or may have fallen out of use altogether, with most nouns being reassigned to *bu*-. As for the plural, it is likely that **ga*- was the original plural of *a^X- as in Kobiana, though probably not of **a*-. **ga*- was simply lost in Bainunk, along with the loss of its singular counterpart *a^X-. See section 6.3 for more on plurals.

6.1.4 *ba^X-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ba-	ba-	-Vŋ	†ba-II	a-I	-a
			ba-II	ba-II	—
			(ba-I	ba-I	ga-I)
			(ba-?	ba-III	-a)

Same-class cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
ba-ji̹d	(da-gi̹d)	ba-jid	bajjídd	ba-jid (pl. ga-jidda)	‘girl’
ba-ka̹r	ba-ka̹r	ba-ka̹r	bakkáar	bakaad	‘chicken’
ba-caam	ba-caam		ba-ccáa(m)	ba-caam	‘money/payment’
ba-wuc	ba-wuc	ba-wuc	buucc (*bu-I*)	bo-wuc	‘wind/air’

Bainunk: A somewhat small class for noun roots, with rather broad semantics. There are some animals: *ba-baxuun* ‘dove,’ *ba-liiray* ‘whale,’ etc. (though at least the second of these is borrowed from Joola). Very common as a deverbalizing/infinitive noun class. The plural is formed by affixation of -*Vŋ* to the singular form.

Kobiana: *ba-II* is no longer a morphologically active class on noun roots, though it is very common in forming verbal nouns (see section 6.6). There are however a good number of nouns with fossilized *ba-II*, most of which are animals: *baccáañaali* ‘porcupine,’ *baddúkkend* ‘palm rat,’ *báttappaali* ‘monkey sp.,’ *battínd* ‘dolphin,’ etc. There are a few nouns with an active prefix *ba*-, taking *ba-III* agreement. These are semantically more in line with the collective class *ba-I*, and will be discussed in section 6.2.2. Note however that *ba-ccáa(m)* ‘money’ is in this *ba-III* class synchronically. There is a single *ba-I* noun *bá-zeeb* ‘shade’ which is unlike other collective *ba-I* nouns in that it has a plural *gá-zeeb*. Nonetheless, this noun is probably best taken as a member of the *ba-I* collective class, rather than representing a separate class. The plural of *ba-II* nouns is formed by affixation of -*a* to the singular form.

We can reconstruct *ba^X- triggering gemination for the proto-language— the same as the commonly used infinitive class. This class either attracted a few more members in Bainunk, or lost members in Kobiana-Kasanga. The first of these possibilities would help to explain the presence of lenis-initial roots in Bainunk *ba*-, which ought not to exist if they were originally in the geminating *ba^X- class. This scenario would leave us with a more semantically coherent proto-class consisting mainly of animals. The influence of the collective class **ba*- may have facilitated the broadening of this class in Bainunk. Synchronically, there is no way to tell these classes apart in Bainunk, and indeed many nouns now treated as singular *ba-* nouns have a collective/mass meaning, including *ba-ku̟ni* 'shade,' *ba-meej* 'embers,' *ba-wuc* 'wind,' and *ba-curux* 'itching substance.' The word 'girl' seems somewhat semantically exceptional in this class, and may have been influenced by the Joola use of a homophonous class for 'girl,' e.g. Eegimaa *ba-ju̟r* (this is the only human in the *ba-* class in both languages). **ba-ccaam* 'money/payment' also seems out of place, and so we can be fairly certain that it was borrowed into the proto-language from Joola, (Eegimaa *ba-ccam*, Fonyi *ba-caam*), rather than the other way around. The plural of **ba*^{X}- was formed by the simple addition of **-aŋ* to the singular noun, as in the modern languages.

Aside from the existence of lenis-initial noun roots in Bainunk *ba-*, there is at least one noun in Kobiana-Kasanga that provides evidence for potentially reconstructing a separate singular noun class **ba-*.

Gub.	Guñ.	Guj.	Ko.	Ka.	
fa-ci̟r	fa-kki̟r	fa̟kr	be-hil	bɛɛl	'monkey'

The root *-*kíl* ('jump' as well as 'monkey') appears in the *fa-* class in Bainunk, but seems to be prefixed with *ba-* in KK (*bu-* would not yield the attested vowels), like a number of other animals. However the root is clearly in grade I in KK, so we cannot straightforwardly assign it to **ba*^{X}- historically. This root also behaves irregularly in Bainunk in that *fa-* did not trigger gemination historically, so it is hard to know what to make of this particular word. While the evidence in scant, we cannot dismiss the possibility that **ba-* existed as a separate singular class alongside **ba*^{X}-.

6.1.5 *u-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
u-	u-	ñaN-, iN-, (ja-)	u-I	u-I	i-I, ja-I, (bi-I)

Same-class cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
u-di̟igen	u-di̟igeen	u-dige̟en	ú-ligee(n)	u-lien	'man'
u-dikaam	u-dikaam	u-dikaam	ú-likkaa(m)	u-likaam	'woman'
u-du̟g	u-du̟g	u-dug	u-lúgu		'thief'
u-nam		u-nam	ú-nam	u-nom	'king'
u-lax		(b)u-lax	ú-hah		'smith'
		u-li̟in	u-híi(n)		'weaver'
wu̟r	wu̟r	wur	ú-li	u-liŋ	'person'
u-ba̟r	u-ba̟r		wal	(ko-mbol)	'child'[99]

Bainunk: This class contains exclusively people, and only a very few personal nouns are not in it. There are a number of peculiarities regarding the markers for both the singular and plural of this class. In the singular, the form of the agreement marker in certain situations is *mu-* rather than *u-*: the proximal demonstrative (normally *CL-m-CL e.g. Guñ. *ta-n-ta*) is *um(m)u*, the

[99] The Bainunk cognate to Kobiana *wal* would at first appear to be *wol* 'child,' but the PKK initial consonant must be *b based on the Kasanga form, cf. Ka. *baab* vs. Ko. *wàbb* 'father.' Though there may be some connection between *wal* and *wol*, they do not seem to be truly cognate.

distal demonstrative is *mo-ŋoon* in Guñaamolo and *u-mo-oŋ* in Gubëeher (cf. *ta-ta-aŋ*), and the relative marker is *mu* in Guñaamolo. There are three possible plural class markers for the noun itself. Most take *ñaN-*, but a few very common nouns take *iN-*: 'man, woman,' *u-diin* 'friend,' all words for siblings, e.g. Gub. *u-d̝aan* 'same sex sibling,' and Gub. *u-dihel* 'adult.' In Guñaamolo, an even smaller number of nouns have their plural in *ja-*: the plural of *wol* 'child' is *ja-raah* (Guj. ⁽ʷ⁾*ja-raax*), the plural of *wu̝r* 'person' is *ja-maŋ*, and the plural of *u-ba̝r* 'child' is *ja-be̝r-eŋ* or alternately *im-be̝r-eŋ*. In Gubëeher, a few borrowings from Joola have plurals in the Joola class *e-*. For all of these plurals, agreement is with *iN-*.

Kobiana: This is also the personal class, with very few personal nouns being outside of it. As in Bainunk, the class marking is irregular in comparison to other classes. The singular demonstrative which generally takes the form CL-V (e.g. *sii* for *si-III*, *buu* for *bu-I*) is *woo*, and the agreement marker on certain grammatical modifiers is *wo-*, e.g. *wó-nguro* 'which,' *wo-kk* 'this one.' The plural for most *u-I* nouns is *ja-I*, but the word *ú-li* 'person' takes *i-I*, as well as all proper nouns referring to people, e.g. *i-zɛkkíi(n)* 'Wolof people.' In somewhat of a reversal of the situation on nouns themselves, agreement for most personal plural nouns is with *i-I*, but a few very common nouns take *ja-I* agreement: 'man, woman, older sibling, younger sibling.' There is a single noun *wal* 'child' with a highly irregular plural *beel*, being the only noun to take *bi-I* agreement in the plural. Unprefixed nouns for family members take *a-I* agreement in the singular, and form their plurals with *ja-I*: *yen / ja-yéna* 'mother(s),' *wàbb / ja-wàbb* 'father(s),' etc.

The singular class **u-* must have had some irregularities in its agreement marking on demonstratives and relatives, but it is perhaps impossible to know the original distribution of the forms *u-*, *mu-* and *wo-*. For the plural, the nouns 'man, woman,' and terms for siblings must have had plural agreement in **ja-*, but otherwise it is hard to determine the distribution of **ja-*, **i(N)-*, and **ñaN-*. It is conspicuous that the aforementioned nouns have irregular plurals in each language, but they make use of different markers, with *iN-* noun marking being irregular in Bainunk, and *ja-* agreement marking being irregular in Kobiana. Regarding **i(N)-*, there is no obvious explanation for the discrepancy in the presence of the nasal. Perhaps KK *i-I* was influenced by the plural class **i-*, originally the plural of **bu-*. Both 'person' and 'child' are highly irregular in each language, and must have been so in the proto-language as well. For 'child,' it is likely that the Kobiana plural *beel* from **bi-al* is an archaism. This is noteworthy for being the only trace of a b-initial personal plural class marker, which are common across Atlantic, as well as broader Niger-Congo. The use of *ñaN-* in Bainunk as the default plural marker on the noun could possibly be an innovation, as this marker is used as the plural for several other common classes. However, a comparison with the Wolof personal plural *ñ-* is compelling, and suggests that this use of **ñaN-* is probably original.

6.1.6 *ji-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ji-	a-	-Vŋ	ji-I	a-I	-a

Same class-cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
ji-fek	ji-fekk	ji-fek	jifèekk	jifeeh	'pig'
ji-gaaj	(ji-moop)	ji-gaj	jigáaz	jiyaaj	'panther'
ji-muxoor		ji-mukor	jimúkkoor	jimukoor	'lion'
ji-bo̜oñ	ji-bo̜oñ	ji-boon	jíbooñ		'horse'
ji-hala			jéeho		'(monitor) lizard'

Same (historical) class, same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
jixi	jihi	jihi	jufáah	jifaar	'dog'
ji-xoox	ji-kooh	jukundo̜l	jibégedd		'rat (sp.)'

Bainunk: This is a medium-sized class containing mostly animals. It is also used for "negative" human nouns, e.g. *ji-ba̜an* 'coward,' *ji-pal* 'jerk.' Other notable nouns are *ji-bo̜og* 'calabash' and *ji-fand* 'shoulder.' The plural is formed by affixation of *-Vŋ* to the singular form. Two words referring to years begin with *ji-*: *jiman* 'next year' and *ji̜ig* 'this year.'

Kobiana: This is no longer a morphologically active class (though see section 6.5 for a smaller active *ji-* class), but some nouns are fossilized with this prefix, enforcing grade I mutation. Nouns in this class are exclusively animals. The plural is formed by affixation of *-a* to the singular form. All temporal adverbs referring to years begin with *ji-*: *jíngaŋe* 'this year,' *jiccéeb* 'next year,' *jináa(n)* 'last year,' *jílekkətte* 'a later year.'

The **ji-* class was very strongly associated with animals, particularly mammals of a dog-like size. There may have been some other nouns originally present, and the extension from animals to "negative" human nouns is straightforward. Even in the proto-language, it seems that agreement was with the marker **a-*, and the plural was formed with **-aŋ* as in the modern languages. A class of the form **ji-* also seems to have been used for 'year' terms, though the word for 'year' itself is not in this class (**di̜in*, also meaning 'rain/sky/god'). This may be same class as the **ji-* animal class, though the Kobiana words suggest that the 'year' class may have been **jiN-*.

6.1.7 *raN- and *saN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
raN-	raN-	ñaN-	sa-III	sa-III	ña-III

Same-class cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
(a-kund)	ran-kund	ran-kund	sa-kkún	sa-kun	'scorpion'
ran-gu̜ux	(ran-kub)	ran-guux	sa-ngòokk		'crab'
ran-kuluux	ran-kulu	(bu-kulunk)		sa-kulunk	'rooster/chicken'
		ran-kas	sa-kkás	sa-kes	'roof'

Bainunk: *raN-* is a somewhat small class with eclectic semantics. Two areas of focus are woven sitting mats (Gub. *ram-basa*, Guñ. *ram-basaŋ* and *ran-noŋ*), and crabs (as well as 'scorpion' in all but Gubëeher). Cobbinah records five species of crab in Gubëeher, all in *raN-*.

Kobiana: *sa-III* is a rather large class containing principally flat, often leaf-like objects: *sá-ntufa* 'leaf,' *sá-ccedd* 'skin,' *sa-kkáas* 'roof,' *sa-kkúusa* 'shirt,' *sa-ppíikkeh* 'fan,' etc. Leaves of any plant can be productively formed in this class, e.g. *sa-mbákka(n)* 'tobacco leaf,' *sa-náana* 'banana leaf.' Some nouns can be seen as fitting this shape-based profile through metaphorical extension, like *sá-yebb* 'crowd,' and diseases like *sá-ŋuña* 'scabies,' but a few *sa-III* nouns do not fit this criterion at all. Notably, these include *sa-ngòokk* 'crab' and *sa-ncáañ* 'small crab sp.,' as well as the physically similar 'scorpion' and *sa-ñarñaróo(n)* 'spider.' There are a small number of *sa-III* nouns with grade I consonants on the noun itself, most notably *sá-bu(n)* 'cold' and *sá-lebə(n)* 'heat.'

The phonological forms of *raN-* and *sa-III* cannot be reconciled. While *s becomes Bainunk /r/ in final position, this change did not occur elsewhere, as seen in the multiple s-initial noun class markers in Bainunk. However the somewhat exceptional inclusion of crabs and scorpions as well as 'rooster' in each class cannot be coincidental, suggesting that these classes must be connected. It is notable that *sa-III* is a somewhat major class in Kobiana, but *raN-* is rather small in Bainunk, and lacks the semantic connection with flat objects and leaves. While *raN-* does include sitting mats in Gubëeher and Guñaamolo, there is no broader connection with objects of this shape, and in fact the root **basa(ŋ)* is unprefixed in Kobiana *básə(n)*, Kasanga *basa*, and Gujaher (w)*basa* (as well as in D'Avezac's *bassan*)[100]. The original class **saN-* must have included almost exclusively flat objects and leaves, but was lost in Bainunk, with most nouns reassigned to the *gu-* class, which now contains the word 'leaf' and all leaves. It may be that certain longer leaves were originally in **gu-*, while wider leaves were in **saN-*. As a sort of regularization, Bainunk settled on *gu-* as the sole class for leaves, leaving very few nouns remaining in *saN-*, while Kobiana-Kasanga moved all leaves to **saN-*. **raN-* would have been a small class including the animals noted above and likely a few other nouns, which was lost in Kobiana-Kasanga. The original **raN-* nouns were reassigned to *sa-III*, facilitated by the phonological similarity of the markers, and the fact that they likely shared a plural class **ñaN-*. It is possible that the Kobiana grade I nouns 'heat' and 'cold' were originally part of a small separate class **sa-*.

6.1.8 *siN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
siN-	siN-	ñaN-	si-III	si-III	ñi-III

Same-class cognates:

Gub.	Guñ.	Guj.	Ko.	Ka.	
sin-cind	sin-kind	cin-cind	si-kkínd	si-kind	'rope/string'
sim-moot	si-moot		si-móott		'(cotton) thread'
sin-ceem		(b)kin-kyem	si-kkéem		'sleep'

[100] It is significant that this root is a borrowing, perhaps originally from Mandinka *basa*, cf. also Joola Fonyi *ka-basa* and Wolof *basaŋ*. Whether it was borrowed into PBKK or separately into the daughter languages, its inclusion in *raN-* must have had some semantic motivation.

Same class, same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
sin-du̥ng	sin-tand	(b)kin-dend	sí-ŋaw (Manjak ka-ŋau)		'vein'
sim-bu̥us, etc.	sin-liib		si-níngəlneh		'vine (sp.)'
si-fooŋ	sin-suul	ci-suul			'bad smell'
si-koon	sin-koon	cin-koon			'bad smell'
si-faan	sin-neb	ci-foot	si-fóoh		'(good) smell'
si-let			sí-ndeŋ		'trap'

Bainunk: This class contains long, flexible string-like things, with a small minority of other nouns: *sin-kal* 'tail,' *si-liin* 'spiderweb,' *sin-kaŋ* 'palm fiber,' etc.

Kobiana: Same semantics as in Bainunk: *sí-ddo* 'rope/string,' *si-ncáaw* 'intestine,' *si-ccúul* 'umbilical cord,' etc.

**siN-* can be reconstructed without complication as a class for strings and similar things. It is hard to know whether the plural was originally **ñaN-* or **ñiN-*; see section 6.3 on plurals for more.

The use of *kiN~ciN-* in Gujaher is part of a larger issue involving a number of class markers. Markers of the shape *si(N)-* in Kobiana-Kasanga and Bainunk can be traced back to four if not five distinct class markers— note that each has a distinct plural class.

		Gub.	Guñ.	Guj.	D'Av.	Ko., Ka.	pl. (Bai./KK):
'string/rope,' 'sleep':	*siN-	siN-	siN-	ciN-	siN-	si-III	ñaN-/ñi-III
'dream':	*kiN-?	—	—	ciN-	ciN-	si-III	—/—
trees:	*ki-?	si-	si(N)-	ci-	?	—	muN-/—
'eye':	$*si^{X}$-	si-	si-	ci-	si-	si-II	i-/ga-I
'arm, leg, ear':	*ki-	si-	si-	ci-	ci-	si-III	ha-/ŋa-I

Figure 193: BKK class markers of the shape si(N)- *and* ki(N)-

The evidence for these distinctions comes in large part from the wordlist in D'Avezac, as this is the only Bainunk variety to maintain a distinction between original *ki(N)-* and *si(N)-* (note that <qu> in this wordlist can represent either [c] or [k]).

siN- nouns:	*sinquindi, simboque* 'rope' ; *smotte* 'string'
ki- nouns:	*quilaac* 'arm' ; *quidinqui* 'leg' ; *quinif* 'ear'
si- noun:	*simahi* 'right hand' (see footnote 101 in section 6.1.9)
si- noun:	*sigguin* 'eye'
siN- infinitives:	*sinquehem* 'sleep' ; *sincobou* 'chew' ; *sintan* 'sell'
kiN- infinitive:	*quinguiom* 'dream'

Figure 194: Nouns and infinitives with si(N)- *and* ki(N)- *in D'Avezac (1845)*

In Gubëeher, Guñaamolo, Kobiana, and Kasanga, we find only /s/ in these markers, while Gujaher has only /k~c/. While there are a number of issues in interpreting the data from D'Avazac, in this respect it is rather clear. There are three words for string/rope, all with <*sin/sim-*>, and three words for limbs (and 'ear') all with <*qui-*>, which most likely represents /ci-/, though it could also be /ki-/. There are a number of infinitive verbs with

<*sin/sim-*>, and only one with <*quin-*>, ‘dream.’ This form tentatively suggests that there were infinitives in both **siN-* and **kiN-*. ‘Eye’ is the only member of its class, and has <*si-*> in D’Avezac. There are unfortunately no trees in the wordlist, and so no way to determine if this Bainunk-specific marker was s- or k-initial. We can draw a connection with the Fula *ki* class which contains all trees, and Cangin **k-* as seen in **ki-rik* ‘tree,’ but this is somewhat speculative. As for /k/ vs. /c/, the existence of /k/ in free variation with /c/ in these markers in Gujaher (at least in the southern variety studied by Wilson) suggests that the relevant markers were originally k-initial, though realizations with [c] were probably already common in PBKK, as this sound developed to /s/ in Kobiana-Kasanga, Gubëeher, and Guñaamolo. There is no clear evidence for the existence of singleton *c outside of these markers, and so it could even be said that *c regularly developed to /s/ in these languages. In Gujaher, it is likely that inter-speaker and inter-dialectal variation between /k~c/ and /s/ in these markers led to free variation between the stop and fricative for all of these markers, after which /k~c/ was settled upon as a sort of regularization.

6.1.9 *ki-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
si-	si-	ha-	si-	si-III	ŋa-I

Same-class cognate:

Gub.	Guñ.	Guj.	D’Av.	Ko.	Ka.	
(bu-laax)	(bu-laaŋ)	ci-nuf	<quinif>	si-núf	(gu-nuf)	‘ear’

Notable nouns:

Gub.	Guñ.	Guj.	D’Av.	Ko.	Ka.	
si-lax	si-lah	ci-lax	<quilaac>	ji-hákk	ji-rek	‘hand/arm’
si-dịix	si-dịih	ci-dix	<quidinqui>	a-ddíkk	bi-lik	‘foot/leg’ (KK ‘thigh’)

Bainunk: This is a very small class containing only limbs of the body and ‘ear.’ For ‘ear,’ note also Gufangor *su-nụf* and Gutobor *si-nụf* (only Gubëeher and Guñaamolo do not use **ki-nụf*). It is distinguished from the ‘tree’ class *si-* by its plural (*ha-* for limbs and *muN-* for trees).

Kobiana: There is only one member ‘ear,’ distinguished from the “string” class *si-III* by its plural in *ŋa-I*. It is impossible to determine the mutation grade on *si-núf*, but agreement is in grade III. The standard plural is *ŋa-núf*, but *ñi-núf* is used when modified by a numeral other than ‘two.’ The class does not exist in Kasanga.

From D’Avezac we know that this marker was k-initial[101]. The **ki-* class likely contained limbs and ‘ear’ in the proto-language. The root **-dịnx* ‘leg’ is found in other classes in Kobiana and Kasanga, but has a somewhat different denotation of ‘thigh.’ The status of ‘hand’ in the proto-language is somewhat unclear, as Kobiana-Kasanga uses the extremely rare class *ji-I* (pl. *ŋa-I*) for the root **-r̥ak(k)*. It is unlikely that this class was innovated, and it certainly could not have been extended from any other noun, as it contains only ‘hand’ and in Kobiana *ji-làdd* ‘slap.’ Therefore it seems likely that **ji-* existed in the proto-language, which

[101] It is however conspicuous that ‘left (hand)’ is <*simahi*>, cf. Gub. *si-may*, when we expect this to be in the same class as <*quilaac*> ‘arm/hand.’ It is not clear what to make of this— perhaps since the *ki-* class was so rare, it took agreement with the more common marker *si-*.

would leave ‘leg’ and ‘ear’ as the only members of **ki-*. Of course it is also possible that ‘arm’ could appear in either **ki-* or **ji-*. The *si-III* agreement in Kobiana is an innovation, using the far more common agreement pattern from the “string” class. The plural of **ki-* was **ha-*, the same as the plural of **gu-* (see section 6.3 for the development to *ŋa-I* in Kobiana).

6.1.10 *si^X-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
si-	si-	i-	si-II	si-III	ga-I

Same-class cognate:

Gub.	Guñ.	Guj.	D’Av.	Ko.	Ka.	
si-jil̟	si-gil̟	ci-gil	<sigguin>	sí-ggəh	si-gir	‘eye’

Bainunk: This class contains only ‘eye.’ In all but the variety in D’Avezac, the singular marker is the same as for the ‘tree’ and ‘limb’ classes, but ‘eye’ has a distinctive plural in *i-*.

Kobiana: Also contains only ‘eye,’ having the distinctive plural *gé-gəh* with *ga-I* agreement.

First, it is important to establish that the root-initial consonant in Kobiana *sí-ggəh* is indeed a geminate, as this will determine whether the class is reconstructed as geminating or not. In fact, this issue will be rather important in discussing the history of the Wolof noun class and mutation systems in chapter 4 (where **si^X-* may be the ancestor of the *s-* diminutive class). We saw in section 2.1.1 that it can be difficult to distinguish voiced geminates from singletons, and perhaps for this reason there is some disagreement in the literature as to the initial consonant in this word. Wilson gives *si-ggih*, being the only word in his Kobiana list with a geminate /gg/. Doneux (1991: 23) gives sg. *sí-gèh*, pl. *gé-ɣèh*, where his <g> represents a phonetic geminate (1991: 4). Voisin (2015) gives *si-ɣəh* (pl. *ge-ɣəh*). In my own fieldwork, the root-initial consonant in *sí-ggəh* was found to be a geminate. When spoken in citation, the closure of /gg/ was consistently around 100 ms in duration or more. This can be compared to the generally much shorter duration of /g/ in *bu-góf* ‘head,’ recorded immediately afterwards in the same session (the shortest token being a fricative).

bu-**g**óf	sí-**gg**əh
76 ms	98 ms
66 ms	101 ms
32 ms	138 ms
55 ms	93 ms

Figure 195: Closure durations of Kobiana /g/ *in* bu-góf *and* /gg/ *in* sí-ggəh

The first two tokens of *sí-ggəh* were spoken in isolation, and the next two were in the phrase *a-níi sí-ggəh* ‘pupil.’ All tokens of *bu-góf* were spoken in isolation. The closure duration in *sí-ggəh* is consistent with other tokens of /gg/, and is noticeably longer than that of /g/ in a word like *bu-góf*. A fricative realization was never observed in this word.

The class **si^X-* contained only **si-ggir̟̥* ‘eye.’ From <*sigguin*> in D’Avezac we can reconstruct an initial *s, and from Kobiana we can be fairly certain that this class triggered grade II mutation. It is also conspicuous that ‘eye’ is recorded with <gg> in D’Avezac, as this is almost the only use of <gg> in the entire wordlist, along with a *ba^X-* class noun.

Recall that this variety seems to have preserved geminates in the *ba^X- class, so we would expect the same with 'eye' if the class marker was indeed geminating. It must however be noted that the same word is recorded as <*siguil*> and <*siguin*> elsewhere in the list. In Kobiana, agreement with 'eye' takes *si-III*, employing the far more common agreement marker from the "string" class, just as with 'ear' from the previous section. The plural is the same as for the *bu-* class in each language, which was probably **i-* in the proto-language (see section 6.3 for *i-* vs. *ga-I*).

6.1.11 *fa-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
fa-	fa-	-Vŋ	fa-I	fa-III	-a

Same-class cognate:

Gub.	Guñ.	Guj.	Ko.	Ka.	
fa-siin		fasiin	fa-síi(n)		'water chevrotain'

Same class, same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
fe̟ebi	†fa-be̟	fa̟bi	fa-ŋáas	faŋaas	'goat'
	fa-jaamen (borr. Joola, cf. Fonyi e-jaameen)				

Bainunk: This is a rather small class, containing almost exclusively animals, like *fa-ci̟r* 'monkey,' *fa-xaat* 'fish.' In fact most members in Gubëeher are species of fish. The only two non-animals in Gubëeher are *fa-sat* 'rainy season' and *fa-gu̟x* 'spirit.' Cobbinah (2013: 347-350) emphasizes the association of this class with goats, with adjectives placed in *fa-* referring to goats by default. The plural is formed by affixation of *-Vŋ* to the singular form.

Kobiana: This class has nearly disappeared, with the two nouns cited above being perhaps the only native members. The general agreement class for both nouns is *a-I*, with *fa-III* agreement being less common. Intriguingly, there are at least two borrowed nouns, *fá-miilee* 'family' from Creole and *fá-ttaaya* 'meat pastry' from Wolof which show obligatory *fa-III* agreement (these might be thought of as members of the otherwise disused *fa-III* augmentative class). It is likely that *faazé* 'mouse/rat' (Kasanga *faji*) was originally in **fa-*, but synchronically it can take only *a-I* agreement. The form of *fa-síi(n)* and perhaps also *faazé* suggests that this prefix enforces grade I on the noun. However, agreement is always *fa-III*. This is almost certainly due to the influence of the augmentative class *fa-III*, which would have been rather more common than *fa-I*. The plural is formed by affixation of *-a* to the singular form.

The class **fa-* would have been a small class containing animals in the proto-language. It can be no coincidence that there is a class **fan* in Proto-Fula-Sereer, **fa-* in Proto-Tenda, and **f-* in Proto-Cangin that contains a number of animals, notably 'goat,' cognate with the Bainunk root: Ser. *fa-mbe*, Fula *mbee-wa*, Noon *pe f-* (and perhaps also Wolof *be̟y w-*). However, in Fula-Sereer the class contains larger animals (elephant, crocodile, etc.), while in BKK 'goat' is its largest member (in Cangin there is **coox f-* 'elephant' and **pani̟s f-* 'horse' but otherwise the animals are smaller than a goat). Furthermore, the PFS class marker is nasal-final, while it is not in PBKK. The plural of **fa-* was formed by the addition of **-aŋ* to the singular noun, as in the modern languages.

6.1.12 *jaN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ja(N)-	a-	-Vŋ	ja-III	a-I	-a

Same class cognate:

D'Av.	Ko.	
<guancounoum>	jakkúnu(m)	'ring'

Same class (possible), same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
ja-re̟eg	ja̟areg	(jireg)	jébba	jebba	'crocodile'
		jan-ñuur (borr?)	ja-ñúh	je-ñur	'fetish/evil spirit'
ja-liixan, jam-peet		jan-lihen	jániileh		'snake (sp.)'

Bainunk: This is a rather small class, with no clear semantic basis. The agreement marker is *a-*[102], and marking on nouns can be either *jaN-* or *ja-*, with the first of these being most common. There are a few animals, including one bug *jan-teŋor* 'cicada.' The plural is formed by affixation of *-Vŋ* to the singular form.

Kobiana: This is no longer a morphologically active class, but many nouns clearly contain this prefix, with grade III mutation. The vast majority of nouns in this class are insects, and in fact almost all insects are in this class: *jandattóol* 'wasp,' *jattúuh* 'tsetse fly,' *jámbudd* 'midge,' etc. Other prominent nouns are *jakkáab* 'bird' and *jambáa(n)* 'chest.' The plural is formed by affixation of *-a* to the singular form.

The original class marker must have been **jaN-*, taking default **a-* agreement like the **ji-* class. The word 'ring' was formed by placement of the root **-kunum* 'finger' in this class; likely originally as a genitive construction 'X of finger' involving some now-lost noun in the **jaN-* class (see Figure 190). The inclusion of large, dangerous reptiles in this class is notable. The Bainunk class for insects is *a-*, including many cognates to Kobiana *ja-III* insects (see Figure 191), and it is not clear which branch underwent the class reassignment. Perhaps the association of this class with dangerous/malicious animals attracted stinging/biting bugs in Kobiana— and of course both **a-* and **jaN-* may have contained different insects in the proto-language. The plural of **jaN-* was formed by the addition of **-aŋ* to the singular noun, as in the modern languages.

6.1.13 *ta-, etc.

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ta-	ta-	ja- / -Vŋ	ta-I	ta-III	ja-I / -a

Same class, same meaning:

Gub.	Guñ.	Guj.	D'Av.	Ko.	Ka.	
ta-ba̟n	ta-be̟n	(w)ta-bən	<tebben>	tá-fər	(bu-reefed)	'cloth'
	ta̟pur	ta̟pa̟r	<tepudu>	ta-ccɛ́n		'sunrise/morning'

[102] Cobbinah (2013: 297) notes that some singular *ja-* nouns have *ja-* agreement, but historically these all seem to be nouns in the *ja-* collective class that have been reinterpreted as singular, e.g. *ja-mul* 'harvest,' *ja-rax* 'rice field.'

Bainunk: This is a small class containing some words for cloth (*ta-lof* 'woven cloth'), a few birds (*ta-hoox* 'crow,' *ta-fer*, *ta-wuc* 'bird sp.') and 'morning' (but in Gubëeher *ta-feeŋ* 'noontime'). The 'cloth' words use *ja-* for the plural, but the birds and 'morning' use *-Vŋ*.

Kobiana: A rather small class, with some peculiarities regarding mutation and plural marking.

sg.	sg. agr.	pl.	pl. agr.	
tá-fər	ta-III	jé-fəra	ja-I	'cloth'
tá-bbambeh	ta-II	já-bambeh	ja-I	'child-carrying cloth'
ta-kkúh	ta-III	ja-húh	ja-I	'house'
tá-kko	ta-III	tákkoa	ga-I	'burnt rice crust'
tá-ppooh	ta-III	táppooha	ga-I	'flower'
ta-ccɛ́n	ta-III	ga-sɛ́n	ga-I	'sunrise'
tá-ppe(r)	ta-II	já-fe(r) ~ táppera	ja-I ~ ga-I	'foot'

Figure 196: Kobiana nouns with the prefix ta-

ta- appears on only seven nouns, and it is remarkable that among these there are six different strategies for marking agreement and plurality. Wilson records only two *ta-* nouns in Kasanga, *ta-kur* 'house' (pl. *ja-hur*) and *te-ped* 'foot' (pl. *je-fed*).

Here we must be dealing with multiple original classes which have fallen together to various degrees in the modern languages. The clearest of these classes is the 'cloth' class **ta-* with a plural **ja-*, **ja-* being the same as the collective class for leaves, grass, etc. (see section 6.2.1). This may be the same singular class as that of the bird species, though their plural was apparently different. There was likely also a class **taN-*, with a plural in **-aŋ*. The noun 'foot' seems to have been in its own class **ta*^{X}-, which calls to mind the other classes containing only one or two body parts: **si*^{X}- 'eye,' **ji-* 'hand,' **ki-* 'ear, leg.' In Kobiana, the singular agreement for **taN-* was generalized to most of these nouns, but **ta*^{X}- was preserved in 'foot' and oddly extended to 'child-carrying cloth.'

6.1.14 *ka-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ka-	ka-	-Vŋ	(ka-?	ka-III	Ø-)

Bainunk: This is a very small class, containing some miscellaneous nouns, and notably a number of species of fish: *ka-soñop*, *ka-cu̥b*, *kam-piit*. In Gujaher, the word for fish *ka-maafi* is in this class, the root itself being a borrowing from Mandinka *maafe(ŋ)* 'fish or meat eaten with sauce.' Guñaamolo has no class *ka-*, though some nouns in *kaN-* have a prefix of the form *ka-*. However these share nothing with the *ka-* class in the rest of Bainunk, and seem much more in line with *kaN-*.

Kobiana: There is no class *ka-I*, but it is conspicuous that the word for fish *ká-maafe(n)* has this prefix, with the mutation grade unable to be determined on the noun (agreement is with *ka-III*). Unlike all other *ka-III* nouns, its plural is not in *ŋa-III*, but rather is *máafe(n)*, taking *ma-I* agreement. Wilson records *ka-maafi* for Kasanga, with a plural *ñi-maafi*. One other noun *kafambóo(n)* 'vulture' may contain a frozen prefix *ka-I*, but agreement is in the default class. There are in addition at least two place nouns with *ka-I* on the noun (neither can take agreement): *ka-bóy* 'Kobiana land,' and *ka-háam*, the name of a Kobiana village. In Kasanga there is *ko-jeed* 'place' which may contain the cognate prefix.

The word for 'fish,' and perhaps only this word, was probably prefixed with **ka-* originally. In Gujaher and Kasanga-Kobiana, the borrowed root *maafe* replaced the native root, but remained in this class, while in other Bainunk languages the root *-ka(a)t* 'fish'[103] is found in the *fa-* class (Gub. *fa-xaat*, Guñ. *fa-kat*). It is quite possible that the root for 'fish' that originally appeared in the **ka-* class is no longer in use in any modern language.

It may be that another class **ka-* existed for some place nouns, and a connection could be drawn with Bainunk *kaN-* used for place nouns. If these place classes are connected, an original form without a final nasal seems more likely, since the change in Bainunk could be easily attributed to the influence of the **kaN-* class, whereas in KK it would be harder to explain the loss of an original nasal on place nouns due to the influence of a single noun 'fish.'

6.1.15 *kaN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
kaN-	kaN-	ñaN-	ka-III	ka-III	ŋa-III

Same class, same meaning:

Gub.	Guñ.	Guj.	Ko.	Ka.	
kam-ba̟r	ka-mapum		ka-kkɛ́ɛkk		'fishing basket/net'
ka-raafa	(kaaraafa)	(karaafa)	ká-raafi		'bottle' (borr.)
ka-leroŋ			ka-loróŋ		'cooking pot' (borr.)
	ka-jakk		ka-ndéb		'burn (on skin)'

Bainunk: In Gubëeher this class is very small. Its most notable member is *kan-tix* 'place' (Guñ. *kan-tig* 'place,' Guj. *kan-ti* 'somewhere'), and nouns referring to places can be formed using this class, e.g. *kan-noox* 'place to sit' from the verb 'sit.' This class is larger in Guñaamolo, having the locative meaning as well as containing a good number of miscellaneous nouns: *kam-pat* 'shrimp,' *kan-liir* 'spider,' *ka-lub* 'rain' (borr. Joola Fonyi), *ka-ju̟m* 'wound,' etc. Note that a number of Guñaamolo nouns have *ka-* on the noun instead of *kaN-*, though they take *kaN-* agreement. There seems to have been confusion historically between *kaN-* and *ka-*, just as with *siN-* and *si-* in Guñaamolo, which are no longer distinguished as separate classes.

Kobiana: *ka-III* is a medium-sized class, with many nouns referring to dome-shaped or basket-shaped objects, e.g. *ká-kkedd* 'mortar' *ká-kkattəgg* 'hole in ground,' *ka-mpɔ̀tt* 'waterhole/ pothole,' *ka-mpónkulo* 'shaven head.' Some borrowed nouns fitting this profile are assigned to *ka-III*, in addition to 'cooking pot' and 'bottle' above: *ká-kkɔɔppa* 'cup' and *ka-ttɛkkál* 'basket' (from Joola). This class contains many borrowings from the Manjak *ka-* class, and these often do not fit this shape-based criterion (e.g. *ká-mbalambaamb* 'lightning'), though some do (e.g. *ká-mbakkah* 'cheek,' *ká-ccakk* 'shoulder'). The plural of *ka-III* is *ŋa-III.*

[103] This root is probably also borrowed, as /t/ in the rest of Bainunk has become /r/ in Guñaamolo. Perhaps compare Joola Karon *e-ket* 'fish.'

*kaN- must have been a rather small class originally. Its size in Kobiana is mainly due to borrowings from Manjak. The concave/convex shape-based criterion does hold for the non-borrowed nouns, and so this can be reconstructed with some confidence. In Bainunk, in addition to 'fishing net/basket,' we find the synchronically unprefixed *ka̤gil* 'hole in ground' and *kabanda* 'shoulder' in Guñaamolo. It is presumably a coincidence that the borrowed words for 'cooking pot' and 'bottle' fit into this class so neatly. Conspicuously, Gubëeher *kan-tix* takes the plural suffix *-Vŋ* rather than the prefix *ñaN-* of other *kaN-* nouns. It is quite likely that this represents a separate class originally, and its semantics do not fit well with those of **kaN-* (see the previous section on **ka-*). The plural of **kaN-* was almost certainly formed by a change in prefix rather than suffixation. The discrepancy in plural prefix (*ñaN-* vs. *ŋa-III*) can be explained in one of two ways. Bainunk *ñaN-* was either extended from its use as the plural of a number of other classes, or else Kobiana *ŋa-III* is an innovation created under the influence of the plural *ŋa-I* class. See section 6.3 for more on plurals.

6.1.16 *kuN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
kuN-	kuN-	-Vŋ	Ø	ku-III	-a

Same class cognate:

Gub.	Guñ.	Guj.	Ko.	Ka.	
kuul	(kuul)		kooh	hoor	'fire'

Bainunk: This class contains only a few nouns. In Gubëeher: 'fire,' *ku̯ur* 'mortar,' *kun-du̯ng* 'nape,' *kum-bil* 'gift,' *kun-no* 'palm wine,' and two derived nouns *kun-di̯igen* 'male force' and *kun-dikaam* 'female force.' In Guñaamolo, only two are reported: *kun-ju̯m* 'wrestling match' and *kum-pan* 'honey.' In Guñaamolo *kuul* 'fire' is considered unprefixed and takes *a-* agreement. Gubëeher *ku̯ur* 'mortar' has the plural *ñan-ku̯ur*, but otherwise these nouns take the plural suffix *-Vŋ*.

Kobiana: There is only one noun in this class, *kooh* 'fire.'

A class **kuN-* can be reconstructed for 'fire,' containing few or possibly no other nouns. As for the form of 'fire,' the root was presumably vowel-initial or perhaps h-initial, before which marker-final nasals regularly delete. Gubëeher *ku̯ur* 'mortar' (Gujaher *kund*) was not originally in this class. It was likely in **kaN-* like Kobiana *ká-kkedd* 'mortar,' with original **ka-hu̯(n)d* (cf. Guñ. *bu-hu̯ur* 'pestle') developing to *ku̯ur* and adopting *kuN-* agreement after the vowel fusion obscured its original class. This would explain its irregular plural in *ñaN-*. The terms 'male force' and 'female force' likely derive from expressions 'fire of man' and 'fire of woman.' It is possible that 'honey' was in this class based on Guñaamolo *kum-pan*, but both Gujaher *gum-pan* and Kobiana-Kasanga **gu-njaab* suggest that this was in **guN-*. It seems likely that when the small **guN-* class was lost in Guñaamolo, **gum-pan* was reassigned to the phonologically similar **kuN-* class.

6.1.17 *ku- and *ho-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ho-	ho-	(-Vŋ)	ku-I	ku-I	—
hu-	hu-	(-Vŋ)			

Same-class cognate:

Gub.	Guñ.	Guj.	D'Av.	Ko.	Ka.	
honj	honj	honj	<conque>	koñ	honj	'thing'

Bainunk: *ho-* is the class for *honj* 'thing,' and in Gubëeher *ho-rụk* 'something,' and can be used to form some derived nouns like *ho-ruux* 'some water' from *baa-ruux* 'water.' Gubëeher has a separate class *hu-* with a single noun *hu-naaŋ* 'thing,' but it is also used in various grammatical functions as a 'default' noun class, e.g. *hu-nam* 'mine.' Gujaher has only *hu-*, used for *honj* and in the same way as Gubëeher *ho-* (e.g. *hu-tịit* 'some millet'). In Gubëeher, *honj* can be used as either singular or plural, with the same agreement, whereas in Guñaamolo, there is a plural form *honj-oŋ*, and both languages have *ho- -Vŋ* agreement. Gubëeher *hu-naaŋ* also does not change in the plural, and takes *hu- -Vŋ* agreement.

Kobiana: There are two nouns in *ku-I*, *koñ* and *kóno(n)* both meaning 'thing,' and a few derived nouns like *kú-hobbeh* 'food' from *-h~kkobbeh* 'eat.' Any adjective can be placed in this class to create a noun meaning 'something Adj.,' e.g. *kú-le* 'something big.' It is used in many grammatical functions as a 'default' noun class, e.g. *ku-raam* 'mine,' and in relative clauses, e.g. *ku wal ppégi* 'what the child saw.' The nouns *koñ* and *kóno(n)* can be either singular or plural, with *ku-I* agreement regardless. The noun *kubɔ́mpali* 'frog/toad' borrowed from Manjak *u-bɔpal* seems to have taken this prefix, though agreement is in the default class. The same can be said of *kiñáng* 'chameleon,' which appears with a root *-ñang* or *-ñank* in many languages of the area.

Since *h develops to /w/, /y/, or Ø in Kobiana-Kasanga, the *ku-I* class cannot be traced back to an h-initial class marker. Kasanga *honj* must be from an earlier *k, cf. *hoor* 'fire' from a k-initial noun (see section 6.1.16) — thus PKK must have had **konj* 'thing.' Because initial *k remains unchanged in all Bainunk languages before back vowels (cf. the other class markers *kaN-*, *ka-*, and *kuN-*), the markers *ho-* and *hu-* cannot be traced back to a k-initial marker without complication. Most likely, there was an original class **ho-* used on **ho-nj* 'thing,' as well as a 'default' class **ku-* used in the same way as Gubëeher *hu-* and Kobiana *ku-I*. In KK, **honj* was further prefixed with *ku-* as **ku-honj*, and **ho-* ceased to be an active class. Kobiana *kóno(n)* 'thing' must have also been in **ho-* originally, explaining the vowel of the first syllable. In Gubëeher, **ku-* may have been influenced by *ho-*, becoming *hu-*. These classes were likely numberless originally, with the use of the plural suffix being an innovation in some of Bainunk (and Kasanga *honja*).

6.2 Collective classes

6.2.1 *ja-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ja-	ja-	—	ja-I	ja-I	—

Same-class cognate:

Gub.	Guñ.	Guj.	D'Av.	Ko.	Ka.	
ja-jand	ja-gend	je-gen	<guaguen>	je-gé(n)	je-gen	'hair'
ja-moot	(ba-mott)	ja-mot	<guamolle>	ja-móott		'cotton (threads)'

Bainunk: This is a large collective class, being used for most non-human objects that are not fruits/vegetables. It is most common for leaves, grasses, and other plants and long flexible objects, but also many animals and other assorted nouns. This is used as the plural of cloths in the *ta-* class.

Kobiana: This is the collective class for leaves, e.g. *ja-báakka(n)* 'tobacco leaves.' It also contains some masses of plant material without a singular, like *ja-léehe(n)* 'straw,' *já-gege(n)* 'chaff,' and *je-rúgeli* 'kapok seed pod' (a seed pod that matures into a bundle of cotton-like fibers). This is also the plural of cloths in the *ta-III(II)* class.

**ja-* can be reconstructed as a collective class for plant material and hair without complication. It may have also been used as the collective of other nouns as in Bainunk.

6.2.2 *ba-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
ba-	ba-	—	ba-I	ba-I	—

Bainunk: This is the collective class for vegetables and seeds in *bu-* and *bi-*, as well as the collective class for most nouns in *gu-*, especially seeds, fruits, and vegetables. Certain (perhaps all?) trees can be put in this class along with the plural suffix *-Vŋ* to derive a noun meaning 'grove of X trees.' There are a number of nouns referring to masses of small grain-sized pieces found exclusively or primarily in this class: *ba-yidur* 'sorghum,' *ba-joboroŋ* 'Pleiades,' *ba-fung* 'mold,' etc.

Kobiana: This is the collective class for most fruits and vegetables, most of which are in *a-II*. It is also the plural/collective of *pa-III*, which contains small bead-shaped items. There are two nouns which appear in this class without a singular form: *bé-ddo* 'powder/flour' (with exceptional grade II/III mutation on the noun itself), and *bá-zeeb* 'shade,' though this can have a plural *gá-zeeb*. There is also *bé-gər* 'pepper,' from which a singular *pa-bégər* 'peppercorn' can be formed by stacking class markers.

The **ba-* class was the collective for most fruits and vegetables, and other collections of small, mostly round objects. Kobiana *bá-zeeb* 'shade' is somewhat of an outlier. It is worth noting that Joola uses a class *ba-* as the general collective class.

6.2.3 *di-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
di-	di-	—	di-I	di-III	(-a)

Bainunk: This is used as the collective class for fruits in *bu-* and *bi-*, but also contains some mass nouns: *di-raax* 'earth,' *di-kiñaañ* 'sand,' *di-di̥b* 'mud,' *di-lootend* 'saliva,' *di-ñiilen* 'snot,' *di-be̥rend* 'feces,' *di-de̥eb* 'fish intestines,' *di-lu̥ur* 'boilt rice,' and *di-ŋaam* 'pus.'

Kobiana: This is the collective class of both varieties of millet, *di-hínd* 'millet' and *dí-zumb* 'pearl millet,' and also contains *di-yáah* 'earth/sand.' It enforces grade I on the noun itself, but grade III in agreement, e.g. *di-hínd dí-ndikkaa(m)* 'woman's millet.' In Kasanga it is used only as the collective of millet, with 'sand' and 'earth' appearing in *ti-III* (section 6.2.4).

The class **di-* seems to have been for formless masses, with 'earth/sand' being the clearest inclusion. The grade III agreement in Kobiana is probably taken from the augmentative plural marker *di-III.*

6.2.4 *tiN-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
tiN-	tiN-	—	t-	ti-III	(ga-)

Bainunk: This is a small class that can be used to form words for saps of trees, e.g. *tin-do̥oma* 'sap of *si-do̥oma* tree.' In Gubëeher it contains *ti-loom* 'wax,' *ti-rux* 'cold,' *ti-ñuxaat* 'palm juice' and *tin-kepul* 'ointment sp.' as underived nouns, and Guñaamolo has *ti-fuf* 'foam.' In Gubëeher 'sap' itself is *teepund*, which must have been in this class historically, but is now treated as unprefixed. These are all mass nouns, with no plural.

Kobiana: This class contains only *táandi* 'clay.' A plural *ga-háandi* can be coerced, but is not common. Kasanga uses this class for some nouns found in *di-III* in Kobiana: *ti-yaar* 'soil/earth,' *ti-keeñe* 'sand,' and note also *timbej* 'mud.'

The class **tiN-* was associated with viscous liquids. It is difficult to say which specific nouns would have been in this class.

6.2.5 *guN-

Guj.	Guj. agr.	Guj. pl.	Ko.	Ko. agr.	Ko. pl.
guN-	guN-	—	gu-III	gu-III	(ŋa-III)

Bainunk: This class survives only in Gujaher, where it contains *gum-pan* 'honey,' *gun-dat* 'fermented palm wine,' and *gun-no* 'palm wine' using the default root.

Kobiana: A small class with some miscellaneous nouns: *gú-ndebb* 'palm wine,' *gu-mbún* 'beauty,' *gu-mbúubeh* 'bathing place,' *gu-ccúu(n)* 'feces.' Plural forms, if they exist, are in *ŋa-III*, cf. *ŋa-I* for *gu-I.* However, like *ba-III* this is best considered a collective class. There is also *gu-ddúkku* 'hunger' and *gí-njaab* 'honey' which were likely in this class originally, but now take grade I agreement. Kasanga has *gu-njaab* 'honey' but the agreement for this noun is not known.

The class **guN-* was probably used for 'honey' and 'palm wine,' with perhaps a few more members. In most Bainunk languages it was lost, and Gubëeher *kun-no* 'palm wine' and Guñaamolo *kum-pan* 'honey' were assigned to the phonetically-closest class.

6.2.6 *muN- and *ma-

Gub.	Gub. agr.	Gub. pl.	Ko.	Ko. agr.	Ko. pl.
muN-	?	—	mu-	mu-III	—
			ma-I	ma-I	—

Bainunk: The liquid *muN-* class is very marginal. It does not exist in Guñaamolo, but is fossilized on some nouns, and has only four members in Gubëeher. It is more common in Gujaher, with at least eight members. It is used as the infinitive class for 'urinate' in Gubëeher, and for 'urinate' and 'defecate' in Gujaher. There is no *ma-* class in any Bainunk language.

Kobiana: The liquid class is *ma-I*, containing most common liquids. It is also used as the infinitive marker for a number verbs, most of which denote bodily functions: 'urinate, vomit, burp, blow nose, breathe, spit, sneeze, fly, swim.' The class *mu-III* is extremely marginal, containing perhaps only three nouns, 'marrow,' 'brain,' and 'kaldu (sauce sp.).' Only the last of these has a grade III consonant on the noun, though agreement is always with *mu-III*. There are no infinitives in *mu-III*.

The common liquids in each language are:

Gub.	Guñ.	Guj.	D'Av.	Ko.	Ka.	
baa-ruux	baaru	mun-du	<moundou>	má-le(m)	a-yaab	'water'
mind	mi̟nd	muŋ-yin	<mini>?	ma-nóo(n)	ma-noon	'milk'
mum-me̟er	mumme̟er	mum-meer	<houmedde>	ma-fóos	ma-foos	'salt'
gu-leeñ	muheen	mu-leen	<moquel>	bí-heeh	bi-ler	'blood'
mun-ji̟len	munkul	mun-jil	<mounguin>	má-gəh	ma-gir	'tear'
mu-se̟len	musaal	mun-saal	<moussaan>	ma-sétt	ma-seta	'urine'
mi̟ita	gu-degleer	(w)mu-xuc mun-no 'oil'	<mounguiou>	mejj	m-ej	'palm oil'

Figure 197: Common liquids in Bainunk, Kobiana, and Kasanga

And these additional m-initial nouns are found:

Gub.		Ko.	
mu̟uj	'syrup'	mi-ncélelekk	'kaldu (sauce sp.)'
mun-toop	'spinal marrow' (borr. Joola Fonyi *mu-toop*)	mú-fokk[104]	'brain' (borr. Manjak *m-fuk*)
		mú-loŋ	'marrow'
Guñ.		má-ges	'vomit'
mawujen	'diarrhea' (JF *ba-wujen*)	má-sɛn	'daylight'
		má-yett	'saliva'
Ka.		ma-yóol	'drool'
ma-reta	'saliva'		
ma-yaab	'thirst'		

*Figure 198: Further liquids in BKK *ma- or *muN-*

[104] This word is pronounced with strong nasalization on the class prefix, which can even be realized as a full nasal consonant: [múmfokk] ~ [mṵ́fokk].

It is impossible to reconcile *muN-* and *ma-* phonologically, and so this is not a case of one original class splitting into two. Here a comparison with the rest of the Northern Atlantic languages will be helpful.

With the possible exception of Fula-Sereer, all other Northern Atlantic branches have a liquid class resembling *ma-*, though in Wolof there is no support for the vowel.

Tenda: *maŋ-
Biafada: ma-III
Wolof: m-
Cangin: *ma-
Fula: III- -ɗam

Figure 199: Liquid noun class markers in non-Bak Northern Atlantic languages

Liquid classes of a form *ma-* are found throughout Niger-Congo, being one of perhaps only two class markers found across the entire proposed family (the other being the personal plural *ɓa-*). In Joola Eegimaa, the principal class for liquids is *mu-*. This class includes 'myrrh, milk, breastmilk, tears, salted river water, grease, marrow/brain, intestines, honey, pus, urine,' as well as a number of abstract nouns like 'sharpness' and 'witchcraft.' There is also a marker *ma-* used for infinitives of bodily functions: 'cough, urinate, blow nose, defecate, yawn, fart, drink;' and also for some non-liquid nouns like *ma-agen* 'truth.' Sagna (2008) terms these classes 10a and 10b respectively, as both take the same agreement. In Manjak the liquid class is *m-*, and in the closely related Pepel it is *mun-*, which must be the original form in this subgroup (e.g. Pepel *mun-taw* 'milk' = Manjak *m-taw*)[105].

It cannot be an accident that the form *muN-* rather than the more common *ma(N)-* is found in Bainunk, which has such close cultural and linguistic contact with Joola. That *mu-III* is found also in Kobiana suggests that it was perhaps present in PBKK, which already must have had extensive contact with Joola and/or early Manjak-cluster languages. It must however be stressed that most of the BKK words cited above are not directly borrowed from a Bak language *mu(n)-* class noun. Nonetheless, the similarity in the shape of the markers between these two families is striking. The use of Kobiana *ma-I* and Joola *ma-* for infinitives of bodily functions is a clear case of areal influence. In Bainunk *gu-* serves this function, as it does for a number of verbs in Kobiana, suggesting that the use of *ma-* is an innovation in Kobiana. Given the widespread use of *ma-I* for liquid nouns in Kobiana-Kasanga where *mu-* is used in Joola, and given the use of *ma(ŋ)-* in the rest of the non-Bak Northern Atlantic languages, it seems highly improbable that *ma-* was not present in PBKK. So then, the most likely situation is that the proto-language contained both **ma-* and **muN-*, with the second of these being introduced through contact with Bak languages. Due to the functional and formal similarity of these classes, they collapsed to *muN-* in Bainunk, and *ma-* for the most part in Kobiana-Kasanga. Both of these changes were likely influenced by continued contact with Joola, emphasizing *muN-* on nouns in Bainunk, and *ma-* on infinitives in Kobiana-Kasanga. In Kobiana, *mu-III* was reinforced by continued borrowing from Manjak-cluster **mun-* nouns.

[105] Or else it may be true, as Doneux (1975) argues, that the final nasal in Pepel is due to nasalization from the initial consonant. However this would not explain why the marker was borrowed as **muN-* into PBKK.

6.3 Plural marking

In both Bainunk and Kobiana-Kasanga, there are two strategies for plural marking depending on the singular class: a change in the prefix, or the suffixation of *-Vŋ* (Bainunk) / *-a* (KK) to the full singular form. The original form of the plural suffix was **-aŋ*. In Bainunk, the original low vowel now harmonizes with the preceding vowel, but never rises above a mid vowel. In KK the final nasal was lost, which may have simply been due to phonological erosion, but may also have been influenced by a resegmentation of this final **ŋ* (discussed below). All languages are essentially in agreement about which singular classes took the plural suffix: **ba*^{X}*-*, **fa-*, **jaN-*, **ji-*, **ka-*, **kuN-*, and perhaps **ta-* (for non-cloths). **a-* probably also took the plural suffix as in Bainunk, with the Kobiana plural *ga-I* being extended from **a*^{X}*-*. The agreement patterns for these **-aŋ* plural forms are rather different in each branch. Bainunk uses a prefix as well as *-Vŋ* on the agreeing element, whereas Kobiana uses the prefix *ga-I* and no suffix on the agreeing element. The prefix in Bainunk is the same as that used in singular agreement, which is the same as the prefix on the noun except in the *ji-* and *ja(N)-* classes, where the agreement prefix is *a-*.

Gubëeher	Kobiana	
ba-ka̟r ba-de̟	bakkáar á-le	‘a big chicken’
ba-ka̟r-aŋ ba-de̟-eŋ	bakkáar-a gá-le	‘big chickens’
ji-fek a-de̟	jifèekk á-le	‘a big pig’
ji-fek-eŋ a-de̟-eŋ	jifèekk-a gá-le	‘big pigs’

Figure 200: Plural marking involving the suffix *-aŋ *in Gubëeher and Kobiana*

It is not clear which of these patterns is original, though the use of *ga-* for these nouns is almost certainly a Kobiana innovation. See Cobbinah (2017b) for a more thorough discussion of the use and history of the plural suffix in Bainunk.

The other, somewhat more common method of plural formation is to replace the singular class marker with a prefix marking a separate plural class. While the languages agree as to which singular classes employed this strategy, there are many discrepancies in the forms of the plural class markers. One prominent difference is that Kobiana has three ŋ-initial plural classes, and a comparison might also be drawn to the two s-initial classes whose plural changes /s/ to /ñ/.

Ko. sg.	Ko. pl.	Ka. pl.	Bainunk pl.
gu-I	ŋa-I	ŋa-I	ha-
u-	ŋu-III	—	—
ka-III	ŋa-III	?	ñaN-
sa-III	ña-III	ña-III	(ñaN-)
si-III	ñi-III	ñi-III	ñaN-

Figure 201: Nasal-initial plural classes in Kobiana

An initial assessment could be that some nasal segment (probably *ŋ-*) was used as a sort of plural prefix. This *ŋ-* is found nowhere in Bainunk. The origin of this nasal marker is almost certainly a resegmentation of the plural suffix **-aŋ*. This process can be seen most clearly in the plural of **gu-*, which is *ha-* in Bainunk, but *ŋa-I* in KK. Because *h regularly deletes in KK (or becomes /w/ or /y/), an original prefix **ha-* would develop to **a-*.

*ha-NOUN ha-ADJ > *a-NOUN a-ADJ

This prefix is the same as the default singular agreement prefix *a-I* (with *a-II* and *a-I* being very common on singular nouns as well), and as such plurals of **gu-* nouns would look like singular nouns, especially when followed by an agreeing element. To reinforce the plurality of these nouns, the plural suffix *-*aŋ** was added to the noun:

*a-NOUN a-ADJ > *a-NOUN-aŋ a-ADJ

This new construction was subject to a resegmentation where the /ŋ/ was interpreted as part of the class prefix on the agreeing element:

*a-NOUN-aŋ a-ADJ > *a-NOUN-a ŋa-ADJ

After this resegmentation, the form of the agreement prefix was spread to the noun:

*a-NOUN-a ŋa-ADJ > *ŋa-NOUN-a ŋa-ADJ

This process might also help to explain the development of original *-*aŋ** to *-a* in KK, though this may simply be due to erosion. A complication with this account is that the plural class *ŋa-I* does not appear alongside the plural suffix *-a* synchronically. We must assume that after the creation of the uniquely plural *ŋa-I*, there was no longer any need for the plural suffix, and it was dropped in these forms. It is rare in KK for plural forms to contain both a plural prefix and the plural suffix, and as such the continued use of both affixes together would have been rather marked.

The singular/plural pair *u-/ŋu-* in Kobiana is borrowed directly from Manjak (*u-/ngə-*). It is however very unlikely that this borrowed prefix pair gave rise to *ŋa-*, since it is only found in Kobiana, while both Kobiana and Kasanga have *ŋa-*.

The plural *ŋa-III* of *ka-III* could also be explained by the use of an innovated *ŋ-* if the sequence /ŋk/ were simplified to /ŋ/. However, as Bainunk uses *ñaN-* as the plural of *kaN-*, two other explanations seem much more probable. Either the plural of **kaN-* was originally **ñaN-* as in Bainunk, and was altered to *ŋa-III* in Kobiana through the influence of the more common newly-innovated plural suffix *ŋa-I*; or, somewhat less likely, the plural may have originally been a distinct class **ŋaN-*, which was replaced by the more commonly used **ñaN-* in Bainunk.

It is also conspicuous that the plural of KK *si-III* and *sa-III* are *ñi-III* and *ña-III* respectively. We might be tempted to attribute these plural forms to the same element *ŋ-*, which assimilated and fused with the palatal /s/, yielding /ñ/. However, this explanation is unlikely and unnecessary, given that **ñaN-* must certainly be reconstructed to the proto-language. In Bainunk, *ñaN-* is used as the plural of *raN-*, *kaN-*, *siN-*, and most human *u-* nouns, which could not be explained by the prefixation of some element *ŋ-*. Furthermore, BKK's closest relative Wolof uses *ñ-* as a plural class, further cementing the need to reconstruct **ñaN-*. If **ñaN-* was originally the plural of **saN-*, the only question is the origin of *ñi-III*. In Bainunk, the plural of *siN-* is *ñaN-*, and it may simply be that in KK, *ña-III* was altered to *ñi-III* when used as the plural of *si-III*. This change can be schematized as a sort of simple analogy: singular *sa-III* is to plural *ña-III* as singular *si-III* is to plural __, for which *ñi-III* could be easily filled in, especially given its phonological similarity to the preexisting *ña-III*. There is a diminutive *ñi-I* plural suffix in Kasanga: *ko-mbol / ñi-bura* 'child,' *ti-piid / ñi-fiid* 'younger sibling,' *ka-maafi / ñi-maafi* 'fish.' This prefix is probably not related to *ñi-III*, but if it existed in PKK, it could have influenced the creation of *ñi-III*.

The other notable discrepancy in plural class prefixes is the use of *ga-I* in KK, which is found nowhere in Bainunk. In Kobiana, *ga-I* is the plural of *a-II* (and the uncommon *a-I*), *bu-I*, *pu-III*, and a few assorted nouns from other classes. It is also used as the default plural agreement prefix for synchronically unprefixed plurals (the counterpart of singular *a-I*). Bainunk has *i-* as the plural of *bu-* and *bi-*, which is not found in KK. It is conspicuous that Bainunk has lost the singular **a*^{X}- as well plural **ga-*, and so it seems almost certain that these were originally a singular-plural pair. **ga-* was probably not used outside of this function originally, and so when **a*^{X}- was lost in Bainunk, **ga-* would have disappeared altogether. The expanded use of **ga-* in Kobiana is rather straightforward. Because it was the plural of the common *a-II* class, the singular/plural *a-/ga-* alternation was generalized to other situations where singular *a-* was used, namely as the default agreement marker *a-I*, so that wherever *a-I* appeared in the singular, *ga-I* was used as the plural. After its establishment as the default plural class, some new plurals were innovated in *ga-I*, like *ga-génde(ŋ)*, the plural of unprefixed *génde(ŋ)* 'night.' Bainunk *i-* (the plural of *bu-* and *bi-*) is certainly original, cognate with Wolof *i/y-*, the default plural class (it is no coincidence that *b-* is the default singular class in Wolof). Thus, *ga-I* must have replaced original **i-* in KK as the plural of **bu/bi-* as well as the plural of **si-ggi̥r̥* 'eye.'

Both languages agree that the plural of cloths in **ta-* is **ja-*, which must simply be a use of the collective class **ja-*. Similarly, the collective class **ba-* is used as the plural of Kobiana *pa-III*. Each branch uses its own unrelated noun class for trees, each with a different plural: sg. **ki-* / pl. *muN-* in Bainunk, and sg. *u-III* / pl. *da-III* in Kobiana (*di/du-III* in Kasanga). The only remaining discrepancy involves the plural of the personal class, which likely employed a complicated combination of **i(N)-*, **ja-*, **ñaN-* and **bi-* in PBKK (see section 6.1.5).

Setting aside personal nouns, diminutives, and augmentatives, we can reconstruct six unique plural classes for PBKK: **i-*, **ñaN-*, **ga-*, and **ha-*, with **muN-* and **daN-*[106] for trees, along with the plural suffix **-aŋ*. In comparison to the over 30 corresponding singular classes that can be reconstructed, this is a rather small number. The larger number of plural classes in KK is due to innovation.

6.4 Diminutives and augmentatives

The Bainunk languages and Kobiana-Kasanga make use of both diminutive and augmentative classes. When a noun is placed into one of these classes, its class prefix is replaced by the appropriate diminutive or augmentative prefix.

[106] The vowel /a/ seems a more likely reconstruction in this prefix, since Kobiana would have no reason to innovate /a/ in this marker, while in Kasanga original *a could be altered to /u/ in order to match the corresponding singular class *u-III*. From Wilson's data it is unclear if the vowel in *di-III* is a predictable change from /u/ in certain phonological environments, like we see in most Kobiana classes with underlying /u/. Note that there is also the augmentative plural **diN-* which may have influenced the Kasanga plural tree class.

	Bainunk	Kobiana (Doneux 1975, 1991)
dim sg.	ko-	tu-[107]
dim pl.	ño-	ni-I
aug. sg.	da-	da-I, fa-III
aug. pl.	diN- (-Vŋ)	di-III

Figure 202: Diminutive and augmentative classes in Bainunk and Kobiana

These seem to no longer be in use in Kobiana, and were not recognized by any of my consultants, but are recorded by Doneux. Wilson records a noun *ko-mbol*, pl. *ñi-bura* 'baby' for Kasanga, which appears similar to the Bainunk diminutive classes, as well as a noun *ti-piid*, pl. *ñi-fiid* 'younger sibling,' which appears similar to the Kobiana diminutive classes. It is almost certain that the proto-language made use of diminutives and augmentatives, but with these languages agreeing only on the augmentative pair **da-/*diN-*, it is hard to say what the forms of these markers were originally. There may have been multiple classes, or some of the markers in the modern languages may be innovations.

6.5 Language-specific classes

Some classes are found in only one branch of the family. The following classes are found in Bainunk languages, but not Kobiana-Kasanga:

****ki-***: The class for almost all trees (Gub., Guñ. *si-*, Guj. *ki~ci-*): *si-de̝en* 'kapok tree,' *si-o̝og* 'baobab,' *si-ba̝mb* 'cola tree,' etc. In Guñaamolo it has fallen together with the *siN-* "string" class, and *siN-* appears on many trees. A similar collapse is described by Cobbinah for Gubëeher (2013: 184-5), though to a lesser extent.
muN-: The plural of the **ki-* tree class.
fu(N)-: Found in a few Joola borrowings in Gubëeher, e.g. *fu-lac* 'shark.' This class is itself borrowed from Joola *fu-*. The marker on nouns is *fu-* in all but one case (*fun-kop* 'ball'), though agreement is with *fuN-*, somewhat inexplicably.
e-: Found on a few Joola borrowings in Gubëeher, e.g. *e-sigir* 'heart.' Also used for a few personal plural nouns borrowed from Joola. In Joola *e-* is the 'default' singular noun class, and used for most personal plural nouns.
bi-: Collective class for bugs in *a-* used in Gubëeher.
ti-: Plural/collective for bugs in *a-* used in Guñaamolo.
pi-: Found on a single noun *pi-taari* 'tobacco' in Gubëeher. Guñaamolo *pitaari* is unprefixed. This class is certainly an innovation, and must be a reinterpretation of the initial syllable as a class marker.
paN-: Listed by Quint (2015) for Gufangor, he gives only one noun *pat-pat* 'rice bran.' Probably an innovation, and found in no other Bainunk language. This class is so semantically distinct from Kobiana *pa-III* that they are probably not related, though an assessment is hard to make based on a single noun.

[107] From Doneux's data (1991: 31-32) this class does not seem to assign a consistent mutation grade. Usually the grade is the same as on the singular noun, but in some cases it changes from grade III to grade I, and in others from I to II or III. There are some examples with *ti-* as well, but most are in the phonological environment that conditions /u/ → /i/ in prefixes (see Figure 127). Wilson (2007) gives the prefix as *ti-II* in both Kobiana and Kasanga.

The following classes are found in Kobiana, but not Bainunk:

u-III: This is the class for all trees: *ú-ddo* 'tree,' *u-wúcc* 'palm tree,' *ú-mbaaz* 'baobab,' *u-nɔ́ɔ* 'néré tree,' etc. There is only one non-tree in this class, *u-mbɔ́y* 'calf of leg,' with a plural *ñi-mbɔ́y*.
da-III: The plural of the *u-III* tree class. *di-/du-III* in Kasanga.
pa-III: Contains small bead-like objects and some fruits: *pá-ccoo(n)* 'bean,' *pa-náañ* 'peanut,' *pá-ttakka(n)* 'derem (coin),' etc. Often used for a single grain of nouns usually found in a plural/collective class, with *pa-* stacked on top of the existing class marker: *pa-bé-ro* 'bead,' *pa-ŋɔ́ɔcc* 'palm nut' (*ŋa-wucc → ŋɔɔcc*), *pa-máanə(m)* 'grain of rice' from *máanə(m)* 'rice.' The plural/collective is *ba-I* for most nouns, but *ga-I* for a few, and *ŋa-I* for *pá-nɔɔ* 'néré fruit' and 'palm nut.' The synonymous *pá-maattəru* and *pa-mentéŋ* 'tomato' have plurals in *ba-I* and collectives in *ka-III*. Manjak *pə-* is also used for beads, seeds, etc. (among many other things), and this may have influenced the *pa-III* class. However the class itself is probably not borrowed, as all Manjak *Cə-* classes are borrowed as *Cu-* in Kobiana, including *pu-* from *pə-*. This class does not appear to exist in Kasanga.
pu-(III): Contains miscellaneous nouns, including a number of large, empty things: *pú-fər* 'room,' *pú-lanka(n)* 'public square,' *pú-lebəri(n)* 'drum,' *pí-heenk* 'fishnet,' etc. Most nouns have grade I mutation, but *pú-ddo* 'jug' and *pú-ttan* 'corral' have grade III (or II). Agreement is always with *pu-III*, and the plural of most *pu-* nouns is in *ga-I* (with a few using *-a* instead). This class is borrowed from Manjak *pə-*, and most nouns in this class are Manjak *pə-* nouns. Of the 21 collected *pu-* nouns, only *pú-leŋ* 'nape,' *pú-lɔɔh* 'corner,' *pu-gús* 'granary,' and *pú-ddo* 'jug' are not obviously borrowed. 'Granary' is a BKK root, appearing in *bu-* in Bainunk. The Kobiana word appears to have been influenced by Wolof *pukkus* with the same meaning, and even has a variant *pu-kkús*. The use of the native 'default root' *-ddo* with this class marker indicates that this class has acquired identifiable semantics due to the number of Manjak borrowings of empty containers/pots in *pu-*. This class does not exist in Kasanga.
ba-III: This small class contains some miscellaneous nouns: *bá-zaabe* 'fat/grease,' *bá-sarampa* 'cataract,' *ba-máag* 'debt' (borr. Joola *ku-ma̩ag*), *ba-ppɔ̀cc* 'sauce' (borr. Manjak), *ba-ccáa(m)* 'money' (borr. Joola), *bá-lafoŋ* 'balafon' (borr. Mandinka). Mutation on the noun itself is sometimes grade I, and sometimes grade III (and grade II in one case: *bá-jjukk* 'fetish'). It is also used as the collective class for *a-ttáatta* 'sweet potato' and *pa-ttáab* 'hibiscus.' The plural is formed with *-a*, just as with *ba-II*, though some nouns have no plural. In this respect, and by nature of the semantics of many of its members, *ba-III* might be considered a collective class (like *ba-I*). Many of these nouns happen to be borrowings, but this may be insignificant.
bu-III: This contains the single noun *bú-kkaab* 'bed,' with a plural *gá-haab* (*ga-I* is also the plural of the common *bu-I* class). This noun is borrowed from Manjak *bə-kaab*, and the fact that /kk/ cannot be a grade I consonant inspired the creation of a new class with grade III agreement specifically for this word.
ji-I: Contains only *ji-hákk* 'hand/arm' and *ji-làdd* 'slap.' These nouns take *ji-I* agreement, as distinct from the synchronically unprefixed †*ji-I* nouns (section 6.1.6) with *a-I* agreement. The plurals are *ŋa-hákk* (*ŋa-I* agreement) and *jilàdda* (*ga-I* agreement). Kasanga has *ji-rek* 'hand/arm' (pl. *ŋa-rek*).
ta-II: This contains two nouns *tá-ppe(r)* 'foot' and *tá-bbambeh* 'child-carrying cloth.' See section 6.1.13 for discussion. Kasanga has *te-ped* 'leg.'

nu-III: Contains the noun *nú-na* 'place,' and can form place nouns like *nu-ccétteh* 'toilet' from *-s~ccett* 'urinate.' Also present in Kasanga, though 'place' is *ko-jeed* representing a seemingly unique class (see section 6.1.14).
ma-III: Used only for *ma-ndɛ́ɛko*, the collective of *a-ddɛ́ɛko* 'manioc.'
ka-III: Used only in the collectives *ká-maattəru* and *ka-mentɛ́ŋ* 'tomatoes.' Both of these roots are borrowings (from Portuguese and Mandinka respectively), but of course the use of this collective prefix cannot be attributed to either of these source languages. Formally identical to the singular *ka-III* class.
u- (a-I): A large class containing only borrowings. Uses *u-* on the noun with no particular mutation grade, and *a-I* agreement. This use of *u-* is a Kobiana innovation (not recorded for Kasanga), which is borrowed from Manjak. In Manjak the *u-* class is the most common for inanimate objects, and many borrowings are assigned to this class. Many instances of the otherwise rare root-initial prenasalized voiceless stops appear in this class. Even in borrowed roots without nasals in the source language, initial voiceless stops are often prenasalized in this class (e.g. *ú-mpint* 'paint' from Portuguese *pintura*, and *ú-nkɔmbɛ* from Joola *e-kombe*). This is true of many but not all of these words in Manjak as well. Most words in this class are borrowed directly from Manjak, and many are borrowings themselves in Manjak.
ŋu-III: The plural of the *u-* borrowing class. A pronunciation [ŋgu-] is common. The prefix *ŋu-* on the noun does not change the initial consonant of the singular form, but agreement is always with *ŋu-III*. This class is borrowed from Manjak *ngə-* (Mankanya *ŋ-*), the plural of *u-*.
i- (a-I): Used only in the collective *í-kkɔɔla* 'cola nuts' (sg. *gú-hɔɔla*). Takes *a-I* agreement. Borrowed from Manjak.
na- (a-I): Found on a couple of nouns borrowed from Manjak: *ná-zibe(n)* 'orphan,' *ná-ntəhi* 'old person.' In Manjak *na-* is the personal class. Takes *a-I* agreement, and forms plurals in *ja-I* with *i-I* agreement, like regular personal nouns in *u-I*.

A minority of these classes are innovations or borrowings, but most were probably inherited from the proto-language and lost in one branch or the other. The discrepancy in the 'tree' classes is somewhat surprising, being so large in each language. It is probable that both classes existed in the proto-language for different types of trees, with a different one being generalized in each branch. Gubëeher *ra-wuc* 'palm tree' (cf. Guj. *ci-wuc*, Ko. *u-wúcc*) is evidence that trees could indeed appear in different classes originally.

6.6 Infinitive noun classes

Bainunk, Kobiana, and Kasanga are notable for having lexically-specific class markers on infinitive verbs (aka "verbal nouns"). This feature is also present in the nearby Joola and Manjak-cluster languages. A similar phenomenon exists for Fula-Sereer and Wolof when deriving deverbal nouns, though these languages use a default infinitive class or unmarked verb in many grammatical constructions. For any given BKK verb, it is not predictable which prefix(es) will appear on the infinitive form, though many infinitive classes have some identifiable semantics, and certain derivational suffixes require that the verb be placed in a particular class. There are often multiple possible classes in which a verb can appear, sometimes with a difference in meaning. The infinitive prefixes for Gubëeher and Kobiana verbs are given below (see also Figure 130 for Kobiana examples):

Gubëeher (n = 826):

ba-	44	pluractionality
bi-	9	misc.
bu-	744	default
faN-	1	*fan-c̣ir-eŋ* 'jump'
fuN-	1	*fun-ḳad* 'play football'
gu-	93	bodily functions, *-a* 'passive/reflexive/middle' suffix, misc.
ha-	5	misc.
ja-	10~14	agriculture
jaN-	1~5	misc.
jiN-	6	violent actions (one w/ ji-)
ka(N)-	18	borrowings, ritual events
kuN-	8	postures, misc.
muN-	1	*mu-sẹl* 'urinate'
ñaN-	1	*ñan-ciil* 'laugh'
raN-	3	*ra-liin* 'weave,' *ran-komb* 'hunt in group,' *ra-yụb* 'dance sp.'
si-	8~13	negative human characteristics
siN-	16~21	sleeping, *-ay* 'reciprocal' suffix, 'be co-wives'
ta-	3	fishing

Kobiana (n = 509):

a-II	56	*-a* 'anticaus.,' *-əndəna* 'recip.,' 'hunt, paddle, line-fish, fight, etc.'
ba-I	3	'laugh, be big, clap(?)'
ba-II	many	default without an object, misc.
bu-I	many	default with an object
ga-I	4	'run, open mouth, be embarrassed, have missing tooth'
gu-I	20	bodily functions, misc.
ja-III	3	'dance, run, walk'
ka-I[108]	10	'be strong, be skinny, be short,' other qualities, 'sow, shave'
ka-II	1~2	'be big'
ka-III	1~2	'burn'
ma-I	9	bodily functions involving liquids, 'swim, fly'
pa-	1	'be cowardly'
sa-I	1	'be hot'
si-I	1	'be old'
si-III	3	'dream, sleep, be co-wives'

Figure 203: Infinitive prefixes in Gubëeher and Kobiana

The mutation grade in Kobiana and presence of a final nasal in Gubëeher cannot be determined with certainty on some infinitives, as it is generally difficult or impossible to use these infinitives with an agreeing element. Thus the only indication is often on the verb stem itself, which may begin with an immutable or nasal-deleting consonant. Most of the infinitive classes are also used on noun roots, but Gub. *faN-* and *jiN-* and Ko. *ka-I*, *ka-II*, *sa-I*, and *si-I* are

[108] Borrowed from the uncommon Manjak infinitive prefix *ka-* in a few verbs, e.g. *ká-saal* 'sow,' but its most common (and perhaps productive) use with stative verbs of quality is not borrowed, and uses a suffix *-a* (e.g. *ká-loha* from *-ndoh* 'be short' and *ká-zeha* from *-njeh* 'be smart.'

exclusive to infinitives, and Kobiana *ja-III* exists as a synchronically active class only on infinitives, being fossilized on a number of nouns. Gub. *fuN-* and many instances of *ka(N)-* used as an infinitive class are borrowed from Joola, and Ko. *ma-I* may be as well (see section 6.2.6). Some of these classes can be connected by form and meaning: **bu-*, **ba-*, **gu-* and **siN-*; and **jaN-* can be hypothesized based on form but not meaning. Otherwise, the inventory of infinitive classes is rather distinct between these two languages, though most of the remaining classes are quite minor. Recall that the *a^X- class was lost for Bainunk nouns, and this is the case for infinitives as well.

The proto-language certainly made use of multiple infinitive classes, with **bu-* and *ba^X- being the most common, most likely followed by **gu-* and *a^X-. That Bainunk *ba-* represents earlier *ba^X- is confirmed by the three *k-initial verb forms which can appear in either *ba-* or *bu-* (Figure 174). Numerous cognates can be found for these common classes (except *a^X-, which was lost in Bainunk), as well as **sin-keem* 'sleep' in **siN-*. Otherwise, it is hard to say what the size or meaning of individual infinitive classes may have been.

6.7 Summary of the Proto-Bainunk-Kobiana-Kasanga noun class system

The noun classes in Figure 204 below can be reconstructed for PBKK. Those which exist in only one branch are in parentheses. A question mark in the plural column indicates uncertainty about the plural of the singular class to the left.

Singular/plural classes

a-	-aŋ	animals (insects?), misc.
ba^{X}-		animals, misc.
fa-		animals: 'goat,' etc.
jaN-		dangerous reptiles, insects?, misc.
ji-		animals (dog-sized)
ka-		'fish'
kuN-		'fire'
ta-	ja-	cloth (pl. = collective *ja*-), birds (pl. *-aŋ*)
(ta^{X}-)	?	'foot'
u-	i(N)-/ja-	humans
	(bi-)	'child'
(raN-)	ñaN-	crabs, 'scorpion, rooster, roof'
(saN-)		flat, leaves
siN-	?	string/rope-shaped
kaN-	?	concave or convex
(a^{X}-)	(ga-)	small and round
bu-	i-	misc. (round)
(bi-)		misc. (round)
si^{X}-		'eye'
gu-	ha-	long and rigid, languages, 'speech,' misc.
ki-		'ear, leg, (arm)'
(ji-)		'hand/arm'
(uN-)	(daN-)	trees
(ki-)	(muN-)	trees
(paN-)	ba-	small, bead-like (pl. = collective *ba*-)
ku-, (ho-)	—	'thing'
(taN-)	?	misc.
ko-	(ño-)	diminutive
(tu^{X}/ti^{X}-)	(ni/ñi-)	diminutive
da-	diN-	augmentative
(faN-)		augmentative

Collective/single-number classes

ba-	coll. of vegetables, fruits
di-	'earth, sand,' formless masses
muN-, (ma-)	liquids
tiN-	viscous liquids
guN-	'honey, palm wine'
ja-	coll. of leaves, grasses, 'hair'
(bi-), (ti-)	insect swarms
(baN-)	misc.
(nuN-), (ka(N)-)	places
(kaN-), (maN-)	coll. of a few vegetables?
(sa-)	'heat, cold'

Figure 204: Proto-Bainunk-Kobiana-Kasanga noun class system

This system has by far the highest number of classes of any Atlantic sub-group, and with many more singular than plural classes. An extremely conservative count gives around 30 classes total, but a more likely estimate is closer to 50. As there are a number of classes with only a few members, it is entirely possible that there were even more classes in the proto-language which were lost in both branches. The semantics of most classes are remarkably strict compared to other Atlantic languages, having clear, often shape- or animacy-based criteria for membership. These properties are characteristic of relatively new noun class systems like those found in some South American languages (e.g. Miraña (Seifart 2005), with 60 noun classes, recently grammaticalized from a classifier system).

6.8 Cognate noun classes in other families

In reconstructing the PBKK class markers, there is rarely any question as to their form, and when such questions do arise, comparisons with other families within Atlantic or Niger-Congo are never able to answer them. The genetic relations with other languages are simply too distant to be of any help in this regard. For a discussion of these outside noun class connections, see chapter 6, section 4.2. By far the most connections can be made with Wolof, which we can briefly examine before moving on.

It is quite likely that Wolof is BKK's closest relative (as first suggested by Doneux 1978), and the bulk of the evidence for this subgrouping comes from the similarities in their noun class systems. This issue will be discussed in more detail in chapter 4 on Wolof, but in brief, the following potential cognate classes can be identified:

Wolof	PBKK	Wolof note
b-	*bu-, *bi-, *ba^{X}-	default sg. class
i/y-	*i-	default pl. class
k-	*ku-	has only 'thing' and 'person'
ñ-	*ñaN-	personal pl. class
g-(N)	*gu-, *guN-, *kaN-, *ki-	tree class, among other things
m-N	*ma-, *muN-	liquid class, among other things
j-	*ja-, *ji-, *jaN-	fruit collective, among other things
s-N	*si^{X}-, *siN-?, *saN?-	diminutive, among other things
l-N	*raN-?	
w-	*fa-?	large mammals, among other things

Figure 205: Possible noun class cognates between BKK and Wolof

The 10 classes of Wolof are marked synchronically only on agreeing elements, and take the form of a single consonant. Some classes induce nasalization of the initial consonant of the noun, marked with "N" in Figure 205 above. Some Wolof classes clearly represent multiple classes which have fallen together historically, and thus there are in some cases multiple PBKK classes with which the Wolof class might be cognate. While some of these connections are extremely tentative (especially the last two), it is somewhat remarkable that given the very low number of cognates which are specific to Wolof-BKK, so many Wolof classes appear to be cognate to classes in PBKK.

6.9 Summary of noun class borrowing

The effects of borrowing on the noun class systems of BKK languages have been noted in various places up to this point, and are summarized here. Gubëeher has borrowed two classes from Joola: *fu(N)-* from Joola *fu-* and *e-* from Joola *e-*. Both are rather rare. Furthermore, many uses of *ka-* as an infinitive prefix are due to Joola. Kobiana has borrowed a number of classes from Manjak, most notably *pu-* (with *pu-III* agreement) from Manjak *pə-*, and the borrowing class *u-* from Manjak *u-*, along with its plural *ŋu-III* from Manjak *ngə-*. There are also a few nouns with the borrowed Manjak prefixes *na-* and *i-*, which alternate with other prefixes, but do not show agreement. The Manjak borrowing *bu-kkaab* 'bed' prompted the creation of an agreement class *bu-III*. The **kaN-* class was originally a rather minor class, but Kobiana *ka-III* has become a much larger class due to borrowings from the Manjak *ka-* class. The use of Kobiana *ma-I* as the infinitive class for bodily functions is probably adopted from Joola, where *ma-* has the same function. In PBKK, the **muN-* liquid class was very possibly borrowed from Bak, existing alongside native **ma-*. The collective class **ba-* may also have been borrowed from Joola, where *ba-* is used as a collective class. The use of **gu-* for languages may have been adopted from Joola, where *gu/ku-* has this same function, though the opposite direction of influence seems more likely in this case.

6.10 Analogical changes to nominal mutation

In Kobiana and Kasanga, mutation in the nominal system is usually the direct result of a segment that was present at the end of the prefix historically. However, there are some cases in which analogical pressures have reshaped the mutation triggered by certain agreement markers such that they no longer match that seen on the noun itself. There is furthermore one clear case in which the initial consonant on the noun itself has been changed due to analogy, involving historically *r-initial roots.

6.10.1 The "default" status of grade III in Kobiana nominal mutation

In Kobiana (and Kasanga), there is no "unmutated" grade synchronically. However, at least in Kobiana it seems that grade III has taken on this role to some extent in the nominal system. There are a number of classes which take grade III agreement, but in which a nasal was never present historically.

noun marker	agr. marker	note
ŋu~ngu-	ŋu~ngu-III	plural of the borrowed *u-* class, borr. Manjak *ngə-*
pu-	pu-III	borrowed from Manjak *pə-*
bu-III	bu-III	contains only *bu-kkaab* 'bed,' borr. Manjak *bə-kaab*
si-II	si-III	*sí-ggəh* 'eye'; si-III is a common class for strings, etc.
si-	si-III	*si-núf* 'ear'
fa-I	fa-III	contains only a few nouns; note fa-III augmentative
di-I	di-III	contains only a few nouns; note di-III aug. pl.
ta-I	ta-III	only *tá-fər* 'cloth'; ta-III also exists as a noun marker

Figure 206: Kobiana classes with innovative grade III agreement

For a number of these classes, the agreement marker was co-opted from a class that is segmentally identical but enforces a different mutation grade. This occurred with *fa-I*, *di-I*, *ta-I*, *si-II*, and *si-* (from **ki-*). In all of these cases the class assigning grade III is more common or productive, and so it is unsurprising that its agreement marker would be generalized. This same process can be seen in other Atlantic languages, e.g. Sereer *a-II* being generalized as the agreement marker for the *a-III* class, due to the *a-II* class being much more common. However in the case of Kobiana *ŋu-III* and *pu-III*, no such explanation can be given.

pu-III is entirely borrowed from Manjak *pə-* (see section 6.5), but in Manjak this class has no association with nasality. In fact, the large majority of *pu-* nouns in Kobiana have a grade I consonant on the noun itself. Thus it is significant that the mutation chosen for agreement is grade III. The same is true of the plural class *ŋu-*, borrowed from Manjak *ngə-*. As it contains many (perhaps most) borrowings, it is a very common class in Kobiana, and the initial consonant on the noun itself takes no particular grade. The choice of grade III mutation for *pu-* and *ŋu-* class agreement suggests that grade III is seen as the default grade for agreement. Finally, the *bu-III* class is noteworthy in that the initial /kk/ on the borrowed noun 'bed' was interpreted as grade III rather than grade II, which would have been just as plausible.

The treatment of grade III as the "default" agreement grade cannot be easily explained. In the nominal system, by far the most common classes are *gu-I* (pl. *ŋa-I*) and *a-II* (pl. *ga-I*), in that order. The most common agreement markers are *a-I* for the singular and *ga-I* for the plural— note that none of these assign grade III. It is true that grade III is the only grade which preserves the contrast between all initial consonants— in grade I /h/ corresponds to grade II/III /kk/ and /tt/, and in grade II /dd/ corresponds to grade I /r/ and /l/. This fact may provide a slight functional motivation for the use of grade III, but it seems unlikely that this was a significant factor. Probably the best explanation is that by type frequency, grade III would have been the most commonly assigned grade for agreement markers, even though most of the classes themselves are quite small (only 4 have an appreciable number of members: *si-III*, *sa-III*, *ka-III*, and *u-III*). It is also perhaps relevant that grade III can be taken as the default grade in the verbal system, as all unprefixed verbs take grade III.

6.10.2 Exceptional mutation on Kobiana nouns

Synchronically, a minority of Kobiana nouns appear to have an exceptional root-initial consonant, given the form of their class as defined by its agreement prefix. Of the 647 prefixed nouns I have collected that are not in the *u-* borrowing class, 40 have an exceptional consonant. A number of these are explained by the phenomenon described in the previous section by which grade III agreement has been innovated for a class that did not originally assign grade III. Still others are borrowings:

noun	agr.		
a-sɔbɔ́ɔla	a-II	'onion'	Port. *cebola*
bá-lafoŋ	ba-III	'balafon'	Mandinka *balafoŋ*
bá-sarampa	ba-III	'cataract'	Joola Fonyi *ka-sampo* ?
bú-ttette(n)	bu-I	'tooth gap'	Joola Fonyi *fu-t̹aat*
gu-kkéjjina	gu-I	'kitchen'	Port. *cozinha*
ka-loró(ŋ)	ka-III	'pot'	Port. *caldeirão*
ká-raafi	ka-III	'bottle'	Port. *garrafa*
mú-fokk	mu-III	'brain'	Manjak *m-fuk*
pa-góoha	pa-III	'cowrie shell'	JF *e-gu̹ura* 'cowrie,' *e-go̹ra* 'money'
sá-fɛfɛ(n)	sa-III	'peel'	c.f Joola Fonyi *-fe̹eful* 'peel bark'
sá-laal	sa-III	'spider's thread'	cf. Manjak *u-laar* 'spider'
sa-líih	sa-III	'small cloth'	cf. Joola Fonyi *-liir* 'weave'

Figure 207: Kobiana borrowed nouns with exceptional mutation

The remaining nouns are:

noun	agr.		note
á-ddett	a-I	‘ash’	no plural
a-ndaakkú	a-I	‘lizard’	pl. ga-laakkú
á-hakka(n)	a-II	‘sea’	
bé-ddo	ba-I	‘powder’	originally ba-III?
bá-zaabe	ba-III	‘grease’	
gu-ddúkku	gu-I	‘hunger’	originally gu-III?
gí-njaab	gu-I	‘honey’	originally gu-III
sá-bu(n)	sa-III	‘cold’	originally *sa- class?
sá-lebə(n)	sa-III	‘heat’	originally *sa- class?
pa-bɔ́ɔl	pa-III	‘cob’	class-stacking; pl. *bɔɔl* (ba-I)
si-fɛ́l	si-III	‘hawk’	
si-fóoh	si-III	‘smell’	
ká-bɛnj	ka-III	‘floor’	
ka-fímattis	ka-III	‘dizziness’	
mú-loŋ	mu-III	‘marrow’	

Figure 208: Other Kobiana nouns with exceptional mutation

It is likely that a number of these are also borrowings which I have not been able to identify. There are a few other nouns that look like they could have been in uncommon classes, and taken agreement from a more common class with a segmentally identical prefix. In the case of ‘heat’ and ‘cold,’ this original class does not exist synchronically. For the remaining words (like the first three in Figure 208) there is no obvious explanation, but these are extremely few.

This and the previous section have shown that mismatches between the agreement grade on the noun and the agreement marker can be explained as innovations. For PBKK, we can safely assume that the form of the prefix on the noun and agreeing elements was always identical (except for **ji-*, and **jaN-* which probably used the default agreement marker **a-*).

6.10.3 The reanalysis of *r-initial roots in grade II and III nouns

There is evidence that historically r-initial nominal roots in the *a-II* class were reanalyzed as l-initial in Kobiana-Kasanga, due to the overlap in their mutation series.

	Kobiana		Kasanga	
grade I	l	r	l	d
grade II	dd	dd	d	d
grade III	nd	dd	nd	d

In Kobiana verb roots, r-initial roots are less common than l-initial roots (13 /r-/ vs. 25 /l-/ in my data). In verbs there is no possibility for reanalysis, since only grades I and III are used, in which these two mutation series have no overlap. It is perhaps expected that /r/ should be less common, since modern /l/ comes from historical *d as well as *l, whereas /r/ comes only from *r, which is rather less common than *d in reconstructions. In nouns which take grade I, /r/ is even less common (13 /r/ vs. 49 /l/), but still appreciably represented. However in the *a-II* class (the only common class which assigns grade II to noun roots), /r/-initial roots are rare (5 /r/ vs. 19 /l/). The grade I consonant can be seen in the *ga-I* plural form (e.g. *á-ddim / gá-lim* ‘doorway(s)’). Of the five r-initial roots that I have encountered, three are deverbal (*a-ddéefaañ* 'braid,' *a-ddénda* 'lotion,' and *a-ddíimool* 'gap from missing tooth'), one is the default root *´-ro~ddo*, and the other is *á-ddobi* 'brick' borrowed from Portuguese *adobe*. In all of these cases but the last, /r/ would appear in these roots in other morphological contexts. Thus, for the roots that appear only in *a-II* and its plural *ga-I*, only the borrowing *á-ddobi* alternates with /r/ in grade I. If the frequency of initial /r/ in verb roots is indicative of the historical situation, we must assume that some r-initial noun roots did originally exist in the *a-II* class, but were reinterpreted as l-initial due to the ambiguity of /dd/ as grade II of both /r/ and /l/ in grade I. There is less data from grade III classes, but here 9 noun roots have /nd/, and only two have /dd/. These two are *´-ddo* in various classes and *ká-ddeerno* 'notebook' from Portuguese *caderno*. It is not clear why r-initial roots would have been eliminated from grade III classes, since grade III /dd/ (from *N-r) would have always been distinct from /nd/ (from *N-d and *N-l). The elimination of r-initial roots is not specific to Kobiana. For Kasanga, Wilson gives 8 d-initial nouns in *a-II*, all of which have *ga-I* plurals with /l/, rather than /d/ (the regular reflex of *r). Furthermore, only one grade III class has a d-initial root: *u-ddo* 'medicine' (= Kobiana *ú-ddo*). This suggests that r-initial noun roots other than **-ro* had already been eliminated in grade II and III classes in Proto-Kobiana-Kasanga.

7 Synchronic analysis of mutation

To my knowledge, no synchronic theoretical analysis of mutation has been proposed for either Kobiana or Kasanga. Doneux (1991) treats Kobiana mutation only briefly, and mostly in the context of its historical connection with other Atlantic languages. It will be interesting to think about how we might analyze Kobiana-Kasanga mutation synchronically, keeping in mind its diachronic origin. In what follows we will first explore an analysis which attempts to parallel the historical sound changes that gave rise to mutation. We will then discuss the problems with this analysis, and why it should probably be avoided. Finally, we will introduce some ideas for how we might move towards an alternative, more satisfying analysis. Here we will focus on Kobiana, with comments on Kasanga where relevant.

7.1 A historically-based analysis

Phonetically, the alternations seen in the Kobiana mutation system are relatively straightforward when compared with some of the more unusual alternations seen in other mutation systems. Grade I contains continuants, while Grade II involves gemination and hardening, and grade III involves nasalization. The only caveats are that voiceless consonants and /r/ become geminates in the nasal grade, and that /tt/ in grades II and III corresponds to /h/ in grade I, which involves more of a phonetic leap than in the other mutation series. Both of these can be overcome without much trouble. For the voiceless consonants in Grade III, we can appeal to the fact that voiceless prenasalized sounds are typologically marked in comparison with voiced prenasalized sounds, and are thus avoided. This holds true across the entire language, not only in mutation environments, though exceptions do exist. For the /h~tt/ alternation, we could either take [h] as an allophone of singleton /t/, or have two separate phonemes, velar /h_1/ which alternates with /kk/, and coronal /h_2/ which alternates with /tt/. This of course parallels their distinct diachronic sources, *x and *r̥. In Kasanga this could be avoided, as these two sounds remain distinct as /h/ and /r/.

One major question in a synchronic analysis is which grade if any should be taken as basic or underived. From a historical standpoint, each grade is the result of a characteristic sound change: lenition in grade I, gemination in grade II, and prenasalization in grade III. However in grades II and III these changes were the result of consonant clusters, such that modern grade II and III consonants were once two consonants in sequence, whereas lenition in grade I operated post-vocalically on singleton consonants. Thus we can take grade I to be underlying, with grades II and III showing the effect of some preceding element on the underlying consonant. These preceding elements can be abstract phonemes, represented as /X/ (for grade II), and /N/ (for grade III). The basic identity of the underlying grade I consonants could simply be their continuant realizations (which would require the /h_1/ vs. /h_2/ distinction), but could also be singleton stops /p, t, c, k/ and /b, d, j, g/. This underlying-stop analysis is supported by a few alternations like:

(69)	<u>sg.</u>	<u>pl.</u>	
	táandi	ga-háandi	'clay'
	diin	ga-líina	'year/rain'

which can be taken as evidence for the allophony of [t~h] and [d~l]. It would however be necessary to have the continuant /r/ as distinct from /d/ in Kobiana, and in Kasanga /l/ as distinct from /d/. This proposal would require a general post-vocalic lenition rule affecting singleton consonants. As this process holds across the entire language, it seems quite reasonable. One consequence of this underlying-stop analysis is that /p/ and /f/ would be identical in all positions except word-initially, which is rather abstract since there would never be any evidence for which of the two phonemes is represented by the sound [f] in non-initial position. Furthermore singleton /c/ would only have a single allophone [s], since it never appears word-initially.

The basic analysis as sketched up to this point would attribute mutation to preceding abstract phonemes /X/ and /N/:

Underlying:	p	t	c	k	f	b	d	j	g	r
Post-vocalically:	f	h	s	h	f	b~β	l	z	g~ɣ	r
In combination w/ X:	pp	tt	cc	kk	pp	bb	dd	jj	gg	dd
In combination w/ N:	pp	tt	cc	kk	pp	mb	nd	nj	ng	dd

Figure 209: Kobiana allophonic alternations in an abstract-phoneme analysis

The underlying allophones in Figure 209 would appear word-initially, and the lenited allophones post-vocalically. The phonemes /X/ and /N/ could also account for geminates and prenasalized stops in other positions, such that the underlying phoneme inventory could be reduced to those in Figure 210 below.

p	t	c	k	X
f				
b	d	j	g	
m	n	ñ	ŋ	N
w	r	y		

Figure 210: Underlying phonemes of Kobiana in an abstract-phoneme analysis

The rare surface voiceless prenasalized stops must be accounted for either as separate unitary phonemes, e.g. /ⁿt/, or as consonant clusters like /nt/ as distinct from /Nt/. In this way, Kobiana's 38 surface phones could be represented with 18 underlying phonemes. The following rules of allophonic realization could account for the surface forms:

- Stops become continuants after a vowel in the same word
- /X/ assimilates completely to a following stop, /f/, or /r/
    - /ff/ and /rr/ are realized as [pp] and [dd]
- /N/ is realized as a homorganic nasal before voiced stops
    - but assimilates completely to voiceless stops and the continuants /f, r/
- /X/ and /N/ are deleted before nasals and /y, w/

The analysis sketched above can be termed the "XN analysis" for its prominent use of these abstract phonemes.

The XN analysis works rather well in the nominal domain, where prefixes that trigger grade II simply have a final /X/, and those that trigger grade III have a final /N/.

/páN-kaXju/	[pákkájjù]	'cashew apple'
/bá-kaXju/	[báhájjù]	'cashew apples'
/aX-déeməna/	[àddéemə́nà]	'lemon'
/ga-déeməna/	[gàléemə́nà]	'lemons'
/uN-déeməna/	[ùndéemə́nà]	'lemon tree'
/táX-per/	[táppè(r)]	'foot'
/já-per/	[jáfè(r)]	'feet'
/úN-taNg/	[úttàŋg]	'palm tree'
/áX-taNg/	[áttàŋg]	'palm fruit'
/gá-taNg/	[gáhàŋg]	'palm fruits'

Figure 211: Kobiana nominal mutation in the XN analysis

Under this analysis, there is not truly any allomorphy in the strictest sense, as all alternations are accounted for by general allophonic processes.

Mutation in the verbal system is much more difficult in this analysis. Because the mutation of the verb stem is determined by a combination of subject, aspect, focus, and polarity, it is impossible to identify specific morphemes that induce a particular mutation grade when they precede the verb stem. In a number of cases, the same pre-verbal morpheme will be followed by different mutation grades.

(70) a) má-ndéehi 'I know' (perfect)
b) má-léeha 'I'll know' (imperfect)

c) mà-gù-faatta 'I won't come' (imperfect negative)
d) ngèe-gù-ppaatta 'we won't come' (imperfect negative)

In (70a) and (b), the difference in mutation is triggered by a difference in aspect, and cannot be attributed to the 1st sg. subject prefix *ma-*. In (c) and (d), the difference in mutation is triggered by a difference in subject, and cannot be attributed to the imperfect negative prefix *gu-*. In the XN analysis, it would not be possible to attribute grade III mutation in the verbal system to prefixes which end in a phoneme /N/. The best the XN analysis could do would be to propose a separate prefix *N-* which always immediately precedes the stem, and is found in exactly those verb forms which exhibit grade III mutation. This is of course not at all insightful. In Kasanga, the XN analysis would struggle even more, as the homorganic nasal 3rd person subject prefix is distinct from the phoneme /N/ (resulting in voiceless prenasalized stops rather than grade III voiceless stops), and would have to be represented differently.

In essence, the XN analysis is successful only when mutation is the direct result of a historically-present preceding consonant. However, especially in the verbal system, this is simply not the case. The behavior of mutation in the verbal system is excellent evidence that an XN-style analysis is not particularly appropriate, since the appearance of the complex consonants (geminates and prenasalized stops) is triggered by grammatical categories, rather than specific prefixes to which a final abstract phoneme /X/ or /N/ can be appended. Synchronically, there is no particularly good reason to think of the complex consonants as consisting of two underlying elements, as there is no way in which they are marked, or behave as clusters when compared to the grade I consonants[109]. In fact, we have seen in sections 5 and 6.10.1 that grade III has in many ways emerged as the unmarked grade in both the verbal (at least in Kasanga) and nominal systems. In Kasanga, there is not even the phonetic argument for the "complexity" of most of these segments, as the historical geminates are now apparently pronounced as singletons.

Even in the nominal system the XN analysis is not entirely satisfactory, due to the behavior of irregular (usually borrowed) noun roots. Some borrowings retain the consonant which best approximates the consonant of the source word, even when it appears in a class that ought not to permit that consonant root-initially (see the examples in Figure 207). In the XN analysis, these would require exceptional allomorphs of the noun class prefixes. However, intuitively it is not the prefix which is the source of the exceptional initial consonant, but the root itself which is exceptional. The use of /l/ in *ka-loró(ŋ)* 'cooking pot' is due to the pressure to approximate the source word more closely, which wins out against the pressure to use a grade III consonant as imposed by the class prefix *ka-III*. An analysis which puts the irregularity in the prefix rather than the root is thus rather unsatisfying. The overall success of the XN analysis in accounting for nominal mutation is rendered rather unimpressive when we consider that noun stems can never be preceded within words by anything other than a class prefix. It is simply a fact of Kobiana morphology that the only prefixes in the nominal domain are the class prefixes, and thus they will inevitably always directly precede the nominal stem. This means that it is impossible to answer the question of whether noun class as a grammatical category, or the class prefixes as segmental morphemes are truly responsible for mutation. When class prefixes do stack on a noun, the first prefix in fact generally causes no change to the second one, as in *pa-bé-ro* 'bead' or *sí-ji-hákk* 'bracelet,' in which the first prefixes are *pa-III* and *si-III*. This behavior is unexpected if these prefixes are truly /paN-/ and /siN-/[110].

7.2 Towards an alternate analysis

If we are to reject the XN analysis from the previous section, we must think about how a more satisfying analysis could be formulated. The essential idea is that grammatical categories impose a strong preference for a certain set of consonants, rather than overt

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109 With the exception that word-final complex consonants license the all-low tonal pattern, but this cannot be easily attributed to their status as complex consonants.

110 The class *a-II* does in fact mutate a following prefix, as in *á-ggu-lúna* 'breakfast.' Furthermore, the genitive linker *r-* which appears only before vowel-initial class prefixes mutates to *dd-* after grade II and III prefixes: *á-dd-a-ppée(n)* 'dinner' with *a-II*, *sí-dd-a-ddáaf* 'necklace' with *si-III* vs. *jifèekk á-r-a-ggíddeg* 'wild boar' with *a-I* as the first prefix.

morphemes triggering phonological changes that result in consonant alternation. There is no requirement that the lexical root be adjacent to any other element, nor is the imposition of a particular mutation grade inviolable. If some other pressure wins out, other consonants can appear. For nouns, the only pressures are noun class and faithfulness to some form considered "standard," e.g. the pronunciation of a loanword in the source language. In the verbal system, the following pressures could be identified:

Stronger pressure	i)	Use grade III with a plural subject
	ii)	Use grade III with an unprefixed verb
	iii)	Use grade III with subject focus forms
	iv)	Use a different grade from the perfect affirmative form in corresponding negative and imperfect forms
	v)	Use grade I with a non-overt 3rd sg. subject
	vi)	Use grade III after a subject prefix
Weaker pressure	vii)	Use grade I

This list may seem rather arbitrary or stipulative, but we have seen that each of these pressures has a historical explanation:

i) All of the plural pronouns were *n-final (**ngeen*, **kaan*, **naan*).
ii) There was a nasal or NV- 3rd sg. prefix that resulted in grade III mutation. This accounts for the large majority of modern unprefixed verbs, and grade III was extended to the other ones by analogy.
iii) The subject focus prefix was **iN-*.
iv) Subject markers were originally post-verbal in negative (and probably imperfect) forms, so grade III naturally did not arise in 1st and 2nd sg. forms, contrasting with the perfect affirmative forms. The resulting "switch" seen in these forms was extended analogically to the 3rd sg. by introducing grade III mutation in the negative and imperfect forms (as distinct from grade I in the 3rd sg. perfect affirmative form).
v) The subject prefix **a-* (originally a free pronoun) was used for 3rd person forms in the absence of an overt NP subject.
vi) All other subject prefixes happened to be nasal-final.
vii) Grade I naturally arose in the absence of any preceding consonant.

This sort of analysis is most obviously compatible with an Optimality Theory-style approach, though it is certainly not the only option (and standard OT would have trouble with (iv) above, see Wolf 2011 for why "exchange rules" cannot be easily modeled in OT).

While the ultimate origin of consonant mutation in Kobiana-Kasanga lies in regular sound changes affecting consonants in different phonological environments, its application in the modern languages is largely the result of entirely non-phonological considerations. Once mutation arises, it takes on a life of its own. It becomes a direct marker of grammatical information, not the incidental phonological effect of certain prefixes. As a marker of grammatical information, its application in specific contexts can expand or be reduced in order to more effectively perform this role. Changing the specific application of mutation patterns is an excellent example of analogical change, and in historical linguistics we have come to expect that analogy will often have an equal if not greater role in shaping the evolution of morpho-phonological patterns than the regular sound changes which originated them. Thus, it is probably unfair to characterize the XN analysis as the historically analogous one. In truth, it relies too heavily on the role of regular sound change while being unable to elegantly account for the effects of analogy. An account which takes as primary the association of mutation patterns with grammatical information is simply acknowledging the fact that mutation patterns, once established, are more beholden to analogical pressures than to maintaining the phonological distinctions of a previous stage of the language.

8 Conclusion

Mutation in Kobiana-Kasanga arose in multiple stages. Already in Proto-Bainunk-Kobiana-Kasanga, certain noun class prefixes triggered gemination of the following root-initial consonant, which is carried on as grade II mutation in KK. This gemination process was lost with only a few traces in Bainunk, principally because of the loss of the *a^X- class which was its principal trigger. This original gemination process must have originated when certain oral consonants at the end of the class markers assimilated to the root. However with the exception of the innovative KK diminutive marker *tu/ti-II*, there is no clue as to what these consonants may have been. PBKK also exhibited lenition of voiceless singleton stops in most non-initial positions, which was expanded in Kobiana to include voiced stops. The result is that Kobiana grade I contains almost exclusively continuants.

The PBKK noun class system can be reconstructed with a good deal of confidence, and makes use of a very large number of classes (probably ~50). These often have very specific semantic domains, or are used for only a few common nouns. Class prefixes were of the form (C)V(N)-. The final homorganic nasal present in some class prefixes was independent of the root, and remains as such in Bainunk— PBKK did not have grade III nasal mutation. In KK, this final nasal fused with the following consonant, giving rise to grade III mutation. Certain pre-verbal grammatical morphemes (most notably a number of subject markers grammaticalized from free pronouns) also ended in a nasal segment, which gave rise to grade III mutation in the KK verbal system.

In the nominal system, mutation can be almost entirely attributed to the presence or absence of final consonants on the class markers, though the assigned mutation grade of some smaller classes has changed due to analogy. However in the verbal system, which employs only grades I and III, the presence of final nasal segments on grammatical morphemes can account for only a portion of the modern mutation patterns. Once verbal mutation arose due to regular sound change, the resulting patterns were reshaped by analogy in both Kobiana and Kasanga such that many modern verb forms use grade III despite never having a pre-stem nasal segment historically.

Chapter 4: Wolof

Wolof makes use of a rather simpler system of initial mutation when compared to other Atlantic languages. There are only two grades, unmutated and mutated, and the phonetic alternations are rather straightforward. Mutation was historically realized as prenasalization, which is still the case for voiced stops. Voiceless continuants harden, but are no longer prenasalized. The mutated grade is only triggered on nouns, and never verbs. For these reasons, the role of mutation in Wolof is often downplayed in the literature. For example, McLaughlin (1997: 7) acknowledges only "traces" of mutation in Wolof. While it is true that mutation must have once played a somewhat larger role (especially in number marking), it is still seemingly productive in both the formation of deverbal nouns, and the formation of diminutives.

mbay m-	'cultivation'	bay	'cultivate'
càcc g-	'theft'	sàcc	'steal'
ndëngte g-	'dishonesty'	dëng	'be dishonest'
nguy s-	'little baobab'	guy g-	'baobab'

The trigger of mutation was historically noun class and, it can be argued, still is synchronically. Certain noun classes induce nasalization, while others do not. Historically, these class markers were mostly of a form CVN-, while those that do not induce mutation were CV-. These facts can be confirmed through comparison with Bainunk-Kobiana-Kasanga (BKK), Wolof's closest relative, as well as from language-internal evidence. There is also evidence for an earlier fortition mutation triggered by two original noun classes (both cognate with geminating noun classes in Proto-BKK), which has merged with nasal mutation in the modern language.

Wolof also exhibits root-final gemination and degemination in the presence of certain verbal derivational suffixes.

gàcci	'dig up'	gas	'dig'
lemmi	'unfold'	lem	'fold'
jafal	'set on fire'	jàpp	'burn (intr)'
jaaxal	'worry (tr)'	jàq	'worry (intr)'

This phenomenon has been somewhat conflated with the entirely separate phenomenon of initial mutation, most notably in Sapir (1971) who presents a three-grade mutation system for Wolof based on these unrelated phenomena. This chapter will first treat Wolof initial mutation, and then examine root-final geminate mutation.

1 Sources

The principal source for all modern data in this chapter is Diouf's (2003) >10,000 entry dictionary, by far the most extensive lexical source for modern Wolof. Some additional forms come from McLaughlin (1997) and Babou and Loporcaro (2016). For Wolof we are lucky to have a number of earlier sources, which will be cited throughout this chapter.

Anonymous	c. 1670	~1000 word list, published in D'Avezac (1845)
Barbot	c. 1680	~250 word list from his travel journal
de Villeneuve	c. 1785	~400 word list found in the account of his travels in Senegal
Dard	1825	~4500 entry dictionary
Dard	1826	Grammar (somewhat basic)
Kobès	1869	Grammar (more extensive and phonologically precise than Dard)
Kobès & Abiven	186?-1923	~10,000 entry dictionary. Kobès died in 1872, and this was later revised and published by Abiven.
...		
Guy-Grand	1923	> 15,000 entry (French headwords) dictionary w/ short grammar

There are a few other early wordlists like that of Golberry (1802), but these are mostly copied (sometimes without attribution) from Barbot. The language of translation is French in all cases. The early wordlists are compiled in Gamble (1992), who is also responsible for dating D'Avezac's list.

2 Background

Wolof is spoken by members of the Wolof ethnic group of over 5 million, but also serves as the national lingua franca in Senegal with a population of over 15 million, and is widely used in The Gambia. Historically, the Wolof people inhabited an area in the northwest of Senegal, bordered by the Sereer-speaking area in the south and Fula speakers in the east, but Wolof settlement and political influence has extended south to The Gambia since before the colonial period. Only in the last century has it spread in use to the Casamance region in the south of Senegal.

2.1 Phoneme inventory and phonotactics

Wolof has the following consonants:

	labial	alveolar	palatal	velar	uvular
vl. stop	p, pp	t, tt	c, cc	k, kk	qq <q>
vd. stop	b, bb	d, dd	j, jj	g, gg	
vl. prenas.	mp	nt	nc	nk	nq
vd. prenas.	mb	nd	nj	ng	
nasal	m, mm	n, nn	ñ, ññ	ŋ, ŋŋ	
vl. cont.	f		s	(h)	x
vd. cont.	w, ww	l, ll	y, yy		
flap/trill		r, (rr)			

Figure 212: Consonant inventory of Wolof

Geminate /rr/ is found only in ideophones. The geminates and voiceless prenasalized stops cannot appear word-initially, with the exception of three words in /nq/. The singleton stops /p, c, k, d/ cannot appear word-finally except in a few borrowings and onomatopoeic words. Singleton voiced stops /b, j, g/ are devoiced utterance-finally or before a consonant, but remain voiced before a vowel. Singleton /q/ does not exist, so geminate /qq/ is spelled <q>. /h/ occurs only in the Saalum dialect (*h > Ø, y, w in others). It is phonetically glottal, but patterns with velars phonologically. Intervocalic clusters are not particularly rare, though roots tend to be CV(C) or CVCV(C) (where C represents any consonant, including a complex one).

Wolof has the following vowels:

high	i, ii		u, uu
+ATR mid	é, ée	ë [ə]	ó, óo
-ATR mid	e, ee	a [ɐ]	o, oo
low		à [a], aa	

Figure 213: Vowel inventory of Wolof

Long vowels cannot appear before a complex consonant (a prenasalized stop or geminate), though they are allowed before clusters of simple consonants. The vowel /à/ can only appear before a complex consonant— historically it arose from shortened /aa/, though many modern tokens were lowered from /a/. Throughout this chapter I have chosen to use the official orthography, which is widely used in academic publications as well as non-linguistic literature, and increasingly in media such as advertisements. Since Wolof is not a tonal language, and the only data from a tonal language cited in this chapter are a few Kobiana words, there is no risk of confusion with tone marks.

2.2 Noun class

As noun class is the trigger of mutation in Wolof, it will be important to have a basic understanding of the noun class system before moving on to the mutation alternations themselves.

2.2.1 The classes and their semantics

Wolof noun classification is particularly intriguing from a cross-linguistic perspective since it takes into account a mix of semantic, morphological, and phonological criteria, as explored in McLaughlin (1997). Wolof has ten noun classes, each marked with a single phoneme (a consonant in all but one case). Eight of these are singular and two are plural, though two of the singular classes (*s-* and *j-*) are also used as collective classes for some words. The plural class *ñ-* is used for only a few human nouns, most notably *nit* 'person' which is one of only two nouns in the *k-* singular class. All other plurals use *y-*.

sg.	pl.	frequency of sg. class in Diouf
k-	ñ-	2 (+variants of *këf* 'thing')
b-	i/y-	2199
g-		799
m-		364
w-		346
j-		293
l-		197
s-		84

Figure 214: Frequency of each Wolof noun class in Diouf's dictionary

There is a semantic component to most classes, involving generally rather restricted semantic subdomains, but these cannot account for the majority of nouns in any class.

k-: Contains only *nit* ‘person’ and *këf* ‘thing.’
b-: All fruits. Most personal nouns (exceptions: ‘person,’ family members, and proper names).
g-: All trees. Most other plants. Place names. Times of day. Many long rigid objects.
m-: Many liquids. All personal names. Sheep.
w-: Most large mammals. Common insects.
j-: Diseases. Collective of fruit. Family members. Arabic religious terminology. Days of the week and traditional subdivisions of the year.
l-: No clear semantic domains.
s-: Diminutives, powders.

Figure 215: Semantic subdomains of each Wolof singular class

McLaughlin (1997) puts forth the claim that certain suffixes on the noun guarantee the assignment to particular noun classes, with *b-* being specifically avoided. McLaughlin cites *-in* ‘manner of Ving’ as specifically assigning *w-*, and seems to suggest that assigning a particular class is a general property of suffixes. Based on the data in Diouf (2003) this is not strictly true for almost any suffix, but certain suffixes do show somewhat of a preference for particular classes. Interestingly the only suffixes with a strong preference select the *b-* class.

-te (general nominalizer):	16 in *g-*	7 in *l-*	3 in *b-*	2 in *j-*	2 in *m-*	
-aay ‘-ness’:	39 in *b-*	15 in *l-*	9 in *g-*	1 in *m-*		
-(t)eef ‘-ity’ (roughly):	8 in *b-*	6 in *g-*	2 in *m-*	2 in *w-*	2 in *l-*	
-in ‘manner of Ving’:	11 in *w-*	9 in *b-*	2 in *g-*	1 in *j-*		
-it ‘piece resulting from V’:	14 in *b-*	13 in *w-*	5 in *m-*	2 in *l-*	1 in *g-*	1 in *y-*
-ukaay ‘instrument for Ving’:	28 in *b-*	3 in *g-*	1 in *w-*			
-uwaay ‘place for Ving’:	5 in *b-*					

Figure 216: Noun class distribution of Wolof suffixed nouns

The agentive suffix *-kat* always forms nouns in *b-*, but this can be taken as a semantic assignment, as most personal nouns and almost all agentive/occupational nouns appear in *b-* regardless of suffixation.

2.2.2 Exponence of noun class

In general noun class is not marked on the noun, and the noun itself does not change from singular to plural. Rather, class is manifested on agreeing determiners and a few other modifiers[111]. There are furthermore some contexts in which a class marker appears before the noun, and some nouns in which the prefixed class marker is fossilized as the initial consonant.

2.2.2.1 On determiners

There are a number of determiners, the most common being the post-nominal definite articles *-i* (proximal) and *-a* (distal), pre-nominal indefinite article *a-* (or *u-*) (not possible in some classes), and post-nominal relative determiner *-u*. Some examples of these determiners with nouns:

[111] These are *-épp* ‘all,’ *-enn* ‘one,’ *-eneen* ‘other’ and *-os* ‘the one belonging to...’ as well as optionally after the genitive singular particle *u* to agree with the possessed noun, e.g. *bésub pénc* ‘day of judgment’ (*bés b-* ‘day’), *loxol gone* ‘child’s hand’ (*loxo l-* ‘hand’).

nit ki/ka	'the person'	ak nit	'a person'	nit ku baax	'a good person'
xaj bi/ba	'the dog'	ab xaj	'a dog'	xaj bu baax	'a good dog'
garab gi/ga	'the tree'	ag garab	'a tree'	garab gu baax	'a good tree'
jinax ji/ja	'the mouse'	—		jinax ju baax	'a good mouse'
ndaa li/la	'the pot'	—		ndaa lu baax	'a good pot'
réew mi/ma	'the country'	am réew	'a country'	réew mu baax	'a good country'
soxna si/sa	'the lady'	as soxna	'a lady'	soxna su baax	'a good lady'
xaj yi/ya	'the dogs	ay xaj	'some dogs'	xaj yu baax	'good dogs'
nit ñi/ña	'the people'	(ay nit)	'some people'	nit ñu baax	'good people'

Figure 217: Nouns in each class alongside determiners

Note that Wolof does not use adjectives, and thus all qualification is achieved by use of relative clauses (cf. *baax* 'be good' above rather than an adjective 'good'). Determiner agreement is by far the most common exponent of noun class in Wolof.

2.2.2.2 Before nouns

Historically, nouns were prefixed with a class marker. This is arguably still present in the plural class *y-* as a prefix *i-* on the plural noun, e.g. *xarit* 'friend,' *i xarit* 'friends.' Kobès (1869) always cites plural forms with this prefix. Diouf (2003) treats this *i* as a variant of the indefinite article *ay*, but while it is certainly not required in all contexts, it has neither the distribution nor the semantics of the indefinite article. It may be that *i* has become somewhat restricted, but it is still required in many contexts such as after a numeral, or with a possessive pronoun (e.g. *sama xarit* 'my friend,' *samay xarit* 'my friends'). In fact, in this particular environment it is possible to get even singular class markers. After the vowel-final possessive pronouns *sama/suma* 'my,' *sa* 'your (sg),' and *sunu/suñu* 'our,' the class marker of the possessed noun can appear before the noun itself. Examples of this construction can be found throughout Diouf (2003), including the following:

sab takkoon	'your cord'
sab laax	'your porridge'
sam kuuy	'your ram'
sam xalaat	'your idea'
sag càggan	'your negligence'
sag ngone	'your childhood'
sag njub	'your honesty'
samag ndaw	'my youth'
samaw fas	'my horse'

Figure 218: Use of the Wolof class marker between a possessive pronoun and the noun

With a singular noun this class marker is never required, and in fact is rather uncommon. With plural nouns, use of pre-nominal *y/i* is required even with the consonant-final possessive pronoun *seen* 'your (pl.)/their', and the post-nominal *-am* 'his/her/its' (*seeni tank* 'your/their legs,' *i tankam* 'his/her legs'). The class marker can also appear between a noun and the preposition *ci/ca* 'to/in/at/on/from' (these seem to be less common, and Diouf gives no examples of this construction with *ca*).

cib nàmpal	‘to weaning’
cib tënk	‘in summary’
cig gàttal	‘in short’
cim nger	‘from corruption’

Figure 219: Use of the Wolof class marker between the preposition ci *and the noun*

There is no reason to believe that these class markers are reduced indefinite articles as they do not carry these semantics, and furthermore cannot be replaced with a full indefinite article[112]. Rather, these class markers are probably retentions of the prefix on the noun itself, which was preserved post-vocalically in these particularly tightly-bound constructions. Thus, *sab laax* ‘your porridge’ may have originally been **sa bu-laax* and *sag njub* [sɐknjup] ‘your honesty’ **sa kan-jub* or **sa gun-jub* (see section 3.7 for the reasoning behind the forms of these reconstructed prefixes).

2.2.2.3 Fossilized on nouns

There are some nouns in which the noun class marker survives as the initial consonant, which alternates either from singular to plural, or when the same root is placed in another class.

bëñ b-	‘tooth’	gëñ y-	‘teeth’
bët b-	‘eye’	gët y-	‘eyes’
baaraam b-	‘finger’	waaraam y-	‘fingers’
boroom b-	‘owner’	woroom y-	‘owners’
bàmmeel b-	‘tomb’ (*karmel g-* in Dard)	armeel y-	‘cemetery’
bant b-	‘stick’	†want y-	‘sticks’
baadoolo b-	‘peasant’	†waadoolo y-	‘peasants’
bakkan b-	‘nose’	†wakkan y-	‘noses’
loxo l-/b-	‘arm’	**y**oxo y-	‘arms’
garab g-	‘tree’	†**y**arab y-	‘trees’
buy b-	‘baobab fruit’	wuy y-	‘baobab fruits’
guy g-	‘baobab tree’	wuy w-	‘baobab fruit in shell’
gàpp g-	‘limit’	àpp b-	‘limit’
gif g-	‘baobab fruit kernel’	**j**if j-	‘ditto’
ñaar ñ-	‘two’	**y**aar y-	‘two’
ñett ñ-	‘three’	**y**ett y-	‘three’
ñent ñ-	‘four’	†**y**ent y-	‘four’
ween w-	‘breast’	**m**een m-	‘breastmilk/maternal line’
bees	‘be new’ (< bu ees)	(y)ees	‘be new’

bopp b-	‘head’	†gopp y-	‘heads’	ngopp l-	‘north’
buur b-	‘king’	wuur y-	‘kings’	nguur g-	‘government’

lëf l-	‘thing’	**k**ëf k-	‘thing’	**y**ëf y-	‘things’	**j**ëf j-	‘action’

Figure 220: Wolof nouns with a variable initial consonant from a historical prefix

[112] In the case of the construction with *ci*, there is sometimes an indefinite interpretation. However the regular contraction of /i + a/ in all other contexts is /ee/, so for original *ci ab* we would expect $^{\times}$*ceeb* and not *cib*.

Most of the plural forms are no longer known to most speakers, and those that are known are considered archaic (except *yëf*). Historically, these noun roots were either vowel-initial or began with a /w g, h/ (and perhaps /y/) which deleted after the prefix, thereby preserving the consonant of the prefix. In most nouns, the initial prefix eroded entirely. Of course, there must be more nouns than only those in Figure 220 which have retained the noun class prefix as an initial consonant, but in which the singular/plural alternation was leveled entirely even in the earliest recorded sources.

2.2.3 Class assignment based on initial consonant

Due to the preservation of the prefix in a minority of nouns like those in Figure 220, a sort of alliteration[113] naturally exists between some nouns and their determiner. This pattern was seized upon and extended such that nouns which began with certain consonants were often reassigned to the class which matched this consonant. In addition to the truly alliterative associations, the initial consonant /k/ is associated with the *g-* class, as well as /mb/ with *m-*, and all other voiced prenasalized stops with *l-*. One way to view the resulting asymmetry is to look at all nouns beginning in a certain consonant and see what percentage of them appear in the matching class, as compared to the percentage of all nouns in that class.

X	Y	% of X-initial nouns in Y		% of all nouns in Y
#b	in *b-*:	241/278	86.7%	50.8%
#j	in *j-*:	51/229	22.3%	6.8%
#w	in *w-*:	75/185	40.5%	8.0%
#g	in *g-*:	94/229	41.0%	18.5%
#k	in *g-*:	106/223	47.6%	18.5%
#m	in *m-*:	58/187	31.0%	8.4%
#mb	in *m-*:	100/138	72.5%	8.4%
#s	in *s-*:	51/369	13.8%	1.9%
#nd	in *l-*:	54/116	46.6%	4.6%
#ng	in *l-*:	40/95	42.1%	4.6%
#nj	in *l-*:	46/111	41.4%	4.6%

Figure 221: Of all Wolof nouns beginning with /X/, the % which are in class Y

Additionally, for each class we can compare the percentage of nouns in that class which begin with one of these "alliterative" consonants with the percentage of all nouns that begin with these same consonants.

[113] "Alliteration" is not entirely appropriate here, but is used for lack of a better term. For one, not all of the associations between initial consonants and class markers are alliterative (/k/ with *g-*, prenasalized stops with *l-*, and arguably /mb/ with *m-*). In addition, /l/-initial nouns have no preference for being in *l-*; only 3.2% of them are in this class, compared to 4.6% of all nouns.

Y	X	% of Y nouns beginning in X		% of all nouns beginning in X
b-	#b	241/2199	11.0%	6.4%
j-	#j	51/293	17.4%	5.3%
g-	#g, k	200/799	25.0%	10.4%
w-	#w	75/346	21.7%	4.3%
m-	#m, mb	158/364	43.4%	7.5%
l-	#nd, nj, ng	140/197	71.1%	7.4%
s-	#s	51/84	60.7%	8.5%

Figure 222: Of all Wolof nouns in class Y, the % which begin with /X/

The effect is much stronger in some classes than others, and stronger for some initial consonants than for others, but this "alliterative principle" has clearly had a major influence on Wolof noun class assignment. This principle is at work even in borrowings. Most borrowings are assigned to the "default" *b-* class, but there is also an appreciable influence of the initial consonant.

n =				
63	#b	in *b-*: 61		in other classes: 2
18	#j	in *b-*: 9	in *j-*: 7	in other classes: 2
17	#w	in *b-*: 9	in *w-*: 5	in other classes: 3
26	#g	in *b-*: 18	in *g-*: 6	in other classes: 2
64	#k	in *b-*: 45	in *g-*: 17	in other classes: 2
52	#m	in *b-*: 32	in *m-*: 13	in other classes: 7
5	#mb	in *b-*: 1	in *m-*: 4	in other classes: 0
82	#s	in *b-*: 53	in *s-*: 16	in other classes: 15

Figure 223: Class distribution of Wolof borrowed nouns beginning in certain consonants

Some native nouns show specific evidence of having been reassigned by the alliterative principle. Some can take two classes, of which the non-alliterative one is probably original (e.g. *kaaŋ g/m-* 'skull,' *safara s/w-* 'fire'). For some, the older class is preserved in fixed expressions, like *genn-wàll* 'one half' from *wàll w-* 'half,' in which the prefix *g-* on *-enn* 'one' is the original class marker. Furthermore the use of *s-* and *j-* as minor human collective classes seems to be entirely based on the initial consonant of the noun.

uses *s-* collective		uses *j-* collective	
sàmm b-	'herder'	janq b-	'girl'
séeréer b-	'Sereer person'	jeeg b-	'lady'
sëriñ b-	'Marabout'		
soldaat b-	'soldier'		

Figure 224: Wolof person nouns using the s- *collective and* j-*collective classes*

However, due to Wolof's relative isolation genealogically, it is impossible for most non-borrowed nouns to say which were reassigned based on their initial consonant, and which nouns originally served as the basis for this reassignment. Two resulting questions are particularly important. First, is the association of /k/ with the class *g-* based purely on class reassignment due to phonetic similarity, or was there a class with a prefix *k-* which merged with the *g-* class? Of course, this class would have to be distinct from the personal class *k-*. It is conspicuous that no similar association exists between /c/ and *j-* or /p/ and *b-*. Second, are there any cases where a prefix of the shape CV- rather than simply C- is preserved on the noun? There seem to be at least a few in *g-* like *gawar g-* ‘rider’ from *war* ‘ride’ (see the end of section 3.7.1.3 for more). Other nouns like *jinax j-* ‘mouse’ could in theory contain a full historical prefix *ji-*, but without cognates between Wolof and other languages, this question is impossible to answer for individual nouns.

3 Initial mutation

Mutation affects initial voiced stops and the voiceless continuants /f/ and /s/, as well as roots which historically began with *h[114], which is now Ø, /y/ (before front vowels) or /w/ (before round vowels) in standard Wolof.

unmutated:	b	d	j	g	f	s	Ø/w/y
mutated:	mb	nd	nj	ng	p	c	k

Figure 225: Wolof initial consonant mutation system

There is furthermore precisely one instance of each of the following alternations: /x~nq/, /r~nd/, /w~ng/, /w~mb/ (see section 3.6). These can certainly be excluded in a treatment of modern mutation, and for all but /x~nq/ it is far from clear that these even represent an alternation which operated historically. The effects of mutation can be seen when a root is placed in certain noun classes. The two most common sources of mutation are deverbal nouns and diminutives.

[114] In fact, /h/ is preserved in the Saalum dialect of Wolof (Ndiaye 2013: 26), e.g. *hëtt* ‘yard,’ *hóote* ‘call,’ *hiir* ‘cover/protect’ for standard *ëtt*, *(w)óote*, *(y)iir*. The existence of *h is also confirmed by borrowings into Sereer which took place at a time before /h/ was lost in standard Wolof.

Sereer		Wolof
o-hak	‘bark’	àkk < *hàkk
hañaañ	‘be jealous/wicked’	aññaan < *haññaan
haraw	‘roll flour roughly’	araw < *haraw
hebil	‘send (on mission)’	yebal < *hebal
o-hinde	‘steamer’	inde < *hinde
hod	‘betray’	wor < *hod
hooloox	‘trust’	(w)óolu < *hóolu
hoor	‘fast (v)’	woor < *hoor
hud	‘feed animal’	wudd < *hudd
hup	‘exceed’	ëpp < *hëpp

/h/ was certainly lost in the standard variety by the time of Dard’s (1825) dictionary, but it is difficult to say whether it existed in earlier wordlists. <h> is often spelled where we would expect /h/ to be (e.g. <*louhaisse*> for *lu hees ‘what’s new,’ <*dâih*> for *deeh ‘die’ in de Villeneuve’s c. 1785 list), but this could very well be meant to be silent, as in French. However, for de Villeneuve <h> is the most common spelling for /x/ (e.g. <*hol*> ‘heart’ for *xol*, and <*ouah*> ‘speak’ for *wax*), where it is certainly not meant to be silent. There is also <*goloch*> ‘monkey’ for modern *golo* in Barbot’s c. 1680 wordlist. Thus it seems that /h/ probably survived up until at least the time of de Villeneuve.

3.1 Deverbal/derivational mutation

By far the most prominent function of mutation in Wolof is to mark certain deverbal nouns. When a verb is nominalized in Wolof, it must be placed into a noun class. Deverbal nouns are found in all of the singular classes except *k-*. Verbs can be nominalized without suffixation, or can take various derivational suffixes like *-in* 'manner of Ving' or *-aay*, roughly '-ness.' The class of a deverbal noun is influenced by its meaning, suffix (if present), and initial consonant, but is often simply lexically-specific. Figure 226 gives all of the deverbal nouns with mutation found in Diouf (2003).

caaf l-	'roasted peanuts'	saaf	'roast'
caalit b-	'losing one's mind'	saalit	'lose one's mind'
càcc g-	'theft'	sàcc	'steal'
cafaay l-	'sauce accompanying *laax*'	saf	'be tasty'
cafka l-	'flavor/taste'	saf	'be tasty'
càggan g-	'negligence'	sàggan	'be negligent'
càmm g-	'livestock'	sàmm	'watch over'
càng g/m-	'fat around stomach'	sàng	'cover'
càngaay l-	'shroud'	sàng	'cover'
cangaay l-	'protective holy water sp.'	sang	'bathe'
cangat l-	'purifying bath'	sang	'bathe'
cant g-	'thanks'	sant	'thank'
car b-	'small branch, splitting'	sar	'stick through'
cawarte g-	'energy/vitality'	sawar	'be dynamic, etc.'
ceet g-	'fortune-telling'	seet	'look at/for'
céyt g-	'wedding'	séy	'wed'
cellte g-	'purity'	sell	'be pure/unblemished'
cëslaay g-	'support'	sës	'prop against/be upright'
cet g-	'cleanliness'	set	'be clean'
ciiñ m-	'gums'	siiñ	'show gums'
cobte g-	'unruliness'	sob	'be unruly'
cofeel g-	'love/sympathy'	sopp	'love'
col g-	'clothing'	sol	'wear'
colaay/colin g-	'manner of dress'	sol	'wear'
cong g-	'attack'	song	'attack'
coobare g-	'will'	soob	'please'
coono b-	'tiredness/exertion'	sonn	'be tired'
coow l-	'noise'	soow	'be noisy'
coppite g-	'change'	soppi	'change'
cosaan l-	'tradition/origin'	sos	'originate'
cox b-	'bran'	soq	'pound to remove bran'
coxor(te) g-	'malice/cruelty'	soxor	'be wicked/cruel'
cuub b-	'dying/dyed cloth'	suub	'dye'
cuuraay l-	'incense'	suur	'smoke'
kaaraange l-	'protection'	aar	'protect'
kàddu g-	'speech/word'	àddu	'answer verbally'
kaññaan g-	'jealousy'	aññaan	'be jealous'
karaw g-	'couscous ball sp.	araw	'roll flour sp.'

kàttan g-	‘power/aptitude’	àttan	‘be capable’
kéemtaan g-	‘mystery’	yéem	‘marvel’
kéewaange g-	‘environment’	yéew	‘circle around’
kemtalaay g/l-	‘limit/measure’	yem	‘stick to’
kend(aay) l-	‘spending the day’	yendu	‘spend the day’
kiiraay l-	‘protection’	yiir	‘protect’
kilifa g-	‘chief/boss’	yilif	‘command’
koddaay l-	‘clothing (for woman)’	wodd	‘dress (a woman)’
kóolute g-	‘trust’	wóolu	‘trust’
koor g-	‘fast/Ramadan’	woor	‘fast’
kor g-	‘betrayal’	wor	‘betray’
kubéer g-	‘lid’	ub	‘close’
kujje g-	‘rivalry’	wujje	‘compete/be co-wives’
mba m-	‘pardon’	ba	‘let’
mbaal m-	‘pardon’	baal	‘let’
mbaax g-	‘goodness/generosity’	baax	‘be good’
mbàcc m-	‘threshing’	bàcc	‘thresh’
mbañ g-	‘enemy’	bañ	‘hate’
mbañeel g-	‘hate’	bañ	‘hate’
mbay m-	‘cultivation’	bay	‘cultivate’
mbéeru g-	‘urinal’	béeru	‘urinate’
mbëgg m-	‘desire’	bëgg	‘love/want/like’
mbëggeel g-	‘love’	bëgg	‘love/want/like’
mbégte	‘happiness’	bég	‘be happy’
mbënn m-	‘ear piercing sp.’	bënn	‘pierce’
mbër m-	‘wrestler’	bëre	‘wrestle’
mbërëngaan m-	‘dung beetle’	bërëŋ	‘roll’
mbetteel g-	‘surprise’	bett	‘surprise’
mbind m-	‘writing’	bind	‘write’
mbindafoon b-	‘creature’	bind	‘create’
mbindeef m-	‘creature’	bind	‘create’
mbojj m-	‘millet threshing’	bojj	‘thresh’
mbokk m-	‘relative’	bokk	‘share/have in common’
mbombu g-	‘scouring sponge’	bomb	‘scrub’
mbon(eel) g-	‘evilness’	bon	‘be evil’
mboob m-	‘dry grass’	boob	‘mow dry grass’
mboole m-	‘entirety’	boole	‘assemble’
mbooleent m-	‘community’	boole	‘assemble’
mbooloo m-	‘crowd’	boole	‘assemble’
mbootaay m-	‘organization/club’	bokk	‘share/have in common’
mbootu m-	‘child-carrying cloth’	boot	‘carry on the back’
mbooy g-	‘fallow ground’	booy	‘be overgrown/fallow’
mbooy m-	‘inattentive moment’	booy	‘be interrupted’
ndaag l-	‘slow, elegant walk’	daagu	‘walk slowly’
ndaas m-	‘sharpening’	daas	‘sharpen’
ndaje m-	‘meeting’	daje	‘meet’

ndal l-	'reception (place)'	dal	'arrive (e.g. at an inn)'
ndam l-	'glory'	damu	'glorify'
ndàmpaay l-	'massage'	dàmp	'massage'
ndañ l-	'blow to the head'	dañ	'hit on the head'
ndàq m-	'sending back'	dàq	'send back'
ndeete l-	'end'	dee	'die'
ndéey l-	'secret'	déey	'whisper in the ear'
ndéeyoo l-	'whispering things'	déeyoo	'whisper to each other'
ndëgërlaay l-	'support'	dëgër	'be hard/solid'
ndëggu l-	'sole (of foot)'	dëgg	'have one's foot on'
ndekkite g-	'resurrection'	dekki	'resurrect'
ndem l-	'going'	dem	'go'
ndenceef l-	'reserve'	denc	'keep'
ndend l-	'close friend/neighbor'	dend	'be close to'
ndëngte g-	'dishonesty'	dëng	'be dishonest'
ndesit l-	'leftover'	des	'be left'
ndetteel l-	'falling on rear'	detteel	'make s.o. fall on rear'
ndëxënteef l-	'treasure'	dëxëñ	'hide/stow something'
ndigaale g/l-	'relations/ties betw. people'	digg	'be between'
ndigg l-	'hips/waist'	digg	'be between'
ndikkaan m-	'unwanted person'	dikk	'come'
ndimmal l-	'help'	dimmali	'help'
ndof g-	'madness'	dof	'be crazy'
ndog m-	'major obstacle'	dog	'cut/interrupt'
ndogu l-	'meal to break fast'	dog	'cut/interrupt
ndogal l-	'judgment'	dogal	'decide'
ndollent l-	'addition'	dolli	'add'
ndono l-	'inheritance'	donn	'inherit'
ndoorte l-	'beginning'	door	'begin'
ndoxaan l-	'courtship'	dox	'walk'
ndugg m-	'victuals'	dugg	'buy victuals'
ngaañ l-	'wrong/injury'	gaañ	'injure'
ngaana g-	'leper'	gaana	'have leprosy'
ngas m-	'digging'	gas	'dig'
ngàttaan b-	'short person' (m- in B&L)	gàtt	'be short'
ngëm g-	'faith'	gëm	'believe'
ngëmadi g-	'lack of faith'	gëmadi	'doubt'
ngën g-	'the best'	gën	'surpass/be better'
ngëneel l-	'advantage/merit'	gën	'surpass/be better'
nger m-	'corruption'	ger	'spoil'
ngërëm l-	'thanks'	gërëm	'thank'
ngiir l-	'removing grain sp.'	giiru	'remove grain from stalk w/ finger'
ngiñ g-	'swearing'	giñ	'swear'
ngistal l-	'exhibition/vanity'	gis	'see'
ngóob l/m-	harvest	góob	'harvest'

ngor g-	'honesty'	gore	'be honest'
njaaxaanaay l-	'lying on one's back'	jaaxaan	'lie on one's back'
njaay m-	'commerce'	jaay	'buy'
njam l-	'tattooing session'	jam	'poke/pierce'
njambaan l-	'watery mix of baobab/tamarind'	jamb	'mix'
njàmbat l-	'grievance'	jàmbat	'complain sp.'
njàng m-	'study/learning'	jàng	'learn'
njàngaan l-	'student/apprentice'	jàng	'learn'
njàngale m-	'teaching'	jàngale	'teach'
njàpp m-	'ablution'	jàpp	'ablute'
njàppaan b-	'wildcat sp.' (seizes chickens)	jàpp	'seize'
njàppu l-	'handle'	jàpp	'seize'
njàqare g-	'confusion/worry'	jàq	'be worried'
njariñ l-	'usefulness'	jariñ	'be useful for'
njarte l-	'ease of sales'	jar	'cost'
njaxas m-	'mix'	jaxas	'mix'
njébbal l-	'offering'	jébbal	'put'
njeexital l-	'ending of an action'	jeex	'be done'
njëmbët m-	'transplanting'	jëmbët	'transplant sp.'
njénd m-	'purchase'	jénd	'buy'
nji m-	'seeds'	ji	'plant'
njiglaay l-	'happy outcome'	jig	'be favorable/lucky'
njigtal l-	'good luck charm'	jig	'be favorable/lucky'
njiit l-	'leader'	jiit	'be first/lead'
njiiteef g-	'leadership	jiit	'be first/lead'
njong l-	'circumcision ceremony'	jong	'be circumcised'
njoowaan g-	'hammock'	joow	'swing'
njot g-	'redemption'	jot	'attain, etc.'
njub g-	'honesty'	jub	'be straight/honest'
njudduwaale l-	'innateness'	juddu	'be born'
njur g-	'giving birth'	jur	'give birth'
njureel g-	'maternity'	jur	'give birth'
njuumte l-	'error/fault'	juum	'make a mistake'
pàddu b-	'vital point of the body'	fàdd	'kill with a blow'
paj m-	'healing'	faj	'heal'
pal g-	'election'	fal	'elect'
pase g-	'divorce/renouncing'	fase	'divorce'
pas-pas b-	'knot/decision'	fas	'knot/conclude'
pastéef b-	'will/determination'	fas	'knot/conclude'
pay g-	'leaving the home in anger'	fay	'leave the home in anger'
pecc m-	'dance'	fecc	'dance'
peeñu b-	'apparition'	feeñ	'appear'
pénc m-	'public square'	fénc	'discuss in the public square'
peesu b-	'skinning place'	fees	'skin an animal'
péex m-	'fresh air/rest'	féex	'be cool'
péexlukaay b-	'place to take fresh air'	féexlu	'take the air'

penku b-	'east' (where the sun appears)	fenk	'appear'
peral m-	'weaning'	fer	'be weaned'
perantal b-	'weaned baby that suckles'	fer	'be weaned'
perlukaay b-	'place for weaning'	fer	'be weaned'
pexe m-	'solution'	fexe	'find a solution'
pey g-	'salary, pay'	fey	'pay'
peyoor b-	'payday'	fey	'pay'
po m-	'game'	fo	'play'
póon m-	'powdered tobacco'	fóon	'smell/inhale'
portaat m-	'gathering here and there'	for	'gather'
póotu b-	'laundry place'	fóot	'wash laundry'
pótit m-	'washwater'	fóot	'wash laundry'
purit/puurit m-	'foam'	fuur	'froth'

Figure 226: Wolof deverbal nouns with mutation

In addition to deverbal derivation, there are also examples of denominal derivation (or stated more neutrally, a noun root appearing in two different singular classes) that result in mutation alternations. An incomplete list is given in Figure 227.

kuude g-	'cobbling/leatherworking'	wuude b-	'cobbler/leatherworker'
ndéwénal l-	'*tabaski* gift'	déwén j-	'next year'
ngallax l-	'thin porridge sp.'	gallax b-	'clot/curd'
ngan l-	'stay'	gan g-	'guest'
ngone g-	'childhood'	gone g-	'child'
njàmbaar g-	'courage'	jàmbaar b-	'brave person'

Figure 227: Wolof denominal nouns with mutation

The mutating effect of nominal derivation is of course noted in descriptions of Wolof, from Kobès (1869) to modern treatments like McLaughlin (1997). However there are two important points that are to my knowledge not clarified in the literature. First is the degree of productivity of this process. These alternations are so frequent and involve so many common verb/noun pairs that it would be quite surprising if they were not applied to new borrowings or nonce words, but to my knowledge no relevant studies exist. Second (and most important for our purposes) is that only certain noun classes regularly trigger mutation. A clear distinction exists between the mutating classes *g*-, *m*-, and *l*- on the one hand, and the non-mutating classes *b*-, *w*-, and *j*- on the other. The *s*- class is inconclusive, being used mainly for s-initial roots by the alliterative principle. We will see in section 3.2 that *s*- does in fact induce mutation when used as the diminutive class. This distinction between mutating and non-mutating classes can be clearly seen by comparing some unsuffixed deverbal nouns in each class:

	noun		verb	
b-:	fo	'playing'	fo	'play'
	sàcc	'thief'	sàcc	'steal'
	ànd	'accompanying'	ànd	'accompany'
	bàkkaar	'sin'	bàkkaar	'sin'
	dàmp	'massage'	dàmp	'massage'
	gàkk	'stain/defect'	gàkk	'be stained'
	jaal	'tooth gap'	jaal	'have gap between teeth'
w-:	fen	'lie'	fen	'lie'
	sant	'family name'	sant	'greet'
	ër	'mycosis'	ër	'make indentation sp.'
	doxat	'fart'	doxat	'fart'
	gajj	'scratching'	gajj	'scratch'
	joor	'salutation'	joor	'greet'
j-:[115]	seekeeg	'mumps'	seekeeg	'have mumps'
g-:	pal	'election'	fal	'elect'
	càcc	'theft'	sàcc	'steal'
	kàddu	'speech/word'	àddu	'answer verbally'
	mbañ	'enemy'	bañ	'hate'
	ndof	'madness'	dof	'be crazy'
	ngëm	'faith'	gëm	'believe'
	njub	'honesty'	jub	'be straight/honest'
m-:	po	'game'	fo	'play'
	ciiñ	'gums'	siiñ	'show gums'
	mbind	'writing'	bind	'write'
	ndaje	'meeting'	daje	'meet'
	ngas	'digging'	gas	'dig'
	njàpp	'ablution'	jàpp	'ablute'
l-:	kend	'spending the day'	yendu	'spend the day'
	coow	'noise'	soow	'be loud'
	ndam	'glory'	dam	'glorify'
	ngaañ	'injury'	gaañ	'injury'
	njariñ	'usefulness'	jariñ	'be useful for'
s-:[115]	sarax	'alms'	sarax	'give alms'
	seere	'testimony'	seere	'testify'
	sikk	'flaw'	sikk	'be flawed'
	soxla	'need'	soxla	'need'

Figure 228: Wolof unsuffixed deverbal nouns in each class

[115] The *j-* class is only used deverbally for diseases. The *s-* class is only used deverbally for s-initial verbs.

While there are some exceptions, it is overwhelmingly true that mutation is triggered only by *g-*, *l-*, and *m-*. Figure 229 gives the number of (mostly deverbal) derived nouns in Diouf (2003) which do and do not exhibit mutation in each class. Of course this count only includes bases which begin with a mutable consonant.

	mutation	no mutation
b-	20	311
j-	0	21
w-	0	23
g-	82	33
m-	58	9
l-	79	3
s-[116]	9	10

Figure 229: Number of Wolof derived nouns in each class with and without mutation

The small minority of mutated nouns in *b-* might at first seem inconsequential. It is possible that they are evidence for the generalization of mutation as marking nominalization regardless of class. Another conceivable explanation is that these are nouns from other classes which were reassigned to *b-*, as is increasingly common for nouns in modern Wolof. However, it is noteworthy that all but four of these 20 mutated *b-* nouns involve the hardening of /f/ and /s/. We will see in section 3.5 that this sub-pattern probably carries on an older fortis mutation pattern, completely separate from the nasalization responsible for mutation in *g-*, *l-*, and *m-*. The few exceptions in *m-* are mostly liquids, or somehow evoke the idea of liquids, e.g. *saw* 'urine,' *sebet* 'water for washing grains,' and *suy* 'sprinkling.' The exceptions in *g-* cannot be ignored, but are in the minority. Overall, the distinction between the mutating and non-mutating classes is quite clear, and it would not be accurate to say that mutation is generally triggered by derivation. Rather, it is the assignment to particular classes that is the trigger of mutation, even synchronically.

Since specific noun classes are the trigger of mutation in derived nouns, the question naturally arises of whether these same patterns can be found in underived nouns. In all other Atlantic mutation systems, the grade assigned by each class is essentially consistent regardless of whether the noun is derived. For Wolof this would mean that for the classes which trigger mutation on derived nouns, we would also expect to find underived nouns which have initial consonants in the mutated grade, and for those classes that do not trigger mutation, we should not find these mutated consonants. The initial consonants which are unambiguously unmutated are the voiced stops, /f/, and /s/, and we can add to this group roots which once had initial *h, now having an optional glide or no initial consonant[117]. The voiceless stops /p, c, k/ can be the result of mutation, but in other cases are unmutated (in fact initial /p, c/ which are not the result of mutation or borrowing are somewhat rare). The initial consonants which are unambiguously mutated are the voiced prenasalized stops. The occurrence of these three groups of sounds, identified as A, B, and C respectively, is given for each class in Figure 230.

[116] The mutated nouns are denominal diminutives (see section 3.2), and of the 10 unmutated nouns, 8 are s-initial.
[117] It is not clear whether all such roots were *h-initial, or if some were always vowel initial. Vowel-initial roots are underrepresented synchronically, and so it shouldn't throw off the numbers too much to include all of these in this group, even if some were truly vowel-initial and thus could not have exhibited mutation.

	A	B	C	
b-	647	247	48	
j-	127	11	8	(44 have /j/)
w-	88	17	5	
g-	214	110	40	(88 have /g/, 80 have /k/)
m-	8	35	95	(70 have /mb/)
l-	1	17	95	(no roots with /k, p, mb/)
s-	47	1	3	(43 have /s/)

Figure 230: # of underived nouns beginning in A: /b,d,j,g,f,s,*h/; *B:* /p,c,k/; *and C:* /ND/

For all but *g-*, the initial consonants are basically as expected. The classes *b-*, *j-*, and *w-*, which do not mutate derived nouns, also do not contain many underived nouns with a mutated consonant. There are an appreciable number of mutated nouns in *b-*, but again this is the "default" class and many nouns must have been assigned to *b-* which were once in other classes— 11 are personal nouns which could have been reassigned on a semantic basis. The classes *m-* and *l-*, which trigger mutation of derived nouns, also contain almost exclusively mutated underived nouns. Of the 8 unmutated nouns in *m-*, two are liquids, assigned on a semantic basis (*soow m-* 'buttermilk' and *sexaw* 'kinkeliba tea'), but the others are exceptional (e.g. *segg m-* 'panther,' *sàq m-* 'granary'[118]). The *s-* class is simply not used much except for /s/-initial nouns. It is the diminutive class (section 3.2), and is used for some powdery substances, but was likely not used much if at all outside of these two functions until nouns were reassigned by the alliterative principle. The *g-* class is somewhat more complicated. As expected from its mutating effect on derived nouns, there are a number of mutated underived nouns. However most *g-* nouns are unmutated. This class serves as the class for all trees and many other plants, and these nouns are almost all unmutated— e.g. *banaana* 'banana tree,' *daqaar* 'tamarind tree,' *jàmb* 'sugarcane.' Furthermore there are a large number of *g*-initial nouns that are assigned to this class by alliteration (or a retained prefix). Even excluding these two categories, many unmutated nouns remain, e.g. *buum* 'rope,' *dëgg* 'truth,' and *fett* 'arrow.' It is clear that the *g-* class represents multiple classes that have fallen together historically. At least one of these was nasalizing, while at least one other (including the tree class) was not. Of these original *g-* classes, it is possible that the one most commonly used for deverbal nouns was nasalizing, but it is conspicuous that of the three classes which nasalize derived nouns, *g-* has the most exceptions. It may even be that, like underived *g-* nouns, most derived *g-* nouns were originally unmutated, but as mutation came to be seen as a mark of derivation, the minority of mutated derived *g-* nouns exerted an influence on the unmutated ones, encouraging mutation of derived *g-* nouns which were historically members of a non-mutating class. As for the remaining classes, plural *y-* is clearly not a mutation trigger (see section 3.3), while personal *k-* and *ñ-* are inconclusive, being used for very few nouns.

To summarize, mutation in derived nouns can be attributed to the fact that certain noun classes (*g-*, *l-*, and *m-*) are triggers of mutation. Even in underived nouns, two of these classes (*l-* and *m-*) trigger mutation with only minimal exceptions. The classes *b-*, *j-*, *w-* and *y-* do not trigger mutation. The *g-* class sometimes does and sometimes does not trigger mutation— it

[118] The fact that most of these exceptions are s-initial is not a coincidence— note that the same was true for the exceptional derived nouns in *m-*. As we will see in section 3.7.1.5, the nasalization caused by the prefix of the *m-* class arose historically after nasalization triggered by *g-* and *l-*, since the nasal in *m-* was prefix-initial rather than prefix-final. The regular outcome of initial /ms/ in these *m-* nouns is /s/, rather than /c/.

does much more often than not for derived nouns. We might be justified in identifying two separate *g-* classes, one which triggers mutation, and one which does not.

3.2 Diminutive/denominative mutation

The diminutive class is *s-*, and diminutive formation is noted as a productive process from Kobès (1869) onward. When a noun is placed into the diminutive *s-* class, it is subject to mutation. In McLaughlin's (1997) data, the full range of mutation alternations are seen in diminutive formation, both for voiced stops and voiceless continuants. This includes roots which once had *h (mutating to /k/), and this alternation has been extended to other vowel-initial roots which are borrowings and never had initial *h. Remarkably, McLaughlin also reports that /x/ is mutated to /q/ in diminutive formation. Otherwise, /q/ is illicit in word-initial position, being a geminate[119]. The following examples are provided by McLaughlin (1997: 4).

sg. noun	diminutive	
buur b-	mbuur s-	'king'
béy w-	mbéy s-	'goat'
doj w-	ndoj s-	'stone'
deret j-	nderet s-	'blood'
jigéen j-	njigéen s-	'woman'
jàkka j-	njàkka s-	'mosque'
géwél b-	ngéwél s-	'griot'
guy g-	nguy s-	'baobab'
séq g-	céq s-	'cock'
séex b-	céex s-	'twin'
xaj b-	qaj s-	'dog'
xar m-	qar s-	'goat'
oto b-	koto s-	'car'
àlluwa j-	kàlluwa s-	'Qur'anic board'

Figure 231: Wolof diminutive s- class nouns

McLaughlin gives the following important note about the source of her data:

> "These data were all elicited in Dakar from Babacar Mboup, a griot from Kaffrine. For many Wolof speakers, especially those from large urban areas, only stop-initial stems undergo consonant mutation in diminutive formation, becoming prenasalized. The fact that Mboup is a griot indicates that his speech may be more elaborate than that of non-griots, and therefore not typical of the 'average' Wolof speaker. However, it is especially for those reasons that I have chosen to include Mboup's forms since they present the full array of synchronic forms and may ultimately prove useful in diachronic studies."

It is indeed my experience that Wolof speakers are generally unfamiliar with diminutive alternations other than those affecting voiced stops. It is also notable that the only diminutive forms listed in Diouf (2003) have voiced prenasalized stops. However the existence of the

[119] It is probable that this alternation was innovated, but a /x~nx/ alternation did exist earlier (see section 3.4). However the regular outcome of initial /nx/ in all other contexts is /x/.

/s~c/ alternation in Kobès (1869) confirms that at least this alternation must be original. With these voiceless alternations included, the effect of the *s-* diminutive class is the same as the other mutation-triggering classes. We are unable to determine the behavior of *s-* with regard to mutation in other contexts, since it is used almost exclusively for s-initial nouns. The full list of mutating and non-mutating classes can now be presented:

b-	g-N
g-	l-N
j-	m-N
w-	s-N
y-	

Figure 232: Wolof noun classes and their mutating effect

Diminutive mutation is simply a specific case of assigning the same root to a mutating and non-mutating class. Other examples of this phenomenon can be seen where a noun appears optionally in two different classes with the same meaning:

kóllëre g-	wóllëre w-	'alliance/loyalty'
kubéer g-	ubéer b-	'lid'
mbàq g-	bàq b-	'stomach/tripe'
njabar m-	jibar b-	'charlatan'
njéggal l-	jéggal b-	'pardon'
ngar l-	gar b-	'bundle of peanuts'

Figure 233: Wolof nouns appearing in multiple classes with the same meaning

However we will see in section 3.5 that the use of nasal mutation for *s-* diminutives is probably a recent innovation, replacing an earlier fortis mutation pattern.

3.3 Singular/plural mutation

Since the plural class *y-* does not trigger mutation and a number of singular classes do, we would expect that mutation alternations should exist between many singular/plural pairs, just as in other Atlantic mutation systems. There are indeed some examples of this phenomenon, though as with the number alternations seen in Figure 220, these are considered archaic or are unknown altogether in the modern language. Some of the examples in Figure 234 are found in Diouf (2003), but most come from Babou and Loporcaro (2016).

sg.	pl.	
mbaam m-	baam y-	‘donkey’
mbàttu m-	bàttu y-	‘gourd sp.’
mbootaay m-	bootaay y-	‘piggyback’
mbagg m-	wagg y-	‘shoulder’
ndab l-	dab y-	‘utensil’
ndënd m-	dënd y-	‘drum sp.’
ndono l-	dono y-	‘heritage’
ngàttaan m-	gàttaan y-	‘short person’
pepp m-	fepp y-	‘grain’
†pan m-	fan y-	‘day’ (*fan w-* is current)
nqalle m-	xalle y-	‘insect/pigeon sp.’

Figure 234: Singular/plural mutation alternations in Wolof nouns

Two of these involve alternations seen nowhere else in the language: *mbagg~wagg* and *nqalle~xalle*. However in general the singular form is unchanged in the plural. It must be that these number alternations were once robust, but were leveled in favor of the singular for almost all nouns. A modern analysis could still treat the *y-* class as non-mutating, but would have to build the plural form off of the singular, rather than some underlying root.

3.4 Voiceless prenasalized sounds and other evidence from older sources

The first surviving written attestations of Wolof are in the Arabic script from at least the 17th century, followed by some early wordlists from European travelers, most notably an anonymous list from circa 1670 and Jean Barbot’s from circa 1680. Dard’s (1825) dictionary and (1826) grammar are the first extensive sources on Wolof. He uses a French-based orthography which obscures some phonological contrasts, but is overall quite accurate (note <ǰ> for /x/ and <ă> for /a/ and sometimes /ë/). Kobès (1869) is an excellent grammar for its time, and uses an orthography which has been further refined to capture almost all phonological contrasts (though in some cases it disagrees with modern sources on vowel length and ATR values). Kobès also compiled a dictionary around the same time that was published many years later (1923). The languages described by these two authors agree in almost every respect, with the only notable change being that the /g^w/ vs. /g/ distinction present in Dard was lost by the time of Kobès. Furthermore, with the exception of the word-initial voiceless prenasalized sounds (explored below), these sources describe a language which is essentially the same as modern Wolof. The following historical changes and/or phonetic properties are already attested in these sources: word-final devoicing of singleton stops, the loss of *h, post-vocalic *d>r, vowel shortening before complex consonants, and (at least in Kobès) epenthesis of schwa after word-final complex consonants. Furthermore, the noun class system is seemingly identical to that of the modern language, and nouns are with few exceptions already in their modern classes. The “alliterative principle” of noun class assignment is already fully established, confirming that this is not a recent innovation. There is a tendency among modern educated speakers to assume that many of the differences between Wolof and the other non-Mande languages of Senegal (Fula, Sereer, Joola, etc.) such as the seemingly reduced noun class system, simpler and more restricted mutation system, and less synthetic verbal system are due to rapid urbanization and the use of Wolof as a national lingua franca. These sources suggest that every distinctive feature of Wolof was already established by the Colonial period.

While it is true that even before this time Wolof had considerable political and social power in the region, there is no reason to believe that this was responsible for any of the language's distinctive features.

For our purposes, the most notable difference in these sources from the modern language is that voiceless prenasalized sounds were found word-initially. It is not clear whether this feature would have been common to all dialects at the time, but it is found in all sources prior to and including Guy-Grand's (1923) dictionary[120]. To my knowledge this feature is not reported to have survived in any modern dialect, and is absent in Ward (1939, data collected 1937) for both Gambian and Senegalese speakers, and in all subsequent sources. These word-initial sounds can be seen both in underived nouns and derived nouns.

Kobès (~1869)[121]	Diouf (2003)			
ncàmmoñ l-	càmmoñ l-	'right hand'		
ncel	cell	'absolutely quiet (Ideo)'		
nker g-	ker g-	'shadow'		
mpicc m-	picc m-	'bird'		
nxar m-	xar m-	'sheep'		
nxaaf m-	xaaf m-	'ram'		
nxel m-	xel m-	'spirit'		
			verb	
mpo m-	po m-	'game'	fo	'play'
mpecc m-	pecc m-	'dance'	fecc	'dance'
mpénc m-	pénc m-	'public square'	fénc	'discuss in public square'
mpexe m-	pexe m-	'means'	fexe	'manage'
mpóot m-	póot m-	'laundry'	fóot	'wash clothes'
ncàcc g-	càcc g-	'theft'	sàcc	'steal'
ncàngaay g-	càngaay l-	'clothing/shroud'	sàng	'cover'
ncoow l-	coow l-	'noise'	soow	'be loud'
ncofeel m-	cofeel g-	'love'	sopp	'love'
ncosaan l-	cosaan l-	'beginning'	sos	'originate'
nkélif g-	—	'command'	élif	'command'
mpes m-	pes b-	'slap'	pes	'slap'
ntael g-	—	'laziness'	tael	'be lazy' (standard *tayal*)
ntoroxte m-	toroxte j-	'humiliation'	torox	'be humiliated'
ntuutaay g-	tuutiwaay b-	'smallness'	tuut(i)	'be small'
nkadu g-	—	'thunder'	kadu	'thunder'
nxereñ g-	—	'dexterity'	xereñ	'be dexterous'

Figure 235: Word-initial voiceless prenasalized consonants in Kobès (1869)

We can see that in both the derived and underived nouns, the voiceless prenasalized sounds are found only in classes that trigger mutation. Before the loss of these initial prenasalized sounds, the nasalizing effect of particular noun classes would have been extremely clear. The large

[120] It is also found (with the exception of /nx/) in Angrand (1952), but a number of earlier editions were published, the earliest from 1920.
[121] I have adopted Kobès's orthography to the modern orthography. He does not distinguish geminates except word-finally (by noting the schwa release), and so these are based on their modern form.

majority of nouns in *m-* and *l-* as well as many in *g-* were prenasalized, with the only immutable consonants being pure nasals and voiced continuants. Kobès notes that there are exceptions to the prenasalization of derived nouns, but all of his given exceptions are in the *b-*, *w-*, or *g-* classes (54). Kobès further notes that these sounds are never found word-initially in verbs (55), though a few examples are found in Dard. Dard's (1825) dictionary also has initial voiceless prenasalized sounds in these same nouns. With few exceptions, every modern noun beginning in /p, t, c, k, x/ in the classes *m-* and *l-* (and many in *g-*) has /mp, nt, nc, nk, nx/ in Dard and Kobès. The mutation system at this time would have been as follows[122]:

Unmutated:	b	d	j	g	p	t	c	k	f	s	*h	x
Mutated:	mb	nd	nj	ng	mp	nt	nc	nk	mp	nc	nk	nx

Figure 236: Earlier Wolof initial mutation system

The voiceless stops other than /t/ were at this time relatively rare in initial position (except /k/ from an earlier class prefix (see section 3.7.1.3), which does not participate in mutation), so the series /p~mp/, /c~nc/, and /k~nk/ would have been uncommon.

Some /k/-initial nominalized forms that in the modern language seem to be the result of mutation have /k/ rather than /nk/ in Kobès and Dard.

<u>*g-* noun</u>		<u>verb</u>	
kélifa g-	'chief'	élif	'command'
keeu g-	'waking up'	eeu	'wake up'
kimtaan g-	'admiration'	imtaan	'admire'
kumpa g-	'secret'	umpa	'be unknown'

Figure 237: Deverbal nouns in Kobès with initial /k/

These are all in the *g-* class, and so here we must be dealing with a class prefix rather than nasal mutation. In section 3.7.1.3 we will see that there is good reason to believe that the modern *g-* class arose from the merging of multiple classes, as least one of which had a /k/-initial class marker.

The other important features attested in older sources are the presence of a prefix *m-* on *m-* class nouns (see section 3.7.1.5), and the aforementioned /g^w/ phoneme attested in Dard, which is crucially found in the *g-* (earlier *g^w-*) class (see section 3.7.1.3).

3.5 Fortition induced by *b-* and diminutive *s-*

In the modern language there is no reason to assume that any initial mutation operates other than the single two-grade system which can be attributed to prenasalization. Without any documentation of earlier Wolof, we would have no reason to believe that mutation came about for any reason other than prenasalization. However in Kobès and Dard, where all mutated consonants should be prenasalized, we find that not all instances of mutation result in prenasalization. Specifically, the few *b-* class nouns with mutation are never prenasalized,

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[122] Kobès gives one other alternation, with one example: *ŋabu* 'be proud,' *nŋabu g-* 'pride.' There is no evidence for this alternation in Dard, who spells initial /ŋ/ as <ngn> consistently, including in both the noun and verb forms of this root (<*ngnabou g-*> 'pride' and <*ngnaboulo*> 'make proud'). It is extremely doubtful that there was actually any initial geminate contrast for /ŋ/, considering it does not exist for any other nasal. This transcription may have simply been due to Kobès being unaccustomed to word-initial /ŋ/.

involving only the hardening of /f, s/ to /p, c/, and the examples given by Kobès of diminutives in *s-* involve only hardening, and never prenasalization.

The *b-* class is not generally a mutating class, but in Figure 229 we saw that a small number (20/331 words with a mutable consonant) of derived *b-* nouns in Diouf (2003) do in fact exhibit mutation. Conspicuously, all but four of these[123] involve the hardening of /f, s/ to /p, c/.

b- noun		verb	
caalit b-	'losing one's mind'	saalit	'lose one's mind'
car b-	'small branch, splitting'	sar	'stick through'
coono b-	'tiredness/exertion'	sonn	'be tired'
cox b-	'bran'	soq	'pound to remove bran'
cuub b-	'dying/dyed cloth'	suub	'dye'
pàddu b-	'vital point of the body'	fàdd	'kill with a blow'
pas-pas b-	'knot/decision'	fas	'knot/conclude'
pastéef b-	'will/determination'	fas	'knot/conclude'
peeñu b-	'apparition'	feeñ	'appear'
peesu b-	'skinning place'	fees	'skin an animal'
péexlukaay b-	'place to take fresh air'	féexlu	'take the air'
penku b-	'east' (where the sun appears)	fenk	'appear'
perantal b-	'weaned baby that suckles'	fer	'be weaned'
perlukaay b-	'place for weaning'	fer	'be weaned'
peyoor b-	'payday'	fey	'pay'
póotu b-	'laundry place'	fóot	'wash laundry'

Figure 238: Wolof derived b- *class nouns with hardening of* /f, s/

Of these only *coono* and *penku* are found in Kobès and Dard (both in *b-*), but neither are prenasalized. Most derived *b-* class nouns do not harden /f, s/ (83, vs. the 16 that do), but this process is quite common among nouns suffixed with *-u(kaay)*. We will see in section 3.7.1.1 that Wolof *b-* can be connected with two classes in Bainunk-Kobiana-Kasanga: **bu-/bi-*, and the rather less common **ba*^{X}*-*. This second class has the effect of geminating and hardening the root-initial consonant in BKK. Importantly, in BKK *h was never subject to gemination, and no alternation ever arose from *h in the history of any BKK language. Assuming that this gemination process also operated in earlier Wolof, once these initial consonants were degeminated the only remaining alternations would be /f~p/ and /s~c/— exactly what we see in Wolof for *b*-induced mutation. It can further be noted that /p/ and /c/ are much more common initial consonants in the *b-* class than in the other fully non-nasalizing classes: 9.2% for *b-*, vs. 2.6% for *w-*, and 2.4% for *j-*. By assuming the cognacy of Wolof *b-* with both BKK **bu-/bi-* and **ba*^{X}*-*, the Wolof facts are explained rather neatly. Because **bu-/bi-* was the much more common class, mutation is generally not observed for *b-*. However, for the minority of nouns which were originally in **ba*^{X}*-*, /f/ and /s/ mutate to /p/ and /c/ (importantly not /mp, nc/), which is not seen in the other non-mutating classes *w-* and *j-*. All of this evidence points to the

[123] These are *mbindafoon* 'creature,' *ndem-dellu* 'U-shaped mouse hole,' *ngàttaan* 'short person,' and *njàppaan* 'wildcat sp.,' and are probably the result of class reassignment. Notably *ngàttaan* is given in the *m-* class in Babou and Loporcaro (2016).

reconstruction of root-initial gemination triggered by certain noun classes all the way to Proto-Wolof-BKK.

It is also quite possible that diminutive *s-* originally induced this same fortis mutation, rather than the standard nasal mutation used in the modern language. Kobès (1869: 79) notes the mutating effect of diminutive *s-*, and provides the following examples:

noun	*s-* diminutive	
safara s-	cafara s-	'fire'
suuf s-	cuuf s-	'dirt/ground'
ndox m-	ndox s-	'water'
ndaw l-	ndaw s-	'young person' ('girl' in dimin.)
bënkler b-	bënkler s-	'small pestle' (from his dictionary)
góor g-	góor s-	'man'

Figure 239: Diminutives in Kobès (1869)

Crucially, these *s-* diminutives do not induce nasalization (cf. modern *ngóor s-* 'little man'), but do harden /s/ to /c/. Unfortunately Dard does not provide any diminutive forms. With only four relevant forms in Kobès (*ndox* and *ndaw* can be set aside as they are prenasalized in their base forms), we cannot draw any definitive conclusions. However based on the available data, there is no evidence that *s-* was a nasalizing class at this time. It is perhaps relevant that the most notable non-s-initial noun in the *s-* class is *xorom* 'salt,' with no prenasalization. There are two examples in Kobès where prenasalization is expected but absent: *pan m-* 'day' (cf. *fan y-* 'days') and *koor g-* 'fast' (<*nkaure g-*> in Dard, from *(w)oor* 'fast'). Perhaps these four diminutive forms are similar exceptions. However if diminutive *s-* was truly nasalizing, it is conspicuous that four out of the six exceptions to mutation being marked by prenasalization happen to be *s-* diminutives. Only a few classes induced fortition in Proto-BKK, but one was **si*^{X}-, used on the single noun **si-ggir̥* 'eye.' It is possible that this is cognate with the Wolof diminutive class. There is precedent elsewhere in Atlantic for the diminutive class being used as the class for 'eye': in the Padee dialect of Noon (Soukka 2000) *ku-has* has become standard (cf. *has* in the Sawii dialect), and also in Lehar *koas* (Soukka and Soukka 2013), with *ku-* being the diminutive class prefix. This is the only cited noun in these two languages which obligatorily appears in the diminutive class. If Wolof-BKK **si*^{X}- was originally a diminutive class, it could quite easily become associated with 'eye' in BKK, with its original diminutive function being subsequently taken over by innovative classes. We could then trace both BKK **ba*^{X}- and **si*^{X}- back to Proto-Wolof-BKK with the same geminating effect seen in BKK.

The "regularization" of diminutive mutation to match the nasal mutation seen in other classes (see Figure 231) must then have taken place only after the loss of initial voiceless prenasalized consonants. With /mp, nc/ merging with /p, c/, there would have no longer been any difference in the fortis and nasal mutations of /f/ and /s/, and thus the diminutive alternation could be interpreted as the same process seen in other classes. Mutation on diminutives could then be analogically extended to all mutating consonants, resulting in the full inventory of mutation alternations being used. It is interesting that for most modern speakers, the only productive diminutive mutation alternations involve the voiced stops, which were in fact innovated through analogy, while the original /f~p/ and /s~c/ alternations have fallen out of use.

3.6 The possibility of other alternations

Other than the productive modern alternations involving voiced stops, /f/, /s/, and *h, there is one example each of four other consonant alternations.

mutated		unmutated	
nqalle m-	'insect/pigeon sp.'	xalle y- (pl.)	
mbagg m-	'shoulder'	wagg y- (pl.)	
nguur g-	'government'	wuur y-	'kings'
ndaw g-	'youth/virginity'	raw g-	'hymen'

Figure 240: Irregular Wolof mutation alternations

The first of these is probably a retention of the earlier /x~nx/ alternation, in which /nx/ irregularly developed to /nq/ rather than expected /x/. It is significant that *nqalle* is in the *m-* class, which contained some exceptionally prenasalized nouns at the time of Dard (*nsàq* 'granary' and *nweddi* 'contradiction'). Historically, prenasalization in the *m-* class arose after prenasalization in other classes (see section 3.7.1.5). The other three alternations find no further support in Dard, Kobès, or any other source.

The *mbagg~wagg* alternation may hint at an earlier /w~mb/ series, but there is perhaps a more likely explanation. For a number of nouns, including two body parts, there is an alternation between a *b-* class singular beginning in /b/, and a *y-* plural beginning in /w/.

baaraam b-	'finger'	waaraam y-	'fingers'
boroom b-	'owner'	woroom y-	'owners'
bant b-	'stick'	†want y-	'sticks'
baadoolo b-	'peasant'	†waadoolo y-	'peasants'
bakkan b-	'nose'	†wakkan y-	'noses'
buy b-	'baobab fruit'	wuy y-	'baobab fruits'
buur b-	'king'	wuur y-	'kings'

Figure 241: Wolof singular/plural b~w *alternations due to singular* b-

These arose naturally from /w/-initial roots to which the singular prefix *b-* was attached. A form *mbagg m-* would be expected to have a plural ×*bagg y-*. It may be that this was replaced with *wagg* by contamination from these other irregular plural forms.

The *wuur~nguur* alternation perhaps suggests the existence of an earlier /w~ng/ or /ɣ~ng/ series. However it is also possible that the original form of 'government' was simply *guur* with the *g-* class prefix on the root *wuur*. Nasalization could have then been introduced due to the association of nasalization with derived *g-* nouns.

The *raw~ndaw* alternation may be a coincidence. There exists a noun *ndaw l-* 'young person/messenger' in addition to *ndaw g-*, which means 'youth' regardless of gender in addition to 'virginity.' Furthermore *ndaw* is used as a verb meaning 'be small.' It is possible that all of these words *ndaw* can be ultimately traced to a root *raw* 'hymen' through a chain of semantic shifts, but the resemblance between these roots may simply be coincidental.

While we cannot exclude the possibility that a /w~mb/, /w~ng/, and/or /r~nd/ alternation existed as a regular process at some earlier time and was leveled out, other explanations are available, and based on only one word each it is impossible to draw any definitive conclusions.

3.7 History of the noun class system

We have already revealed some of the history of Wolof noun classes by determining which of them trigger nasalization and which do not. We can confirm some of these facts and get an even clearer picture of the history of the noun class system through comparison with Bainunk-Kobiana-Kasanga (BKK), Wolof's closest relative. Wolof has no close relatives, and has been termed an "isolate within the West Atlantic group" in McLaughlin (1994: 5, citing Pozdniakov, p.c.). However comparison with the BKK group reveals that while the relation is quite distant, it must be Wolof's closest relative. This relationship was first proposed by Doneux (1978), correcting an earlier hypothesis by Sapir (1971) which grouped Wolof with Fula-Sereer. Sapir's hypothesis has unfortunately been repeated in numerous publications subsequently (e.g. Wilson's overview of Atlantic in Bendor-Samuel 1989). Given their almost total lack of interaction for many centuries, the similarities between Wolof and BKK are particularly telling of a genetic, rather than areal relationship. There exists a rather small number of potential lexical cognates found nowhere outside the Wolof-BKK subgroup.

Wolof		BKK	
réy	'be big'	*-de̟	'big'
ñuul	'be black'	Ko. -ñuru	'be black'
-enn	'one'	KK *-r̥een	'one/other'
juróom	'five'	Ko. júroog	'five'
yég	'be informed'	*-ye̟(e)g	'hear/understand'
sol	'wear'	Bai. gu-sol	'shirt'
napp	'fish (v)'	KK *-naapp	'fish (v)'
ndox m-	'water'	Bai. *(mun-)ruux	'water'
biir b-	'belly'	Bai. bu-ye̟r~bi-ye̟r	'belly'
man	'1s pronoun'	*man	'1s pronoun'
†ng^{w}i, ng^{w}a	locative/aux. copula	*-gu̟	copula

Figure 242: Possible cognates specific to Wolof-Bainunk-Kobiana-Kasanga

It is also perhaps significant that Wolof and BKK lack implosives, despite Wolof being surrounded by languages with implosives. However most telling are the similarities in the noun class systems of these languages.

Wolof	BKK
b-	*bu-/bi-, *ba^X-
i/y-	*i-
k-	*ku-
ñ-	*ñaN-
j-	*ja-, *ji-, *jaN-
m-N	*ma-, *muN-
g-	*gu-, *ki-
g-N	*guN-, *kaN-
s-N	*si^X-, *siN- ?, *saN- ?
w-	*fa- ?
l-N	*raN- ?

Figure 243: Possible cognate classes between Wolof and Bainunk-Kobiana-Kasanga

Even simply looking at the phonological shape of the markers, these systems bear a striking resemblance to each other when compared to other Atlantic languages. The use of many different noun classes in deverbal derivation is also much more pronounced in Wolof and BKK than in other Northern Atlantic languages. Just as in BKK languages, the use of different Wolof classes for deverbal nouns is influenced by the semantics of the verb root, the suffix on the verb, and the lexical identity of the verb. When we examine the semantic content of these classes, it becomes even clearer that they must be related. In the following sections we will briefly examine each Wolof class and its connection or possible connection to BKK classes.

3.7.1 The individual classes

3.7.1.1 b-

This is the "default" class in Wolof, being by far the most common and serving as the class for almost all recent borrowings. In BKK we find both **bu-/bi-* and **ba*^{X}*-*, which are almost certainly both cognate to Wolof *b-*. The first of these is quite common in BKK, with **ba*^{X}*-* less so. The semantic domain of *b-* is of course very broad, but there are some identifiable subdomains. Notably, *b-* is used for fruits, and in Bainunk *bu-* has this same role. We saw in section 3.5 that a minority of *b-* nouns show hardening of initial /f/ and /s/, and that these can be attributed to their historical membership in **ba*^{X}*-*, which induces gemination in BKK. This **ba*^{X}*-* prefix may be preserved in the word *bakkan b-* 'nose' (var. *bakken*) if it can be connected to the BKK root for nose **-kin(d)*. Like in BKK, the majority of *b-* nouns would have been in **bu-/bi-*, as they do not induce initial fortition.

3.7.1.2 i/y-

This is the plural class in Wolof, with only a few nouns taking *ñ-* instead. In Bainunk, the plural of *bu-/bi-* is *i-*, and this is almost certainly cognate with Wolof *i/y-*. It cannot be a coincidence that in Wolof *b-* and *i/y-* have become generalized as the default singular and plural classes respectively, when these are a singular/plural pair also in Bainunk.

3.7.1.3 g-(N)

This is the second most common Wolof class by far. It has a number of peculiarities which indicate that it must represent multiple original classes which fell together. First, we saw in section 3.1 that *g-* is the only class containing many mutated as well as unmutated nouns. We might even say that synchronically there are two classes, *g-* and *g-N*. Secondly, *g-* is associated with both /k/- and /g/-initial roots. There is no similar association between /p/ and *b-* or /c/ and *j-*, so this is probably not due to phonetic similarity. Just as the association with /g/ arose in analogy with nouns prefixed with *g-* (e.g. *guy g-* 'baobab tree' from the root *wuy*), its association with /k/ arose from words prefixed with **k-*. A clear example is *karmel g-* 'tomb' found in Dard, cf. *armeel y-* 'cemetery' and *bàmmeel b-* 'tomb' in Diouf. Some other good candidates are *kuur g-* 'pestle,' with a Bainunk cognate **ka-hụ(n)d* 'mortar,' and perhaps *kanam g-* 'face' and *kawar g-* 'hair' which may contain a prefix **ka-*. Presumably the agreement for this original k-initial class was not *g-*, but fell together with *g-* at some point. Importantly, almost all /k/-initial nouns in *g-* have /k/ and not /nk/ in earlier sources, confirming that these are not simply nouns with an earlier *h-initial root showing mutation in the *g-* class. See also the deverbal *g-* class nouns which have a prefix *k-* on a vowel-initial root in Figure 237. Nouns beginning in /nk/ in earlier sources show no preference for the *g-* class, and in fact all but one of them (*nker* 'shadow') are deverbal.

There are four (or perhaps five) potential cognate classes to *g-* in BKK. First is **gu-*, used for long, rigid objects. This may be the origin of the tree class in Wolof, and can explain *g-* nouns like *roq* 'stick sp.,' *fett* 'arrow,' *dibi* 'gun,' and *illeer* 'hilaire (long stick used as farming tool).' The *gu-* class is used in Bainunk for some locations (Cobbinah 2013: 312), e.g. Gubëeher *gu-baabo* 'Ziguinchor' from the root meaning 'European,' just as *g-* is used in Wolof for place names. **gu-* is the most common class in BKK, which fits well with *g-* being such a common class in Wolof. Some rather clear evidence for *g-* being traced to **gu-* comes from Dard (1825). At this time, there was a distinction between /g/ and labialized /g^w/ (neutralized before round vowels), which was lost by the time of Kobès (1869). Dard writes, "*gu* se prononce à-peu-près comme, en français, *g* devant *a*, *o*, avec une petite modification; ainsi *guarap* ne se prononce ni *garap*, ni *gouarap*, mais le son participe des deux[124]." It is not entirely clear what is meant by this comment, but a sound that is somewhat in between [g] and [gu] is probably [g^w]. Many nouns in the *g-* class which in the modern language are /g/-initial are /g^w/-initial in Dard, and the agreement marker itself is *g^w-*.

Dard (1825)	Diouf (2003)	
gui, gua	gi, ga	proximal, distal definite article
guănâre	ganaar	'chicken'
guangue	gaŋ	'fig tree'
guărape	garab	'tree/medicine'
guătaȷ̈e	gattax	'millet stalk' ('thatch' in Dard)
guédiame	jàmb (?)	'sugarcane'
gueléme	gëléem	'camel'
guémigne	gémmiñ	'mouth'
guenao	gannaaw/ginnaaw	'back'
gueneu	gënn	'mortar'
guénnewal	genn-wàll	'one half'
guertey	gerte	'peanuts'
guéthie	géej	'sea'
guétte	gétt	'corral'
guife	gif	'baobab kernel'
guiley	gile	'this'
guilite	gilint	'firebrand'

Figure 244: Nouns in the Wolof g^w- > g- *class beginning in* /g^w/ > /g/

[124] "*gu* is pronounced almost as, in French, *g* before *a*, *o*, with a small modification; thus *guarap* is pronounced neither as *garap*, nor as *gouarap*, but the sound has aspects of both."
Before <a> and <ă>, Dard clearly contrasts <gu> and <g>. However it must be noted that he never writes <gi> or <ge> for any word, only <gui> and <gue>. There are two explanations for this fact, and unfortunately no way of knowing which is correct. Most obviously, he may have been guided by French spelling, and used <gui, gue> for /gi, ge/. Under this scenario we cannot know whether /g/ and /g^w/ contrasted before front vowels. The other possibility is that that Wolof lacked the sequences /gi, ge/ at this time (perhaps due to an earlier palatalization change), having only /g^wi, g^we/. Since he specifically notes the pronunciation of <gu> as being different from French, I will assume that he means for <gu> to always represent /g^w/. Some evidence for the existence of the sequence /g^wi/ comes from Barbot, who always spells modern *ngi* (the locative/auxiliary copula) as <*ngré*> (cf. *ngui, ngua* in Dard). The status of /g^w/ in sources earlier than Dard is almost impossible to determine, since <gu> is used for /g/ before front vowels and also for /j/— however we do find <*guarap*> 'medicine' in de Villeneuve, in which there would be no other reason to write a <u>.

It does however seem that the /g^w/ vs. /g/ distinction was already being lost at this time (or else Dard was simply inaccurate in detecting it), as he gives some words with both /g^w/ and /g/ in different places (e.g. *guărape* and *garap* 'tree,' *guenao* and *ganaou* 'back'), and there are furthermore a good number of /g/-initial nouns in the *g^w*- class.

There is also the Bainunk tree class **ki-*. In Wolof it is clear that *g-* and not *k-* is present on a number of trees, most notably *guy* 'baobab' as well as *garab* 'tree' itself. There are however a number of trees with /k/ (e.g. *kàdd* 'Faidherbia albida,' *kel* 'Grewia bicolor,' *kóoni* 'Borassus aethiopum'), and it may well be that the tree class in Wolof is inherited at least in part from **ki-*. Third is BKK **kaN-*, containing miscellaneous nouns, especially concave/convex-shaped things (including 'mortar'). There is also the 'location' class **ka(N)-* (which may be separate from the **kaN-* class) seen in e.g. Kobiana *ka-bóy* 'Kobiana land,' which could be connected with the use of *g-* for place names in Wolof (along with *gu-*, as mentioned above). Finally there is the rare **guN-* class, which can be reconstructed for 'honey' (Kobiana-Kasanga **gú-njaab*, Bainunk **gum-pan*), cf. Wolof *lem g-*, and is used for a few other nouns in Kobiana, such as deverbal *gu-mbún* 'beauty.' While **guN-* is a rare class in BKK, its role may have diminished in this family, or expanded in Wolof. If Wolof *g-* indeed carries on earlier **gu-*, **kaN-*, and **guN-* (and perhaps also **ki-*), this would explain why *g-* contains both mutated and unmutated nouns. Both **gu-* and **kaN-* (and rarely **guN-*) can be used as deverbal nominalizing classes in BKK, which could explain the existence of both mutated and unmutated deverbal nouns in Wolof *g-*.

There are a few derived nouns which suggest the existence of a prefix form **gaN-* as well: *gawar g-* 'rider' from *war* 'ride,' *gànnaar g-* 'Mauritania" from *naar* 'Moor,' *gàncax* 'vegetation' from *sax* 'sprout,' and perhaps *gàngóor g-* 'crowd of people' from *góor* 'man' and *gànjar g-* 'finery/jewel' from *jar* 'cost.' There is also at least one seemingly prefixed *g-* noun which was likely borrowed from a Proto-Fula-Sereer or early Sereer **ɣal* class noun: *gàddeem g-* 'flying fox' from PFS **ɣal-ɗeem* (Sereer *a-feem al-*).

3.7.1.4 j-

There are a number of subdomains of *j-*, most notably as a class for many Arabic borrowings, especially those pertaining to religion[125], and also as the collective class for fruits. Its use as a collective class can also be seen in *jiwu j-* 'seeds,' *deret j-* 'blood' *dugub j-* 'millet,' *su j-* 'cabbage' (borr. French *chou*), and a number of other mass nouns, many referring to vegetable material. In BKK, **ja-* is the collective class for vegetable material such as grass, leaves, etc. Wolof *j-* may also be connected with BKK **ji-* and the rarer **jaN-*, both used for some animals among other things (cf. Wolof *janax/jinax j-* 'mouse,' *jasig j-* 'crocodile,' *jaan j-* 'snake,' *janaab j-* 'cat' vs. Gubëeher *ji-hut* 'mouse,' *ja-rẹeg* 'crocodile,' Kobiana *jániileh* 'snake,' Guñaamolo *jangoon* 'cat'). It may also be significant that Wolof *déwén j-* 'next year' is in *j-*, when BKK **ji-* is used for temporal terms relating to years (including 'next year,' e.g. Gub. *jiman*).

3.7.1.5 m-N

Wolof *m-* is the liquid class. This can be associated with the liquid class of the shape *ma(N)-* found throughout Atlantic and Niger-Congo more broadly. In BKK we find both **ma-*

[125] McLaughlin (1997) provides an appealing explanation for this association involving Pulaar as an intermediary, in which the plural of these Arabic borrowings regularly has the suffix *-ji*, which could be reinterpreted as the singular article in Wolof.

and **muN-*, the latter of which was probably borrowed from a Bak language. In Wolof however this class is used much more broadly, and includes some animals, deverbal nouns, and other assorted nouns, even those that do not begin with /m/ or /mb/: *saaw m-* 'porcupine,' *at m-* 'year,' *pénc m-* (†*mpénc*) 'public square,' etc. It seems quite likely that Wolof *m-* represents multiple classes which fell together, but there are no other potential singular *m*-initial cognate classes in BKK or other Atlantic languages. As for the nasalizing effect of *m-*, we might at first suspect that the original form of the marker was *maN-* as in Tenda **maŋ-*. An original form **muN-* would require an extremely early date of borrowing from Bak into Proto-Wolof-BKK, but cannot be ruled out. However for most nouns, it is clear that the initial *m-* of the prefix is responsible for nasalization, after the deletion of the prefix vowel. In two earlier sources, *m-* class nouns are prefixed with *m-*: Barbot's travel journal from circa 1680, and the anonymous wordlist found in D'Avezac (1845) from circa 1670.

Barbot (c.1680)	D'Avezac (c.1670)	Dard (1825)	Diouf (2003)	
m'doch	mdoc	ndoÿe m-	ndox m-	'water'
m'sang	msing	săngue m-	sëng b-	'palm wine'
ommghar	mkar	nÿărre m-	xar m-	'sheep'
miagh (*mñax?*)	gniac	niaÿe m-	ñax m-	'grass'
	at	atte m-	at m-	'year'
	mseau	sauô m-	soow m-	'buttermilk'
	mreou	raio m-	réew m-	'country'
	mseau	(saw (v))	saw m-	'urine'
	mkel	nÿel m-	xel m-	'spirit'
		nsakÿe m-	sàq m-	'granary'

Figure 245: Wolof m- *class nouns in Barbot and D'Avezac, most with a prefix* m-

These are all of the *m-* class nouns given in Barbot and D'Avezac, and we can see that at this time the *m-* prefix was present on most *m-* class nouns. Note also *mforok* 'sour' in D'Avezac (modern *forox* 'be sour'), likely an *m-* class noun meaning 'sour milk.' This prefix *m-* does not seem to have any effect on root-initial continuants. Even in Dard, there are a few *m-* class nouns that retain a nasal prefix before an unmutated consonant. 'Granary' is the only word with an initial /ns/ sequence in his dictionary. This word is borrowed into Cangin languages as *mesax* (Lehar) and *misax* (Palor). The form *nsàq* could not be the result of a nasal-final marker, as this would yield hardened /nc/ rather than /ns/. Dard also gives *nvaidy m-* 'contradiction,' to be read as *nweddi m-*, the nominalization of *weddi* 'contradict.' Prenasalization of /w/ is not attested in any other word, and must be from this original *mV-* prefix rather than a nasal-final prefix. The most likely original form of the *m-* prefix is **ma-* without a final nasal (especially for the liquid nouns), based on the BKK form. It is probable that some *m-* nouns can be traced back to a different prefix of the form *mV(N)-*.

3.7.1.6 s-N

This is the diminutive class in Wolof, otherwise being used almost exclusively for /s/-initial nouns. In section 3.5 we saw that there is evidence that this class once triggered fortition, being reanalyzed as nasal mutation only after the denasalization of initial voiceless prenasalized consonants. Wolof *s-* can thus be plausibly connected with BKK **sɪ*^{X}*-*, used only for 'eye.' There are two common s-initial classes in BKK, **siN-* used for strings, ropes, etc., and **saN-*, which survives only in Kobiana-Kasanga, and is used mainly for flat flexible things like leaves. It may well be that some non-diminutive *s*-class nouns (which notably almost all begin in /s/) were once in these classes. However the main identifiable semantic subdomain for non-diminutive *s-* nouns is powders:

fariñ	'flour' (borr. Fr.)
fuddën	'henna (powder)'
saaño	'millet species with small grains'
salliñ	'white sea sand'
sànqal	'meal (powdered grain)'
saxaar	'smoke'
sumul	'cornmeal' (borr. Fr.)
sunguf	'powder/flour'
suuf	'dirt/sand'
suukar	'sugar' (borr. Ar.)
suuna	'millet species with small grains'
xorom	'salt'

Figure 246: Powders in the Wolof s- *class*

This use of *s-* finds no connection in BKK. The use of *s-* as a minor human collective class (see Figure 224) has no clear equivalent in BKK. A possible connection could be drawn with **saN-* based on Kobiana *sá-yebb* 'crowd of people,' but this is extremely speculative.

3.7.1.7 w-

This class is very semantically disparate. One small subdomain is for large mammals: *bëy* 'goat,' *fas* 'horse,' *jib* 'antelope sp.,' *nag* 'cow,' *yëkk* 'bull,' *ñay* 'elephant.' This can perhaps be connected with BKK **fa-* used for some animals (cf. Tenda **fa-*, Fula-Sereer **fan* and Cangin **f-*). This may however be coincidental, and the phonological connection between /w/ and /f/ is far from clear (note also Biafada-Pajade **waN-* which also contains large mammals). These animal nouns make up only a tiny proportion of *w-* nouns, and there is no obvious connection to *w-* as a whole in BKK. It seems likely that most *w-* nouns come from a class which has no BKK cognate, perhaps one of a shape *(C)u-*. In de Villeneuve (c. 1785) we find *ouyone* 'law' (also given as *ouion* 'fair') for modern *yoon w-*, which seems to preserve this original prefix. Barbot's (c. 1680) *uhaaire* for modern *weer w-* 'moon/month' may represent a disyllabic pronunciation of [uheer] or [uweer] with a vocalic class prefix *u-*.

3.7.1.8 l-N

The *l-N* class has no clear semantic basis. There is a potential connection to be made with BKK **raN-*, but this is a rather small class, and it is not at all clear that Wolof /l/ and BKK *r can be connected.

3.7.1.9 k-

There are only two nouns in this class, *nit* 'person,' and *këf* 'thing.' It is also used as the personal class when not modifying a noun (e.g. *keneen* 'someone else' from *-eneen* 'other'). Its use with *këf* might be connected to BKK **ku-* used only for 'thing.' However the grammatical use of BKK **ku-* is equivalent to Wolof *l-*, and indeed *lëf l-* 'thing' also exists in Wolof, though in the modern language it has come to mean 'vagina' and thus *këf* is the only basic word for 'thing.' Nonetheless, the use of *këf* does not seem to be a recent innovation, as it is given in Dard (1825) and Kobès (1869) alongside *lëf* 'thing.' With only two noun roots, one of which is nasal-initial and the other vowel-initial, it is impossible to say whether *k-* was originally a nasalizing class. If it is indeed to be connected with **ku-*, it was certainly not.

3.7.1.10 ñ-

Wolof *ñ-* is the personal plural class. Only a few person nouns including *nit* 'person' use this as the plural class[126], but it is also used on headless determiners for human reference (e.g. *ñeneen* 'other people'), and in the 3rd person plural pronoun *ñu*, which is used regardless of animacy. In BKK **ñaN-* is one of only a few plural classes, and in Bainunk it is used (along with some other markers) for the personal plural, as well as for some non-personal classes. Since it is used for so few nouns in Wolof, it is probably impossible to say whether *ñ-* is a nasalizing class. Even if it was originally, the resulting alternations would probably be leveled out like the vast majority of singular/plural alternations.

3.7.2 Historical shape of the class markers

The original shape of the class markers must have been (C)V(N)- prefixes, just as in BKK. Those that ended in a nasal induced nasal mutation, as did *mV-* in which the nasal was initial. The *s-* diminutive class (potentially from **si*^{X}-) and a subclass of *b-* (originally **ba*^{X}-) induced fortis mutation, but there is no reason to believe that there was any consonantal trace left on these class markers after Wolof's split with BKK.

Pre-Wolof class	Form(s) based on BKK	Modern class
*bV-	*bu-, *bi-	b-
*bV^X-	*ba^X-	b-
*kV(N)-	*ku-	k-
*jV-	*ja-, *ji-	j-
*wV- / u-	*wa- ?	w-
*g/kV-	*gu-, *ka-, (*ki-)	g-
*g/kVN-	*kaN-, *guN-	g-N
*lVN-	*laN- ?	l-N
*mV(N)-	*ma-	m-N
*sV^X-	*si^X-	s-N
*i-	*i-	y-
*ñV(N)-	*ñaN-	ñ-

Figure 247: Shape of Pre-Wolof noun class markers

The identity of the vowel in these markers cannot be determined (except in the case of plural *i/y-*, from **i-*), except by assuming cognacy with certain BKK classes. Some of these connections are almost certainly valid, while others are highly speculative. There are doubtless some Pre-Wolof classes which have no BKK cognates, such as the "powder" *s-* class, and the *m-* class used for non-liquids. At a time when these markers still had their full forms, the final nasal of certain class markers fused with the root-initial consonant, resulting in mutation. Afterwards, the initial CV- prefix was eroded in the vast majority of cases. In some cases the

[126] Also *góor* 'man,' *jigéen* 'woman,' *gaa* 'guys,' and a few others for some speakers (See Babou and Loporcaro 2016)

initial consonant /w, y, h, g/ of the root was deleted, and the consonant of the class marker was preserved, being reinterpreted as the root-initial consonant. A particularly clear example is *bopp* / †*i gopp* 'head(s),' cf. Bainunk Gubëeher *bu-gof* / *i-gof* 'head(s).' It may be that in some other cases the entire CV- prefix was retained, e.g. in *kanam* 'face' (perhaps with a prefix **ka-*) or *jinax* 'mouse' (perhaps with a prefix **ji-*), but without cognates in other languages there is simply no way to know whether these CV sequences were part of the root or the prefix (or if only the V was part of the root, with the C being retained from the prefix).

3.8 The independent innovation of nasal mutation and inheritance of fortis mutation

Nasal mutation in Wolof arose independently, after its split from Bainunk-Kobiana-Kasanga. Recall from chapter 3 that Proto-BKK did make use of a system of mutation, but one which involved only gemination in the presence of certain class prefixes (and not nasalization). The marker-final nasals were still present in Proto-BKK, giving rise to nasal mutation in Kobiana-Kasanga only after its split with Bainunk. Since no nasal mutation existed in Proto-BKK, there is no possibility that this process was inherited in Wolof. Wolof nasal mutation almost certainly arose under areal pressure from Fula and Sereer which were also developing nasal mutation from marker-final nasals, but at this time it would have almost certainly not been in contact with any BKK language. On the other hand, Wolof fortis mutation, realized as the hardening of /f, s/ to /p, c/, can probably be reconstructed for Proto-Wolof-BKK, as discussed in section 3.5. In the history of Wolof this fortis mutation was triggered only by **ba*^{X}- and diminutive **si*^{X}-, and in the modern language it has become indistinguishable from nasal mutation due to the denasalization of word-initial /mp, nc/ and the analogical extension of all nasal mutation series in diminutive formation.

4 Root-final mutation (gemination)

In an entirely unrelated process to root-initial mutation, Wolof exhibits root-final gemination alternations triggered on verb roots by certain suffixes. All simple consonants are affected (no prenasalized stops) except for some instances of /r/. The fricatives /f, s, x/ harden to /pp, cc, qq/, and earlier *h hardens to /kk/, now realized as a Ø~kk alternation. Rarely a vowel-final root will exhibit a Ø~ww or Ø~yy alternation. When /r/ does geminate, it becomes /dd/. There are two common suffixes which trigger an alternation: reversive *-i* triggers gemination essentially without exception, and causative *-al* triggers degemination in a minority of roots. There are also sporadic instances of gemination and degemination triggered by other suffixes or derivational processes. It should first be noted that these alternations are not triggered by suffixes with any particular phonological form. For example, the itive suffix *-i* 'to go V' never triggers the gemination seen in Figure 248 for reversive *-i*, and the benefactive applicative suffix *-al* never triggers the degemination seen in Figure 252 for the homophonous causative suffix *-al*.

4.1 Reversive gemination

Gemination triggered by the reversive suffix *-i* (also the less common reversive suffixes *-ati*, *-ali*, *-anti*, *-arci*, *-arñi*, *-arbi*) is by far the most common process, and has almost no exceptions (only some instances of /r/ are exempt). These suffixes generally attach to a verb, but also nouns in a few cases. Note that vowels are shortened before a geminate, and *-i* also has the effect of raising some vowels.

tubbi	'leave a religion'	tuub	'convert to a religion'
ubbi	'open'	ub	'close'
xobbi	'strip (bark, etc.)'	xob w-	'leaf'
yebbi	'unload'	yeb	'load'
teddi	'take off/depart (vehicle)'	teer	'land (boat, etc.)'
xàddi	'stop waiting'	xaar	'wait'
àjji	'take down from height'	aj	'put up high'
dàjji	'remove nail'	daaj	'nail'
déjjati	'make run off'	déj	'(cause to) sit'
lijjanti	'unravel'	lëj	'be tangled'
tijji	'open'	téj	'close'
xàjji	'divide'	xaaj	'divide/be half full'
gàgganti	'say word to refresh s.o.'s memory'	gag	'forget lyric'
tàggi	'unhang'	tag	'be perched high up'
teggi	'take away'	teg	'put/take'
roppi	'remove from a pile'	roof	'insert, slide into (tr)'
sàppi	'disgust'	saf	'be tasty'
xippi	'open the eyes'	xef	'blink'
botti	'fell by grabbing belt (in wrestling)'	boot	'carry on back'
butti	'eviscerate'	butit b-	'intestine'
fottarñi	'clear throat of obstruction'	fot	'have sth. stuck in throat'
jottali	'transmit to someone'	jot	'obtain'
wéttali	'keep company'	wéet	'be lonely'
xotti	'rip up'	xoteet	'ideo. of tearing to pieces'
bocci/bucci	'draw a weapon'	boseet	'ideo. of drawing weapon'
fecci	'unknot'	fas	'knot'
gàcci	'dig up'	gas	'dig'
dekki	'revive (tr)'	dee	'die'
yàkki	'lose hope'	yaakaar	'hope'
goqi	'ungulp (cough up?)'	góox	'gulp'
ñuqi/ñuqati	'remove sth. stuffed'	ñuux	'stuff into'
soqi	'fire a gun'	sox	'load a gun'
suqi	'pluck feathers'	suux w-	'flesh'
suqali	'reinvigorate'	suux	'sink'
xiqi/xekki	'catch one's breath'	xëx	'be out of breath'
xewwi	'be out of fashion'	xew	'happen/be in fashion'
yewwi/yiwwi	'detach'	yeew	'attach'
gilli	'exhale, climb'	gël	'built up heat'
làlli	'unmake (bed, etc.)'	lal b-	'bed'
lelli	'remove covering layer'	lal	'spread on'
nellarci	'take something you've reserved'	nal	'reserve'
sulli	'unbury'	suul	'bury'
tóllanti	'pair/renovate'	tóol	'be unpaired/incomplete'
joyyanti	'readjust/straighten'	joy	'lean'
tàyyi	'unstick'	tay	'stick on'
lemmi	'unfold'	lem	'fold'
ximmi	'regain consciousness'	xëm	'faint'
wonni	'no longer exist/take place'	woon	'past tense'
yenni	'remove someone's burden'	yen	'load onto s.o.'s head'

Figure 248: Wolof derived reversive verbs with root-final gemination

There are also many verbs (well over 100 in Diouf) ending in *-i* which have no unsuffixed counterpart, but in these words gemination is still triggered.

buqi	'open eyes wide'	fitti	'emerge'
foqi	'leave the mourning period'	fulli	'flay/strip'
gitti	'empty a calabash gourd'	jolli	'exhale'
làññi	'uncover/expose'	lokki	'detach'
nocci	'remove thread'	noppi	'finish'
ñibbi	'go home'	ràddi	'scamper off'
ruggi	'flay'	sàbbi	'reject'
seqi	'revive'	simmi	'undress'
wàññi	'diminish'	wàqi	'remove sand from hole'
wuññi	'reveal a secret'	yàbbi	'fade (color)'

Figure 249: Wolof underived reversive verbs with root-final gemination

Furthermore every single verb root suffixed with *-ati*, *-ali*, *-anti*, *-arci*, *-arñi*, or *-arbi* ends in a geminate or consonant cluster. Some words with what seems to be a reversive suffix do not have reversive meaning, but trigger gemination nonetheless.

jubbanti	'straighten/correct'	jub	'be straight/honest'
sébbi	'start raining'	seeb	'drip'
mottali	'complete'	mot	'be complete'
sotti	'be finished'	sotal	'finish (tr)'
feccali	'finish filling'	fees	'fill'
yàkki/yàwwi	'elongate'	yaa	'be long'
joqarbi	'point menacingly'	joxoñ	'point at'
soqi	'buy as the first client of the day'	sox b-	'money'
gàlli	'be culturally uprooted'	gaal g-	'boat'
xàmmee	'recognize' (*-ee* is *-i* + applicative *-e*)	xam	'know'
ronni	'size up'	ron	'under'
bàyyi	'leave/let'	ba	'leave/abandon'

Figure 250: Wolof verbs with a semantically unexpected reversive suffix

In verbs which end in a geminate to begin with, the reversive suffix has no effect on the consonant.

dippi	'turn right side out'	dëpp	'turn inside out'
gimmi	'open eyes'	gëmm	'close eyes'
siggi	'straighten self up'	sëgg	'bend down'
tekki	'untie'	takk	'tie'
teppi	'unsew'	tapp	'attach'
wékki	'unhang'	wékk	'hang up'

Figure 251: Underlyingly geminate-final Wolof verbs with a reversive suffix

4.2 Causative degemination and other alternations

There are also a number of cases in which the causative suffix *-al* causes degemination of a final consonant.

abal ~ aal	'lend'	àbb	'borrow'
seral	'cool (tr)'	sedd	'be cold'
teral	'honor'	tedd	'be honorable'
tëral	'make lie down'	tëdd	'lie down'
dugal	'make enter'	dugg	'enter'
jafal	'set on fire'	jàpp	'burn (intr)'
tofal ~ toftal	'add on'	topp	'follow'
yafal	'fatten (livestock)'	yàpp	'devour' (and *yàpp w-* 'meat')
musal	'save'	mucc	'be saved'
boole	'assemble'	bokk	'share/have in common'
dëël	'install in a location'	dëkk	'live (somewhere)'
leel	'help someone eat'	lekk	'eat'
jaaxal	'worry (tr)'	jàq	'worry (intr)'
sonal	'tire'	sonn	'be tired'

Figure 252: Wolof verbs with causative -al *and root-final degemination*

However degemination is not a regular consequence of affixing causative *-al*. Diouf (2003) gives 48 *-al* causatives which preserve a root-final geminate.

A related alternation involves pairs of verbs in which the geminated one is intransitive and suffixed with anticausative *-u* or is unsuffixed, and the degeminated one is transitive and has no suffix.

bippu	'jerk out of a hold'	bif ~ bipp	'yank out (tr)'
dallu	'calm down (intr)'	dal	'calm'
feyyu	'demand payment'	fey	'pay'
juddu	'be born'	jur	'bear (child)'
yewwu	'wake up (intr)'	yee	'wake up (tr)'
tëdd	'lie down'	tër	'lay down (tr)'
xàmm	'be lost in thought'	xam	'know'

Figure 253: Wolof verbs with anticausative -u *and root-final gemination*

In both these and the examples in Figure 252 with *-al*, the transitive form is degeminated, and the intransitive form geminated. There are also some examples of denominal verbs which are marked by gemination.

soq	'remove bran'	cox b-	'bran'
tudd	'name' or 'be named'	tur w-	'name'
màgg	'grow up'	mag m-	'adult' (also *mag* 'be old')
toccal	'let cows in field to fertilize'	tos g-	'manure'
ngonnal	'go to the field in afternoon'	ngoon g-	'afternoon'

Figure 254: Wolof denominal verbs with root-final gemination

It is significant that the anticausative suffix *-u* is commonly used to derive verbs from nouns. Some examples:

fulaaru	'wear a scarf'	fulaar b-	'scarf' (borr. Fr.)
gëléemu	'kneel down w/ hands on ground'	gëléem g-	'camel'
mbaru	'surf'	mbar m-	'wave'
mërgalu	'be round'	mërgal w-	'circle'
njëlu	'leave at dawn'	njël g-	'dawn'

Figure 255: Wolof denominal verbs with anticausative -u

A number of other lexically-specific alternations exist between pairs of suffixed and unsuffixed words. In general, the suffixed form is degeminated.

agsi	'arrive (here)'	àgg	'arrive'
cofeel g-	'love'	sopp	'love'
coono	'fatigue'	sonn	'be tired'
dég-dég b-	'news/understanding'	dégg	'hear/understand'
déglu	'listen'	dégg	'hear/understand'
dégtu	'be audible'	dégg	'hear/understand'
dono b-	'heir'	donn	'inherit'
ndono l-	'inheritance'	donn	'inherit'
ndigaale g/l-	'relations/ties between people'	digg	'be between'
noflaay g-	'rest'	noppal	'rest'
ŋayeet	'open wide (ideophone)'	ŋàyy	'open wide'
teraanga	'hospitality'	tedd	'be honorable'
toflante g-	'putting end to end'	topp	'follow'
tofoo m-	'younger sibling'	topp	'follow'
walaat g-	'quart'	wàll w-	'half'
wonaasu	'swallow (food)'	wonn	'swallow'
yonent b-	'messenger/prophet'	yónni	'send someone'
déjj	'sit still (ideophone)'	déj	'sit'
diggoo	'promise' (*dig-u-e*)	dig	'promise'
joqalante	'exchange (gifts)'	jox	'give'
naqadi	'be bad, unpleasant'	neex	'be good/nice'
wicc-wiccal	'rain lightly/sprinkle'	wis	'rain lightly/sprinkle'

Figure 256: Other cases of Wolof root-final gemination alternations

There is no unifying property behind these examples, and the particular suffixes do not in general trigger any change in roots.

4.3 Phonological history of the gemination alternations

For the most part the phonological alternations themselves are straightforward, but a few require some explanation. First, recall that word-final singleton /p, c, k, d/ are not found in Wolof. Final /f, s, Ø, r/ are permitted, generally becoming /pp, cc, kk, dd/ when geminated. In the case of /r~dd/, there was a sound change which regularly lenited post-vocalic *d except before /i/. This is confirmed by borrowings into Sereer, even very early ones in which Wolof *d was borrowed as implosive /ɗ/.

Sereer		Wolof
bakaad	'sin'	bàkkaar < *bàkkaad
foɗax	'be sour'	forax < *fodax
gidim	'thank'	gërëm < *gëdëm
god	'chop'	gor < *god
jaaɗ	'ground squirrel'	jaar < *jaad
muud	'lucky break'	muur < *muud
soxod	'be wicked'	soxor < *soxod
teemeed	'hundred'	téeméer < *téeméed
wid	'look/go/twist around'	wër < *wëd
xod	'betray'	wor < *hod

Figure 257: Wolof post-vocalic *d *borrowed as a stop in Sereer*

In fact, the Saalum dialect of Wolof has [t] for word-final *d (Ndiaye 2013: 28).

Standard	Saalum	
soxor	soxot	'be wicked'
biir	biit	'belly'
jur	jut	'give birth'
kër	kët	'house'

Figure 258: Development of word-final *d *in the Saalum dialect of Wolof*

Ndiaye unfortunately does not report whether this [t] is pronounced [d] before a vowel, which would justify a phonemic /d/ vs. /t/ distinction, with /d/ subject to final devoicing like all other voiced singleton stops. Original Wolof *r remains /r/ in all dialects[127], and does not alternate with /dd/. Compare the following reversive forms:

muri	'uncover'	muur	'cover'
weri	'take down sth. spread out to try'	weer	'spread out to dry'
wori	'celebrate the end of Ramadan'	woor	'fast'
teddi	'take off/depart (vehicle)'	teer	'land (boat, etc.)'
xàddi	'stop waiting'	xaar	'wait'

Figure 259: Reversives of Wolof *r*-final and* *d*-final roots*

In the case of /f~pp/, /s~cc/, and /*h~kk/, there is no evidence from borrowings that these voiceless fricatives were ever stops. It may well be that long ago some or all were stops, but if so they had already spirantized before any Wolof words were borrowed into surrounding languages. Furthermore there is no evidence that uvular /x/ was ever a stop, and so it seems

[127] Ndiaye (2013) assumes the irregular development of /r/ to /t/ in Saalum, based on the assumption that the forms of the standard variety are original. This inconsistency can be cleared up by understanding that final *d becomes /t/ in Saalum, and *r remains /r/.

safest to assume that historically the voiceless geminate alternations were the result of the hardening of fricatives, rather than the lenition of singleton stops.

4.4 Origin of reversive gemination

The most likely explanation for the geminating effect of reversive *-i* is that it once contained a consonant which assimilated to the preceding root-final consonant. The reversive suffix in Proto-BKK is **-ur̥*, which must come from earlier **-ut*. The Wolof reversive suffix has a variant *-ati*. These facts perhaps suggest that the earlier form of the reversive in Wolof was **-Vti*, in which the vowel was generally lost, and the *t assimilated to the root. The variant *-ali* must also be considered, perhaps suggesting /l/ as the assimilating consonant in some cases. It may seem surprising that in a sequence of two consonants, the second would assimilate to the first, as the opposite scenario is expected (e.g. Latin *octō* > Italian *otto* 'eight'). However in the case of consonantal suffixes, preservation of the root consonant is quite common in the region, and in Africa more broadly. The best parallel comes from the Cangin language Noon, in which a number of *ɗ-initial suffixes and one *s-initial suffix assimilate this original consonant to the preceding root-final consonant resulting in a geminate in many cases, and surfacing as /ɗ/ and /y/ only after a vowel. In Pulaar, the initial consonant of noun class suffixes commonly assimilates to the root. In various Western Nilotic languages (see section 1.13 in chapter 1), systems of root-final consonant mutation have arisen which are quite similar to Wolof's root-final mutation system (though much more robust). The ultimate origin of these systems must be the assimilation of various verbal suffixes to the root-final consonant.

It is probably not the case that the suffixes *-ali*, *-ati*, *-arci*, *-arñi*, and *-arbi* all contained an initial consonant at some earlier period. Rather, once the standard reversive suffix *-Ci* gave rise to root-final mutation, this was seized upon as a marker of the reversive, and extended to all reversive verbs.

4.5 Origin of causative degemination and other alternations

While it may at first seem that causative *-al* has the effect of degeminating underlying geminates, examining the broader pattern suggests that in fact the corresponding intransitive forms without *-al* were at one point suffixed with a consonant. For one, degemination is not a general effect of *-al*, but is triggered on only a minority of lexically-specific verbs. Secondly, there are a number of verbs in which the anticausative suffix *-u* triggers gemination (Figure 253), and some in which a denominal verb is marked by gemination (Figure 254), having the same function as *-u*. Perhaps most importantly, *-u* has a regular allomorph *-ku* after a vowel. /k/ is not a hiatus-filler for other vowel-initial suffixes, which use /y/ or /w/ if anything; rather, this /k/ is associated with only the anticausative suffix. Taken together, this suggests that the anticausative suffix was originally **-ku*, and the /k/ assimilated to the root-final consonant of some words forming a geminate, with the /u/ being lost in some words (or perhaps **-k-u* was in fact bimorphemic). Thus, the synchronically unsuffixed verbs in Figure 252 would have been historically suffixed with *-k*, with the causative forms in *-al* preserving the original singleton consonant. This same suffix **-k(u)* might also explain some of the forms in Figure 256. However a number of geminate-final forms cannot be easily attributed to the effect of this suffix. Some seem to be semantically incompatible, e.g. *sopp* 'love (tr)' (cf. *cofeel g-* 'love'), and in one case the alternation is seen on a noun derived from another noun: *walaat g-* 'quart' from *wàll w-* 'half.' That said, the anticausative suffix has a rather broad distribution synchronically, even in verbs where the semantics do not at all follow from its basic anticausative meaning (e.g. *tinu* 'plead to someone (tr)' from *tin* 'give in to someone's pleas (tr)' or *matu* 'be in labor' from *mat* 'be full-grown'). These "expanded" uses of the anticausative/middle suffix are common in Fula-Sereer (**-oox*) and the Cangin languages (**-ox*) as well. It is plausible that almost all cases of root-final gemination can be attributed to the reversive suffix **-Ci* or the anticausative suffix **-k(u)*. However it is not clear why gemination is so regular with the reversive suffix, but only confined to certain lexically-specific verbs with the anticausative suffix. Perhaps here we are truly dealing with two suffixes **-k* and **-u* which only sometimes occurred together (cf. the Bantu causative **-į* and **-ic-į*).

Finally it should be noted that most geminate-final verb roots do not show any alternation, and there is no reason to assume that they ever contained any suffixed consonant. Geminate-final verb roots are reconstructed for Proto-BKK, and thus probably existed in Proto-Wolof-BKK. Furthermore many noun roots are geminate-final, which of course could not be the result of any verbal suffix. However it is conspicuous that among the few widespread Northern Atlantic lexical roots, we find **ɣof* 'head' and **nuf* 'ear,' which in Wolof are *bopp b-* and *nopp b-* (cf. BKK **bu-gof* and **ki-nuf*). Note also *-enn* 'one' and *-eneen* 'other' which seems to be *-enn* plus the plural suffix *-een*. If these forms are indicative of a wider pattern of innovating final geminates in Wolof, it is not clear what would have caused it.

5 Conclusion

Mutation in Wolof arose in much the same way as in other Atlantic languages. Final nasal segments on CVN- noun class prefixes (and the initial nasal in **mV-*) fused with the following root, leading to alternations between prenasalized consonants in certain noun classes, and unmutated consonants in verbs and other noun classes. This nasal mutation pattern was innovated in Wolof, and not inherited from some parent language. There was however a fortis mutation pattern with a rather restricted use (most notably in the diminutive class) affecting only /f, s/, which seems to have been inherited from Proto-Wolof-Bainunk-Kobiana-Kasanga. The voiceless prenasalized consonants were denasalized word-initially sometime in the early 20^{th} century, such that mutation of voiceless consonants came to be marked by only hardening, and not prenasalization. As a consequence, the earlier fortis mutation pattern used in diminutives was reinterpreted as the much more widely-used nasal mutation pattern. There are two major reasons why mutation in Wolof is somewhat less prominent than mutation in other Atlantic languages. First, initial mutation never arose in the verbal system, since Wolof did not employ verbal prefixes. Second, the singular/plural alternations for nouns were almost all leveled. Otherwise, the mutation patterns that naturally arose have remained basically intact, and it is somewhat misleading to say that the role of mutation in Wolof has been reduced over time to a "trace" or "remnant" of its former self. In fact, in the case of diminutive formation mutation has been expanded to environments where it did not originally operate. It is synchronically quite possible to associate particular noun classes with one of two mutation grades, just as in other Atlantic languages. The unrelated pattern of root-final gemination seen in some verbs arose when the initial consonant of a few suffixes (perhaps only reversive **-Ci* and anticausative **-ku*) assimilated to the preceding root-final consonant.

Chapter 5: The Tenda languages

Perhaps the most complex systems of consonant mutation within Atlantic are found in the Tenda languages. The Bassari, Bedik, and Konyagi languages make use of mutation in much the same way as the languages examined in the previous chapters, namely to mark noun class in the nominal system, and various morphological categories in the verbal system. However the systems of alternation themselves are somewhat more pervasive than in other Atlantic languages, in that they involve all of the consonants of each language— only in Bedik do we find any entirely immutable consonants. Furthermore, both Bassari and Konyagi exhibit alternations between nasal stops and nasal continuants seen nowhere else in Atlantic, and all three languages exhibit alternations involving implosive stops. The complexity of these systems is for the most part attributable to a more extensive set of historical sound changes, but is also the result of the analogical extension and rearrangement of the naturally-occurring patterns. This chapter presents a historical account of how these mutation systems arose in the Tenda languages. Section 2 examines the synchronic mutation systems and basic phonology of each Tenda language. Section 3 establishes the regular sound changes that took place in each language, along with a reconstruction of the Proto-Tenda sound system. Section 4 addresses the status of mutation in Proto-Tenda, arguing that an incipient mutation system did exist at this stage, but that mutation (caused by the assimilation of consonants across certain morpheme boundaries) was not yet obligatory in at least some contexts. Section 5 reconstructs the noun class system of Proto-Tenda, with special attention to the final segments of each class prefix which conditioned mutation in the nominal system. Section 6 discusses the origin of mutation in the verbal system. Finally, section 7 contains a few remarks on the synchronic analysis of the modern mutations systems.

1 Sources

All of the Tenda languages are unfortunately rather understudied. However, we are very lucky to have two extensive sources which together provide a great deal of lexical and (in the case of Konyagi) grammatical data on this language family. The first is Ferry's (1991) three volume *Thesaurus Tenda* which is principally a lexicon of Bassari and Bedik based on her own fieldwork (~4000 entries for each), along with a short grammatical description of each language. Some much more basic information stemming from this fieldwork is found in Ferry (1968a) and (1968b). Without Ferry's contributions, we would have very little information at all on Bassari and Bedik. There are however some peculiarities in the data as presented in Ferry (1991) which must be noted. The first two of the three volumes organizes the lexical entries by semantic field, and provides explanatory lexical and cultural notes where relevant. The final volume is a set of indices, one sorted by the French gloss, and one for each Tenda language organized by headword. There are frequent discrepancies between the forms given in the main text and the indices, often involving tone, tense/lax values of vowels, the form of the prefix, or the plural class of nouns. I have always taken the forms from the main text, but even here there are sometimes discrepancies when the same word is cited in multiple places. Furthermore Ferry's treatment of Bassari and Bedik's rather complicated vowel system is not entirely satisfying, as her description of the systems in the grammatical overview is often contradicted by the data cited throughout the main text. Luckily, there are no such discrepancies involving consonants, and while Ferry's brief analysis of mutation is I believe flawed in some ways, the data presented are sufficient to come to a rather complete understanding of the consonant mutation systems of each language. Further information on

Bassari can be found in a recent sketch grammar by Winters and Winters (2004), an overview of the class system by Perrin (2015), and a very short (and seemingly quite preliminary) overview of the Kakani dialect of Guinea by Wilson (2007).

In the case of Konyagi, we are seemingly on much better ground due to the excellent and extensive grammar by Santos (1996). In my estimation this is one of if not the best available grammar of any Northern Atlantic language. There are close to no discrepancies of the type found in Ferry (1991), grammatical phenomena are clearly and satisfyingly explained, and the grammar is accompanied by a ~4000 entry lexicon. The treatment of mutation specifically (which in Konyagi is rather complicated, in both the nominal and verbal systems) is more extensive than any other account I have encountered for an Atlantic language. Thus, while it is unfortunate that we must rely on the work of a single author, we are in fact much better off in the case of Konyagi than for a number of other more well-known languages.

2 Synchronic background

The Tenda languages are all spoken in a relatively compact area near the southeastern border of Senegal and into Guinea (see the map in Figure 2 in the introduction). Bassari (Oniyan) is spoken by at most 30,000 people (Winters and Winters 2004: 3), roughly equally divided between Senegal and Guinea. The language's endonym is *o-níyə̣̀n*, due to the laterite soil (*e-ɗíyə̣̀n*) on which the Bassaris' homes are built. The term *Bassari* apparently derives from Fula *mbasaari* 'lizard.' A (perhaps apocryphal) story relates that when the Malinke arrived in the region, they asked the Fula who it was that they saw climbing in the hills, to which the Fula replied "a lizard" (Ferry 1991: 4). The Fula term for Bassari, *Tanda*— also sometimes applied to other Tenda groups— may be the origin of the term Tenda[128]. Winters and Winters identify three major dialect groups: Ane, spoken in southern Senegal, Këɗ spoken in Guinea (including the Kakani dialect), and Oxalac spoken to the west of Ane. Both Ferry (1991) and Winters and Winters (2004) contain data principally from an Ane dialect, while Wilson's (2007) data come from the Kakani dialect. A group of Muslim Bassaris known as the Boïn apparently spoke a somewhat different variety of the language, spoken by only 100 people at most in 1988 (Jenkins and Amdahl 2007: 4).

Bedik (Manik or Nik) is closely related to Bassari, and spoken just to the east exclusively in Senegal by around 1,500 people (Jenkins and Amdahl 2007: 4). The language's endonym *mɯ-ník* refers to the dolerite (*i-ɗík*) soil on which they build their houses. The term Bedik comes from this noun in the personal plural class, *ɓə-ɗík*. Ferry (1991: 4) identifies two major dialects, Banapas and Biwol, and Jenkins and Amdahl (2007) list a third group, the Nyolo. Biwol is the largest dialect, and is more similar to Bassari than Banapas is. Ferry's data comes principally from the Banapas dialect, though many Biwol forms are also cited.

A third language Bapeŋ (endonym *mo-pén*, cf. Bassari *ɓa-péŋ* 'palm trees') was until recently spoken in Guinea, and was similar to the Guinean dialects of Bassari. Ferry (1991: 5) situates it between Bassari and Bedik linguistically.

Konyagi (Wamey, Mey) is much more distantly related to the other Tenda languages. It is spoken just to the west of the Bassari area by ~18,000 people. Until recently most lived in Guinea, but as of Jenkins and Amdahl's report (written in 1994) only 4,000 remained, with the rest having relocated to Senegal. The language's endonym is *wæ-mèỹ*, with the exonym taken

[128] Note also Malinke *tenda* 'town/urban area' which may be the ultimate source of the term.

from Pajade *ko-ñaji* ‘Konyagi land[129].’ There is little dialectal variation (Santos 1996: 12), though there are some mainly phonetic differences which separate the northern *wə-xàỹɔ́* and southern *wæ-gə̀ɗ* dialects from the prestige central *fæ̀gæ̀ntɔ́* dialect.

The Pajade (Jaad, Badiaranké, etc.) language spoken just to the north of the original Konyagi-speaking area is sometimes grouped in with the Tenda languages in linguistic overviews of the region. Genetically, its closest relative is Biafada spoken far to the west in Guinea Bissau, and while this subgroup may be Tenda’s closest relative, the relation would be quite distant. For our purposes (and in line with the most common usage of the term), Tenda will refer only to the languages mentioned above, excluding both Pajade and Biafada.

2.1 Phoneme inventories and basic phonology

2.1.1 Bassari

The consonant phoneme inventory of Bassari is as follows:

	labial	coronal	palatal	velar	labiovel.
vl. stop	p	t	c	k	kw
vl. cont.	f	s	ʃ	x	xw
vd. stop	b	d	j	g	gw
vd. cont.	w	r	y	ɣ	
implosive	ɓ	ɗ	ƴ		
nasal	m	n	ñ	ŋ	ŋw
nas. cont.	w̃		ỹ	ɣ̃	
prenas. stop	mb	nd	nj	ng	ngw
lateral		l			

Figure 260: Consonant inventory of Bassari

Note the following deviations from the IPA: <j> = [ɟ], <ñ> = [ɲ], <y> = [j], <ƴ> = [ʄ], <ỹ> = [j̃], and all prenasalized stops are homorganic (these conventions also hold for Bedik and Konyagi). Ferry notes that /ʃ/ can be pronounced as [ʒ] between certain vowels. The nasalized continuants /w̃, ỹ, ɣ̃/ induce phonetic nasalization of immediately adjacent vowels, both preceding and following. The labiovelars are single segments, and no possibility of contrast exists with a velar + /w/. There are no restrictions on where segments can appear within a word, though clusters are only possible across morpheme boundaries, and never word-initially or -finally. Wilson’s description of the Kakani dialect (2007: 123) has a number of differences in the consonant inventory (for example all of the voiceless fricatives are voiced), but is clearly incomplete, and thus will not be discussed here.

The vowel inventory of Bassari is rather complicated, and there are a number of peculiarities in Ferry’s transcription of vowels. She gives two symmetrical sets of 6 vowels, one +ATR and one -ATR (“advanced tongue root”). These are given below in her transcription, along with the symbols that I will use in this chapter. The terms “tense” and “lax” are used instead of “+ATR” and “-ATR” for reasons that will be made clear below. There is no vowel length distinction in the language.

[129] There exists a folk etymology which derives the name from Fula *ñaaki* ‘bees’ due to their use of bees to chase the French from Guinea (Jenkins and Amdahl 2007: 4). This explanation seems unlikely, as the Pajade term would no doubt predate any French presence in the area.

		Ferry's transcription			Adapted transcription		
high	tense	i		u	i		u
	(lax)	ɩ		ʊ	—		—
mid	tense	e	ɤ	o	e̟	ə̟	o̟
	lax	ɛ	ʌ	ɔ	e	ə	o
low	tense		a			a̟	
	lax		ɑ			a	

Figure 261: Vowel inventory of Bassari

The main reason for adopting a different transcription system is to clarify the status of the central vowels, as in Ferry's system it can be difficult to remember which are tense and which are lax. Furthermore, these vowels are described as phonetically central and not back, so Ferry's symbols are not entirely appropriate in that regard. It is not clear what exactly the phonetic distinction between the two low vowels is. For the mid central vowels the distinction is probably tense [ɘ] vs. lax [ə] or [ɐ]— a distinction found in a number of languages spoken to the west (Manjak, Biafada, Wolof). The status of the high vowels is particularly unclear. First, while Ferry lists a vowel <ɩ>, this is never employed anywhere outside of the chart in which it is presented. The back vowel pair <u> and <ʊ> is distinguished in the index, but not the main text, and there is reason to be suspicious of this contrast as well. Ferry (1991: 10) writes:

> "Le premier système est difficile à entendre pour les voyelles d'aperture minimale: ɩ, ʊ. Elles ont souvent été repérées par des effects de labio-vélarisation qu'elles provoquent sur les consonnes vélaires qui les précedent. [...] Je n'ai pas pu trouver de paires phonologiques pour ɩ/i ni u/ʊ mais leur réalization est encore nette et le conditionnement des consonnes qui précèdent ces voyelles lâches est bien marqué."[130]

This claim regarding the labiovelar consonants is extremely dubious. It is true that for the most part, Ferry transcribes a lax vowel after labiovelars, though they are often found word-finally after <u>, and there are some tokens before <a> (=/a̟/). However it is far from true that velars are generally labialized before lax vowels. The labiovelars arose historically from adjacent round vowels, which sometimes lost their rounding, as can be seen through comparison with Bedik and Konyagi (see section 3.1.2.7), and had no relation at all to the tense/lax status of the vowel. I suspect that Ferry was misled into drawing an association between lax vowels and labiovelars, which then led her to propose a split in the high vowels which may not truly exist. It is in fact necessary to reconstruct tense/lax pairs of high vowels for Proto-Tenda (see section 3.1.1), but there is no consistency at all between Proto-Tenda *u and *u̟ and Ferry's <ʊ> and <u>. Since the forms from the main text of Ferry (1991) do not contain <ʊ>, this vowel will not be seen in the Bassari forms in this chapter[131].

While Ferry describes the distinction between the two sets of vowels as one of ATR, a tense/lax distinction is probably more appropriate. First, there is no system of ATR harmony in

[130] "The [ATR] system [of Bassari] is difficult to hear for the vowels of minimal aperture: ɩ, ʊ. They have often been identified by the effects of labio-velarization that they induce on preceding velar consonants. [...] I have not been able to find minimal pairs for ɩ/i or u/ʊ, but their realization is still clear, and the conditioning of the consonants that precede these lax vowels is well marked."

[131] The words cited in this chapter that Ferry gives with <ʊ> in the index are: *a̟-ɓûʃ* 'suck,' *e-ngʊ̀r* 'cricket,' *a̟-ɣʊ̀r* 'fire pottery,' *a̟-yʊ̆kw* 'pound to remove bran,' *màlʊ́* 'rice,' and *xòdʊ́x* 'fire.'

the language. Any two vowels can co-occur in a word or even a root, in any order. Ferry mentions the following vowel alternations: the pronouns *me* and *ko* become *me̟* and *ko̟* after a tense vowel, the imperative suffix *-əl* becomes *-il* after a tense vowel, and noun class prefixes containing /e/ and /o/ have /e̟/ and /o̟/ before a tense vowel. These first alternations may well exist, but can be considered specific to these three morphemes— there are many other suffixes with lax vowels, and they never show an alternation. It should be noted that Winters and Winters (2004: 50) give the imperative suffix as *-əl*, with no alternation mentioned, and in fact in all of her examples, Ferry writes *-əl*, even after a tense vowel. For the noun class prefixes, the alternations which Ferry describes are not at all consistent with her transcriptions. /e, o/ are found overwhelmingly in prefixes, regardless of the following vowel. The cases of /e̟, o̟/ do usually precede a tense mid vowel, but a number of them precede a lax vowel. Thus it seems there is no generally-applicable system of harmony in Bassari, though perhaps the three individual morphemes mentioned above do exhibit some form of alternation. Nonetheless, the phonemic tense/lax distinction for the non-high vowels is very much real, and can be confirmed by the fact that they have different regular correspondences to vowels in Bedik and Konyagi. Historically, full sets of 6 tense and 6 lax vowels must be reconstructed for Proto-Tenda. This distinction comes (for the most part) from an earlier length contrast, with the long vowels being tense, and the short vowels being lax. It is not clear exactly how accurate Ferry's identification of the tense vs. lax vowels is in individual words, but there are a number of instances where the same word is listed in different places with a vowel having different tense/lax values. Furthermore, in comparing with Bedik (for which Ferry is much more consistent) and Konyagi (for which Santos has few if any inconsistencies), we can identify regular outcomes for each of the 12 proto-vowels, and in some words the vowel transcribed for Bassari has the opposite tense/lax value from that which is expected (discrepancies with /a/ vs. /a̟/ are by far the most common). Wilson (2007: 123) gives an 8-vowel inventory for the Kakani dialect (/i, e, ɛ, a, ɔ, o, u, ə/), and Winters and Winters (2004) and Perrin (2015) give a 6-vowel system (with no underlying tense/lax distinction). These accounts probably underreport the existing contrasts, though there is no way to be sure that mergers did not occur in these varieties.

Bassari is a tonal language, contrasting high, low, rising, and falling tones. Ferry unfortunately gives no further information on the tonal system, but notably does not mark a tonal contrast on class prefixes (as opposed to Bedik). The tone marking is occasionally inconsistent, but generally lines up rather neatly with Konyagi and Bedik.

2.1.2 Bedik

The consonant phoneme inventory of Bedik is as follows:

	labial	coronal	palatal	velar	labiovel.
vl. stop	p	t	c	k	kw
vl. cont.	f	s	ʃ	h	(hw)
vd. stop	b	d	j	g	gw
vd. cont.	w	r	y	ɣ	
implosive	ɓ	ɗ	ʄ		
nasal	m	n	ñ	ŋ	ŋw
prenas.	mb	nd	nj	ng	ngw
lateral		l			

Figure 262: Consonant inventory of Bedik

This inventory differs from Bassari only in the lack of the nasalized continuants, and in having /h/ in place of /x/. Ferry describes Bedik /h/ as “simple aspiration” as opposed to Bassari’s velar fricative, also noting that the Bedik sound is closest to [ħ], which is presumably meant to represent a pharyngeal fricative. Ferry does not list /hw/ as a phoneme, but it is found in a number of words. The labiovelars as a whole are rather rare, especially when compared to Bassari and Konyagi. As in Bassari, clusters only exist across morpheme boundaries, and /ʃ/ can be pronounced as [ʒ].

The vowel inventory of Bedik is as follows:

high	i	ɯ	u
upper mid	e̩	ə̩	o̩
lower mid	e	ə	o
low		a	

Figure 263: Vowel inventory of Bedik

There is no length distinction. This inventory differs from Bassari in having the high central vowel /ɯ/, and lacking a distinction in the low vowels. Ferry uses the same symbols for the mid vowels as in Bassari, which I have adapted in the same way as for Bassari above. For Bedik, Ferry has fewer vowel inconsistencies of the sort found in the Bassari data, though they do exist. A common issue is that a tense/+ATR vowel is given in the root, when the prefix has the form conditioned by a lax/-ATR vowel. Usually these correspond to a lax vowel in Bassari (e.g. Bedik *ga-kò̩ɗ* = Bassari *a-ngóɗ-ɣóɗ* ‘shadow’), and thus are probably mistranscribed for Bedik.

Bedik has developed a somewhat complicated system of vowel harmony, most of which must be gleaned from the lexical data, as Ferry does not explain it in full. This system could be analyzed as either an ATR harmony system or a height harmony system— Ferry terms it ATR, and I will use this terminology as well. The vowels /i, u, e̩, o̩, ə̩/ are always +ATR, and the others are -ATR. Ferry reports that speakers are aware of the distinction between these sets of vowels, and term the -ATR ones “heavy.” A +ATR vowel will spread this feature leftward throughout the entire word. The basic alternations are as follows:

a → ə̩	-láŋ → -lə̩́ŋə̩́n	-hàl → -hə̩̀lə̩̀n	
ə → ə̩	-mə́c → mə̩́cé̩n	-fə́cà → -fə̩́cè̩gú	
o → o̩ / u	-mòm → mùmə̩́n	-fòn → -fò̩nú	-fòŋ → -fùŋú
e → e̩	-fèʃ → fè̩ʃə̩́n	-hèɓ → -hè̩ɓú	

/ɯ/ never changes in height, and could be said to be transparent to the harmony process. Whether /o/ becomes /o̩/ or /u/ is entirely unpredictable, with the outcome being lexically-specific, and each being roughly equally common. The suffixes with a +ATR vowel are *-ə̩́n* ‘causative’ (though this is often *-ə́n*), *-ə̩̀ɗ* ‘associative,’ *-e̩* ‘distanciative,’ and *-(g)ú* ‘to go V.’ These are all derivational verbal suffixes. There is furthermore a rounding alternation triggered by /u/ onto a preceding mid vowel.

a → o̩	-ɗāk → -ɗō̩kú	-fárát → -fó̩ró̩tú	
ə → u	-ɗə́ʃ → -ɗúʃú	-hálə̀t → -hó̩lùtú	-sə̩̀ɓə̀r → -sə̩̀ɓùrú
ə̩ → o̩	-ɗə̩̄n → -ɗō̩nú	-ŋə̩̄ɗə̀t → -ŋō̩ɗùtú	
ɯ → u	-ɗɯ́ɓ → ɗúɓú	-ʃɯ́tòf → -ʃútò̩fú	

There are some very rare instances of a front vowel being affected as well. This rounding umlaut sometimes affects only the immediately preceding vowel, and sometimes spreads to multiple vowels. Exceptionally, the anticausative/reflexive suffix *-à* always becomes *-ḛ̀* before an ATR trigger, including /u/, and this /ḛ/ usually (but not always) blocks the spread of rounding to vowels to the left. Furthermore this suffix *-à* becomes *-ḛ̀* after any +ATR vowel, which is the only example of rightward-spreading harmony. Finally, the vowels /i/ and /ḛ/ trigger fronting of a preceding -ATR central vowel (though no relevant forms are given for /ɯ/).

a → ḛ	-ɓànáyà → ɓḛ̀nḛ́yḛ̀gú
ə → i	-ʃə̀nà → -ʃìnḛ̀gú

There are a few exceptions to all of these patterns, usually involving a vowel becoming something unexpected. In general, the regular patterns hold within roots, in that /e, o, ə/ cannot appear before a +ATR vowel, with only a few exceptions. /a/ does appear somewhat commonly before a +ATR vowel, though many of these words are borrowings. Noun class prefixes are subject to their own set of vowel alternations, which will be described in section 2.3.1.

Ferry identifies three level tones for Bedik, and no contour tones. The tones of Bedik are generally flipped from those of Bassari and Konyagi, so that where the other languages have a high tone, Bedik has a low tone, and vice versa. Ferry identifies each class prefix with a particular tone, however it should be noted that the tone given for each prefix is entirely different in Ferry (1968b) and (1991). In this latter work, the tones given on the prefixes in the Bedik data are not consistent with those laid out in the table in the introduction, where certain prefixes are listed with no tone, others with a mid tone, and other with a high tone.

2.1.3 Konyagi

The consonant phoneme inventory of Konyagi is as follows:

	labial	coronal	palatal	velar	labiovel.
vl. stop	p	t	c	k	kw
(vl.) cont.	f	r	s	x	xw
vd. stop	b	d	j	g	gw
vd. cont.	w	l	y		
	v	ry			
implosive	ɓ	ɗ	ƴ		
nasal	m	n	ñ	ŋ	ŋw
nas. cont.	w̃	l̰	ỹ		
vl. prenas.	mp	nt	nc	nk	nkw
vd. prenas.	mb	nd	nj		

Figure 264: Consonant inventory of Konyagi

As in Bassari, the nasalized continuants cause the phonetic nasalization of adjacent vowels. /r/ is a voiced trill, but patterns with the voiceless continuants phonologically. /s/ is phonetically [s] but patterns as palatal. /ry/ is a single segment, and there is no possibility of contrast with an /r/ + /y/ sequence. The labiovelars can occur in any environment, but they are overwhelmingly adjacent to /ə/, and in some cases there is free variation between a sequence of a velar and /o/ or /u/ and a labiovelar and /ə/ (e.g. *ì-kòl ~ ì-kwəl* 'to know,' *ì-ɓònkə́ ~ ì-ɓə́nkw* 'ball up,' and *ì-kùyə́t ~ ì-kwə̀yə́t* 'put under'). As in Bassari and Bedik, consonant clusters are only possible across morpheme boundaries.

The vowel inventory of Konyagi is as follows:

high	i			u
mid	e		ə	o
low		æ	a	

Figure 265: Vowel inventory of Konyagi

There is no length distinction, though sequences of identical vowels can occur across morpheme boundaries. Santos does not make any specific comment on the phonetic realization of these vowels, other than to say that /æ/ is "anterior" and /ə/ "central." Presumably they all have their IPA value, though it would not be surprising if /e/ and /o/ were closer to [ɛ] and [ɔ]. The vowels /æ/ and /ə/ are identified as "weak" and the others as "strong," based on a number of distinctions, most notably that /æ, ə/ cannot receive the word-level accent (which is always root-initial, and realized as a louder and longer vowel). However all seven vowels can appear in roots, monosyllabic or otherwise. /ə/ is deleted word-finally if it has the same tone as the preceding vowel, and /æ/ cannot appear word-finally, with very few exceptions. /æ/ always becomes /ə/ before /a/, except word-initially, as /ə/ cannot appear in this position (Santos 1996: 62).

-ŋæ̀yʕ + -ál	= -ŋə̀yʕál 'investigate'
-ræ̀xæ̀l̰ + -á	= -tæ̀xə̀l̰á 'be at the left'
væ-III + -bàw	= və-mpàw 'vast spaces'
	BUT
æ-III + -bàw	= æ-mpàw 'vast space'

This is the only vowel alternation in the language, other than the free variation involving round vowels mentioned above. This /æ/ → /ə/ process is found only in the central dialect.

Konyagi has high, low, falling, and rising tones. Noun class prefixes are unspecified for tone, being low when the noun is spoken in isolation.

2.2 Bassari mutation

Bassari makes use of a three grade mutation system in the nominal domain, affecting root-initial consonants. The verbal system uses only grades I and II. Grade I contains mainly continuants (including nasal continuants), grade II stops (including nasal stops), and grade III nasals, prenasalized stops, and voiceless stops.

Grade I	f	s	ʃ	x	xw	w	r	y	ɣ	ɣ	w̃	n	ỹ	ɣ̃	ɣ̃	ɓ	l	yʕ
Grade II	p	t	c	k	kw	b	d	j	g	gw	m	n	ñ	ŋ	ŋw	ɓ	ɗ	yʕ
Grade III	p	t	c	ng/k	ngw/kw	mb	nd	nj	ng	ngw	m	n	ñ	ŋ	ŋw	m	n	ñ

Figure 266: Mutation system of Bassari

Note that every consonant of the language is involved in a mutation alternation. The use of /ng(w)/ vs. /k(w)/ in grade III of the voiceless (labio)velar series is unpredictable. The prenasalized stops are more common, but sometimes the same root will use a different grade III consonant in different forms, or even show free variation in the same word (e.g. *a-ngòp ~ a-kòp* 'bark' in the *a-III* class). All current literature on Bassari presents a rather different schema for the series involving implosives and non-velar nasals. Instead of the 6 separate series given in Figure 266 (with /w̃, n, ỹ, ɓ, l, ƴ/ in grade I), the traditional account gives only 3: w̃~ɓ~m, l~ɗ~n, and ỹ~ƴ-ñ. Other than the coronal series, which does exist, these conflate two series into one in a way that is not supported by the attested alternations. This account fails to capture the fact that /ɓ, n, ƴ/ regularly appear in grade I, and /m, n, ñ/ in grade II. There is perhaps one exceptional example of a w̃~ɓ~m alternation, but otherwise the nasalized continuants and implosives have no relation to each other. Further discussion of these nasal and implosive series can be found in section 5.8.

2.2.1 Nominal mutation

Mutation in the nominal system is triggered by noun class. Noun class is marked by prefixes on the noun and agreeing adjectives, as well as by post-nominal determiners and relative/genitive markers. Each nominal prefix requires a particular mutation grade on the root, and in the one unprefixed class, either grade I or II consonants can appear (prenasalized stops are extremely rare). The class system of Bassari is given in Figure 267.

prefix	grade	det.	rel./gen.	pl.	%freq.	note
a̟-	I	a̟n	a̟r	ɓə-I	2.8	personal class
e-	II	el	ed	o-I = oŋ/o-I = ol	19.6	
a-	III	aŋ	and	ɓa-III	32.9	many plants, augmentative
e-	III	eŋ	end	ɓe-III/o-II/o-I = ol	8.0	
Ø (i-)	I/II	in	ir	o-II, etc.	12.3	i- on only a few nouns
a̟-	I	in	ir	(ɓo-I)	0.8	some family relations, plants
i-	III	iŋ	ind	ɓə̟-III	4.3	diminutive
e-	I	eŋ	er		0.4	mainly thick liquids
o-	III	oŋ	ond	(ɓo-III)	2.0	liq., languages, pejor., rare pl.
						pl. of
o-	I	oŋ	or		1.6	*e-II*, also a sg. class w/ no pl.
o-	I	ol	or			some *e-II* and some *e-III*
o-	II	ok	od			Ø, some *e-III*
ɓə-	I	ɓən	ɓər		0.9	*a̟-I*, rare sg./coll. class
ɓo-[132]	I	ɓən	ɓər			*a̟-I = in* family relations
ɓa-	III	ɓaŋ	ɓand			*a-III*
ɓe-	III	ɓeŋ	ɓend			*e-III*
(ɓ)o-	III	ɓoŋ	ɓond			a few misc. nouns, most w/o sg.
ɓə̟-	III	ɓə̟ŋ	ɓə̟nd		0.7	*i-III*, some coll. with no sg.

Figure 267: Noun class system of Bassari

[132] Ferry does not mention this class, as she gives no plurals for the *a̟-I-in* nouns. Winters and Winters (2004) identify this *ɓo-* class as the plural of these nouns. Ferry presents an alternate form *ɓu-* of the personal plural prefix *ɓə-*, but gives no examples of it. This may be the same prefix that Winters and Winters give as *ɓo-*.

Unprefixed nouns can begin with either a grade I or II consonant, but agreement is always with *i-I.* Ferry writes that /e/ and /o/ in prefixes become tense /e̟/ and /o̟/ before a tense vowel, and Wilson (2007: 123) comments that there is a "tendency" for this change to occur. However in practice Ferry is very inconsistent in writing /e, o/ vs. /e̟, o̟/, with the lax vowels often appearing before a tense vowel in the root and vice versa (in fact /e̟, o̟/ is almost never written before the tense vowels /a̟, i, u/). I will always write /e, o/ in prefixes, with the understanding that they may be phonetically tense or lax depending on the following vowel.

The nominal prefix appears on nouns and agreeing adjectives.

(71) e-cò̟ɗ e-dúndú
NC-bean NC-late
'a late bean'

(72) o-ʃò̟ɗ o-rúndú
NC.pl-bean NC-late
'late beans'

The determiner is enclitic on the noun phrase, as is the relative/genitive marker (Ferry writes them as suffixes, as do Winters and Winters for the vowel-initial ones).

(73) a̟-sóʃà̟n =a̟n
NC-man =the
'the man'

(74) ɓə-sóʃà̟n =ɓən
NC.pl-man =the
'the men'

(75) a̟-sóʃà̟n a̟-rám =a̟n
NC-man NC-my =the
'my husband'

(76) e-mě̟cí =end a̟-sóxá̟r =eŋ
NC-goat =GEN NC-woman =the
'the goat of (the) woman'

(77) a̟-sóʃà̟n =a̟r fê̟l-bǎ̟-me̟ =a̟n
NC-man =REL say-PST-1s =the
'the man that I talked about'

There is also a post-nominal demonstrative that takes the place of the determiner, which is formally identical to the determiner followed by *-ô*, except that /n/ is replaced with /j/ (e.g. *a̟jô* for the personal singular). Finally there is a particle *-ɓ* 'from (origin)' which inflects like any adjective for the class of the preceding noun, showing the appropriate mutation to /m/ with a grade III class (for the *ɓə-I* personal plural class, the form is exceptionally *ɓə*, elided to *ɓ* before a vowel)[133].

(78) a̟-sóʃà̟n   a̟-ɓ   e-cóló   =a̟n
NC-man   from   NC-Tiolo   =the
'the man from Etiolo'

(79) ɓə-sóʃà̟n   ɓ   a-ngò̟l   =ɓən
NC.pl-man   from   NC-village   =the
'the men from the village'

(80) ɓe-mákà   ɓe-m   e-dẽ̟n
NC.pl-corn   from   NC-paddy
'ears of corn from the rice paddy'

There are some conspicuous correlations between the mutation grade triggered by the nominal prefix and the final consonant of the determiner, as noted by both Ferry and Winters and Winters. In general, for determiners which end in /ŋ/, the class prefix triggers grade III (with two exceptions). An even clearer connection can be seen between the nominal prefix and the relative/genitive marker. The relative/genitive marker is simply the single consonant /r~d~nd/, prefixed with the same nominal prefix found on nouns and adjectives, and showing the appropriate mutation grade for each class. The only exceptions are for *a̟-I=in* and *ɓo-I=ɓən*, which can be considered subclasses of Ø and *ɓə-I* respectively, differing only in the nominal prefix.

Mutation in the nominal system is manifested in two ways. First, each class requires its members to begin with a consonant in the specified grade. This phenomenon can be seen in Figure 268 for nouns in the *a̟-I* personal class, *e-II* class, and *a-III* class. Ferry gives no *a̟-I* nouns beginning with /xw, w̃, ɣ̃/, so examples are given from the *o-I=oŋ* plural class.

[133] This particle is identified as a "preposition of origin" by Winters and Winters (2004: 40-41). Ferry (1991: 17) misidentifies it as a locative infix between the class marker and the noun, e.g. for (*a-tə̆x*) *am làr* 'the tree by the river' she segments *a-mə-làr*. The schwa is either epenthetic, or else this particle is more accurately *-ɓə*, with elision of the vowel before another vowel.

a̟-I noun		*e-II* noun		*a-III* noun	
a̟-fə́llà̟	‘Fula person’	e-pà̟ỹìbò	‘gecko’	a-pə̀n	‘mushroom’
a̟-sàp	‘smith’	e-tá̟pó̟n	‘frog’	a-tômbò	‘calf (cow)’
a̟-ʃà̟n	‘man’	e-cêɗ	‘cushion’	a-cə̟́l	‘bird’
a̟-xò̟rá̟	‘healer’	e-kà̟ỹ	‘stone’	a-kè̟y	‘day’
(o-xwə̀lér)	‘rare spices’	e-kwòn	‘amulet’	a-kwə̀nd	‘shelter of leaves’
a̟-wólóf	‘Wolof person’	e-bǎr	‘earth/land’	a-mbàf	‘wing’
a̟-rék	‘thief’	e-dèw̃	‘beard/chin’	a-ndú	‘well’
a̟-yíl	‘genie/spirit’	e-jòkwòn	‘hare’	a-njə̟̌m	‘cloth’
a̟-ɣólá	‘Mande person’	e-gə̟̀ɗícá	‘throat’	a-ngò̟l	‘village’
(no ˣɣw in Bassari)		e-gwə̀rə́ɓ	‘wild fonio’	a-ngwàk	‘shield’
(o-w̃ə̟̀l)	‘handfuls’	e-mêr	‘war’	a-màk	‘baobab’
a̟-nə́xá	‘hunter’	e-nə̀p	‘calabash’	a-nè̟w̃	‘spleen’
a̟-ỹân	‘farmer’	e-ñèŋèn	‘egg’	a-ñéròw̃	‘serval’
(o-ɣ̃ùt)	‘eye sockets’	e-ŋátà	‘end’	a-ŋəʏ̟́án	‘*Ficus lecardii*’
(no ˣɣ̃w in Bassari)		e-ŋwə̀l	‘leap’	a-ŋwólír	‘*Andira inermis*’
a̟-ɓàn	‘weaver’	e-ɓǎ̟sá	‘finger’		
a̟-líyà̟n	‘Bassari person’	e-ɗə̟̌ɓ	‘burden’		
a̟-ʏè̟n	‘associate’	e-ʏ́íy	‘forehead’		

Figure 268: Three Bassari noun classes enforcing different mutation grades

Secondly, mutation alternations occur when a stem can be placed in multiple classes which require different mutation grades. This occurs most commonly with singular/plural pairs. The following regular sg./pl. pairs involve a change in mutation grade:

sg. class	pl. class
Ø-(I)	o-II
e-II	o-I (either *o-I = oŋ* or *o-I = ol*)
e-III	o-I = ol
e-III	o-II

Some other uncommon pairs exist for a small number of nouns, but the vast majority of number-based mutation alternations involve one of these four pairs (*e-III / o-II* is not very common).

Ø sg. noun	*o-II* pl.	
fǎ̟càw̃ (in)	o-pǎ̟càw̃ (ok)	‘moon’
sótó (in)	o-tótó (ok)	‘striped mongoose’
ʃá̟w̃âr (in)	o-cá̟w̃âr (ok)	‘monitor lizard’
xá̟ɗə̟̀p (in)	o-ká̟ɗə̟̀p (ok)	‘slave’
rûwìs (in)	o-dûwìs (ok)	‘paternal line’
yìrəxə̀ní (in)	o-jìrəxə̀ní (ok)	‘hyena’
nə̀ng (in)	o-nə̀ng (ok)	‘maternal line’
ỹà̟ngóló (in)	o-ñà̟ngóló (ok)	‘galago’
ɓàʃə́t (in)	o-ɓàʃə́t (ok)	‘shoulder’
lə̟̄kə̄tór (in)	o-ɗə̟̄kə̄tór (ok)	‘doctor’
làr (in)	o-ɗàr (ok)	‘river’

e-II sg. noun	*o-I* pl.	
e-pòr-fòr (el)	o-fòr-fòr (oŋ)	‘nape’
e-tə̂ỹ (el)	o-sə̂ỹ (oŋ)	‘mouth’
e-cəlìs (el)	o-ʃəlìs (oŋ)	‘squash’
e-kə̀rəʃ (el)	o-xə̀rəʃ (oŋ)	‘ravine’
e-kwə̀r (el)	o-xwə̀r (oŋ)	‘track/footprint’
e-bàw̃ (el)	o-wàw̃ (oŋ)	‘corner/place’
e-dèw̃ (el)	o-rèw̃ (oŋ)	‘beard/chin’
e-jè̟l (el)	o-yè̟l (ol)	‘livestock’
e-gòr (el)	o-ɣòr (oŋ)	‘skull’
e-gwàƴ (el)	o-ɣwàƴ (oŋ)	‘mud’
e-mòkw (el)	o-w̃òkw (oŋ)	‘chest’
e-nò (el)	o-nò (oŋ)	‘hive’
e-ñèn (el)	o-ỹèn (oŋ)	‘coal/ember’
e-ŋà (el)	o-ɣ̃à (oŋ)	‘swarm’
e-ŋwòlìr (el)	o-ɣ̃wòlìr (ol)	‘snail’
e-ɓə̀r (el)	o-ɓə̀r (oŋ)	‘breast’
e-ɗə̟̀kə́nà (el)	o-lə̟̀kə́nà (oŋ)	‘knee’
e-ƴín (el)	o-ƴín (oŋ)	‘white quartz’

e-III sg. noun	*o-I* pl.	
e-pə̀l (eŋ)	o-fə̂l (ol)	‘louse’
e-tàmbə̀r-lûŋ (eŋ)	o-sàmbə̀r-lûŋ (ol)	‘bumblebee’
e-cà̟w̃ (eŋ)	o-sà̟w̃ (ol)	‘panther’
e-kàrángá (eŋ)	o-xàrángá (ol)	‘pubic louse’
e-mbár (eŋ)	o-wár (ol)	‘kob antelope’
e-ndáng (eŋ)	o-ráng (oŋ)	‘buffalo’
e-njé̟lá̟kàk (eŋ)	o-yé̟lá̟kàk (ol)	‘large termite sp.’
e-ngé̟lá̟ (eŋ)	o-ɣé̟lá̟ (ol)	‘hippopotamus’
e-ngwól (eŋ)	o-ɣwól (ol)	‘bedbug’
e-măcàr (eŋ)	o-w̃ăcàr (ol)	‘game (animal)’
e-ñà̟ɓə́tín (eŋ)	o-ỹà̟ɓə́tín (ol)	‘big black ant sp.’
e-ŋál-ɣánd (eŋ)	o-ɣ̃ál-ɣánd (ol)	‘wasp sp. *Belanogaster juncea*’
e-ŋwònín (eŋ)	o-ɣ̃ònín (ol)	‘wasp’
e-mèf (eŋ)	o-ɓèf (ol)	‘thigh’
e-nílê (eŋ)	o-lílê (ol)	‘flea’
e-ñàm (eŋ)	o-ƴàm (ol)	‘termite’

Figure 269: Bassari singular/plural noun pairs showing a mutation alternation

Besides number-based alternations, mutation alternations can be seen in diminutive (sg. *i-III*, pl. *ɓə̟-III*) and augmentative (sg. *a-III*, pl. *ɓa-III*) formation for any noun not already in a grade III class. Other opportunities for a stem appearing in multiple classes include fruits (in *e-II*) of trees (in *a-III*), and deverbal nouns (agentive nouns, instrument nouns, etc.). The full three-grade alternation can be seen productively in the following scenarios:

Ø-I sg.	~ o-II pl.	~ III dimin./aug.
o-I pl.	~ e-II sg.	~ III dimin./aug.
o-I = oŋ fruit pl.	~ e-II fruit sg.	~ a-III plant
all adjectives		

Adjectives agree in noun class with the head noun, taking the same nominal prefix as on the noun itself, and thus can show all three grades. Adjectives can be productively formed from stative verbs with a suffix *-a̤x* (sometimes given as *-ax*).

grade I	grade II	grade III	
-fox	-pox	-pox	'ten'
-sà̤s	-tà̤s	-tà̤s	'three'
-ʃə̀xén	-cə̀xén	-cə̀xén	'other'
-xḛ̀mà̤x	-kḛ̀mà̤x	-kḛ̀mà̤x	'hard'
-xà̤f	-kà̤f	-ngà̤f	'raw/green'
-wárà̤x	-bárà̤x	-mbárà̤x	'red'
-rǒmàx	-dǒmàx	-ndǒmàx	'short'
-yékǎx	-jékǎx	-njékǎx	'nice'
-w̃ənək	-mənək	-mənək	'clean/fair'
-ỹìŋə̤́ná̤x	-ñìŋə̤́ná̤x	-ñìŋə̤́ná̤x	'ugly'
-ɓànà̤x	-ɓànà̤x	-mànà̤x	'black'

Figure 270: Bassari adjectives in all three grades

Exceptions to regular nominal mutation do exist, but are rather rare. Even borrowings are almost always fully integrated into the regular mutation system.

Finally, all of the Tenda languages including Bassari make liberal use of headless genitive constructions, by which many nouns have the form of a relative/genitive marker followed by another noun (sometimes with the preposition *gə* between the two). However, often the possessed noun does not appear to exist as a free-standing noun. Some examples are given in Figure 271.

class	noun		possessed noun	
a̤-I	a̤r-gà̤f	'commander'	gà̤f	'head'
a̤-I	a̤r-gə̤-mə̤̀ɗ	'sorcerer'	gə̤-mə̤̀ɗ	'night'
a-III	and-e-pùx	'10 dërëm coin'	e-pùx	'ten'
i-III	ind-e-càré	'first animal killed'	e-càré	'chicken'
o-I	or-a-ngò̤l	'way of life'	a-ngò̤l	'village'
a̤-I	a̤r-kàk	'orphan'	—	
e-I	er-gə-ɓo-tə́ñér	'*Datura metel* bush'	—	
o-II	od-o-kḛ̀ŋ	'age class sp.'	—	
ɓa-III	ɓand-nə̤̂gə̤̀lə́k	'vegetables'	—	

Figure 271: Bassari nouns prefixed with a relative/genitive marker

These nouns show the regular agreement pattern for the class of the relative marker, but the noun root itself is naturally unaffected by the class's mutation grade.

2.2.2 Verbal mutation

Depending on its morphological form, Bassari verbs can take either grade I or II mutation. Ferry (1991) does not provide a comprehensive account of verbal morphology and mutation, but Winters and Winters (2004) present the paradigm for *ạ-w̃ayi* 'to return' with a 1st person singular subject, in which /w̃/ is the grade I consonant, and /m/ grade II[134].

perfective affirmative	ka **w̃**ayi kəme	'I returned'
	aw̃ayi **w̃**ayi kəme	'I returned' (more "insistent")
imperfective affirmative	aw̃ayi kəme **w̃**ayi	'I'm going to return'
imperfect future aff.	aw̃ayi kəme **w̃**ayiɗ	'I will return'
imperfect progressive aff.	aw̃ayi kəme **w̃**ayind	'I'm returning'
imperfect past prog. aff.	aw̃ayi bame **w̃**ayi	'I was going to return'
imperfect conditional aff.	aw̃ayi dome **w̃**ayi	'I would return'
subjunctive[135]	me **m**ayi	'I'm going to return (home)'
subjunctive future	me **m**ayiɗ	'I'll return'
negative "near future"	ame **m**ayina	'I'm not going to return'
negative perfect	ame **m**ayena	'I did not return'
negative past perf.	ame **m**ayibana	'I had not returned'
negative conditional	ame **m**ayidona	'I would not have returned'
negative future	ame **m**ayiɗëna	'I will not return'
negative progressive	ame **m**ayindəna	'I am not returning'
negative past progressive	abame **w̃**ayina	'I was not going to return'
negative imp. conditional	adome **w̃**ayina	'I would not return'

Figure 272: Bassari paradigm for ạ-w̃ayi *'to return'*

Mutation is not affected by subject, which is marked by pronominal affixes/clitics (*me* for 1st sg. in Figure 272). Imperative forms are marked by *-(ə)l* for the singular, and *-(y)in* for the plural, with grade II mutation (e.g. *pətəl* 'throw!'). Assuming that these forms represent the entirety of the verbal paradigm, we can identify a single condition which determines whether the verb takes grade I or II mutation. Whenever the verb root is accompanied by an "auxiliary" (*k(ə)*, *bạ*, or *do*), it takes grade I, otherwise grade II. The auxiliary need not immediately precede the root— in fact in most forms it is followed by a subject marker, and in the perfective affirmative it follows the verb. Note that the infinitive form *ạ-w̃ayi* is morphologically nominal, and takes grade I due to the infinitive prefix *ạ-*. Ferry (1991: 32) lists an "obligative" verb form, which makes use of a seemingly nominalized form of the verb with the prefix *mo-III* (e.g. *mo-ngwàt fọ́ kə́mè-ɣàt* 'I must see').

2.3 Bedik mutation

Mutation in Bedik is very similar to in Bassari, using all three grades in the nominal system, and only I and II in the verbal system. The triggers of mutation are also basically the same.

---

[134] Recall that Winters and Winters do not mark ATR/tenseness. The infinitive prefix /ạ/ and prefix /bạ/ contain a tense vowel, but otherwise I believe all of the vowels in this paradigm are lax/[-ATR]. With the infinitive forms excluded, Ferry writes these verb forms as single words.

[135] Ferry terms this form the "aorist."

Grade I	f	s	ʃ	h	hw	w	r	y	ɣ	ɣ	m	l	ñ	ŋ	ŋw	ɓ	ɗ	ƴ
Grade II	p	t	c	k	kw	b	d	j	g	gw	m	l	ñ	ŋ	ŋw	ɓ	ɗ	ƴ
Grade III	p	t	c	ng/k	ngw/kw	mb	nd	nj	ng	ngw	m	n	ñ	ŋ	ŋw	m	n	ñ

Figure 273: Mutation system of Bedik

Bedik's mutation system differs from Bassari's in the following ways: i) grade I of the non-coronal nasal series has nasal stops instead of nasal continuants; ii) an l~l~n series exists equivalent to Bassari's n~n~n series; iii) the coronal implosive series has /ɗ/ in grade I instead of Bassari's /l/; iv) grade III /k(w)/ is somewhat more common than in Bassari for the voiceless velar series, though /ng(w)/ is still more frequent. As is the case for Bassari, the existing literature unfortunately conflates the nasal and implosive series, omitting the four invariant nasal series as well as the l~l~n series, and listing a series l~ɗ~n which does not exist.

2.3.1 Nominal mutation

The noun class system of Bedik is given in Figure 274.

prefix	grd.	det.	rel./gen.	gen. 2	pl.	%freq.	note
a-	I	ale	ar	ar	ɓə-I	3.3	personal class
e~i-	II	ed	ed (er)[136]	er	ma-I/ma-III/o-I	15.9	
ga~gi-	III	aŋ	an(d)	gaŋ	ɓa-III	25.0	plants, augment.
ge~gi-	III	eŋ	en(d)	geŋ	ɓe-III	6.1	
go~go̟~gu-	III	oŋ	on(d)	goŋ	ɓo-III	6.9	pejorative
Ø (ɓə-, jə-)	I/II	le	(ə)r	(ə)r	ma-III	19.0	prefixes rare
ña-ñV-	III	ñaŋ	ñan(d)	ñaŋ	ɓə̟-III	4.8	diminutive
ña-ñV-	I[137]	ñaŋ	ñan(d)	ñaŋ	(ma-III)	1.5	slime/fiber/grass
gə̟-	III	ə̟ŋ	ə̟n(d)	gə̟ŋ		0.8	
o~o̟~u-	I	od	od (or)[136]	or	ma-III	5.6	pl. of some e-II, sg.
ma~mV-	III	maŋ	man(d)	maŋ		4.2	liq., languages, pl.
ma~mV-	I	maŋ	man(d) (mar)	maŋ			pl. of many e-II
ma~mV-	II	maŋ	man(d) (mar)	maŋ			very rare pl. class
ɓə~ɓV-	I	ɓəle	ɓər	ɓər			pl. of *a-I*
ɓa~ɓi-	III	ɓaŋ	ɓan(d)	ɓaŋ			pl. of *ga-III*
ɓe~ɓi-	III	ɓeŋ	ɓen(d)	ɓeŋ			pl. of *ge-III*
ɓo~ɓo̟~ɓu-	III	ɓoŋ	ɓon(d)	ɓoŋ			pl. of *go-III*
ɓə̟-	III	ɓə̟ŋ	ɓə̟n(d)	ɓə̟ŋ			pl. of *ña-III*

Figure 274: Noun class system of Bedik

136 There is an unfortunate error in Ferry's table on page 19 which appears to list *er* and *or* as the relative markers for these classes. The table on page 22 correctly gives *ed* and *od*, and she specifically notes that the Biwol dialect uses different forms *er* and *or* as the relative markers (rather than *ed* and *od*).
137 This class is not mentioned by Ferry, but many non-diminutive nouns appear with this prefix and grade I mutation. Presumably agreement uses grade III mutation, since no mention is made of a *ña-I* agreement pattern.

Adjective agreement for the “unprefixed” class uses *ə̟-* and grade I. A small minority of nouns in this class do in fact contain a prefix. The most common of these is *ɓə-* (found on seven nouns); two have *jə-*: *jə-ŋát* ‘dog’ and *jə-fê* ‘sheep’; one has *a-*: *a-ràcé* ‘luck’; one has *i-*: *i-ʃìlē̟dè̟* ‘hornbill sp.’ These prefixes alternate in the plural, but the agreement patterns are the same as for any unprefixed noun. A few adjective with *ə̟-* are used without their head nouns as names of festivals. The alternate relative/genitive marker forms *er*, *or*, and *mar* are used in the Biwol dialect. Furthermore, prefixes in the Biwol dialect lack /g/, just as in Bassari. The final stop of the relative/genitive forms ending in /n(d)/ surfaces only before a vowel (though even here it is generally absent in Ferry’s examples), but is always present in the Biwol dialect.

The vowel of most prefixes alternates based on the following vowel. Ferry describes these alternations as being based on the ATR value of the first vowel of the root, but the truth seems to be rather more complicated. The patterns are described below, but note that there are numerous exceptions throughout Ferry (1991).

i) *ga-* and *ɓa-* before: a, e, o, ə
gi- and *ɓi-* before: e̟, o̟, ə̟, i, u, ɯ

ii) *e-*, *ge-*, *ɓe-* before: e, o, ə
i-, *gi-*, *ɓi-* before: a, e̟, o̟, ə̟, i, u, ɯ

iii) *o-*, *go-*, *ɓo-* before: e, o, ə
o̟-, *go̟-*, *ɓo̟-* before: e̟, o̟, ə̟
u-, *gu-*, *ɓu-* before: a, i, u, ɯ

iv) For the m- and ñ-initial classes, many vowels are reported:

1st root V:	mV-	ñV-
a, e, o, ə	ma- (mo-)	ña- (ñi-, ño-, ñə-, ñe-, ñe̟-)
e̟	mə̟-, (ma-, mi-, mɯ-, mu-)	ñe̟-, (ña-)
o̟	mo̟-, (mi-, mə̟-)	ño̟-, (ñu-, 1 ñə̟-)
ə̟	mə̟-, (ma-, mu-)	ñi-, (ñə̟-, ña-, ñe̟-)
i	mɯ-, (ma-, mu-, mə̟-)	ñi-
u	mu-, (mɯ-, ma-)	ñu-, (ña-, ñi-)
ɯ	mɯ-, (mi-)	ñi-, (ñɯ-)

v) For the personal plural, *ɓə-* and *ɓa-* are common, with *ɓa-* exclusively on proper names (clan names, etc.). *ɓe̟-*, *ɓo̟-*, *ɓi-*, *ɓu-* are also rarely given. The singular class prefix *ɓə-* does not appear to alternate, though one example is given with *ɓə̟-*.

Ferry does list contrastive tones on the nominal prefixes, determiners, and relative/genitive markers. In the chart on her page 15, some class markers have a high tone, some a mid tone, and most are unmarked for tone. In practice these tones generally have no relation to how tone is marked throughout the rest of the work. Most often nouns are cited with no tone on the prefix, and when tone is present it often differs from the tone presented in the chart. It is also worth noting that completely different facts regarding the tone of prefixes are presented in Ferry (1968b). I will not mark tone on Bedik prefixes outside of full examples, but it is potentially significant for the history of the Tenda class system that the classes may have had contrastive tones.

The use of the nominal prefix and determiner are the same as in Bassari.

```
(81)  á-ʃán        =álè
      NC-man       =the
      'the man'
```

```
(82)  ɓə́-ʃán       =ɓə́lè
      NC.pl-man    =the
      'the men'
```

```
(83)  a-ʃán        a-rīyẹ̀
      NC-man       NC-one
      'one man'
```

```
(84)  a-ʃán        a-rám  =ale
      NC-man       NC-my  =the
      'my husband'
```

The relative/genitive marker also functions just as in Bassari.

```
(85)  á-ʃán        =ár   lū-mè  =álè
      NC-man       =REL  see-1s =the
      'the man that I saw'
```

```
(86)  é-dòl        =éd   á-ʃán       =éd
      NC-finger    =GEN  NC-man      the
      'the man's finger'
```

In addition to the relative/genitive marker, there is a second genitive marker, given as *gen. 2* in Figure 274. Ferry gives only the following example to contrast it with the relative/genitive marker, the interpretation of which is rather unclear.

```
(87)  gá-ngōp      =án   ó-sò
      NC-bench     =GEN  NC-wood
      'un banc de bois'
```

```
(88)  gá-ngōp      gáŋ   ga-tò
      NC-bench     GEN2  NC-tree
      'un banc (qui est) en bois (fait de l'arbre)'
```

Presumably (87) can refer to only a bench in the woods rather than a wooden bench, though the examples are complicated by the use of different noun classes on the 'tree' root.

As in Bassari there are some connections to be made between the mutation grade of the class and the form of the determiner, relative/genitive marker, and genitive 2 marker. However in Bedik there are more exceptional forms, e.g. *man(d)* as the relative/genitive marker for the *ma-I* class, rather than expected *mar* (which is found in the Biwol dialect, though note Biwol irregular *er* for *e-II* instead of the expected *ed* found in Banapas).

Mutation is manifested in the same ways as in Bassari. First, each class requires the root to begin with a consonant in a specific mutation grade. Examples from the *o-I*, *e-II*, and *ga-III* classes are given in Figure 275.

o-I noun		*e-II* noun		*ga-III* noun	
u-fìɗ	'bow (weapon)'	e-péɗə̂ng	'coccyx'	ga-páng	'wall'
u-sáŋ	'field'	i-tāmb	'wild onion'	gi-tʉ́n	'shelter'
o̟-ʃə̟́s	'splinter'	e-cám	'panther'	gi-cìc	'lizard'
o̟-hé̟ƴ	'ladder'	i-kó̟n	'village'	ga-kàng	'collarbone'
o-hwóƴ	'wet' (inf. verb)	e-kwōt	'forest'	ga-kwòɗ	'buckle/crease'
o̟-wó̟ɗ	'harvest'	i-bǎl	'guinea fowl'	ga-mbél	'grease/fat'
u-rù	'rain'	i-dʉ̀m	'squash'	ga-ndámb	'island'
u-yáŋá	'side'	e-jèntéŋ	'papaya'	ga-njóm	'lung'
u-ɣànd	'nose ornament'	i-gàs	'face'	gi-ngúɓ	'light'
(no $^{\times}$ɣw in Bedik)		e-gwə̄ɗâm	'tamarind'	ga-ngwə̄rácèl	'*Ficus umbellata*'
u-mʉ́ɗ	'day'	i-mə̟̀ɗ	'palm trunk bulge'	gi-mó̟ló̟ŋ	'place'
u-lí	'branch'	i-líl	'egg'	ga-nākà	'bed'
u-ñàk	'edible animals'	e-ñél	'coal/ember'	ga-ñáng	'chin'
o-ŋèñ	'dry season'	i-ŋə̟́g	'flame'	gi-ŋéɗ	'lower abdomen'
o-ŋwól	'bracelet'	(no example of /ŋw/)		(no example of /ŋw/)	
o̟-ɓó̟yó̟	'bell sp.'	i-ɓò̟ɗ	'storm'		
o-ɗâʃà	'altar sp.'	i-ɗík	'dolerite'		
u-ƴāmb	'millet stalk'	i-ƴìŋ	'forehead'		

Figure 275: Three Bedik noun classes enforcing different mutation grades

Secondly, alternations are seen when a root is placed in multiple classes requiring different mutation grades. This most commonly involves singular/plural alternations, which exhibit some irregularities, and will be discussed below. Other productive alternations include: placement in the diminutive, augmentative, or pejorative classes (all requiring grade III in both singular and plural), fruits in e-II (pl. ma-III) of plants in ga-III, and the formation of deverbal nouns. Adjectives (productively formed from stative verbs with the suffix *-à*) all show full three grade alternations, as they can appear in any class.

grade I	grade II	grade III	
-wíʃà	-bíʃà	-mbíʃà	'long'
-rōmà	-dōmà	-ndōmà	'short'
-yʉ́mà	-jʉ́mà	-njʉ́mà	'sweet/salty'
-ɣàʃá	-gàʃá	-ngàʃá	'new'
-fárāmè̟	-párāmè̟	-párāmè̟	'big'
-sé̟mà	-té̟mà	-té̟mà	'deep'
-ʃán	-cán	-cán	'male'
-hé̟là	-ké̟là	-ké̟là	'sharp/light'
-lʉ́m	-lʉ́m	-nʉ́m	'female'
-ɓàkələ̀	-ɓàkələ̀	-màkələ̀	'small'
-ƴə̟́mà	-ƴə̟́mà	-ñə̟́mà	'cold'

Figure 276: Bedik adjectives in all three grades

The common singular/plural pairs involving a change in grade are as follows:

<u>sg.</u>	<u>pl.</u>
Ø (I/II)	ma-III
e-II	ma-I
e-II	ma-III
e-II	o-I (less common)
o-I	ma-III

As in Bassari there are a few additional uncommon pairings affecting a small number of nouns. For the most part, mutation works as expected in these singular/plural pairs. However, there are two ways in which mutation in these plural forms is exceptional. First, the grade I and II consonants /ɓ, ɗ, ƴ, l/ never alternate in the *ma-III* plural class[138]. In all other grade III contexts, these mutate to /m, n, ñ, n/. Contrast the plural form *ma-ɓə̄r* 'breasts' in *ma-III* with the *ma-III* liquid noun *ma-mə̄r* 'milk.' Examples of *o-I / ma-III*, *e-II / ma-I*, and *e-II / ma-III* singular/plural pairs are given in Figure 277.

<u>*o-I* sg.</u>	<u>*ma-III* pl.</u>	
u-fát	ma-pát	'field'
o̤-sé̤f	mə̤-té̤f	'drinking calabash'
u-ʃās	ma-cās	'word'
o-hòɗ	mo-kòɗ	'beer fermenting hut'
u-wát	(gu-mbát)	'company' (*go-III* pejorative)
o-rōŋ	ma-ndōŋ	'quiver'
o̤-yə̤́r	mə̤-njə̤́r	'flute'
u-ɣàrāʃ	ma-ngàrāʃ	'birth name sp.'
u-mɯ́ɗ	mɯ-mɯ́ɗ	'day'
o-lē	ma-lē	'armpit'
(ñàngúmà	ma-ñàngúmà)	'cat' (Ø class)
(ŋátəmāʃé̤r	ma-ŋátəmāʃé̤r)	'otter' (Ø class)
o-ŋwól	ma-ŋól	'bracelet'
(ɓó̤nó̤	mo̤-ɓó̤nó̤)	'wound' (Ø class)
(ɗíyò̤m	mɯ-ɗíyò̤m)	'brain' (Ø class)
u-ƴāmb	ma-ƴāmb	'millet stalk'

[138] The reason for this apparent irregularity is that the plural of the *e-II* class was *ma-I* historically, and not *ma-III*. The plural of *o-I* was *ma-II*. In fact *ma-III* was not a plural class at all originally. In Bedik the determiners of the *ma-I* and *ma-II* plural classes have been borrowed from the *ma-III* class, such that all are *maŋ* (other agreeing elements are also identical, at least in the Banapas dialect). Thus, technically there is nothing to stop us from saying that the plural class of these *e-II* nouns in question in in fact *ma-I*.

e-II sg.	*ma-I* pl.	
i-pàf	ma-fàf	'musical horn'
i-túŋá	mɯ-súŋá	'mortar'
e-cəl	ma-ʃəl	'nose'
i-kọ̀n	mọ-họ̀n	'village'
e-kwə́r	ma-hwə́r	'track/footprint'
e-bər	ma-wər	'Bambara groundnut'
e-də́mb	ma-rə́mb	'reptile tail'
i-jíɓ	mɯ-yíɓ	'roof'
i-gàñ	ma-ɣàñ	'stone'

e-II sg.	*ma-III* pl.	
i-pẹ́lúwẹ̀ndẹ́ŋ	mẹ-pẹ́lúwẹ̀ndẹ́ŋ	'kapok seed pods (open and fallen)'
i-cámbàs	ma-cámbàs	'cowrie shell'
e-kóɗá	ma-kóɗá	'cola nut'
e-bó	ma-mbó	'gourd'
e-dē	ma-ndē	'language'
e-jèntéŋ	ma-njèntéŋ	'papaya'
i-gāf	ma-ngāf	'meal w/o sauce'
e-gwə̄ɗàm	ma-ngwə̄ɗàm	'tamarind'

e-II sg.	*ma-* pl.	
e-mə́ñ	ma-mə́ñ	'*Barilius senegalensis* fish'
i-líl	mɯ-líl	'egg'
e-ñòngòrá	ma-ñòngòrá	'francolin'
i-ŋá	ma-ŋá	'swarm'
e-ɓə̄r	ma-ɓə̄r	'breast'
i-ɗàhà	ma-ɗàhà	'winnowing basket'
i-ɣ̂ìŋ	mɯ-ɣ̂ìŋ	'forehead'

Figure 277: Bedik singular/plural noun pairs showing a mutation alternation

The second irregularity involves the mutation grade of agreeing adjectives. These facts are described in Ferry (1968b), and are not mentioned in Ferry (1991). For the singular/plural class pairs that show a difference in mutation grade, the plural adjective often shows an unexpected consonant. Ferry gives the following four examples:

e-II sg.	pl. class	"expected" pl.	pl.	
i-gāf i-párámẹ̀	ma-III	ˣma-ngāf ma-párámẹ̀	ma-ngāf ma-fárámẹ̀	'big meal w/o sauce'
i-cẹ̄r i-ɓálà	o-I	ˣọ-ʃẹ̄r u-ɓálà	ọ-ʃẹ̄r u-málà	'black chicken'
i-gàs i-ɓálà	ma-I	ˣma-ɣàs ma-ɓálà	ma-ɣàs ma-málà	'black face'
e-cəl e-járárà	ma-I	ˣma-ʃəl ma-yárárà	ma-ʃəl ma-njárárà	'pretty nose'

Figure 278: Bedik adjectives mutating irregularly to show number alternation

Ferry's explanation is that for these plural adjectives, mutation has nothing to do with the plural noun class, but instead changes to mark the singular/plural alternation. Note that for unprefixed nouns and nouns in the *o-I* class, agreement is always with grade I, and the plural is always in *ma-III*, which guarantees a change in the consonant of the adjective from singular to plural wherever possible. Thus this phenomenon is only relevant for nouns in the *e-II* class. However it is perhaps not a coincidence that of all the plural classes, unprefixed and *o-I* nouns always use the one that ensures a change in grade wherever possible. There are some unanswered questions regarding the *e-II* nouns. Note that there are four ways in which adjectives can pattern from grade to grade, exemplified in Figure 279.

	'red'	'white'	'black'	'slow'
I	-wārà	-fèʃà	-ɓálà	-ñàmà
II	-bārà	-pèʃà	-ɓálà	-ñàmà
III	-mbārà	-pèʃà	-málà	-ñàmà

Figure 279: Four Bedik adjectives with different types of mutation patterns

Those with grade I /w, r, y, ɣ/ show a different consonant in each grade, those with /f, s, ʃ, h/ have overlap in grades II and III, those with /ɓ, ɗ, ƴ, l/ have overlap in grades I and II, and those with /m, ñ, ŋ/ have overlap in all grades. From Ferry's claim about the adjective alternating from singular to plural, we can assume that for an *e-II* noun with a *ma-III* plural, the plural adjective would take grade III for 'black.' Similarly, we can assume that for an *e-II* noun with an *o-I* or *ma-I* plural, the plural adjective would take grade I for 'white.'

e-II sg.	pl. class	pl.?	
i-gāf i-ɓálà	ma-III	ma-ngāf ma-málà ?	'black meal w/o sauce'
i-cḛ̄r e-pèʃà	o-I	o̧-ʃḛ̄r o-fèʃà ?	'white chicken'

However we are unfortunately left to speculate about these scenarios. Another question is why for the fully-alternating adjectives like 'red' the *ma-I* or *o-I* plural form takes grade III, rather than the expected grade I (see 'pretty nose' in Figure 278 above). The motivation here cannot simply be to present a different grade from that of the singular, as both grade I and III would be different from the singular grade II in these cases. Regardless of the specific details, one consequence of this phenomenon is that it is often not possible to straightforwardly determine if a plural noun is in the *ma-I* or *ma-III* class (or the rare *ma-II* for that matter). Recall that except in the Biwol dialect, the form of the determiner and genitive/relative marker are the same for these three classes, and thus the only way to distinguish them would be by their effect on the initial consonant of nouns and adjectives. Due to the phenomenon just discussed, mutation on the adjective is not actually a reliable indicator of which class is used. This means that only mutation on the noun itself can distinguish *ma-I*, *ma-II*, and *ma-III*. However, most mutation series do not show an alternation between all three grades. Ignoring the rare *ma-II* for now, this means that in effect it is impossible to determine the plural class of any *e-II* noun beginning in /m, l, ñ, ŋ, ɓ, ɗ, ƴ/ with a plural in *ma-* (recall that /l, ɓ, ɗ, ƴ/ do not change from singular to plural in nouns). Indeed, Ferry is often inconsistent in listing the plural classes of these nouns, often giving one class in the index, and another in the main text. Data from the Biwol dialect could serve to disambiguate these cases (since it has a distinction in the determiners and relative/genitive markers for *ma-I* and *ma-III*), but this dialect was not the main source of Ferry's data.

Finally, in Bedik there are also examples of "headless genitive/relative" nouns like those given for Bassari in Figure 271.

class	noun		possessed noun/relative verb	
a-I	ar-fàn	'neighbor'	-fàn	'point out w/ finger'
go-III	gon-ʃāmbàlə̄kā	'dinner'	ʃāmbàlə̄kā	'evening'
ña-III	ñan-ɓu-ngọ́ɗ	'leaf beetle'	ɓi-ngọ́ɗ	'shells'
ma-III	man-u-láɗ	'masks sp.'	u-láɗ	'sowing'
ɓo-III	ɓon-fẹ́gẹ́-fẹ́gẹ́	'*Loeseneriella richardiana* vine'	—	
ga-III	gan-kòtókə́ƴ	'*Oncoba spinosa* tree'	—	
a-I	ar-náƴ	'person w/ arched back'	—	
a-I	ar-gə̣̀fə̣̄ƴ	'crazy person'	—	

Figure 280: Bedik nouns prefixed with a relative/genitive marker

As in Bassari, the class of the genitive marker naturally has no effect on the mutation of the possessed noun.

2.3.2 Verbal mutation

Based on the perhaps incomplete account of inflectional forms of the verb in Ferry (1991), verbal mutation in Bedik appears to follow basically the same principles as in Bassari. As in Bassari, only grades I and II are employed, and many cells in the verbal paradigm employ nominalized forms of the verb. Forms in which the root is initial or preceded by only a subject marker take grade II (also true of Bassari). Some forms contain an affix *k(ə)*, appearing both as a prefix and a suffix (cognate with Bassari *kə*), and these forms take grade I. Ferry (1991: 34) gives the following 3rd person singular forms of the verb *o-rē* 'say.'

	present	past	future
imperfect	(II) **ó**-dē	— ma-rē yẹ́-k-o	(II) **ó**-dē-é
perfect	(II) **à**-dē	(II) **à**-dē-ɗ	
habitual	(I) mà-rē k-**ò**-rē	— è-dē yẹ́-ɗ-k-ò	— ma-rē èwó-dē
progressive	— ò-rē láŋ èwó	— è-dē yẹ́-k-ò	
inchoative	— è-dē èwó	— k-ò-yẹ́ ma-rē	
imperf. narrative	(I) k-**ó**-rē		(II) **ó**-dē-ɗ è
perf. narrative	(I) rē-k-**ò**	(I) rē-ɗ-k-**ò**/yẹ́-ɗ-k-ò-dē	

Figure 281: Bedik 3rd person singular subject paradigm for o-rē *'to say'*

In Figure 281, the subject markers on the main verb are bolded. Forms of the verb without one of these subject markers (*ma-rē*, *e-dē*, *o-rē*) are nominalizations. Because a number of the cells in the paradigm employ only an auxiliary verb (usually the the copula *yẹ*) with one of these nominalizations, these forms do not exhibit verbal mutation.

2.4 Konyagi mutation

Like Bassari and Bedik, Konyagi makes use of a three-grade mutation system affecting root-initial consonants.

Grade I	f	r	s	x	xw	w	l	y	y/w	w	w̃	l̰	ỹ	ỹ/w̃	w̃	v	ry	y
Grade II	p	t	c	k	kw	b	d	j	g	gw	m	n	ñ	ŋ	ŋw	ɓ	ɗ	ƴ
Grade III	p	t	c	k	kw	mp	nt	nc	nk	nkw	m	n	ñ	ŋ	ŋw	mb	nd	nj

Figure 282: Mutation system of Konyagi

This system is exploited in both the nominal and verbal systems, and unlike in Bassari and Bedik, all three grades are used in both the nominal and verbal domains. The distinctive characteristics of the Konyagi mutation alternations when compared to Bassari and Bedik are: i) voiceless prenasalized stops in grade III of the voiced egressive series, as opposed to voiced prenasalized stops in BB; ii) voiced prenasalized stops in grade III of the implosive series, as opposed to pure nasals in BB; iii) lenition of all three implosives in grade I; iv) the lack of velar continuants, with the labial or palatal continuant used depending on the vocalic environment; v) the existence of the coronal nasalized continuant /l̰/, corresponding to Bassari /n/ and Bedik /l/; vi) the use of /r, s, l/ in grade I corresponding to /s, ʃ, r/ in BB.

For grade I of the voiced velar and velar nasal series, the labial continuant is found when adjacent to /u/ or /o/ (on either side), and the palatal continuant in all other environments. For example:

i-gís	'fish' (i-II sg.)
u-wís	'fish' (u-I pl.)
wæ-yís	'fish' (wæ-I pl.)
i-nkə̀rə̀ỹàlə́	'sand' (i-III sg.)
wæ-yə̀rə̀ỹàlə́	'sands' (wæ-I pl.)
i-ŋòt	'pole' (i-II sg.)
wæ-w̃òt	'pole' (wæ-I pl.)

Figure 283: Labial versus palatal continuants in the Konyagi voiced velar series

Note that the voiced labiovelars always alternate with labial continuants in grade I, regardless of the vocalic environment.

2.4.1 Nominal mutation

The noun class system of Konyagi is as follows.

prefix	grade	agr. (if diff.)	det.	%freq.	note
a-	I		(ỹ)ă	8.4	personal class
i-	II		(ŋ)ă	16.5	
æ-	III		(ŋ)ă	21.9	plants, misc.
i-	III	i-II/i-III	(ŋ)ă	1.7	i-III agr. used by younger speakers
u-	III		(ŋ)ă	1.8	
(i-)	I		(ỹ)ă	2.6	prefix is optional on noun and adj.
ỹi-	I	i-I	(ỹ)ă		only on ‘cow’
Ø	I/II	Ø-I (i-I)	(ỹ)ă	21.5	many borrowings (i-I on demonstratives)
(u-)	I		(w̃)ă	9.5	prefix is optional on noun and adj.
i-	I		(ỹ)ă	3.4	tools
fæ-	I		fă	1.3	mostly animals, sg. of leaves in *yæ-I*
xu~xwə-	II	xu-II	xă	0.2	
xu-	III	xu-II/xu-III	xă	0.2	agreement grades in free variation.
xæ-	II		xă	0.5	one noun with *xa-II*.
si-	III	Ø-I/xæ-I/si-III	?	0.4	one noun each with grade I and II
sæ-	III	Ø-I/xæ-I/?	?	0.3	
fæ-	III		fă	2.2	diminutive
bə-	I		bă	0.1	personal augmentative
ga-	III		gă	0.1	other augmentative
wæ-	III	wæ-II	(ŋ)ă	2.5	liquid/collective class, languages
yæ-[139]	I		(ỹ)ă	1.7	coll. of leaves, a few misc.
ỹæ- / ỹa-	I	ỹæ-I		0.1	only ‘sauce’ and ‘snot’
æ-	I		(ỹ)ă	0.4	contains only places and times
xæ~kæ-	I~II	?	xă?	0.2	temporal words. prefix + grade in free var.
gæ-	III	?	gă		innovated from *gə́* ‘during’ on *æ-III* nouns
					pl. of
wæ-	I		(w̃)ă		*i-II*, many Ø/(i-), *fæ-I*, *x-*, *s*-initial classes
wæ-	II		(ŋ)ă		many Ø/(i-) (incl. all w/ grade II cons.), *u-I*
(w)u-	I		(w̃)ă		a few animals, most in the *i-II* class
w̃u-	I	(w)u-I	(w̃)ă		‘cow’
və-	I		vă		*a-I* personal class
væ-	III		vă		*æ-III*
vi-	III	vi-II/vi-III	vă		*i-III*. vi-III agr. used by younger speakers
vu-	III		vă		*u-III* and *fæ-III* diminutive class
vi-	I		vă		*i-I*
va-	III		vă		*bə-I* and *ga-III* augmentative classes

Figure 284: Noun class system of Konyagi

Recall that /æ/ becomes /ə/ before /a/, so all prefixes of the form *Cæ-* have an allomorph *Cə-* in this environment. The prefixes *æ-I* and *æ-III* are not affected, since /ə/ cannot appear word-

[139] *ỹæ-I* in *wæ-gə̀d* dialect

initially. Some rare singular/plural pairings are not represented in Figure 284. The agreement prefixes are used on adjectives.

(89)	xù-ɗǽkéry	xù-nəŋæ̀xə́		(156)
	NC-dream	NC-pleasant		
	‘a pleasant dream’			

(90)	(ì-)fæ̀ry	(ì-)sæ̀n		(151)
	(NC-)toe	(NC-)male		
	‘big toe’			

(91)	wæ̀-wə́d	wæ̀-vəntæ̀xə́	wæ̀-və́náák	(183)
	NC.pl-mango	NC.pl-ripe	NC.pl-pretty	
	‘pretty ripe mangos’			

The definite determiner is enclitic on the noun phrase. Its basic form is *ŋǎ*, mutating to *ỹǎ* or *w̃ǎ* with a grade I class, but with the initial consonant replaced by the consonant of a CV- class marker (for consonants other than /w, y, w̃, ỹ/). The forms without an initial /w̃, ỹ, ŋ/ are only possible after a consonant or /ə/ (which then assimilates to /a/), but even in these environments they are less common than the full form[140].

(92)	fæ̀-rə̀mp	=fá		(209)
	NC-turtle	=the		
	‘the turtle’			

(93)	à-sæ̀n	=ỹá		(210)
	NC-man	=the		
	‘the man’			

(94)	æ̀-tə́x	=ŋǎ		(210)
	NC-tree	=the		
	‘the tree’			

(95)	wə̀-nkà	wæ̀-ɣǽkǽx	=ǎ	(211)
	NC-water	NC-hot	=the	
	‘the hot water’			

The relative marker in Konyagi is *-lé~dé~nté*, taking the nominal prefix and appropriate mutation of the head noun. However, the relative marker always takes the same prefix and mutation grade as found on the noun itself, not agreeing adjectives. Thus, the relative marker for the *wæ-III* class is *wæ̀-nté*, as opposed to *wæ̀-dé* for *wæ-II*, even though both classes use

[140] The definite determiner forms given in Figure 284 are those that appear when they do not immediately follow the noun (e.g. with an adjective or relative clause intervening). When the definite determiner immediately follows the noun, the form is the same for most classes. However, for *i-II*, *i-III*, and *u-III* (and only after a consonant or /ə)/, only the form *-ǎ* is possible, as well as a full word *ì-ŋá* or *ù-ŋá*, not possible for any other class. There is also a demonstrative of the basic form *ŋî* which has its own irregularities. It can be enclitic on the noun phrase like *ŋǎ*, but can also be a free-standing word with a full class prefix, or prefixed on the noun itself with various irregular forms.

the same *wæ-II* agreement on adjectives. Thus, the relative marker allows the identification of class distinctions which have for the most part fallen together.

Mutation is manifested in the same ways as for Bassari and Bedik. First, nouns in any given class must begin with a consonant belonging to the specified grade. Examples of nouns from the a-I, i-II, and æ-III classes are given in Figure 285.

a-I noun		*i-II* noun		*æ-III* noun	
a-fə̂xwə̀t	'handyman'	i-pæ̀d	'bed'	æ-pə́nd	'nape'
a-rǽx	'child'	i-tə́kw	'end'	æ-tə́x	'tree'
a-sèry	'artist'	i-cə̀nj	'liver'	æ-cǽl̰	'morning'
a-xǽv	'sorcerer'	i-kó	'knee'	æ-kér	'palm tree'
a-xwə́yár	'crybaby'	i-kwə̀t	'chicken coop'	æ-kwə́l	'measles'
a-wə́r	'walker'	i-bùr	'abscess'	æ-mpə̀n	'back'
a-lə̀w̃	'heir'	i-də́nə́n	'honor'	æ-ntíyèl̰ə́	'work'
a-yæ̀w̃	'Bassari person'	i-jùr	'tamarind'	æ-ncə̀l̰	'calabash'
		i-gəɣ	'clay'	æ-nkàl̰	'root/vein'
		i-gwác	'space'	æ-nkwə̀ỹ	'rag'
a-w̃èỹ	'Konyagi person'	i-mə̀nkw	'dew'	æ-mæ̀ỹ	'termite'
a-l̰èxə́	'guest'	i-nə́x	'game'	æ-nə́kà	'afternoon'
a-ỹèw̃	'enemy'	i-ñí	'elephant'	æ-ñǽnj	'cream'
		i-ŋə̀k	'chest'	æ-ŋómpě	'falcon'
		—		æ-ŋwə́ñə́x	'mat border'
a-və́l̰	'zombie'	i-ɓə̀l̰	'ash'	æ-mbú	'baobab'
a-ryə̀xwə̀r	'smith'	i-dɪ́r	'razor'	æ-ndæ̀gə́	'scar'
		i-ɣæ̀nk	'length'	æ-njóndá	'fireplace'

Figure 285: Three Konyagi noun classes enforcing different mutation grades

Mutation alternations can be seen when the same root appears in multiple classes requiring different mutation grades. The common singular/plural pairs with different mutation grades are:

sg.	pl.
i-II	wæ-I
(i-)I, Ø-I	wæ-II (and wæ-I)
u-I	wæ-II

Other uncommon pairs exist with a change in grade, but the vast majority of nouns that alternate from singular to plural are in one of these three class pairs. Examples of *i-II / wæ-I* and *u-I / wæ-II* pairs are given in Figure 286. Note that for *u-I* singular nouns beginning in /w/, the plural always has /g/ or /gw/, and never /b/.

i-II sg.	*wæ-I* pl.	
i-pǽl̰æ̀cə́	wæ-fǽl̰æ̀cə́	'horse'
i-tæ̀k	wæ-ræ̀k	'heel'
i-cæ̀lé	wæ-sæ̀lé	'chicken'
i-kóf	wæ-xóf	'nest'
i-kwə́l	wæ-xwə́l	'peanut'
i-bə́l̰	wæ-wə́l̰	'spiderweb'
i-dúry	wæ-lúry	'tuft of grass'
i-jǽp	wæ-yǽp	'handle/sleeve?' (*'manche'*)
i-gə́b	wæ-yə́b	'tail'
i-gwə́d	wæ-wə́d	'mango'
i-mə́ƴə́x	wæ-w̃ə́ƴə́x	'knot'
i-nìl̰	wæ-l̰ìl̰	'egg'
i-ñàw̃ənt	wə-ỹàw̃ənt	'crocodile'
i-ŋǽl̰	wæ-ỹǽl̰	'eyebrow'
i-ɓǽp	wæ-vǽp	'sheaf'
i-ɗónk	wæ-ryónk	'belly'
i-ƴàñ	wə-yàñ	'pitchfork'

u-I sg.	*wæ-II* pl.	
u-f̂ətél	wæ-pə̀tél	'flower'
u-rə́ñ	wæ-tə́ñ	'millet stalk bracelet'
u-sà	wə-cà	'arrow'
u-xæ̀n	wæ-kæ̀n	'palm leaf's central vein'
u-xwə̀sár	wæ-kwə̀sár	'bamboo bent around roof'
u-lə̀nkw	wæ-də̀nkw	'feather'
u-yə́y	wæ-jə́y	'side (of body)'
u-wús	wæ-gús	'whip'
u-wáy	wə-gwáy	'bamboo mat'
u-w̃æ̀cə́	wæ-mæ̀cə́	'name'
u-l̰ə̀ɗá	wæ-nə̀ɗá	'planted field'
u-ỹírəlǐ	wæ-ñírəlǐ	'sorghum grass necklace'
u-ỹə̀c	wæ-ŋə̀c	'grain'
u-væ̀lə́	wæ-ɓæ̀lə́	'scabbard'
u-ryæ̀t	wæ-ɗæ̀t	'rat path'
u-yə̀nt	wæ-ƴə̀nt	'creel'

Figure 286: Konyagi singular/plural noun pairs showing mutation alternations

Mutation alternations can also be seen in diminutive and augmentative formation, plant/fruit pairs, deverbal nouns, and adjectives. Examples of adjectives in each mutation grade are given in Figure 287.

Grade I	Grade II	Grade III	
-fólǽx	-pólǽx	-pólǽx	'empty'
-rə́kwá	-tə́kwá	-tə́kwá	'last'
-sə́r	-cə́r	-cə́r	'old (man)'
-xáf	-káf	-káf	'raw/unripe/green'
-wə́nkáák	-bə́nkáák	-mpə́nkáák	'adjacent'
-lə́nǽx	-də́nǽx	-ntə́nǽx	'heavy'
-yəlæ̀xə́	-gəlæ̀xə́	-nkəlæ̀xə́	'rotten'
-wúnkǽx	-gúnkǽx	-nkúnkǽx	'bitter'
-wǽmǽx	-gwǽmǽx	-nkwǽmǽx	'blessed/good-looking (inanim.)'
-w̃ééx	-méex	-méex	'bad/evil/ugly'
-l̠æ̀ỹəxə́	-næ̀ỹəxə́	-næ̀ỹəxə́	'big'
-ỹæ̀pǽx	-ñæ̀pǽx	-ñæ̀pǽx	'slow'
-ỹàlǽx	-ŋàlǽx	-ŋàlǽx	'one-eyed'
-væ̀l̠æ̀xə́	-ɓæ̀l̠æ̀xə́	-mbæ̀l̠æ̀xə́	'black'
-ryáw̃	-ɗáw̃	-ndáw̃	'certain'
-yǽw̃	-ƴǽw̃	-njǽw̃	'Bassari'

Figure 287: Konyagi adjectives in all three grades

2.4.2 Verbal mutation

The factors determining verbal mutation in Konyagi are perhaps the most complex of any Atlantic language (rivalled only by Kobiana). For one, there are seemingly many more inflected verb forms in Konyagi than in Bassari and Bedik— the full paradigm for a single verb occupies nine pages in Santos (1996: 546-554). Furthermore, all three grades are commonly employed in the verbal system, as opposed to only grades I and II in Bassari and Bedik. Mutation is sensitive to mood, subject, and negation. Santos also identifies "processive" and "inflectional" forms of each affirmative verb form, which invariably take grade III. Some isolated examples of verbal mutation are given below (see Santos 1996: 111-114, 234-235, and 546-554 for a full account).

(96) yəɗə̀-ɗ-é-ɓǔ-xò 'give (1st sg. non-anterior past passive imperfective)'
(97) njəɗə̀-ɗ-é-nì-xô 'give (3rd pl. non-anterior past passive imperfective)'

(98) njəɗəɗə́xò 'he gave (il donnait)'
(99) ƴəɗəɗélòl̠á 'he didn't give (il ne donnait pas)' (differs only in negation)

Unlike for Bassari, there is no single factor or even a reasonably small set of factors to which mutation can be attributed. The full set of factors that determines mutation is as follows:

- All "processive" and "inflectional" forms take grade III
- All negative forms take grade II
    - Except 3rd person plural forms, which are preceded by an optional subject marker, and take grade I
    - And "minimal mood" forms, which make use of an auxiliary *ntə́-*, with the verb subject to the same mutation patterns as affirmative forms
- All imperative forms take grade II

- All verbs with a full pre-verbal subject pronoun (as opposed to a suffixal subject marker) take grade I
- For all other verbs (affirmative, non-imperative verbs not preceded by a full subject pronoun, and neither "processive" nor "inflectional"), those with 3rd person subjects take grade III (and no subject-marking suffix), and all others take grade I
  - Except that in the "minimal mood," 1st person inclusive forms take grade III

In addition to all of these root-initial mutations, certain verbal affixes are subject to mutation in the presence of specific other affixes.

It must also be noted that the series /y~j~nc/ is never found in verbs, and /w~b~mp/ is extremely rare. As will be discussed in section 4, verbs which would have exhibited these alternations were analogically reassigned to the /y~ʄ~nj/ and /w~g~nk/ series.

3 Historical background

Bassari and Bedik form a rather close genetic grouping to the exclusion of Konyagi. They have 61% cognate terms on the Swadesh 100 word list by my own count. Konyagi has 34% cognate terms with Bassari and also 34% with Bedik. The main contact languages in the area are Fula and Malinke, with Fula more so in Senegal and Malinke in Guinea. This section will lay out the sound changes that took place between Proto-Tenda and the modern Tenda languages, which will be important in establishing cognates as well as understanding the origin of consonant mutation in these languages.

3.1 Sound correspondences and sound changes

3.1.1 Vowels

There is a great deal of inconsistency in the vowel correspondences between the Tenda languages. At least to some extent, these inconsistencies can probably be attributed to inaccurate documentation, as even within Ferry (1991), there are often discrepancies in the tense/lax values of vowels when words are cited in multiple locations. Many of the irregular correspondences involve a vowel in Bassari and/or Bedik with an unexpected tense/lax value. However even setting these cases aside, the number of irregular vowel correspondences is higher for the Tenda languages than for the other language families in this study. Of the 795 cognate sets identified so far, 195 have an irregular vowel correspondence, of which 67 are tense/lax discrepancies. Despite the high number of irregularities, we can establish regular vowel correspondences, and form a rather clear picture of the Proto-Tenda vowel system. This system is reconstructed as follows, given along with the regular correspondences in each language.

Proto-Tenda			Bassari			Bedik			Konyagi		
*i̟		*u̟	i		u	i		u	i		u
*i		*u	i		u	e̟		o̟	i		u
*e̟	*ə̟	*o̟	e̟	ə̟	o̟	ə̟	ɯ (ə̟)	o	æ	ə	o
*e	*ə	*o	e	ə	o	e	ə	o	e	ə	o
	*a̟			a̟			a (e)			a	
	*a			a			a			æ	

Figure 288: Proto-Tenda vowel system and reflexes in each language

The Proto-Tenda vowel system is reconstructed with two symmetrical sets of six vowels, one tense and one lax. This tense/lax distinction must have come from an earlier length distinction, which is confirmed by lexical comparison with other Atlantic languages (all of the families/languages in Figure 289 have a vowel length distinction). Whether the forms in Figure 289 are cognates or borrowings is irrelevant, as long as the borrowing occurred at some point when Proto-Tenda (or more accurately Pre-Tenda) still had a length distinction.

Proto-Tenda	Other Atlantic	
*-ri̟n	BKK *-de̟en	‘kapok tree’
*-ni̟n	BKK *-niin	‘egg’
*-ñu̟ññ	BKK *-ñuuñ, Fula ñuuñu	‘ant’
*-ɓu̟ʃ	Ser. ɓuus, Fula ɓuuc-	‘suck’
*ƴa̟kkəra	Joola F. ka-jaagal	‘jackal’
*-ne̟mɓ	Manj. *-niim	‘get lost’
*-xon	Cangin *hon	‘swallow’
*-ƴakk	Ser. ƴax, Fula ƴakk-	‘chew’
*-ɗim	Cangin *-ɗim, Bak *-rim	‘tongue’
*ji-fe ‘sheep’	Cangin *-pe, Manj. u-pɪ	‘goat’
*-xaʃ	Cangin *has, Ser. xas	‘new’
*-xoɗ	Cangin *koɗ	‘educate/rear’

Figure 289: Tenda tense/lax vowels corresponding to long/short vowels elsewhere in Atl.

In the case of *ə and *ə̟, these were almost certainly *not* the result of an earlier length distinction, as they do not line up with long/short vowels in other Atlantic languages (usually short, but long in a few cases).

Proto-Tenda	Other Atlantic	
*-rəm	FS *rim, Cangin *li̟m	‘give birth’
*-r̥əf	BKK *r̥uf	‘sew’
*-nəf	BKK *-nuf, PFS *-nof	‘ear’
*-ɓərə	FS *ɓir ‘milk (v)’	‘breast’
*-ʃəɗ	Cangin *sel, Pajade ku-cid	‘bird’
*-məʃ	Biafada-Pajade *məs	‘mouth’
*-ɣə̟r̥	BKK *si-ggi̟r̥, PFS *-ɣid	‘eye’
*-r̥ə̟ɓ	Cangin *toɓ, Fula toɓ-	‘rain’
*-ɣə̟r	BKK *-gi̟d	‘run’
*-yə̟m	FS *ɣim, Joola *-ki̟m	‘sing’
*-wə̟r	BKK *-bud, Biafafa bwəl	‘rot’
*-mə̟ɗɗ	Pajade mədd, Kob. -mudd	‘night/dark’

*Figure 290: Tenda *ə and *ə̟ both corresponding to short vowels elsewhere in Atlantic*

Rather, *ə and *ə̟ probably carry on an original quality distinction for these central vowels. Typologically, it is common in the area to lack a length distinction for non-low central vowels (cf. Wolof, in which only [ɐ] and [ə] cannot be long). It is hard to say whether at the time of

Proto-Tenda the tense vowels (other than *ə̟) would have still been longer than the lax ones, but since none of the modern languages have a length contrast, we can assume that already in Proto-Tenda vowel quality and not length was the primary distinguishing characteristic of these two sets of vowels. It should be stressed that this was not an ATR distinction, and that no vowel harmony would have operated in Proto-Tenda. The harmony systems which arose in Bedik and Konyagi are entirely incompatible, and cannot be reconstructed to any earlier stage.

The development of the Proto-Tenda vowels in each language is roughly as follows. In Bassari, the only change was to merge the tense/lax distinction in the high vowels[141]. In Bedik, the lax high vowels lowered slightly to become tense /e̟, o̟/. Tense *o̟ generally merged with lax /o/, though there are at least two words with /o̟/. Original tense *e̟ centralized to /ə̟/, and *ə̟ raised to /ɯ/ (note the chain shift: *i > e̟, *e̟ > ə̟, *ə̟ > ɯ), though some words with *ə̟ have /ə̟/ in Bedik. The distinction in the low vowels was merged, though some tokens of tense *a̟ end up as /e/ or /e̟/. Bedik also developed a system of vowel harmony (described in section 2.1.2) through mainly anticipatory assimilatory changes, affecting tautomorphemic vowels as well as vowels in preceding morphemes. In Konyagi, the tense/lax distinction was maintained only for the low vowels, with /æ/ being lax, and /a/ tense. Otherwise these pairs merged, except that *e̟ became /æ/. The vowel alternation /æ/→/ə/ before /a/ arose only after this *e̟ > /æ/ change, and in fact has not taken place in the northern dialect (Santos 1996: 12).

Cognates for each of the 12 proto-vowels are given below.

***i̟**	**= Ba. /i/**	**= Be. /i/**	**= Ko. /i/**	
*-ni̟	e-nînǐ	u-lí	l̰ì	'branch'
*-xi̟	-xí	-hí	-xí	'two'
*-ri̟	a̟-rǐ	u-rì	i-dí	'make/do'
*gaŋ-ri̟yenə	a-ndǐyèn	gi-ndìyél	æ-ntíyèl̰ə́	'work'
*er-wi	e-bì	i-bí	i-bì	'*Striga hermontica* grass'
*-ɓi̟		u-ɓì	i-ɓì	'melt'
*er-ni̟n		i-líl	i-nìl̰	'egg'
*-yi̟tt	a-njìt	gu-njít		'hole'

***i**	**= Ba. /i/**	**= Be. /e̟/**	**= Ko. /i/**	
*-ɓi	a̟-ɓî	o̟-ɓè̟	i-ɓí	'take in hand'
*fa-ʃin	o-pé̟ʃín	fè̟ʃè̟l	fæ-sìl̰	'donkey'
*-nix		o̟-lé̟h	i-nìx	'break/demolish'
*-ʃim	a̟-ʃìw	o̟-ʃé̟m		'be blind'
*-miʃ	a̟-w̃íʃ	o̟-mè̟ʃ		'strip leaves'
*-insult	a̟-ʃîr	o̟-ʃē̟r		'insult'
*-r̥iɓ	a̟-síɓ	o-sē̟ɓ		'be heavy/thick'
*er-fiŋŋ	e-pìŋ	i-pé̟ŋ		'excrement'

141 Refer to the discussion in section 2.1.1 on why Ferry's proposed high vowel distinction for Bassari is suspect.

***u̟**	**= Ba. /u/**	**= Be. /u/**	**= Ko. /u/**[142]	
*-ɓu̟ʃ	a̟-ɓûʃ	u-ɓùʃ	i-ɓús	‘suck’
*-nu̟	a̟-nuw	u-lū	i-nù	‘see’
*er-fu̟x	e-pùx	ma-fú	i-pə̀xw	‘ten(s)’
*-ɣu̟ʃ	a-ngwə̀ʃá̟	gi-ngùʃ	u-wús	‘whip’
*gaŋ-ɣu̟dd	a-ngúd	gi-wùd	æ-nkwə́d	‘mango tree’
*-ru̟		mɯ-dù	æ-lú	‘rainy season’
*gaŋ-ɣu̟r	a-ngùr	gi-ngùr		‘Kajoor pear tree’
*-ʃu̟	a̟-ʃú	u-ʃù		‘seep’

***u**	**= Ba. /u/**	**= Be. /o̟/**	**= Ko. /u/**[142]	
*-ɣur	e-ngùr	gi-ngó̟r	æ-mpùl	‘cricket’
*max-ɣu	o-gù	mó̟g	wæ-gù	‘oil’
*-ya̟nu	a-njà̟nú	gi-njó̟ló̟	æ-júl̰úl	‘leach’
*-yukk	a̟-yǔkw	o-yòkw	i-ƴə́kw	‘pound to remove bran’
*gaŋ-xuf	a-kùf	gi-kó̟f		‘*Sterculia setigera* tree’
*geŋ-ɣux	e-ngùx	gi-ngò̟		‘rope’
*-xuʃ	a̟-xǔʃ	o̟-hò̟ʃ		‘remove brush’
*geŋ-ɲutt	e-ɲùt	gi-ɲò̟t		‘eye socket’

***e̟**	**= Ba. /e̟/**	**= Be. /ə̟/**	**= Ko. /æ/**	
*-ŋe̟gg	a̟-ỹè̟g	a̟-ŋə̟́g	i-ŋæ̟̀g	‘burn’
*-fe̟ɗ(ɗ)	a-pè̟ɗ	gi-pə̟́ɗ	i-pæ̀ry	‘shoe’
*-xe̟mɓ	a̟-xè̟m	o̟-hə̟́m	i-kæ̀mb	‘be hard/strong’
*-ƴe̟mm	a̟-yè̟m	o̟-ƴə̟́mà	i-ƴæ̀m	‘be cold’
*gaŋ-ye̟nɗ	a-njè̟n	gi-njə̟́n	æ-ncæ̀nd	‘skin/shell’
*-ne̟mɓ	a̟-nè̟m	o̟-lə̟̀m	i-næ̀mb	‘get lost’
*-fe̟dd	a̟-fè̟d	o̟-fə̟́d	i-pæ̀d	‘be together/full’
*-fe̟ɗ	a̟-fè̟l	o̟-fə̟́ɗ	i-pæ̀ry	‘winnow’

***e =**	**Ba. /e/**	**= Be. /e/**	**= Ko. /e/**	
*gaŋ-ʃer̥	a-cês	ga-cēs	æ-cér	‘*Khaya senegalensis* tree’
*er-ñen	e-ñèn	e-ñél	i-ŋèl̰	‘coal’
*-re	a̟-rè	o-rē	i-dè	‘say’
*-feʃ	a̟-fèʃ	o-féʃ	i-pès	‘peel’
*gaŋ-xeʃa	a-ngèʃá	ga-ngēʃà	æ-kèsá	‘calabash spoon’
*-fen	e-pèn	e-pél	u-fèl̰	‘sword bean’
*ji-fe	i-fêỹì	jə-fè	i-fé	‘sheep’
*-re(kka)	a̟-rékká	o-rèkkà	i-dé	‘steal’

[142] Also /ə/ with labialization of an adjacent velar in Konyagi, and rarely Bassari.

***ə̟**	**= Ba. /ə̟/**	**= Be. /ɯ/**	**= Ko. /ə/**	
*gə̟ɗɗ	gə̟̀ɗ	gɯ̀ɗ	gə̀ɗ	‘down’
*nə̟mm	nə̟̀m	lɯ́m	l̰ə̀m	‘mother’
*gə̟ŋ-mə̟ɗɗ	gə̟-mə̟̀ɗ	gə̟-mɯ́ɗ	u-mə̀ɗ	‘night’
*-ɣə̟r̥	a-ngə̟̀s	gi-ngɯ̀s	-nkə́r	‘eye’
*r̥ə̟mm	sə̟̀m	sɯ́m	rə̀m	‘father’
*-r̥ə̟ɓ	a̟-sə̟̀ɓ	u-sɯ́ɓ	i-tə̀v	‘rain (v)’
*-wə̟r	a̟-wə̟̀r	u-wɯ́r	i-gə̀l	‘rot’
*-ʃə̟gg	a̟-ʃə̟̀g	u-ʃɯ́g	i-cə́g	‘fly (v)’
		= Be. /ə̟/ (less common)		
*-rə̟nn	a-ndə̟̀n	gu-ndə̟́n	lə̀n	‘snake’
*xaC-yə̟n	i-ké̟yə̟̀n	hə̟̀yʃə̟́l	xæ-jə̀l̰	‘wound (n)’
*-mə̟C	a̟-wə̟́ɗá̟	u-mə̟̀ɗ	i-mə́j	‘knot (v)’
***ə**	**= Ba. /ə/**	**= Be. /ə/**	**= Ko. /ə/**	
*-nəmb	a̟-nə̀mb	o-lə́mb	i-nə̀mpə́t	‘change’
*-yər	a̟-yə́rà	o-yə̀rá	i-ʃə́l	‘shoo flies’
*gaŋ-yən	a-njə́n	go-njə̀l	æ-ncə́l̰	‘caterpillar’
*-r̥əf	a̟-sə́f	o-sə̀f	i-tə́f	‘sew’
*-r̥əpp	a̟-sə̂p	o-sə̀p	i-tə́p	‘spit’
*-fətt	a̟-fə̂t	o-fə̂t	i-pə́t	‘untie’
*-ñər	a̟-ɣ̃ə̀r	o-ñə́r	i-ñə̀l	‘marry’
*-fən	a̟-fə̂n	o-fə́l	i-pə̀l̰	‘sprout’
***o̟**	**= Ba. /o̟/**	**= Be. /o/**	**= Ko. /o/[142]**	
*er-fo̟gg	e-pò̟g		i-pòg	‘penis sheath’
*er-fo̟ʃ	e-pò̟ʃ	e-pōʃ		‘lower back of the head’
*-r̥okka	a̟-sò̟ká	o-sókā		‘chew (tobacco)’
*a̟-r̥o̟xa̟r	a̟-só̟xá̟r	a-sóɣár		‘woman’
*-ʃo̟kk	a̟-ʃò̟kè	o-ʃók		‘lock (v)’
*er-ʃo̟nga	e-có̟ngwá	e-còngà		‘axe’
*gaŋ-{m/ɓ}o̟ɗ	a-mò̟l	ga-móɗ		‘shadow’
*-ŋo̟ɓ	a̟-ɣ̃ó̟ɓ	o-ŋòɓ		‘invert’
		= Be. /o̟/ (rare)		
*-xo̟m	a̟-xò̟w̃	o̟-hó̟m		‘close the eyes’
*-yoxo̟n	a-njòxó̟n	ɓe̟-yō̟wó̟l		‘*Mucana pruriens* bean’
***o**	**= Ba. /o/**	**= Be. /o/**	**= Ko. /o/[142]**	
*-ʃoy	a̟-ʃó	o-ʃòy	i-còy	‘stop up (w/ leaves, etc.)’
*-xoʃ	e-kóʃ	e-kòʃ	u-xósós	‘elbow’
*-r̥o	ɓa-tó	ga-tōtō	u-ró	‘saliva’
*-xocc	a̟-xwòc	o-hwóc	i-kwə̀c	‘gather/pick’
*-fokk	a̟-fòk	o-fók	i-pòk	‘hinder’
*geŋ-ɣott	e-ngòt	ge-ngót	i-nkòt ~ i-ŋòt	‘pole’
*-yokkonə	e-jòkwòn	e-jókwòl	yə́kwə̀l̰ə́	‘hare’
*-xond	a̟-xònd	o-hònd	i-kônt	‘snore’

***a̟**	**= Ba. /a̟/**	**= Be. /a/**	**= Ko. /a/**	
*gaŋ-ra̟n(n)ə	a-ndà̟n	ga-ndāl	æ-ntànə́	‘*Ficus glumosa* tree’
*ƴa̟kkəra	o-jà̟kkə́rá	ƴàkə̄rá	yákə́lá	‘jackal’
*-ƴa̟mb	o-ƴă̟mb	u-ƴāmb	æ-jàmp	‘millet stalk’
*-ɓa̟	a̟-ɓá̟	u-ɓàkəl	i-ɓá	‘be small’
*-xa̟r	a̟-xá̟r		i-kál	‘love meat’
*-ʃa̟ɗ	a̟-ʃà̟l		i-cáry	‘hunt’
		=Be. /e, e̟/		
*geŋ-ɣa̟w	e-ngà̟wù	ge-ngéw	i-nkàw	‘roan antelope’
*-ɣa̟ɓ	o-ŋá̟ɓ	e-géɓ	u-nkwàv	‘yam’
*-fa̟yƴ	e-pá̟ƴ	e-pèƴ	u-fâƴ	‘*Solanum torvum* plant’
*-xa̟ƴ	a̟-xà̟ƴ	o̟-héƴ	i-kày	‘lean (tr)’
*fa̟ccam	fă̟càw̃	fè̟cé̟m		‘moon/month’
*-ɗa̟	e-ɗà̟	i-ɗé̟		‘beer pot’[143]
***a**	**= Ba. /a/**	**= Be. /a/**	**= Ko. /æ/**	
*-ɓar̥ə	e-măs	gi-mās	æ-mbæ̀rə́	‘bee sp.’
*-xaŋ	a̟-xáɣ̃	u-hàŋ	i-kǽŋ	‘hang up’
*-ŋan	a̟-ɣ̃àn	u-ŋál	i-ŋæ̀l̰	‘love’
*xand-xand	e-kàndànd	hánd-hánd	kæ̀ntæ̀nt	‘giant eland’
*gaŋ-yang	a-njàng	ga-njáng	æ-ncæ̀nk	‘*Pterocarpus erinaceus* tree’
*-nacc	a-nâc	u-làc	i-nǽc	‘abort’
*-ʃan	e-cán	bāʃàl	æ-cǽl̰	‘tomorrow’
*-ʃapp	a̟-ʃàp	u-ʃáp	i-cæ̀p	‘split’
			= Ko. /a/ word finally	
*gaŋ-ʃa	a-cáxèʃ	ga-cá	æ-cá	‘*Detarium microcarpum* tree’
*-ʃa	e-càʃá	u-ʃā	æ-sâ	‘rainy season’
*-a	-a	-a	-a	anticausative/reflexive suff.
*-r̥a	o-tà		u-rà	‘buttock(s)’

Figure 291: Proto-Tenda reconstructions containing each of the 12 proto-vowels

One other regular vowel change of note is that word-final *ə is deleted in Bassari-Bedik (see also ‘work, hare, *Ficus glumosa*, bee sp.’ above).

	Bassari	Bedik	Konyagi	
*er-ɓərə	e-ɓər	e-ɓə̄r	i-ɓələ́	‘breast’
*-xondə	i-ngònd	e-gōnd	xòntə́	‘pestle’
*o-maccə	o-w̃ăc		u-w̃æ̀cə́	‘name’
*fonə		fól	fòl̰ə́	‘Gambia rat’

*Figure 292: Final *ə deleted in Bassari-Bedik*

Of the many irregular vowel correspondences, some involve the rounding or unrounding of a vowel, often next to a labial consonant.

[143] Probably borr. Malinke, cf. Bambara *dàa* ‘pot’

	Bassari	Bedik	Konyagi	
*-rəm	a̟-rôw̃	o-rə̀m	i-də́w̃	'beget'
*-yə̟m	a̟-ỹúw	u-yùm	i-ƴə́w̃	'sing'
*gaŋ-ɓə̟ɲŋ	a-mə̟́ɲà	ga-mòŋ	æ-mbə́ŋ	'shore'
*-ɣu̟bb	a̟-ɣə̀b	u-ɣúb	i-gùb	'harvest/break stalks'

Figure 293: Vowel rounding discrepancies between languages

When the only irregularity in a vowel correspondence is the tense/lax value of a vowel (or if it cannot be determined), I will use a capital letter in the reconstruction, e.g. *A, *E. In the case that a vowel correspondence shows further irregularities, I will simply use the symbol <V>.

In reconstructing the Proto-Tenda tones, we can simply follow those of Bassari and Konyagi (which are generally in agreement), and assume that Bedik underwent a tonal "polarity flip," while also developing mid tones from contour tones. Because the tonal reconstruction is in general so straightforward, and without any insight into the irregular cases, I will omit tone marks from reconstructed Proto-Tenda forms.

3.1.2 Consonants

The reconstructed Proto-Tenda consonants in non-word-initial position are given in Figure 294, along with their reflexes in each language.

Proto-Tenda			
f	r̥	ʃ	x
pp	tt	cc	kk
(mp)	(nt)	(nc)	(nk)
w	r	y	ɣ
bb	dd	jj	gg
mb	nd	nj	ng
ɓ	ɗ	ƴ	
ɓɓ	ɗɗ	ƴƴ	
mɓ	nɗ	nƴ	
m [w̃]	n [l̰]	ñ [ỹ]	ŋ [ɣ̃]
mm	nn	ññ	ŋŋ

Konyagi			
f	r	s	x
p	t	c	k
p	t	c	k
w	l	y	y/w
b	d	j	g
mp	nt	nc	nk
v	ry	y	
ɓ	ɗ	ƴ	
mb	nd	nj	
w̃	l̰	ỹ	ỹ/w̃
m	n	ñ	ŋ

Bassari			
f	s	ʃ	x
p	t	c	k
p	t	c	ng/k
w	r	y	ɣ
b	d	j	g
mb	nd	nj	ng
ɓ	l	ƴ	
ɓ	ɗ	ƴ	
m	n	ñ	
w̃	n	ỹ	ɣ̃
m	n	ñ	ŋ

Bedik			
f	s	ʃ	h/ɣ/Ø
p	t	c	k
p	t	c	ng/k
w	r	y	ɣ
b	d	j	g
mb	nd	nj	ng
ɓ	ɗ	ƴ	
ɓ	ɗ	ƴ	
m	n	ñ	
m	l	ñ	ŋ
m	n	ñ	ŋ

Figure 294: Proto-Tenda consonant inventory with modern non-word-initial reflexes

Word-initial consonants are somewhat different, and will be discussed in section 3.1.2.6. In Proto-Tenda there was a basic three-way distinction between singleton consonants, geminate consonants, and prenasalized consonants. Most of the singleton consonants were continuants, arising from an earlier lenition sound change affecting non-initial stops.

Pre-Tenda:	*p *f	*t	*c *ʃ	*k *x, h	*b *w	*d *r	*j *y	*g *ɣ
Proto-Tenda:	*f	*r̥	*ʃ	*x	*w	*r	*y	*ɣ

Figure 295: Proto-Tenda merging stop vs. continuant contrasts in non-initial position

There is no way to be certain that all of the Pre-Tenda consonants given in Figure 295 would have existed, but it seems a safe assumption given their existence in related families, and the preservation of some of these contrasts in word-initial position. Regardless, any singleton stop/continuant contrast in non-initial position was completely neutralized by the time of Proto-Tenda. The singleton implosive stops were likely still stops in Proto-Tenda, since they remain as such in Bedik and (except for *ɗ) in Bassari. The singleton nasals were probably lenited, given their realizations in Konyagi and Bassari (and note Bedik *n > /l/), though their realization as nasal stops in Bedik (except for *n) may indicate that they were not obligatorily lenited. I will simply use the symbols for nasal stops in reconstructions, though it should be kept in mind that these were probably already lenited at least optionally. For most of the geminate consonants, there is no guarantee that they were still phonetically geminated, since they could remain distinct from the singletons by their realization as stops as opposed to continuants (as in the modern languages). However, because gemination was almost certainly still the phonetically contrastive feature for the implosives, and perhaps also the nasals, I will reconstruct all of these consonants as geminate. The prenasalized consonants can be found in all non-initial positions. There is no conclusive evidence for the existence of the prenasalized voiceless stops, since their reflexes are in general the same as for the voiceless geminates. However there is one cognate where Bassari has /k/ and Bedik /ng/, for which we can reconstruct *nk (*-*fi̟nka* ‘pierce’). Note that it is entirely possible that the prenasalized obstruents were in fact prenasalized continuants [mf, mw], etc.

The remainder of this section will examine each of the proto-phonemes in detail, supported by cognate sets. Verbs will be cited in grade I for all languages.

3.1.2.1 Voiceless obstruents

The singleton voiceless obstruents are *f, *r̥, *ʃ, *x. The coronal consonant *r̥ is the lenition of earlier singleton *t, and develops to /s/ in Bassari-Bedik, and /r/ in Konyagi. The existence of a voiceless rhotic is common in languages spoken to the west (Manjak cluster languages, Bijogo, some Joola languages), and is also reconstructed for Proto-Bainunk-Kobiana-Kasanga as the lenition of earlier *t. Original *ʃ becomes *s in Konyagi, and /s/ continues to function as a palatal sound, just as in most other Northern Atlantic languages. Otherwise the correspondences are entirely straightforward.

*f	Bassari	Bedik	Konyagi	
*-fətt	-fə̂t	-fə̀t	-fə́t	'untie'
*-fokk	-fòk	-fók	-fòk	'hinder'
*-feʃ	-fèʃ	-féʃ	-fès	'peel'
*-fan	-fàn	-fál	-fæ̀l̰	'broadcast (seed)'
*-r̥əf	-sə́f	-sə̀f	-rə́f	'sew'
*gaŋ-nəf	a-nə̀f	ga-nə̄f	æ-nə̀f	'ear'
*gAf	gà̟f	gàf	æ-nkæ̀f	'head'
*-r̥əf	-sə̀f		-rə̀f	'follow'

*r̥	Bassari	Bedik	Konyagi	
*-r̥aŋ	-sǎw̃	-sáŋ	-rǽw̃	'cut/scarify'
*-r̥əpp	-sə̂p	-sə̀p	-rə́p	'spit (v)'
*-r̥akk	-sâk	-sàk	-rǽk	'lack/miss'
*-r̥Ar̥	-sà̟s	-sás	-ræ̀r	'three'
*gaŋ-ʃer̥	a-cês	ga-cēs	æ-cér	'*Khaya senegalensis* tree'
*er-ʃAr̥	i-càs	i-cás	i-càr	'knife'
*-ɲAr̥	-ỹá̟s	-ɲás	-ỹæ̀r	'bite'
*-fər̥	-fə̂s	-fə́s	-fə̂r	'cut (wood)'

*ʃ	Bassari	Bedik	Konyagi	
*-ʃi̟m	-ʃìw̃ú	-ʃùm	-síw̃	'overflow'
*-ʃƏn	-ʃə̟́n	-ʃə̀l	-sə́l̰	'smoke (v)'
*-ʃoy	-ʃó	-ʃòy	-sòy	'stop up (w/ leaves, etc.)'
*-ʃapp	-ʃàp	-ʃáp	-sæ̀p	'split'
*-xaʃ	-xáʃáx	-ɣàʃá	-xàsə̀k	'new'
*-xoʃ	e-kóʃ	e-kòʃ	u-xósós	'elbow'
*-ɓu̟ʃ	-ɓûʃ	-ɓùʃ	-vús	'suck'
*gaŋ-xeʃa	a-ngèʃá	ga-ngēʃà	æ-kèsá	'calabash spoon'

*x	Bassari	Bedik	Konyagi	
*-xi̟	-xí	-hí	-xí	'two'
*-xaŋ	-xáỹ	-hàŋ	-xǽŋ	'hang up'
*-xe̟mɓ	-xè̟m	-hə̟́m	-xæ̀mb	'be hard/strong'
*-xond	-xònd	-hònd	-xônt	'snore'
*-xAx	-xǎx	-hàh	-xàx	'expectorate'
*-xVx	-xə̀x	-hóh	-xùx	'drag'
*gə̟ŋ-fi̟x	pìx	gə̟-pîh	u-píx	'powder/flour'
*-nix		-lé̟h	-l̰ìx	'break/demolish'

Figure 296: Proto-Tenda reconstructions with singleton voiceless obstruents

The geminate voiceless stops *pp, *tt, *cc, *kk remain essentially unchanged in all three languages. While they are no longer geminate, they were crucially not subject to lenition.

*pp	Bassari	Bedik	Konyagi	
*-r̥əpp	-sə̂p	-sə̀p	-rə́p	‘spit (v)’
*-ʃapp	-ʃàp	-ʃáp	-sæ̀p	‘split’
*er-rəpp	e-də̀p		i-də̀p	‘trunk’
*-ɓopp	-ɓòp	-ɓóp		‘slap’

*tt	Bassari	Bedik	Konyagi	
*-nətt	-nə̂t	-lə̀tá	-l̰ə́t	‘scrub’
*-fətt	-fə̂t	-fə̂t	-fə́t	‘untie’
*geŋ-ɣott	e-ngòt	ge-ngót	i-nkòt ~ i-ŋòt	‘pole’
*-ətt	-ə́t	-ə̀t	-ə́t	reversive suffix

*cc	Bassari	Bedik	Konyagi	
*gaŋ-ʃəcc	a-cə̀c	ga-cèc	æ-cə̀c	‘bush’
*-rəcc	-rə̌cá	-rə̄c	-lə́c	‘fart’
*-nacc	-nâc	-làc	-l̰ǽc	‘abort’
*-xocc	-xwòc	-hwóc	-xwə̀c	‘gather/pick’

*kk	Bassari	Bedik	Konyagi	
*-ʏi̟kk/-ʏe̟kk	-ʏíkà̟	-ʏíké̟	-yǽk	‘be hot’
*-ɗAkk	-lâ̟k	-ɗāk	-ryǽk	‘sleep’
*-ɲakk	-ỹàk	-ɲák	-ỹæ̀k	‘be sharp’
*-ʃəkk	-ʃə̀k-ʃə̀ká	-ʃə̀k-ʃə̀ká	-sə̀k	‘be wet’

Figure 297: Proto-Tenda reconstructions with geminate voiceless obstruents

3.1.2.2 Voiced obstruents

The singleton voiced obstruents are *w, *r, *y, *ɣ. These are termed “obstruents” simply because their voiceless counterparts are obstruents, as are their geminate counterparts. In Konyagi, *r develops to /l/[144], and *ɣ to /y/, or /w/ next to a round vowel. *ɣ also rarely becomes /w/ or /y/ in Bassari and Bedik. All of these consonants except *r are extremely rare in non-root-initial position. In the modern languages, only Bassari has an appreciable number of non-root-initial /w, y/, and most of these come from a denasalized /w̃, ỹ/. Most non-root-initial instances of Konyagi /y/ come from *ʏ. It seems likely that most instances of original *y, *w, *ɣ were simply deleted except in root-initial position.

*r	Bassari	Bedik	Konyagi	
*-rə̟ɓ	-rə̟̀ɓ	-rɯ́ɓ	-lə̀v	‘eat by licking’
*-rEɓ	-rè̟ɓ	-réɓ	-lèv	‘draw by pyrography’
*-re	-rè	-rē	-lè	‘say’
*-ri̟	-rǐ	-rì	-lí	‘make/do’
*a̟-yara	a̟-yárà-	a-yārā-	a-yə́lá	‘inlaw’
*-ɣur	e-ngùr	gì-ngó̟r	æ-mpùl	‘cricket’
*-ñər	-ỹə̀r	-ñə́r	-ỹə̀l	‘marry’
*maŋ-ɓərə	o-mə̀r	ma-mə̄r	wæ-mbə̀lə́	‘milk’

[144] There is in fact nothing to stop us from reconstructing *[l], with a change to [r] in Bassari-Bedik. Either option requires a single phonetic change in one branch or the other.

*w	Bassari	Bedik	Konyagi	
*-wə̟r	-wə̟̀r	-wɯ́r	-wə̀l	‘rot’
*-wVf	-wèf	-wùf	-wə́f	‘stoke fire’
*-wVr̥	-wǐs		-wúr	‘vomit’
*-wu̟ggəra	-wùgə̟́rá	-wùgə̟̀ré̟		‘hit the water’
*-war	-wâr	-wār		‘be red’

*y	Bassari	Bedik	Konyagi	
*-yukk	-yǔkw	-yòkw	-yə́kw	‘pound to remove bran’
*-yVnn	-yìn	-yēn	-yə̀n	‘breathe’
*-yə̟m	-ỹúw	-yɯ̀m	-yə́w̃	‘sing’
*-yər	-yərà	-yərá	-yə́l	‘shoo flies’
*-ʃoy	-ʃó	-ʃòy	-sòy	‘stop up (w/ leaves, etc.)’
*gaŋ-ri̟yenə	a-ndǐyèn	gi-ndìyél	æ-ntíyèl̰ə́	‘work’
*kUyVtt	kúyít		kùyə́t	‘underneath’

*ɣ	Bassari	Bedik	Konyagi	
*-ɣi	-ɣì	-yé̟	-yè	‘be’
*-ɣu̟bb	-ɣə̀b	-ɣúb	-wùb	‘harvest/break stalks’
*-ɣUtt	-ɣút		-wə́t	‘empty the mortar’
*-ɣUr	-ɣùr		-wúl	‘fire pottery’
*-ɣə̟nd	-ɣə̟̀nd	-ɣɯ́nd		‘be pregnant’

Figure 298: Proto-Tenda reconstructions with singleton voiced obstruents

The geminate voiced obstruents *bb, *dd, *jj, *gg are basically unchanged, though they are no longer geminated. They are considerably less common than the voiceless geminates.

*bb	Bassari	Bedik	Konyagi	
*-ɣu̟bb	-ɣəb	-ɣúb	-wùb	‘harvest/break stalks’
*-ɣu̟bb	-ɣə́b	-ɣùb		‘pound (a 2nd time)’

*dd	Bassari	Bedik	Konyagi	
*gaŋ-ɣu̟dd	a-ngúd	gi-wùd	æ-nkwə́d	‘mango tree’
*-fe̟dd	a̟-fè̟d	o̟-fə̟́d	i-pæ̀d	‘be together/full’
*gaŋ-fƏdd	a-pə́d	gi-pə̟̀d		‘space between houses’

*jj	Bassari	Bedik	Konyagi	
*-ɣVjj	i-ngwèj	ño̟-ngó̟j	wòj	‘antelope sp.’
*-ɣə̟jj	-ɣə̟̀j	-ɣə̟̀j		‘fry’

*gg	Bassari	Bedik	Konyagi	
*-ʃə̟gg	-ʃə̟̀g	-ʃɯ́g	-sə́g	‘fly (v)’
*-ŋe̟gg	-ỹè̟g	-ŋə̟́g	-ỹæ̀g	‘burn’
*-nə̟ggətt		-lɯ̀gə̀t	-l̰ə̀gə́t	‘wake up’
*-xeggətta	-xèggə̆tá		-xègə́tá	‘cross (v)’
*-r̥ə̟gg	-sə̟̀g	-sɯ́g		‘be ripe’

Figure 299: Proto-Tenda reconstructions with geminate voiced obstruents

3.1.2.3 Implosives

The singleton implosives *ɓ, *ɗ, *ƴ lenite to /v, ry, y/ in Konyagi. In Bassari only *ɗ lenites to /l/, and in Bedik none of the implosives lenite.

*ɓ	Bassari	Bedik	Konyagi	
*-ɓaññ	-ɓáñí	-ɓàñ	-vǽñ	'forbid'
*-ɓan(əng)	-ɓànə́ng	-ɓálə̄ng	-væ̀l̰	'be black'
*-ɓa̟	-ɓá̟	-ɓàkəl	-vá	'be small'
*-ɓi	-ɓî	-ɓè̟	-ví	'take in hand'
*-rə̟ɓ	-rə̟̀ɓ	-rɯ́ɓ	-lə̀v	'eat by licking'
*-ɗVɓ	-lə̟́ɓá̟r	-ɗé̟ɓè̟	-ryæ̀v	'feed'
*er-xoɓ	e-kə̀ɓ	e-kóɓ	i-kóv	'pile of rocks'
*ʃVɓ	ʃé̟ɓ	ɓə-ʃè̟ɓ	sǽv	'tail'

*ɗ	Bassari	Bedik	Konyagi	
*-ɗong	-lòngw	-ɗóng	-ryə̀nkw	'be first'
*-ɗam	-làw̃	-ɗám	-ryæ̀w̃	'kill'
*-ɗVʃ	-lə́ʃ	-ɗə́ʃ	-ryæ̀s	'laugh'
*-ɗƏnn	-lə̟́n	-ɗə̀n	-ryə́n	'insert'
*-ɗAkke̟ɗ	-lâ̟ké̟l	-ɗə̟̄kə̟̀ɗ	-ryǽkǽry	'dream'
*-fe̟ɗ	-fè̟l	-fə̟́ɗ	-fæ̀ry	'winnow'
*-fƏɗ	-fə̟̀l	-fə́ɗ	-fə̀ry	'wrap up'
*-ʃƏɗ	a-cə̟́l	e-cə̀ɗ	sə́ry	'bird'

*ƴ	Bassari	Bedik	Konyagi	
*-ƴi̟kk/-ƴe̟kk	-ƴíkà̟	-ƴíké̟	-yǽk	'be hot'
*-ƴe̟mm	-ƴè̟m	-ƴə̟́mà	-yæ̀m	'be cold'
*-ƴV	-ƴè̟	-ƴé	-yì	'go'
*-ƴe̟pp	-ƴé̟p		-yǽp	'be bland'
*-xa̟ƴ	-xà̟ƴ	-hé̟ƴ	-xày	'lean (tr)'

Figure 300: Proto-Tenda reconstructions with singleton implosives

The geminate implosives *ɓɓ, *ɗɗ, *ƴƴ do not lenite in any language, though they are no longer geminate. Like the voiced egressive geminates, they are relatively uncommon.

*ɓɓ	Bassari	Bedik	Konyagi	
*-xVɓɓətt	-xóɓə́tá̟	-hóɓə̀t	-xùɓə́t	'strip bark'

*ɗɗ	Bassari	Bedik	Konyagi	
*gə̟ɗɗ	gə̟̀ɗ	gɯ̀ɗ	gə̀ɗ	'down'
*gə̟ŋ-mə̟ɗɗ	gə̟-mə̟̀ɗ	gə̟-mɯ́ɗ	u-mə̀ɗ	'night'
*-nVɗɗ	-nè̟ɗ	-láɗ	-næ̀ɗ	'sow'
*-xoɗɗ	a-kwòɗ	go-kə́ɗ	wæ-kwə̀ɗ	'sleep (n)'

*ƴƴ	Bassari	Bedik	Konyagi	
*-fa̟ƴƴ	e-pá̟ƴ	e-pèƴ	u-fâƴ	‘*Solanum torvum* plant/berry’
*er-ɣVƴƴ	e-gwàƴ	i-gə̟̀ƴ	i-gə̀ƴ	‘mud/clay’
*-xoƴƴ	-xòƴ	-hwóƴ	-xòƴ	‘wet (v)’

Figure 301: Proto-Tenda reconstructions with geminate implosives

3.1.2.4 Nasals

The singleton nasals *m, *n, *ñ, *ŋ were probably already optionally lenited as [w̃, l̰, ỹ, ɣ̃] in Proto-Tenda. In Konyagi they are all nasalized continuants, with *ŋ [ɣ̃] developing to /ỹ/, or /w̃/ next to a round vowel. In Bassari all but *n are nasalized continuants /w̃, ỹ, ɣ̃/, with *n being /n/. Sometimes *ŋ develops to /w̃/ or /ỹ/ in Bassari. In Bedik, all but *n are nasal stops /m, ñ, ŋ/, with *n [l̰] developing to /l/.

*m	Bassari	Bedik	Konyagi	
*-mənd	-w̃ə̌nd	-mə̀ndàl	-w̃ə́nt	‘resemble’
*-mVʃ	-w̃íʃ	-mè̟ʃ	-w̃ús	‘strip leaves’
*-mə̟C	-w̃ə̟́ɗá̟	-mə̟̀ɗ	-w̃ə́j	‘knot (v)’
*-makk		-māk	-w̃æ̀k	‘scar (v)’
*-nVm	-nè̟w̃	-lém	-l̰æ̀w̃	‘mix’
*-ʃAm	e-cà̟w̃	e-cám	i-sæ̀w̃	‘panther’
*-rəm	-rôw̃	-rə̀m	-lə́w̃	‘beget’
*-ɗim	a-nîw̃	i-ɗé̟m	ryə̀w̃	‘tongue’

*n	Bassari	Bedik	Konyagi	
*-nax	-nàx	-lá	-l̰æ̀x	‘four’
*-nu̟	-nuw	-lū	-l̰ù	‘see’
*-nəmb	-nə̀mb	-lə́mb	-l̰ə̀mpə́t	‘change’
*-ne̟mɓ	-nè̟m	-lə̟̀m	-l̰æ̀mb	‘get lost’
*gaŋ-yən	a-njə́n	go-njə̀l	æ-ncə́l̰	‘earthworm’
*geŋ-ɓAnə	e-mà̟n	gi-māl	i-mbæ̀l̰ə́	‘body’
*er-ʃən	e-cén	e-cə̀l	i-cə̀l̰	‘nose’
*-ʃan	-ʃàn	-ʃàl	-sǽl̰	‘leave’

*ñ	Bassari	Bedik	Konyagi	
*-ñər	-ỹə̀r	-ñə́r	-ỹə̀l	‘marry’
*-ñVma	-ỹé̟wá̟	-ñómà	-ỹə̀w̃á	‘scratch self’
*-ñəmb		-ñə̀mb	-ỹə́mp	‘immerse’
*-ñu̟gg	-ỹùgw	-ñùg		‘write/draw’
*-ɾ̥Vñ	e-tǎỹ	gi-tíñ	i-tâỹ	‘pile’
*-ɗa̟ñ	-lâ̟ỹ		-ryáỹ	‘lick’
*-xeñ	-xèỹ	-héñ		‘shout’
*er-xa̟ñ	e-kàỹ	i-gàñ		‘stone’

*ŋ	Bassari	Bedik	Konyagi	
*-ŋan	-ɣ̃àn	-ŋál	-ỹæ̀l̰	‘love’
*-ŋe̟gg	-ɣ̃è̟g	-ŋə̟́g	-ỹæ̟̀g	‘burn’
*-ŋAr̥	-ɣ̃á̟s	-ŋás	-ỹæ̀r	‘bite’
*-ŋakk	-ɣ̃àk	-ŋák	-ỹæ̀k	‘be sharp’
*-r̥aŋ	-sǎw̃	-sáŋ	-rǽw̃	‘cut/scarify’
*er-ɓa̟ŋ	e-ɓà̟ɣ̃	i-ɓáŋ		‘corner’
*-ɗoŋ	-lòɣ̃	-ɗɔ̀ŋ		‘be thick/viscous’

Figure 302: Proto-Tenda reconstructions with singleton nasals

The geminate nasals *mm, *nn, *ññ, *ŋŋ are degeminated, but are otherwise unchanged.

*mm	Bassari	Bedik	Konyagi	
*-ƴe̟mm	a̟-ƴè̟m	o̟-ƴə̟́mà	i-ƴæ̀m	‘be cold’
*nə̟mm	nə̟̀m	lɯ́m	l̰ə̀m	‘mother’
*r̥ə̟mm	sə̟̀m	sɯ́m	rə̀m	‘father’
*-ɗəmm	-lə̀m		-ɗə́m	‘close (eyes)’

*nn	Bassari	Bedik	Konyagi	
*a̟-ʃAnn	a̟-sóʃàn	a-ʃán	a-sæ̀n	‘man’
*-yVnn	-yìn	-yēn	-yə̀n	‘breathe’
*-ɗƏnn	-lə̟́n	-ɗə̂n	-ryə́n	‘insert’
*-rə̟nn	a-ndə̟̀n	gu-ndə̟́n	lə̀n	‘snake’

*ññ	Bassari	Bedik	Konyagi	
*-ɗAñña	-làñá	-ɗáñà	-ryàñá	‘lie on back’
*-ɓaññ	-ɓáñí	-ɓàñ	-vǽñ	‘forbid’
*-xəññ	-xə̀ñ		-xə́ñ	‘be right/straight’
*-yaññ	-ɣ̃àñə́t	-yáñ		‘spread fingers’

*ŋŋ	Bassari	Bedik	Konyagi	
*gaŋ-ɓə̟ŋŋ	a-mə̟́ŋà	ga-mòŋ	æ-mbə́ŋ	‘shore’
*er-fiŋŋ	e-pìŋ	i-pé̟ŋ		‘excrement’
*-r̥ə̟́ŋŋ	-sə̟̀ŋ	-sɯ́ŋ		‘pound’
*-fəŋŋ	-fə̂ŋ	-fòŋ		‘stop up’

Figure 303: Proto-Tenda reconstructions with geminate nasals

3.1.2.5 Prenasalized consonants

Proto-Tenda had three series of prenasalized consonants: voiced egressive, voiced implosive, and voiceless egressive. These might also be considered consonant clusters. In the case of the egressive consonants, it is possible that some or all of them were prenasalized continuants. The voiced prenasalized egressive consonants *mb, *nd, *nj, *ng are rather common. They are unchanged in Bassari-Bedik, but somewhat remarkably are devoiced in Konyagi as /mp, nt, nc, nk/. Cross-linguistically, post-nasal devoicing as a sound change is rare at best, but here there is no question that this took place in Konyagi. We can be sure that these consonants were originally voiced, based on their appearance root-initially as the result of consonant mutation. Here they are the nasal counterparts of the voiced obstruents, and never the voiceless ones (e.g. Konyagi /l~d~nt/ = BB /r~d~nd/). If these voiced prenasalized consonants were in fact continuants ([mβ, ŋɣ], etc.) this may help explain how they were able to devoice, since fricatives are more prone to devoicing. However, the non-prenasalized voiced obstruents were also certainly continuants, so there is no way to avoid the fact that these consonants devoiced in Konyagi only when they were prenasalized. This is especially surprising since even the voiced geminates do not devoice.

*mb	Bassari	Bedik	Konyagi	
*-ɣ̰amb	o-ɣ̰ǎmb	u-ɣāmb	æ-jàmp	'millet stalk'
*er-ɣamb	e-kàmb	i-gámb	i-gæ̀mp	'penis'
*-nəmb	a̰-nə̀mb	o-lə́mb	i-nəmpə́t	'change'
*-rəmbən	a-ndə́mbə́n		u-lə́mpə̂l̰	'thorn'

*nd	Bassari	Bedik	Konyagi	
*xand-xand	e-kàndànd	hánd-hánd	kæ̀ntæ̀nt	'giant eland'
*-xondə	i-ngònd	e-gōnd	xòntə́	'pestle'
*-mənd	-w̃ə̌nd	-mə̀ndàl	-w̃ə́nt	'resemble'
*-xond	-xònd	-hònd	-xônt	'snore'

*nj	Bassari	Bedik	Konyagi	
*-ɣənjV	ɓə-ɣə̌njè		æ-nkə́ncá	'chain(s)'
*-xanj		-hánj	-xæ̀nc	'be rough'
*gaŋ-xanjar	a-ngánjár	ga-kánjə̀r		'*Ficus capreafolia* tree'
*a̰-ɓanj	a̰-ɓânj	a-ɓànj		'sorcerer'

*ng	Bassari	Bedik	Konyagi	
*gaŋ-yang	a-njàng	ga-njáng	æ-ncæ̀nk	'*Pterocarpus erinaceus* tree'
*-yang	-ỹàng	-yáng	-yæ̀nk	'be wide'
*-ɗAng	-làng	-ɗàng	-ɗánk	'raise the head'
*-ʃənənga	e-cə́nə́ngá		u-sə́l̰énká	'okra'

Figure 304: Proto-Tenda reconstructions with prenasalized voiced obstruents

There was also a rather rare series of prenasalized implosives *mɓ, *nɗ, *nƴ. These develop to egressive prenasalized stops /mb, nd, nj/ in Konyagi, and plain nasal stops /m, n, ñ/ in Bassari-Bedik. Prenasalized implosives are much more common as a result of initial mutation, where they participate in series like Konyagi /v~ɓ~mb/ = BB /ɓ~ɓ~m/.

*mɓ, *nɗ	Bassari	Bedik	Konyagi	
*-xe̤mɓ	-xè̤m	-hə̤́m	-xæ̀mb	'be hard/strong'
*-ne̤mɓ	-nè̤m	-lə̤̀m	-l̰æ̀mb	'get lost'
*-nə̤mɓ		ɓi-nɯ́m	i-nə̀mb	'millet sp.'
*-fəmɓ		i-púm	fə̀mb	'tree stump'
*gaŋ-ye̤nɗ	a-njè̤n	gi-njə̤́n	æ-ncæ̀nd	'skin/shell'
*-xa̤nə̤nɗ		-hə̤̀lə̤̀n	-xálə́nd	'make stand/stop'

Figure 305: Proto-Tenda reconstructions with prenasalized implosives

There is very little evidence for voiceless prenasalized stops *mp, *nt, *nc, *nk, since their reflexes would be the same as for the voiceless geminates in each language, with the exception that *nk sometimes becomes /ng/ in Bedik and Bassari. There is one cognate pair with *nk: Bassari *-fíkà* = Bedik *-fíngé* 'pierce' reconstructed as **-fi̟nka*. Whether other voiceless prenasalized stops existed tautomorphemically in Proto-Tenda cannot be determined.

3.1.2.6 Consonants in word-initial position

In word-initial position, geminates and prenasalized consonants could not occur in Proto-Tenda. However, here it seems that the earlier distinction between stops and continuants was not entirely neutralized in all languages, as it was in non-initial position (see Figure 295). That is to say, whereas up to now there was no reason to assume the separate existence of singleton *r and *d, *k and *x, etc., evidence from initial position suggests that these singleton stop vs. continuant contrasts did exist in Proto-Tenda, and in some cases have been preserved in the modern languages.

Since most words are prefixed, and the prefixes themselves were subject to irregular reductions in Bassari and Konyagi, the main source of evidence for word-initial consonants comes from adverbs and unprefixed nouns[145]. This evidence can be rather difficult to assess, since many if not most unprefixed nouns in each language are borrowings. Even for the nouns that are not obviously borrowings, many have a CV(ŋ) syllable structure, as is typical of borrowings from Malinke. Furthermore, we cannot exclude the possibility that an unprefixed noun was once prefixed, and retains the mutated consonant enforced by the lost prefix. Nonetheless, there are enough non-borrowed unprefixed nouns and adverbs to give us some idea of how word-initial consonants developed in each language. Understanding the development of initial consonants will be important in determining the origin of mutation in the verbal system (section 6). Specifically, it is important to establish whether initial stops could remain as such, thereby merging with the grade II stops descended from geminates, or whether they would lenite even in initial position, merging with grade I consonants. If they could remain stops, there is no need to posit any prefix to account for verb-initial grade II consonants.

For each category of consonant (voiceless obstruent, voiced obstruent, implosive, nasal) we will examine the distribution of continuant- and stop-initial words which are not obviously borrowed in each language[146]. It is hoped that this will reveal which contrasts were possible in word-initial position in Proto-Tenda, as well as which consonants (if any) were subject to initial lenition in each language. Special consideration will be given to words that can be reconstructed for Proto-Tenda and which appear unprefixed in one or more of the modern languages. Of course we must allow for the possibility that certain stop vs. continuant contrasts were neutralized by lenition (even in initial position) in one or two of the modern languages, while remaining distinct in the other language(s). Furthermore it may be that even in Proto-Tenda, certain consonants were already lenited in initial position, while others were not.

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[145] We might also consider unprefixed verb forms, but here the effects of analogy may have reshaped the mutation of initial consonants in a way that no longer reflects their outcome by regular sound change (see section 6.1).
[146] The counts given are for nouns only. While adverbs are also considered, they are not included in the counts.

Voiceless obstruents:

	Ba.	Be.	Ko.
p	2	3	1
t	0	7	6
c	5	10	3
k	22	30	29
f	10	25	15
r̥	10	12	13
ʃ	34	43	45
x	13	16	22

Figure 306: # of Tenda non-borrowed unprefixed nouns with initial voiceless obstruents

	Bassari	Bedik	Konyagi	
*tAkk	ták̟		tǽk	‘all’
*tocc	tócc	tócc		‘last time’
*kUyVtt	kúyít		kùyə́t	‘underneath’
*kəmm(-a̟ɗi̟)	o-kə́má̟lì	kúmáɗì	kə̀m-kə̀m	‘(stomach) ache’
*kandIkka	kàndíká		kǽntíká	‘scarf’
*fa̟ccam	fă̟càw̃	fè̟cé̟m		‘moon/month’
*feɗe		féɗé	fèryè	‘long-tailed nightjar’
*fonə		fól	fòl̰ə́	‘Gambia rat’
*-fəmɓ		i-púm	fə̂mb	‘tree stump’
*-fettE	a-pété̟	fèté		‘baboon’
*-fan(d)accə		fándàc	i-pǽl̰æ̀cə́	‘horse’
*r̥ə̟mm	sə̟̀m	sɯ́m	rə̀m	‘father’
*-r̥appar	sàpàr	i-tápár		‘foot’
*-r̥otto	sótó	go-tótó		‘banded mongoose’
*-r̥ə̟ɓ	a-tə̟̀ɓ	gɯ-tɯ́ɓ	rə̀v	‘rain’
*ʃongo	ʃòngò		sònkò	‘millet sp.’
*ʃa̟nA		ʃàlà	sál̰á	‘palm rat’
*ʃVɓ	ʃé̟ɓ	ɓə-ʃè̟ɓ	sǽv	‘tail’
*ʃAmar	ʃá̟w̃âr	ʃāmàr	sǽw̃ǽl	‘monitor lizard’
*-ʃAtt	o-ʃá̟t		sǽt	‘blood’
*-ʃəɗ	a-cə̟́l	e-cə̀ɗ	sə́ry	‘bird’
*-ʃa	ʃàcá	i-cá, cácán		‘grandfather’
*-ʃa̟kk	a̟-ʃă̟k	ʃākàr		‘fortune teller’
*-xu̟mmA		ña-kúmà	xwə̀má	‘red-flanked duiker’
*-xondə	i-ngònd	e-gōnd	xòntə́	‘pestle’
*-xa̟yʕ	xà̟yʕ	o̟-hé̟yʕ		‘ladder’
*-xa̟r̥	o-kă̟s	hás		‘*Hyparrhenia rufa* grass’

Figure 307: Possible Tenda unprefixed cognates with initial voiceless obstruents

For the voiceless obstruents, it seems that at least a contrast between *x (or perhaps *h) and *k existed. All three languages have a sizeable number of unprefixed nouns with each of these two consonants, and there exist potential Proto-Tenda reconstructions with initial *k as well as *x. A contrast between *t and *r̥ is also possible, but much less certain. There are fewer relevant modern forms, and I suspect that the two reconstructions with initial *t are in fact borrowings that I have been unable to identify. For *p vs. *f and perhaps also *c vs. *ʃ, it seems likely that the contrast had already been lost in favor of the continuants, as no *p- or *c-initial words can be reconstructed, and relatively few modern words begin with /p, c/.

Voiced obstruents:

	Ba.	Be.	Konyagi
b	10	10	5
d	11	7	3
j	5	9	2
g	7	7	1
w	1	2	5
r	1	0	16
y	9	4	25
ɣ	2	1	—

Figure 308: # of Tenda non-borrowed unprefixed nouns with initial voiced obstruents

	Bassari	Bedik	Konyagi	
*dorV	dórô		dòlə́	‘today’
*dəɓacc	də́ɓàc	də̄ɓác		‘germinated millet’
*gə̟ɗɗ	gə̟̀ɗ	gɯ̀ɗ	gə̀ɗ	‘down’
*ga̟kkV	gà̟kó		gàkî	‘now’
*genge	géngě	gèngé		‘resting platform’
*gAf	gà̟f	gàf	æ-nkæ̀f	‘head’
*-ɣVjj	i-ngwèj	ño̟-ngó̟j	wòj	‘antelope sp.’
*-rə̟nn	a-ndə̟̀n	gu-ndə̟́n	lə̀n	‘snake’

Figure 309: Possible Tenda unprefixed cognates with initial voiced obstruents

For the voiced obstruents, it is clear that most if not all of the stops were possible in initial position. In Bassari and Bedik these initial voiced stops are still common (much more so than the continuants), and even the Bedik class prefixes preserve /g/ and /j/. It Konyagi it seems that these stops were usually lenited word-initially, given the high number of *r-* and *y-* initial words relative to BB— however a number of stop-initial words are found in Konyagi, some with clear cognates. The status of the continuants is less clear. With perhaps the exception of /y/, initial voiced continuants are very rare in BB, suggesting that they may not have been possible in Proto-Tenda, or else were somewhat rare. For our purposes, the important point is that initial voiced stops certainly existed and were not subject to lenition in Bassari-Bedik, whereas these same stops were subject to lenition intervocalically and word-finally after a vowel.

Implosives:

	Ba.	Be.	Ko.
(v)	—	—	7
(l/ry)	15 (l)	—	18 (ry)
(y)	—	—	25
ɓ	14	10	5
ɗ	1	16	4
ʄ	6	2	2

Figure 310: # of Tenda non-borrowed unprefixed nouns with initial implosives

	Bassari	Bedik	Konyagi	
*ɗokkotta	o-ɗókwə̀tâ	ɗōkótá		'mask sp.'
*ɗamm	ɗám	ɗàm		'close (adv)'
*-ɗim	a-nîw̃	i-ɗẹ̟́m	ryə̀w̃	'tongue'
*-ɗar	làr	ɓə-ɗár		'river'
*-ɗamen	e-nàwén	ɗámèl		'*Andropogon tectorum* grass'
*-ʄịŋ	e-ʄíy	i-ʄìŋ	yə́w̃	'forehead'
*ʄạkkəra	(o-jạ̀kkə́rá)	ʄàkə̄rá	yákə́lá	'jackal'

Figure 311: Possible Tenda unprefixed cognates with initial implosives

For the implosives (and nasals) no question of phonemic contrast in Proto-Tenda is at stake, but it is still important to establish the regular outcomes of these sounds in each language. In Bedik the implosives never lenite in any position, and in Bassari only *ɗ lenites to /l/. It seems that in Bassari this lenition also affected initial *ɗ, though 'close' and the noun *ɗòxọ́ñà* '*Rungia eriostachya* plant' are unexplained. In Konyagi it seems that initial implosives generally lenited, but some unexplained implosive stop-initial words do exist.

Nasals:

	Ba.	Be.	Ko.
w̃	0	—	3
l̰/l	—	10 (l)	14 (l̰)
ỹ	16	—	11
ɣ̃	0	—	—
m	4	6	2
n	9	3	0
ñ	2	14	0
ŋ	1	5	0

Figure 312: # of Tenda non-borrowed unprefixed nouns with initial nasals

	Bassari	Bedik	Konyagi	
*nə̟mm	nə̟̀m	lɯ́m	l̰əm	‘mother’
*nu̟w?		lú	l̰əw̃	‘song’
*nox	nòx	lóhò		‘who?’
*-ni̟	e-nînǐ	u-lí	l̰ì	‘branch’
*-nənwətt	a-nə́mbə́t		l̰ə́nkə́t	‘root’
*ñer-ñer	ỹé̟r-ỹé̟r	ñér-ñér		‘striped’
*ñar̥	ỹàs	ñás	fæ-ỹær	‘meat’
*məʃ		ɓə-mə̀ʃ	w̃ə́s	‘lip(s)/mouth’

Figure 313: Possible Tenda unprefixed cognates with initial nasals

In Konyagi all initial nasals lenited. In Bedik the only nasal to lenite in any position is *n to /l/, just as in word-initial position. Bassari is the most interesting as well as the least conclusive. In non-initial position, all nasals other than *n lenite, but it seems that word-initially *m and *ŋ did not lenite, while *ñ did, though this conclusion is based on very little evidence.

In conclusion, it does seem that some consonants which invariably lenited in non-initial position avoided lenition in initial position in each language. The unlenited consonants yielded by regular sound change in word-initial position in each language are summarized in Figure 314:

	p	t	c	k	b	d	j	g	ɓ	ɗ	ƴ	m	n	ñ	ŋ
Ba.	—	—	—	y	y	y	y	y	(y)	—	(y)	y	y	—	?
Be.	—	?	—	y	y	y	y	y	(y)	(y)	(y)	(y)	—	(y)	(y)
Ko.	—	?	—	y	y?	?	?	?	—?	—?	—?	—	—	—	—

Figure 314: Tenda unlenited consonants in word-initial position by regular sound change

A ‘—’ indicates that that sound was always lenited in initial position. A (y) in parentheses indicates that the sound never lenited in any position in that language. Thus, the particularly relevant cells are those with a plain ‘y,’ indicating that the sound did lenite non-initially, but seems to have remained unchanged in word-initial position.

3.1.2.7 Other consonant changes and issues

Voiceless *x is often voiced in Bedik, and less often Bassari. Recall that in both languages the grade III alternate of this consonant is often /ng/. The southern dialects of Bassari voice *x consistently, and the inconsistent voicing in the other dialects and Bedik must be attributed to dialect borrowing/mixture.

	Bassari	Bedik	Konyagi	
*-xaʃ(ʃ)	-xác	-ɣáʃ		'castrate'
*-xaf	-xàf	-ɣāf		'raw/green'
*-xOf	-ɣəf		-xòf	'clear brush'
*-xonɗəf	gʷənəf		xwəndəf	'spirit that one fights with'
*a̤-r̥oxa̤r	a̤-só̤xá̤r	a-sóɣár		'woman'
*-xonə̤ng	ɣónə̤ng		u-xòḻənk	'leg'
*-xaʃ	-xáʃáx	-ɣàʃá	-xàsək	'new'
*er-xa̤ñ	e-kà̤ỹ	i-gàñ		'stone'
*-xondə	i-ngònd	e-gōnd	xòntə́	'pestle'
*-xe̤r̥-ke̤r̥	-xés-késǎ	-ɣə̤́s-ɣə̤́s		'be pointed'

Figure 315: Voicing of Proto-Tenda *x

In Bedik *x is often deleted when not stem-initial, usually next to a round vowel.

	Bassari	Bedik	Konyagi	
*gaŋ-r̥əx	a-tə̆x	ga-tò	æ-tə́x	'tree'
*er-fṳx	e-pùx	ma-fú	i-pəxw	'ten(s)'
*-nax	-nàx	-lá	-ḻæ̀x	'four'
*-fox	-fôxw	-fò		'be full'
*-foxa	-fòxwá	-fōwà		'clap'
*geŋ-ɣux	e-ngùx	gi-ngò̤		'rope'
*-yox	-yóx	-yò		'dare'

Figure 316: Deletion of *x *in Bedik*

Velar consonants are often labialized next to a round vowel, with the vowel becoming /ə/ in Konyagi and sometimes in Bassari. This is more common in Konyagi than in Bassari or Bedik.

	Bassari	Bedik	Konyagi	
*-xocc	-xwòc	-hwóc	-xwəc	'gather/pick'
*-yokkonə	e-jòkwòn	e-jókwòl	yə́kwəḻə́	'hare'
*-rong	e-ndòngw	ge-ndóng	u-lənkw	'feather'
*-ɗong	-lòngw	-ɗóng	-ryənkw	'be first'
*-xocc-	-xwòcə́rá	-hócə́tá	-xwəcá	'undress'
*gaŋ-ɣṳdd	a-ngúd	gi-wùd	æ-nkwə́d	'mango tree'
*er-fṳx	e-pùx	ma-fú	i-pəxw	'ten(s)'
*-ɣṳʃ	a-ngwəʃá̤	gi-ngùʃ	u-wús	'whip'
*-xoƴƴ	-xòƴ	-hwóƴ	-xòƴ	'wet (v)'

Figure 317: Labialization of Tenda velar consonants next to a round vowel

In Bassari, /y, w/ are often nasalized in the presence of another nasal segment. Similarly, /ỹ, w̃/ are often denasalized in this same environment. Occasionally this denasalization change occurs even in the absence of another nasal.

	Bassari	Bedik	Konyagi	
*-yə̩m	-ỹúw	-yùm	-yə́w̃	'sing'
*-ƴi̩ŋ	e-ƴíy	i-ƴìŋ	yə́w̃	'forehead'
*-ñVma	-ỹé̩wá̩	-ñómà	-ỹə̀w̃á	'scratch self'
*-yang	-ỹàng	-yáng	-yæ̀nk	'be wide'
*-r̥im	-sìw	-sé̩m	-rə̀w̃	'be deep'
*-ɣə̩mɓ(-ətt)	-ỹà̩ɓət	-ɣùm	-yə́mbétá	'burp'
*-ŋam	-ỹàw		-ỹæ̀w̃	'be distant'
*-yen	-ỹèn	-yél		'lay out'

Figure 318: Nasalization and denasalization of voiced continuants in Bassari

It is possible that *l existed in Proto-Tenda, based on the following potential cognates.

Bassari	Bedik	Konyagi	
là̩wó̩		làwó	'friend'
-ɣə̩̀l	-ɣə́l		'swallow'
ngàlén	ma-ngàl	u-nkwàlél̰	'lightly fermented beer'
e-kə́lə́m	i-kə̀l		'ball (of food)'
-xə́lá		-xə̀lá	'ask pardon'
o-ngó̩là		wæ-kòlá	'Malinke language'
də̩̂lí		væ-ntə̀lí	'*Sorghum guineense*'
ƴálángó		u-yǽlǽnkònə́	'cram-cram (grass)'
-làpá	-lápá		'alight'
màlú	mālò̩ŋ	æ-màlú	'rice'
a-ngò̩l		æ-nkòl	'village'

Figure 319: Potential evidence for reconstructing Proto-Tenda *l

However, it is suspicious that only two of these are found in all three languages. It may be that all of these are borrowings— 'rice' is certainly a borrowing from Mande. Pajade *laao* 'friend' may have been borrowed into Konyagi and Bassari. 'Swallow' is probably not a borrowing, but there is also *-ɣə̩̀ɗícá* 'swallow' in Bassari, suggesting a reconstruction with *ɗ, with the Bedik development to /l/ being irregular. Throughout this chapter we will assume that no consonant *l existed in Proto-Tenda.

4 Mutation sound changes, and the status of mutation in Proto-Tenda

Looking at the modern mutation systems, and with our understanding of the Proto-Tenda consonant inventory established in section 3.1.2, we could propose a mutation system for Proto-Tenda as follows:

Grade I	f	r̥	ʃ	x	w	r	y	ɣ	m	n	ñ	ŋ	ɓ	ɗ	ƴ
Grade II	pp	tt	cc	kk	bb	dd	jj	gg	mm	nn	ññ	ŋŋ	ɓɓ	ɗɗ	ƴƴ
Grade III	mp	nt	nc	nk	mb	nd	nj	ng	mm	nn	ññ	ŋŋ	mɓ	nɗ	ñƴ

Figure 320: Possible mutation system of Proto-Tenda

After the application of the regular sound changes described in section 3.1.2, this proto-system would for the most part naturally result in the modern mutation systems of each language. If this system indeed operated already in the proto-language, the sound changes resulting in consonant mutation would have taken place in some Pre-Tenda period, with no possibility of divergent regular developments in each language (of the sort seen between Fula and Sereer, see chapter 2 section 4.6). For the most part, this assumption is successful in accounting for the modern mutation patterns, along with some analogical changes (see section 5.8). However, there are a few issues that cast doubt on the idea that a fully-formed mutation system like that in Figure 320 already operated in Proto-Tenda.

First is the development of the coronal nasal series in Bedik. In modern Bedik, this series is /l~l~n/, notably with /l/ in grade II as well as grade I. In the verbal system, /l/ appears without exception in grades I and II[147]. And yet, we know that the regular reflex of *nn in Bedik is /n/, represented by the n:n:n correspondence set between the three languages (see Figure 303). In Bassari and Konyagi, grade II of this series is /n/ as expected. There is no way to easily explain the use of grade II /l/ in Bedik by analogical change. All other nasal series are non-alternating in Bedik, so if anything we might have expected /n/, rather than /l/, to be analogically extended. Bedik grade II /l/ can only be explained by investigating the specific prefix(es) which historically triggered grade II in Bedik. We will see in section 5 that only a few nominal prefixes ended in an oral consonant, which led to the triggering of the originally geminate grade II in Tenda. Of these prefixes, essentially only **er-* survives in Bedik as the modern *e-II* class. The plural **max-* did survive, but is extremely rare in Bedik, and Ferry gives no /n/- or /l/-initial nouns in this plural class. The use of /l/ in grade II within the verbal system is entirely expected given the historical origin of verbal grade II in Bassari-Bedik (see section 6). These grade II verb forms were simply unprefixed, and thus the consonant developed as would any word-initial consonant, which for *n is to /l/ in Bedik (see section 3.1.2.6). Since essentially the only trigger of Bedik grade II was the noun class prefix **er-*, we can explain grade II /l/ if we assume that *n-initial nouns in this class retained a sequence *[rl̰], which developed to [l], as distinct from *[nn], which developed to [n]. Thus, the *e-II* noun *i-líl* 'egg' would be reconstructed as **er-n̟in* [ɛrl̰il̰]. Of course, this explanation is incompatible with the idea that a mutation grade *n~nn~nn existed already in Proto-Tenda. At least for this class prefix, the marker-final consonant must not have already fully assimilated to all root-initial consonants.

Second is the mutation of historical *ɣ and *w in Konyagi. The regular development of *ɣ in Konyagi is to /w/ or /y/, usually determined by the vocalic context. As such, a velar series /w~g(w)~nk(w)/ exists alongside a labial series /w~b~mp/. Due to the overlap between these series with /w/ in grade I, roots originally in one are sometimes analogically reassigned to the other. In general the tendency is for original labial /w/ to be reinterpreted as part of the velar /w~g~nk/ series, but the opposite direction is attested in at least 'cricket' below. These analogical changes are most often seen in verbs, where the tendency is to overwhelmingly prefer the velar series.

[147] There is perhaps only one instance of a native Bedik root with an exceptional /n/ in grade II, being *i-níní* 'sand.' However in Bassari we find *e-ɗìnì*, suggesting that this root was originally *ɗ-initial, assigned to a nasalizing class in Bedik alongside e-II, and then the nasal form of the root was extended to the e-II noun.

	Bassari	Bedik	Konyagi	
*-wVcc		u-wīc	i-gə̀c	'unearth'
*-wVx	a̙-wòx		i-gùx	'dry up'
*-wett	o-bèt (pl. n)		i-gwètá (v)	'bow-leg(ged)'
*-wə̙r	a̙-wə̙̀r	u-wʉ́r	i-gə̀l ~ i-bə̀l	'rot'
*-wVf	a̙-wèf	u-wùf	i-bə́f ~ i-gə́f	'stoke fire'

Figure 321: Reanalysis of *w-*initial roots as velar in Konyagi*

However for some nouns, the analogical explanation is less likely, since they would not have appeared in grade I with /w/.

	Bassari	Bedik	Konyagi	
*-ɣur	e-ngùr	gi-ngó̙r	æ-mpùl	'cricket'
*-wun(n)		gi-wó̙l	æ-gwə̀n	'shea tree'
*gaŋ-wVf(-a̙)	a-mbèfá̙	gi-mbùfè	væ-mpə̀f ~ væ-nkə̀f	'bellows'

Figure 322: Unexpected outcomes of *w *and* *ɣ *in Konyagi noun mutation*

For 'shea tree' and 'bellows' analogy is possible due to the existence of *u-wə̀n* 'shea fruit' and the verb forms of 'stoke fire' above, but for 'cricket' no such explanation is possible. This root appears only in *æ-III* and its plural *væ-III* in Konyagi, and thus would have always been prenasalized in all environments (BB use **geŋ-/ɓeŋ-*, but these are still nasal classes). If there was already an established grade III form **-ngur* of this noun root in Proto-Tenda, there is no way to explain the Konyagi form with /mp/. Rather, this noun must be reconstructed as **gaŋ-ɣur* or **geŋ-ɣur*, which could regularly develop to **gaŋ-wur* and then to *æ-mpùl* in Konyagi. The crucial point is that if the fully-fledged mutation series presented in Figure 320 existed already in Proto-Tenda, the prenasalized stops *mb and *ng would have already existed to the exclusion of the sequences *Nw and *Nɣ. If this were the case, it would be very difficult to explain the Konyagi developments, especially in 'cricket.'

A similar argument can be made regarding /ƴ/ and /y/ in Konyagi. Because the regular development of singleton *ƴ is to /y/ in Konyagi, two palatal mutation series containing /y/ arose naturally: /y~j~nc/ from earlier *y or *j, and /y~ƴ~nj/ from earlier *ƴ. This overlap allowed for many analogical reassignments from one mutation series to another— most notably all verbs and adjectives were transferred to the implosive series. However, in the case of some nouns which never appeared in grade I, analogy cannot be invoked as an explanation for why a historically *ƴ-initial root now has /j/ or /nc/. Two such nouns are 'stalk' in *æ-III* and 'wound' in *xæ-II*:

	Konyagi	Bassari	Bedik	
*gaŋ-ƴa̙mb	æ-ncàmp	o-ƴămb	u-ƴāmb	'(millet) stalk'
*xaC-ƴə̙n	xæ-jə̀l̰	i-kéƴə̀n	hə̙̀ƴə̙́l	'wound'

Figure 323: Two *ƴ-*initial nouns unexpectedly in the Konyagi* /y~j~nc/ *series*

The plural of Konyagi 'stalk' is in *væ-III* and the plural of 'wound' is *wæ-xæ̀jə̀l̰*, and so these roots would have never appeared in grade I. If a fully-formed mutation system existed in Proto-Tenda, the original forms would have been **ga-nƴa̙mb* and **xa-ƴƴə̙n*, which could only have developed /nj/ and /ƴ/ as initial consonants respectively. However, if we assume that the

Konyagi-specific change of *ɣ to /y/ took place when the prefix was still unassimilated to the following root, the development of **gaŋ-ya̤mb* and **xaC-yə̤n* to their modern forms with /nc/ and /j/ would be entirely natural. Of course the continued existence of the implosive palatal series proves that many instances of *ɣ were affected by mutation in Konyagi before they would have developed to /y/, but for at least some nouns it seems likely that mutation did not arise until after the *ɣ > y change, which of course took place after the breakup of Proto-Tenda.

The picture that emerges for Proto-Tenda is one in which a sort of preliminary mutation system had already begun to form through assimilation of prefix-final consonants to root-initial consonants. However, these assimilation processes could not have been obligatory in all cases, and the full form of the original prefix with its final consonant in tact must have remained as an option at this stage. There was likely variation between the assimilated and unassimilated form of the prefix, such that a C-C sequence across a morpheme boundary could in some cases be pronounced as a geminate or homorganic prenasalized stop, while (perhaps in more formal speech) could retain a more conservative, unassimilated pronunciation.

5 Origin of nominal mutation: Noun class

Mutation in the nominal system is triggered by noun class. Historically, this is the result of interactions between the final segment of the noun class prefix and the initial segment of the following root. Vowel-final noun class prefixes resulted in regular lenition of the root-initial consonant, a process which had already taken place both within and across morphemes in Proto-Tenda. Nasal-final noun class prefixes resulted in a prenasalized stop (Grade III), and class prefixes ending in certain oral consonants resulted in geminates (Grade II). In what follows we will undertake a reconstruction of the Proto-Tenda noun class system with particular attention to the phonological form of the prefix, and specifically the identity of the final segment of each prefix. For Tenda, the identification of cognate classes presents few complications for the most part, especially between Bassari and Bedik. However certain classes that have become fossilized in one language or another or which have shifted use through analogical change are not so straightforward. More detailed discussions of each class (including their semantics) are presented in sections 5.1-5.5, but we can begin with an overview of the cognate markers and their reconstructed forms, along with an explanation of how these reconstructions were arrived at.

Most evidence for the phonological form of the class prefixes comes from Bassari and Bedik, which make use of distinct determiners that are not predictable from the form of the prefix on nouns (as they are in Konyagi). These determiners preserve elements of the prefix-final consonants that cannot be recovered from the prefixes on nouns. Furthermore, Bedik class markers were subject to less erosion than those of Bassari and Konyagi, most notably in their retention of initial *g (though only in the nominal prefix and genitive 2 marker). Figure 324 presents the cognate class markers of Bassari and Bedik along with their reconstructions.

PBB	Ba.	Be.	Be. gen2	PBB determiner	Ba. det.	Be. det	PBB rel.	Ba. rel.	Be. rel.
*ạ-	ạ-I	a-I	**ar** ($^{\times}$a)	*ạ-ne	ạn	ale	*ạ-re	ạr	ar
*Ø~i-	Ø~i-I	Ø	**r** ($^{\times}$Ø)	*(i-)ne	in	le	*(i-)re	ir	r
*er-	e-II	e-II	er	*er-ne > *edd	**el** ($^{\times}$ed)	ed	*er-re	ed	ed / **er**
*gaŋ-	a-III	ga-III	gaŋ	*gaŋ-ne > *gaŋŋ	aŋ	aŋ	*gaŋ-re	and	an(d)
*geŋ-	e-III	ge-III	geŋ	*geŋ-ne > *geŋŋ	eŋ	eŋ	*geŋ-re	end	en(d)
*goŋ-	o-III	go-III	goŋ	*goŋ-ne > *goŋŋ	oŋ	oŋ	*goŋ-re	ond	on(d)
*gə̣ŋ-	(o-III)	gə̣-III	gə̣ŋ	*gə̣ŋ-ne > *gə̣ŋŋ	(oŋ)	ə̣ŋ	*gə̣ŋ-re	(ond)	ə̣n(d)
*ñaŋ-	i-III	ña-III	ñaŋ	*ñaŋ-ne > *ñaŋŋ	iŋ	ñaŋ	*ñaŋ-re	ind	ñan(d)
*ña-	e-I	*ña-I	**ñaŋ** ($^{\times}$ña)	*ña-ne	**eŋ** ($^{\times}$en)	**ñaŋ** ($^{\times}$ñale)	*ña-re	er	**ñan(d)** ($^{\times}$ñar)
*o-	o-I	o-I	**or** ($^{\times}$o)	*o-ne	**oŋ** ($^{\times}$on)	**od** ($^{\times}$ole)	*o-re	or	or / **od**
*ma-	o-I	ma-I	**maŋ** ($^{\times}$ma)	*ma-ne	**ol** ($^{\times}$on)	**maŋ** ($^{\times}$male)	*ma-re	or	mar / **man(d)**
*max-	o-II	ma-II	**maŋ** ($^{\times}$max)	*max-ne > *makk	ok	**maŋ** ($^{\times}$mak)	*max-re	od	**mar/man(d)** ($^{\times}$mad)
*maŋ-	o-III	ma-III	maŋ	*maŋ-ne > *maŋŋ	oŋ	maŋ	*maŋ-re	mand	man(d)
*ɓə-	ɓə-I	ɓə-I	**ɓər** ($^{\times}$ɓə)	*ɓə-ne	ɓən	ɓəle	*ɓə-re	ɓər	ɓər
*ɓaŋ-	ɓa-III	ɓa-III	ɓaŋ	*ɓaŋ-ne > *ɓaŋŋ	ɓaŋ	ɓaŋ	*ɓaŋ-re	ɓand	ɓan(d)
*ɓeŋ-	ɓe-III	ɓe-III	ɓeŋ	*ɓeŋ-ne > *ɓeŋŋ	ɓeŋ	ɓeŋ	*ɓeŋ-re	ɓend	ɓen(d)
*ɓoŋ-	(ɓ)o-III	ɓo-III	ɓoŋ	*ɓoŋ-ne > *ɓoŋŋ	ɓoŋ	ɓoŋ	*ɓoŋ-re	ɓond	ɓon(d)
*ɓə̣ŋ-	ɓə̣-III	ɓə̣-III	ɓə̣ŋ	*ɓə̣ŋ-ne > *ɓə̣ŋŋ	ɓə̣ŋ	ɓə̣ŋ	*ɓə̣ŋ-re	ɓə̣nd	ɓə̣n(d)

Figure 324: Cognate Bassari and Bedik noun class morphology with reconstructions

Bolded forms are those which have been changed analogically, with the expected reflex given in parentheses. In the final column, where two relative marker forms are given for Bedik, the one with /r/ is used in the Biwol dialect, and the other in Banapas. Aside from the loss of initial *g, the other notable sound change affecting the shape of markers is the denasalization and monophthongization of *Na(C)- markers in Bassari.

*ma-	> *w̃a	> *wa-	> o-
*ña-	> *ỹa	> *ya-	> e-

While Bassari *o-*, *e-* and Bedik *ma-*, *ña-* appear rather distinct at first glance, recall that the regular development of *m, *ñ in Bassari is to /w̃/, /ỹ/. As part of the more general phonological reduction of Bassari prefixes, these nasalized continuants were then denasalized, and the resulting sequences were monophthongized. Note that the cognate Konyagi prefixes also undergo denasalization to *wæ-* and *yæ-*, though they are not monophthongized. The nominal prefix itself develops straightforwardly in each language, with no analogical changes. Prefixes originally ending in a nasal consonant trigger grade III, and those ending in an oral consonant trigger grade II.

For the determiner, if we assume that the original form was the regular noun class prefix followed by some uniform element, the only choice is **-ne*, which regularly yields the Bedik forms *ale*, *le*, and *ɓəle*. In Bassari the determiner lost its final vowel, but still *n must be reconstructed, as it is the only possible source of /n/ as seen in *a̤n*, *in*, and *ɓən*. For the other classes, the loss of the final vowel *e is seen also in Bedik, and may have already taken place in the proto-language. Crucially, these determiners contain final consonants which are the reflexes of geminates, and not singletons. The only sources of Bassari /ŋ, k/ and Bedik /d/ are *ŋŋ, *kk, and *dd respectively. Unless we assume that the class prefixes themselves ended in geminates, the most likely source of these geminates is a consonant cluster formed from the final consonant of the prefix and the initial consonant of the determiner. Since we have already identified the determiner morpheme as **-ne* for the other classes, *n seems a likely candidate for the second member of these clusters. It is quite possible that in these determiner forms, the *n of the determiner base had already assimilated to the preceding consonant in Proto-Tenda. Of course, the development of C_1C_2 to CC_1 rather than CC_2 is irregular, but this irregular change must have taken place in these determiners, since the change in consonant corresponds with a change in class (which supplies C_1) rather than any change in the determiner (which supplies C_2). As such, these consonants in the determiners are the best available evidence for the identity of the final consonants of class prefixes. For the nasal-final prefixes, we must reconstruct *ŋ. Of course it is conspicuous that all nasal-final prefixes are reconstructed with *ŋ, and it is likely that a wider range of prefix-final nasals had been reduced to *ŋ already in Proto-Tenda. The two oral consonant-final prefixes are somewhat more complicated. If Bassari *ok* is original, it could only come from a prefix ending in *x, which geminates as *kk. And indeed this form must be original, since there is no plausible analogical source for /k/ in this morpheme, whereas the equivalent Bedik determiner *maŋ* could easily be extended from the **maŋ-* class. For the Bedik determiner *ed*, the only regular source would be a prefix with *r, which geminates as *dd. The equivalent Bassari *el* cannot be regular regardless of the reconstruction, since Bassari /l/ can only derive from singleton *ɗ by regular sound change. Most likely we are dealing with an irregular weakening of **ed* to *el* in Bassari, as reconstructing any other coronal segment would require irregular changes in both Bassari and Bedik. A few other determiners were subject to analogical replacement, all of which had a vowel-final prefix historically. That of the "slime" class **ña-* replaces the expected reflex of *n with /ŋ/ in both languages (note that this is no longer a synchronically distinct class in Bedik), under pressure from the extremely common ŋ-final determiners. That of the **o-* class co-opts /ŋ/ in Bassari, and /d/ in Bedik from the *e-II* class (note that Bedik *e-II* and *o-II* are two of only three vowel-initial class prefixes). Finally, the determiner of the **ma-* class co-opts /l/ from *e-II* in Bassari, and the common /ŋ/ in Bedik. The first of these three analogical replacements (for **ña-*) may have taken place already in the proto-language, but the incompatible outcomes of the other two classes prove that they must be separate innovations in each language.

The relative marker can be easily reconstructed as a consonant **-r* preceded by the regular noun class prefix. Since the cognate in Konyagi is *-le*, we can reconstruct **-re*, though the vowel may have been lost already in Proto-Bassari-Bedik. In Bassari, no analogical changes took place, such that even synchronically the relative marker can be analyzed as *-r*, mutating appropriately based on the class prefix. In Bedik a few have been replaced by contamination from other classes.

The "genitive 2" marker in Bedik is particularly intriguing because it appears to be derived from the bare class prefix without any additional morphology (recall that in Bedik the regular outcome of singleton *ŋ is /ŋ/). Most of the originally vowel-final genitive 2 markers have a final /r/, but this must be extended from **er-*, since an original morpheme ×*-r* would yield the same forms as for the relative marker. If this analysis is correct, it is further evidence for reconstructing *r as the final consonant of **er-*.

For the most part, the Konyagi cognates to the reconstructed Bassari-Bedik classes are rather clear. There are some classes in each branch which have no cognate in the other. Furthermore a few classes which are synchronically active in Konyagi exist in Bassari-Bedik only as fossilized prefixes on a few nouns. Unfortunately, for classes which survive only in Konyagi or which have become fossilized in Bassari-Bedik, there is no way to determine the identity of the final consonant if one was present (though we can assume that any nasal-final class contained *ŋ). Note that in Konyagi, prefix mid vowels peripheralize to /i, u/.

Proto-Tenda	Konyagi	Proto-BB	Bassari	Bedik	
*a̟-	a-I	*a̟-	a̟-I a̟n	a-I ale	personal
Ø	Ø	Ø	Ø in	Ø le	
*ji-	(i)-I, (ỹi-)	*ji-	i-I in	jə-I le	
*er-	i-II	*er-	e-II el	e-II ed	
*gaŋ-	æ-III (ga-III?)	*gaŋ-	a-III aŋ	ga-III aŋ	plants, (augment.?)
*geŋ-	i-III	*geŋ-	e-III eŋ	ge-III eŋ	
*goŋ-	u-III	*goŋ-	o-III oŋ	go-III oŋ	
*gə̟ŋ-	u-III	*gə̟ŋ-	(o-III oŋ)	gə̟-III ə̟ŋ	
*ña-	yæ-I / ỹæ-I	*ña-	e-I eŋ	ña-I ñaŋ	
*maŋ-	wæ-III	*maŋ-	o-III oŋ	ma-III maŋ	liquids, etc.
*o-	u-I	*o-	o-I oŋ	o-I od	
*fa-	fæ-I	*†fa-	(†fa-)	(†fa-)	
*ʃaC-	sæ-III	*†ʃaC-	(†ʃa-)	(†ʃa-)	
*xoC-	xu~xwə-II	*†xoC-	(†x(w)o-)	(†hV-)	
*xaC-	xæ-II	*†xaC-	(†xa-)	(†-ha-)	
*ɓə- ?	—	*ɓə- (sg.)	—	ɓə-I le	
*xuŋ/xoŋ- ?	xu-III	—			
*ʃiŋ/ʃeŋ- ?	si-III	—			
*(C)i/(C)e- ?	i-I	—			
*ka(C)- ?	xæ~kæ-I/II	—			
*(C)a- ?	æ-I	—			
*ñaŋ-	—	*ñaŋ-	i-III iŋ	ña-III ñaŋ	diminutive
*faŋ- ?	fæ-III	—			diminutive
*ɓə-	və-I	*ɓə-	ɓə-I ɓən	ɓə-I ɓəle	personal pl.
*ɓaŋ-	væ-III(va-III?)	*ɓaŋ-	ɓa-III ɓaŋ	ɓa-III ɓaŋ	
*ɓeŋ-	vi-III	*ɓeŋ-	ɓe-III ɓeŋ	ɓe-III ɓeŋ	
*ɓoŋ-	vu-III	*ɓoŋ-	(ɓ)o-III ɓoŋ	ɓo-III ɓoŋ	
*ɓə̟ŋ-	vu-III	*ɓə̟ŋ-	ɓə̟-III ɓə̟ŋ	ɓə̟-III ɓə̟ŋ	
*ɓi/ɓe- ?	vi-I	—			
*o-	(w)u-I (w̃u-)	*o-	o-I oŋ	o-I od	
*ma-	wæ-I	*ma-	o-I ol	o-I maŋ	
*max-	wæ-II	*max-	o-II ok	ma-II maŋ	
*bə- ?	bə-I	—			augmentative pl.

Figure 325: Cognate noun classes between the Tenda languages

These classes will now be examined in detail.

5.1 Singular classes

5.1.1 *a̟-

Bassari	Bedik	Konyagi
a̟-I = an	a-I = ale	a-I

	Bassari	Bedik	Konyagi	
*a̟-yara	a̟-yárà-	a-yārā-	a-yə́lá	‘in-law’
*a̟-ʃAnn	a̟-sóʃàn	a-ʃán	a-sæ̀n	‘man’
*a̟-ɓan	a̟-ɓàn	a-ɓál	a-væ̀l̰	‘weaver’
*a̟-ɓən		a-ɓə̀l	a-və́l̰	‘zombie’
*a̟-ʃa̟nda	a̟-ʃá̟ndà-	a-ʃàndá-	(a-yə̀ntî)	‘co-wife’
*a̟-an	(a̟-là)	hál	àà̰l̰ (pl. væ̀l̰)	‘person’
	a̟-líyà̟n	a-ɗìyé̟n	a-yǽw̃	‘Bassari person’
	a̟-ɓó̟ɓé̟ɗ	a-ɗík	(ñóxólo)	‘Bedik person’
	a̟-ʃĕn	a-ʃèn	a-w̃èỹ	‘Konyagi person’

This is the personal class. The large majority of nouns referring to people are in this class in all three languages.

The shape of the marker can be reconstructed as **a̟-* with no initial or final consonant. This is one of the only class markers with a tense vowel, and probably the only one which comes from an earlier long vowel (*ə̟ was probably never long). The quality of this vowel is confirmed not only by its regular reflexes in Bassari and Konyagi, but by the fact that it never alternates with another vowel in Bedik, unlike markers containing lax *a. Doneux (1975) makes the suggestion that the Bedik form *hál* ‘person’ is evidence for an earlier *k-initial marker for this class, but this is highly unlikely. It is much more likely that the /h/ is prothetic, as the regular outcome of **a̟-an* would be **al*, which would be the only vowel-initial noun root in the language.

5.1.2 *gaŋ-

Bassari	Bedik	Konyagi
a-III = aŋ	ga-III = aŋ	æ-III

	Bassari	Bedik	Konyagi	
*gaŋ-r̥əx	a-tə̆x	ga-tò	æ-tə́x	‘tree’
*gaŋ-ʃəcc	a-cə̀c	ga-cèc	æ-cə̀c	‘bush’
*gaŋ-ra̟nə	a-ndà̟n	ga-ndāl	æ-ntànə́	‘*Ficus glumosa* tree’
*gaŋ-yang	a-njàng	ga-njáng	æ-ncæ̀nk	‘*Pterocarpus erinaceus* tree’
*gaŋ-ɣu̟dd	a-ngúd	gi-wùd	æ-nkwə́d	‘mango tree’
*gaŋ-ɣor-tott	a-ngòtòt	ga-ngór-tót	æ-nkòtòt	‘*Acacia macrostachya* tree’
*gaŋ-ʃer̥	a-cês	ga-cēs	æ-cér	‘*Khaya senegalensis* tree’
*gaŋ-ga̟pp	a-ngŏb	ga-ngàp	æ-nkáp	‘bat (animal)’
*gaŋ-yən	a-njə́n	(go-njə̀l)	æ-ncə́l̰	‘caterpillar’
*gaŋ-ri̟yenə	a-ndĭyèn	gi-ndìyél	æ-ntíyèl̰ə́	‘work’
*gaŋ-xeʃa	a-ngèʃá	ga-ngēʃà	æ-kèsá	‘calabash spoon’
*gaŋ-nəf	a-nə̀f	ga-nə̄f	æ-nə̀f	‘ear’
*gaŋ-ye̟nɗ	a-njè̟n	gi-njə̟́n	æ-ncæ̀nd	‘skin/shell’
*gaŋ-ɗVr	a-năr	ga-nár	æ-ndíl	‘skin’
*gaŋ-ɓə̟ŋŋ	a-mə̟́ŋà	ga-mòŋ	æ-mbə́ŋ	‘shore’
*gaŋ-fan	a-pân	ga-pàn	æ-pǽl̰	‘termite mound’
*gaŋ-ɣAn	a-ngàn	ga-ngál	æ-nkàl̰	‘vein/root’

Almost all trees are in this class, along with most plants. Even discounting the plants, **gaŋ-* is one of the two largest classes, along with **er-*. It contains many body part terms, some animals, natural features, and abstract nouns. In general there is a tendency for flat and/or flexible things to be in this class. This is also used as the augmentative class in Bassari-Bedik, though Konyagi employs a separate augmentative class *ga-III* (perhaps an etymological doublet). The phonological form of the class marker can be reconstructed as **gaŋ-* without complication. The plural of this class is **ɓaŋ-*.

5.1.3 *er-

Bassari	Bedik	Konyagi
e-II = el	e-II = ed	i-II

	Bassari	Bedik	Konyagi	
*er-ñen	e-ñèn	e-ñél	i-ŋèl̰	‘coal’
*er-ʃən	e-cén	e-cə̀l	i-cə̀l̰	‘nose’
*er-ɓərə	e-ɓə̀r	e-ɓə̄r	i-ɓə̀lə́	‘breast’
*er-wi	e-bì	i-bí	i-bì	‘*Striga hermontica* grass’
*er-xoɓ	e-kə̀ɓ	e-kóɓ	i-kóv	‘pile of rocks’
*er-ɣamb	e-kàmb	i-gámb	i-gæ̀mp	‘penis’
*er-ʃAr̥	(i-càs)	i-cás	i-càr	‘knife’ (Ba. in dim. *i-III*)
*er-ʃare	e-càré	i-cē̟r	i-cæ̀lé	‘chicken’
*er-feŋ(ŋ)	e-péỹ	e-pèŋ	i-pêŋ	‘palm fruit’
*er-ɣVyƴ	e-gwàƴ	i-gə̟̀ƴ	i-gə̀ƴ	‘mud/clay’
*er-ɗVkk(əna)	e-ɗə̟̂kə́nà	e-ɗə̂kə̀là	i-ɗə́kw	‘knee’
*er-fo̟gg	e-pò̟g		i-pòg	‘penis sheath’
*er-r̥akk	e-tàk		i-tæ̀k	‘heel’
*er-rəpp	e-də̀p		i-də̀p	‘trunk’
*er-xor		e-kór	i-kòl	‘star’
*er-ni̟n		i-líl	i-nìl̰	‘egg’
*er-mong		e-ɓóng	i-mə̀nkw	‘dew’
*er-ʃo̟nga	e-có̟ngwá	e-còngà		‘axe’

This is a very large class in all three languages. Its main semantic domain is for round (often small) things, including most fruits and berries. This is used as the infinitive class in Konyagi, and a productive deverbal class in Bassari and Bedik, also used in parts of the verb paradigm.

The reconstruction of the class marker is not entirely straightforward. BB confirms the vowel as *e, with Konyagi /i/ being the regular outcome of *e in a prefix. As it triggers grade II in all languages, the marker must contain a final oral consonant. The evidence for this consonant comes from the BB determiners and genitive/relative markers. In Bedik the determiner is *ed*, which (if it arose regularly) could only come from **er-C*, as /d/ can only come from *dd, which is the gemination of *r. Furthermore, the Bedik genitive 2 marker is *er*, which is historically simply an unaffixed noun class marker— though it must be noted that /r/ has been inserted analogically in most vowel-final classes. The Bassari determiner is *el*, which is irregular, in that the final consonant of the determiner must come from a geminate. The only regular source of /l/ in Bassari is singleton *ɗ, but here it seems more likely that *el* is a reduction of earlier **ed*. Note that even if *ɗ were reconstructed in place of *r, the Bassari determiner would be irregular, as we would expect ˣ*ed* from a hypothetical ˣ**ed-ne*. The plural of **er-* is **ma-*.

5.1.4 Unprefixed nouns

Bassari	Bedik	Konyagi
Ø-I/II = in	Ø-I/II = le	Ø-I/II

	Bassari	Bedik	Konyagi	
*r̥ə̟mm	sə̟̀m	sɯ́m	rə̀m	‘father’
*nə̟mm	nə̟̀m	lɯ́m	l̰ə̀m	‘mother’
*ʃAmar	ʃá̟w̃âr	ʃāmàr	sǽw̃ǽl	‘monitor lizard’
*ʃongo	ʃòngò		sònkò	‘millet sp.’
*feɗe		féɗé	fèryè	‘long-tailed nightjar’
*fonə		fól	fòl̰ə́	‘Gambia rat’
*ʃa̟nA		ʃàlà	sál̰á	‘palm rat’
*məʃ		ɓə-mə̀ʃ	w̃ə́s	‘lip(s)/mouth’
*nu̟w?		lú	l̰ə̀w̃	‘song’
*fa̟ccam	ẵ̟	fè̟cé̟m		‘moon/month’

A large number of nouns are unprefixed in each modern language. While most of these are borrowings, some are native nouns (see section 3.1.2.6 for more examples). Especially in Konyagi, some very basic vocabulary is unprefixed (e.g. ‘tongue, snake, rain, blood, bird’). The agreement pattern in Bassari and Konyagi is *i-I* (however Konyagi adjectives are unprefixed, with *i-I* appearing only on the relative marker and demonstratives), while in Bedik a prefix ə̟- is used on adjectives, with the determiner and relative/genitive markers being unprefixed. There are no clear semantic generalizations to be made about this class, though of the nouns that can be reconstructed as prefixless, a good number are animals.

The appreciable number of unprefixed nouns in each language (including many cognates) all but confirms that the proto-language had prefixless nouns. These include borrowings into Proto-Tenda like **ñar̥* ‘meat’ from Biafada-Pajade **ña-r̥e*[148], but probably also some native vocabulary. Whether the greater number of Konyagi unprefixed nouns is due to the loss of prefixes, or the introduction of prefixes on these nouns in Bassari-Bedik is difficult to determine. The origin of the Bedik agreement prefix ə̟- is unclear.

It may be that some unprefixed nouns contain a frozen class prefix that cannot be easily identified. Possible candidates include Bassari *sàpàr* ‘foot’ (Bedik *i-tápár*), which might be reconstructed as **r̥a-ppar*, containing a prefix **taC-*, cf. Kobiana-Kasanga **ta-pper* ‘foot’ with a prefix **ta*^{X}- (used for only this noun), and Bassari *ɣónə̟̀ng* ‘leg’ (Konyagi *u-xòl̰ə̀nk*) which might be traced back to a form **xo-nə̟ng* containing a prefix **ko-*, cf. Proto-Bantu **ku-* used for ‘leg’ along with perhaps only three other nouns. Isolated examples like these are purely speculative, and of course cannot be used as evidence for the existence of specific lost noun classes. Nonetheless it is quite likely that a number of modern unprefixed nouns do contain fossilized class prefixes, even if it is not possible to identify them. In Bassari and Bedik we are only able to identify the frozen class prefixes **fa-*, **ʃaŋ-*, **xoC-*, and **xaC-* because they survive as small classes in Konyagi. It may even be that at the Pre-Tenda stage all nouns were prefixed, with the exception of some borrowings.

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[148] This is assumed to be a borrowing because the prefix is morphologically active in BP, and not Tenda.

5.1.5 *ji-

<u>Bassari</u>	<u>Bedik</u>	<u>Konyagi</u>
i-I = in	jə-I = le	(i)-I

<u>Bassari</u>		<u>Bedik</u>		<u>Konyagi</u>	
i-fêỹì	‘sheep’	jə-fè	‘sheep’	i-fé	‘sheep’
i-ỹà̟mə̟̀ɗ	‘crocodile’	jə-ŋát	‘dog’	i-vé	‘dog’
i-xèƴ	‘cow’			ỹi-l̰ì	‘cow’
i-ɣêd	‘hartebeest’			i-sæ̀w̃	‘panther’
i-ỹà̟ró	‘cat’			i-l̰àŋ	‘mouse’
(yìrə̀xəní)	‘hyena’			(ỹìnə́)	‘hyena’
(yílè̟mù)	‘*Lycaon pictus*’			i-wúl	‘baboon’
(yìràŋ)	‘lion’			i-vəsél̰	‘lion’
(yìràng)	‘harnessed bushbuck’			i-vàkə́	‘finger/hand’
				i-sə́ñ	‘place’
				i-ryə̀xwə̀rá	‘anvil’
				i-fə́k	‘bush/wild’

This class contains a good number of nouns in Konyagi (50/1972 in Santos 1996), but is rather small in Bassari (13/2285 in Ferry 1991[149]), and has only two nouns in Bedik. In all three languages, the agreement pattern is the same as for unprefixed nouns, except for the prefix *i-* on adjectives in Konyagi, which is not found on unprefixed nouns. On both nouns and adjectives, the Konyagi prefix *i-* is optional for all nouns in this class. In Bassari and Bedik this class contains only animals, and many Konyagi nouns in this class are animals as well. It seems quite likely that the non-animals represent a completely separate original class, which is likely also the source of the Bassari agreement marker *i-I* used for all unprefixed nouns. This inanimate class may be related to the Bedik agreement marker *ə̟-* used for unprefixed nouns.

At first glance, Bassari and Konyagi *i-* might not appear to be cognate with Bedik *jə-*. However recall that both Bassari and Konyagi prefixes are subject to erosion, whereas Bedik preserves initial consonants. The regular outcome of **ji-* in Konyagi would be *yi-*, and while there is no evidence that initial lenition of *j to /y/ in Bassari is regular, the development of **ji-* to *yi-* in a prefix would hardly be unexpected given the general reduction of prefixes in Bassari. A change from *yi-* to *i-* in each language would be quite natural, and note the retention of the initial consonant /y/ in Konyagi ‘cow’ and ‘hyena’ (with nasalization from the root), and a number of Bassari nouns in which the frozen prefix /yi-/ is preserved in the modern noun root. The vowel of the prefix could have been either *i or *ə. No other prefix with *i survives in Bedik, so there is no evidence against a reduction to /ə/. On the other hand a change from **yə-* to /i/ in Bassari and Konyagi would not be at all unnatural. Bainunk-Kobiana-Kasanga and Biafada-Pajade have a seemingly cognate animal class **ji-*, which can even be reasonably connected with Bantu class 9 (agreement prefix **ji-*), and so the vowel /i/ would seem to be original in the Tenda prefix. We can unfortunately only speculate as to the existence of a separate class (perhaps of the form **(C)i-*) containing inanimate objects, but such a class seems quite likely given the inanimate nouns in Konyagi, and the use of *i-I* as an agreement marker in Bassari and Konyagi.

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[149] Note however that aside from the five animal nouns listed here, the remaining nouns that Ferry gives in this class have grade III mutation, and are in fact originally diminutives in the *i-III* class.

5.1.6 *o-

Bassari	Bedik	Konyagi
o-I = oŋ	o-I = od	u-I

	Bassari	Bedik	Konyagi	
*o-fatt		u-fát	u-fæ̀t	'field'
*o-maccə	o-w̃ǎc		u-w̃æ̀cə́	'name'
*o-ɓan		u-ɓál	u-væ̀l̰	'weaving'
*o-rə̥nn	o-rə̥̌n	u-rʉ̀n		'sky/god'
*o-xacce	o-xàcé	u-hácè		'bamboo'

This is a rather sizeable singular class in Konyagi and Bedik, but is very small in Bassari. This class has three main semantic centers. First, it is used for abstract (often deverbal) concepts: 'thirst, harvest, cooking, speech,' etc. Following from this deverbal function, it is used as the infinitive class in Bedik. Secondly, it is used for many long rigid objects in Konyagi and Bedik: 'arrow, stalk, porcupine spine, stick, nail,' etc. Thirdly, it is used for expanses of land: 'field, country, garden,' and in Konyagi the names of all countries. In Konyagi it also contains most fruits, though many are in *i-II*. Some notable nouns that do not fit into any of these categories are *u-læ̀v* 'sun' and *u-lèpèrá* 'moon' in Konyagi, *u-mʉ́ʉ́ɗ* 'day' and *u-rù* 'rain' in Bedik, and *o-ʃá̰t* 'blood' in Bassari.

**o-* is also used as a plural class (mainly for animals), which was probably somewhat rare in the proto-language (see section 5.4.2). The diminished use of **o-* as a singular class in Bassari is perhaps due to the phonological collapse of **o-* and the plural **ma-* as *o-I* in Bassari, which reinforced **o-* as a primarily plural class. The long, rigid **o-* nouns were mainly reassigned to *a-III* or *e-II* in Bassari.

The marker can be reconstructed as **o-* without any initial or final consonant. Its plural was probably **max-* as in Konyagi, with Bedik *ma-III* being an innovation (see section 5.4.2).

5.1.7 *geŋ-

Bassari	Bedik	Konyagi
e-III = eŋ	ge-III = eŋ	i-III

	Bassari	Bedik	Konyagi	
*geŋ-ɣott	e-ngòt	ge-ngót	i-nkòt ~ i-ŋòt	'pole'
*geŋ-ɓAnə	e-mə̥̀n	gi-māl	i-mbæ̀l̰ə́	'body'
*geŋ-ɣa̰w	e-ngà̰wù	ge-ngéw	i-nkàw	'roan antelope'
*geŋ-ɓVf	e-mèf		i-mbùf	'thigh'
*geŋ-ɣVɗa̰	e-ngḛ́lá	gi-ngḛ́ɗḛ́	(i-mbú)	'hippopotamus'
*geŋ-ɣux	e-ngùx	gi-ngò̰		'rope'
*geŋ-ŋutt	e-ŋùt	gi-ŋò̰t		'eye socket'
*geŋ-xoɗ	e-ngwól	ge-kwòɗ		'bedbug'
*geŋ-{ñ/ɣ}an	e-ñàn	gi-ñál		'sun'

This class is extremely semantically disparate in all three languages. It is smaller in Konyagi than in Bassari and Bedik, but still contains an appreciable number of nouns, some of which are rather common (e.g. *i-nkə́r* 'eye,' *i-ntæ̀w̃* 'animal,' *i-nkæ̀lə́* 'ground').

The marker can be reconstructed without complication as *geŋ-. The plural is *ɓeŋ-, though in Bassari many plurals are in the modern descendant classes of *max- and *ma-.

5.1.8 *goŋ-

Bassari	Bedik	Konyagi
o-III = oŋ	go-III = oŋ	u-III ?

	Bassari	Bedik	Konyagi	
*goŋ-yi̤	o-njì	gu-njí		'grass'
*goŋ-yen	o-njèn	go-njèl		'thatch'
*goŋ-{ɓ/m}akk	o-mâk	gu-màk		'clay-rich soil'
(*xaC-r̥əx)	o-kàtəx	gu-kāt	xæ-táx	'hole'
(*xoC-ʃən)	o-kwócə́n	go-kwəc ~ go-kwòc	xwə-cìcə́	'smoke'

This class is relatively large in Bedik. The regular outcome of an original class *goŋ- would be *o-III* in Bassari, and *u-III* in Konyagi, both of which exist. However Bassari *o-III* is also the regular outcome of the liquid *maŋ- class, and Konyagi *u-III* carries on the distinct *g̤əŋ- class. Thus it is not entirely certain that *goŋ- truly survived in either of these languages. Unlike Bedik *go-III*, Bassari singular *o-III* and Konyagi *u-III* are rather small classes. In both Bedik and Bassari this is used as the pejorative class (often with an additional augmentative sense). Along with the cognates given above, this is probably sufficient evidence to confirm the survival of *goŋ- as *o-III* in Bassari. No cognates in Konyagi *u-III* can be found for any Bedik *go-III* nouns, so it is possible that the class was lost altogether. Some Konyagi *u-III* nouns which are not obviously descended from *g̤əŋ- are *u-mpên* 'flame,' *u-nkwàv* 'yam,' and *u-ŋwæ̀ry* 'bow,' forming their plurals in *vu-III*. As *g̤əŋ- is a collective class with no plural, the sg./pl. pair *u-III/vu-III* is probably descended from *goŋ-/ɓoŋ-. For Bedik nouns which are in *go-III* by default, there is no clear semantic basis for their assignment. Some notable nouns in this class are *g̤o-k̤ər* 'monkey,' *go-kə́ɗ* 'sleep,' *gu-mb̤ə́ɗ* 'cloud,' *gu-nd̤ə́n* 'snake,' and *go-pə́tèr* 'flower.'

Based on the Bedik form alone, the marker can be reconstructed as *goŋ-. The plural of this class is *ɓoŋ-, based on Bedik *ɓo-III* and Konyagi *vu-III*.

5.1.9 *fa-

Bassari	Bedik	Konyagi
—	—	fæ-I

	Bassari	Bedik	Konyagi	
*fa-ʃin	fé̤ʃín	fè̤ʃè̤l	fæ-sìl̰	'donkey'
*fa-ʃo	fòʃò	fáʃō	fæ-só	'porcupine'
*fa-ʃar	fă̤ʃàr	fā̤ʃàr		'cane rat'
*fa-yVmar?	fàjúɣ̃árè	fáƴímár		'waterbuck'
			fæ-rún	'crocodile'
			fæ-rə̀mp	'turtle'

This class survives only in Konyagi, but the prefix is fossilized on some nouns in Bassari-Bedik. The few reconstructable nouns are all animals. However, in Konyagi only 8 of the 25 fæ-I nouns in Santos (1996) are animals. The majority are singulars of fibrous plants or leaves in the *yæ-I* collective class. The only other Konyagi *fæ-I* nouns given are fæ-rǽxæ̀l̠ 'left' and fæ-rə̀xw 'right.'

The prefix can be reconstructed as **fa-*, though **pa-* might also be possible. However, comparison with animal classes of the shape *fa-* in other Atlantic families (Cangin *f-*, Bainunk-Kobiana-Kasanga **fa-*, Fula-Sereer **fan-*) all but confirms **fa-*. The plural was probably formed with **ma-* or **max-* stacked in front of the singular class marker, just as in the modern languages (Konyagi *wæ-fæ̀rún* 'crocodiles,' Bassari *o-pòʃò* 'porcupines,' Bedik *ma-páyímár* 'waterbucks').

5.1.10 *ʃaŋ-

Bassari	Bedik	Konyagi
—	—	sæ-III

	Bassari	Bedik	Konyagi	
*ʃaŋ-ʃAn	e-cícə̰́n	ʃācàr	sæ-cæ̀l̠	'hedgehog'
		ʃānjə̀l	sæ-njìnkə́	'frog'
*ʃaŋ-ɓay	ʃàmè	ʃámáy		'left' (cf. Be. -*ɓay* 'left (adj.)')
			sæ-mpǽl̠	'kid (goat)'

This class survives only in Konyagi, where it contains only the three nouns given above. It is fossilized on some nouns in Bassari-Bedik, though it is hard to say how many. Other nouns begin with *ʃa-* followed by a grade III consonant in each language, but it is impossible to say whether this sequence was simply part of the noun root: Bassari *ʃángà* 'greater honeyguide,' *ʃángáràŋò* 'young elephant,' Bedik *ʃámbálàŋ* 'female goat'). Bedik *ʃánjóm* 'hiding place,'derived from the verb *-yóm* 'hide,' is a particularly good candidate. Most of the few nouns in this class are animals, though seemingly not all.

The marker can be reconstructed without complication as **ʃaŋ-*. Its plural was likely formed with **ma-* stacked on the singular class prefix, as in the modern languages (e.g. Konyagi *wæ-sæ̀cæ̀l̠* 'hedgehogs').

5.1.11 *xoC-

Bassari	Bedik	Konyagi
—	—	xu~xwə-II

	Bassari	Bedik	Konyagi	
*xoC-ɗVx	xòɗúx	ñu-kúɗò	xwə-ɗə̂x	'fire'
*xoC-ʃən ?	o-kwócə́n	go-kwə̀c ~ go-kwòc	xwə-cìcə́	'smoke'
			xu-ɗǽkéry	'dream'
			xu-jì	'cold'

This small class survives only Konyagi, but the prefix is fossilized on at least the two nouns above in Bassari-Bedik. It seems to contain mostly deverbal nouns. 'Fire' is likely derived from *-*ɗox* 'burn,' and 'smoke' from the verb *-*ʃən* 'smoke' (at least in Bassari-Bedik). In Konyagi, only 'cold' is not deverbal.

From Konyagi it is impossible to determine whether the vowel of the prefix was *u, *u̟, or *o, but the two Bassari-Bedik forms suggest *o. As there was likely a contrast between *x and *k word-initially (but perhaps lost in Konyagi prefixes, see section 3.1.2.6), the initial consonant might have been *k instead of *x. Because this class enforces grade II mutation, it must have had a final oral consonant. However, with no determiner forms from Bassari-Bedik, it is impossible to determine what this final consonant might have been.

5.1.12 *xaC-

Bassari	Bedik	Konyagi
—	—	xæ-II

	Bassari	Bedik	Konyagi	
*xaC-ʏ̑ə̟n	i-ké̟ʏ̑ə̟̀n	hə̟̀ʏ̑ə̟́l	xæ-jə̀l̰	‘wound’
*xaC-r̥əx	xàtə̀x	gu-kāt	xæ-tə́x	‘hole’
		hāʏ̑àl		‘urine’ (der. -*ʏ̑âl* ‘urinate’)
		ma-hālā		‘four’ (from root *-*nax*)
			xæ-ʏ̑ò	‘epilepsy’
			xa-mè	‘forearm’

This small class survives only in Konyagi, but is fossilized on a few nouns in Bassari and Bedik. There does not seem to be any semantic coherence to this class. In Konyagi, only ‘forearm’ shows the prefix form *xa-*. The prefix is always *xæ-II* on agreeing adjectives.

The form of this prefix can be reconstructed as **xaC-* (or perhaps **kaC-*). As with **xoC-*, we can be sure that there was a final oral consonant, but cannot determine what it was.

5.2 Single-number/collective classes

5.2.1 *maŋ-

Bassari	Bedik	Konyagi
o-III = oŋ	ma-III = maŋ	wæ-III

	Bassari	Bedik	Konyagi	
*maŋ-ɣa̟	(mên)	mə̟-ngè̟	wə-nkà	‘water’
*maŋ-ɓərə	o-mə̀r	ma-mə̄r	wæ-mbə̀lə́	‘milk’
*maŋ-ʃAnn	(o-ʏ̑ân)	ma-cán	wæ-cæ̀n	‘sperm’
*maŋ-xorə̟ɓ	o-kwə́rə̟́ɓ	mə̟-kə̟̀rə̟́ɓ		‘seeds’
*maŋ-xoy	o-kòỹ	ma-kóy		‘sesame seeds’
*maŋ-ɣo	o-ngò	ma-ngó		‘broth’
*maŋ-ɣaɗ	o-ngàl	ma-ngáɗ		‘salt’
	o-ngó̟là	ma-ŋàʃ	wæ-kòlá	‘Malinke language’

This class contains some common liquids, including some masses of granular particles. It is also used as the class for languages in all three languages.

The class marker can be reconstructed as **maŋ-*. In Konyagi and Bassari, the initial consonant lenited, and the prefix developed as follows:

> *ma- > *w̃æ- > wæ- (Konyagi)
> *ma- > *w̃a- > *wa- > o- (Bassari)

This denasalization is only witnessed in prefixes, but is part of the larger pattern of prefix reduction in these two languages. This development also affected the plural prefixes **ma-* and

**max-*. This same lenition of the initial nasal and (in Bassari) monophthongization can be seen with the prefix **ña-*.

5.2.2 *ña-

Bassari	Bedik	Konyagi
e-I = eŋ	ña-I = ñaŋ	yæ-I ~ ỹæ-I

	Bassari	Bedik	Konyagi	
*ña-ñən		ña-ñə̀l	ỹæ-ỹə́l	'snot'
*ña-wụɗ	(e-ɣùnìnj)	ñu-wùɗ	ỹa-w̃ə́ry	'sauce'
*ña-ɗər	a-ñèlə́r	ña-ɗə̀r		'bamboo fiber'
*ña-nịr	e-ỹànín	ñi-lìr	(yæ-ỹúc)	'algae'
	e-ʃóɓò	ñi-lìyár	yæ-xòỹə́-kòỹé	'jute'

This class contains slimes and masses of plant fibers. In Konyagi, nouns meaning 'leaves of X plant' can be productively formed in this class (e.g. *yæ-vú* 'baobab leaves' form *æ-mbú* 'baobab'). The class is reasonably large in Konyagi and Bedik, but very small in Bassari. In Bedik, the agreement for this class is co-opted from the *ña-III* diminutive class, but remains distinct by its grade I mutation on the noun. In Konyagi, the southern *wæ-gə̀ɗ* dialect has *ỹæ-I* as the prefix, where other dialects generally have *yæ-I*. However, 'snot' and 'sauce' have /ỹ/ in all dialects, perhaps retained due to the root-initial nasalized continuants in these two words. The vowel /a/ rather than /æ/ in 'sauce' is unexplained.

The form of the prefix can be reconstructed as **ña-*. The development of this prefix in Konyagi and Bassari is an exact parallel to the development of *ma-* in prefixes (Bassari [ỹa] denasalizes and monophthongizes to [e] just as [w̃a] denasalizes and monophthongizes to [o]):

*ña- > ỹæ- (> yæ-) (Konyagi)
*ña- > *ỹa- > *ya- > e- (Bassari)

In Bassari, some nouns in this class are doubly-prefixed, in that **ña-* is fossilized at the beginning of the root, while still being synchronically prefixed, in some cases by *e-I* (*e-ỹèxáráƴ* '*Cajanus kerstingii* fiber' in addition to 'algae' and 'bamboo fiber' above). One noun, *ỹèsə́n* 'sauce' retains the consonant of the prefix, and is still in the *e-I* class synchronically.

5.2.3 *gə̣ŋ-

Bassari	Bedik	Konyagi
Ø-III	gə̣-III = ə̣ŋ	u-III

	Bassari	Bedik	Konyagi	
*gə̣ŋ-mə̣ɗɗ	gə̣-mə̣̀ɗ[150]	gə̣-mɯ́ɗ	u-mə̀ɗ	'night'
*gə̣ŋ-fịx	pìx	gə̣-pîh	u-píx	'powder/flour'
*gə̣ŋ-xoƴ	ngòƴ	(ə̣-)ngòƴ	(u-ñén)	'(millet) beer'
		gɯ-ñìt		'strongest beer'
		gə̣-ník		'Bedik beer'

[150] Found in Winters and Winters (2004: 86) as *gəməɗ*, and also given in Ferry (1991) as *gə̣-mə̣̀ɗ*, alongside *e-mə̣̀ɗ / o-w̃ə̣̀ɗ* 'night(s).' Presumably this sg./pl. pair is used in counting nights, as the *gə̣-* form can have no plural.

This is a very small class, but seems to have retained most of its original members in each language. This class remains distinct only in Bedik. In Konyagi, it merges with **goŋ-* as *u-III*. In Bassari, the prefix is lost in all words but 'night,' but these nouns can still be distinguished by being the only unprefixed nouns that have a grade III initial consonant. It is not clear why the word 'night' retains the original prefix, remarkably including the initial consonant. The Konyagi form of 'night' retains the initial /g/ in the phrasal noun *a-vә́-gù-mәd* 'sorcerer,' literally 'person of the night' (cf. Ba. *ar-gә̣-mә̣ɗ*, Be. *ar-gɯ-mɯ́ɗ*). Other than the two prominent members 'night' and 'powder,' most remaining nouns in this class refer to beer.

Bassari		Konyagi	
njík	'beer'	u-ndә̀nkwә́l̰	'first part of beer'
mbárә̣̀x	'beer sp.'	u-ndèvèryә́l̰	'second part of beer'
mbә̣̂lòfĕkә̣̀l	'dregs of beer'	u-nkwæ̀l̰ә́	'hardly fermented beer for children'
ngàf	'hardly fermented beer'	u-ŋàsæ̀xә́	'strong beer'
ngàlén	'light beer'	u-pæ̌cæ̀lél̰	'light beer brewed in a day'
kúxә̄t	'beer served to elders'		

Other notable nouns in Bedik are *gɯ-tɯ́ɓ* 'rain' and *gә̣-nә̣̀r* 'cloth.'

The vowel correspondence in this prefix is seemingly irregular due to Konyagi /u/, but any form other than **gә̣ŋ-* would require some very unexpected changes in Bassari-Bedik. Since vowels in Konyagi prefixes are reduced to peripheral vowels, it is possible that the change of **ә̣* to /u/ is perfectly normal. This development is probably confirmed by the Konyagi diminutive plural *vu-III*, cognate with Bassari-Bedik *ɓә̣-III*.

5.3 Diminutive and augmentative classes

Despite the overall similarity of the class systems in the three Tenda languages, the diminutive and augmentative classes show some notable differences between languages. This is by now unsurprising, as the same was seen to be true of Fula-Sereer (see chapter 2 section 6.2.4.6) and Bainunk-Kobiana-Kasanga (see chapter 3 section 6.4).

	dim. sg.	dim. pl.	aug. sg.	aug pl.
Bassari	i-III	ɓә̣-III	a-III	ɓa-III
Bedik	ña-III	ɓә̣-III	ga-III	ɓa-III
Konyagi	fæ-III	vu-III	ga-III/bә-I	va-III

Figure 326: Diminutive and augmentative classes

The singular diminutive is *fæ-III* in Konyagi. Bedik has *ña-III*, and Bassari *i-III*. The Bassari-Bedik markers might at first seem unrelated, but note that the regular outcome of **ñaŋ-* would be ˣ*e-III* in Bassari (cf. **ña- > e-I*), requiring only a sound-symbolic raising of the vowel to arrive at *i-III*. The prevalence of high vowels in diminutive forms is well-attested cross-linguistically, and compare the raising of diminutive pl. *fo-III* to *fu-III* or *fi-III* in some Sereer dialects. There is certainly no way to reconcile BB **ñaŋ-* and **faŋ-* as suggested by Konyagi. These classes may have both existed in Proto-Tenda, or else one or both might be innovated. The diminutive plural **ɓә̣ŋ-* is cognate between all three languages (see section 5.4.1).

In Bassari-Bedik, the class **gaŋ-* (pl. **ɓaŋ-*) is employed as the augmentative class. Recall that this class contains by default many flat/broad entities. Konyagi has two unique augmentative classes: *bә-I* for humans, and *ga-III* for people, both with the plural *va-III*. The association of *ga-III* with **gaŋ-* is tempting, and may in fact be valid. However note that the regular outcome of **gaŋ-* is Konyagi *æ-III*. For augmentative *ga-III* to also descend from **gaŋ-*, it would have had to irregularly retain the initial *g, as well as undergo backing of the vowel. This latter change is plausible as a sort of sound symbolism (lower and backer vowels are associated with augmentatives cross-linguistically). As for the retention of the consonant, we are reminded of the Sereer Saalum augmentatives *gi-III* and *ga-III*, being the only classes to retain an initial *ɣ which was lost in all other classes. It is thus plausible if not probable that Konyagi *ga-III* indeed represents the same original class **gaŋ-* that regularly yielded *æ-III*. The personal augmentative *bə-I* cannot be connected with anything in Bassari-Bedik. It may be descended from an original class **bə-*, or may have been innovated.

5.4 Plural classes

5.4.1 *ɓə- and other ɓ-initial classes

The plural of the personal **a̧-* class is **ɓə-*. All *g-initial classes form their plural by substituting *ɓ for *g. Additionally, the diminutive plural is **ɓə̧ŋ-*, and the Konyagi augmentative plural is *va-III* (sg. *ga-III*). The Konyagi-specific "tool" class *i-I* has a plural formed by this same pattern.

sg.	Ba.	Be.	Ko.	pl.	Ba.	Be.	Ko.
*a̧-	a̧-I	a-I	a-I	*ɓə-	ɓə-I	ɓə-I	və-I
*gaŋ-	a-III	ga-III	æ-III	*ɓaŋ-	ɓa-III	ɓa-III	væ-III
*geŋ-	e-III	ge-III	i-III	*ɓeŋ-	ɓe-III	ɓe-III	vi-III
*goŋ-	o-III	go-III	u-III	*ɓoŋ-	ɓo-III	ɓo-III	vu-III
	i-III	ña-III	fæ-III	*ɓə̧ŋ-	ɓə̧-III	ɓə̧-III	vu-III
			ga-III				va-III
			i-I				vi-I

Figure 327: Classes with a plural containing *ɓ *in each language*

With the exception of **ɓə̧ŋ-*, these were all ultimately formed by stacking the personal plural **ɓə-* on the singular class marker. This phenomenon is also seen in Biafada-Pajade, and was likely an areal feature, or else reconstructable to an ancestor of both groups. By the time of Proto-Tenda, these plural classes had already been established, and could no longer be segmented into **ɓə-* + the singular class marker. As for **ɓə̧ŋ-*, it may be that **gə̧ŋ-* was originally used as the diminutive plural (note that it is used for **gə̧ŋ-fi̧x* 'powder,' being many small particles), which was then altered to **ɓə̧ŋ-* to reinforce plurality.

5.4.2 Other plural classes: *ma-, *max-, *maŋ-, *o-

All other singular classes as well as some nouns in **geŋ-* form their plurals with the classes **ma-*, **max-*, **maŋ-*, and **o-*. The first two of these are much more common, with **o-* and **maŋ-* being originally mass/collective classes which came to be employed as plurals. These four plural classes passed into the modern languages as shown in Figure 328.

	*o-	*ma-	*max-	*maŋ-
Bassari	o-I = oŋ	o-I = ol	o-II = ok	o-III = oŋ
Bedik	o-I = od	ma-I = maŋ	ma-II = maŋ	ma-III = maŋ
Konyagi	(w)u-I	wæ-I	wæ-II	wæ-III

Figure 328: Descendant classes of *o-*,* *ma-*,* *max-*, and* *maŋ- *in each Tenda language*

All of these markers can be reconstructed without much complication. The final *x in **max*- is the only consonant that could have yielded the Bassari determiner *ok*, as discussed in the beginning of section 5. The use of these four plural classes differs greatly between the three modern languages. For each relevant singular class, Figure 329 shows the percent of nouns with their plural in each of these plural classes (as well as **ɓeŋ*- for singular **geŋ*-. Note that some nouns are not listed with a plural class in Ferry or Santos).

		*o-	*ma-	*max-	*maŋ-	*ɓeŋ-	(n =)
Bassari	e-II	69.2%	23.3%	5.0%	2.5%		240
	Ø (i-)	3.5%	1.8%	92.9%	1.8%		113
	e-III	3.3%	22.8%	16.3	8.9%	48.8%	123
Bedik	e-II	15.1%	52.7%	0.5%	31.7%		205
	Ø	0.9%	1.4%	0.5%	97.2%		216
	o-I			6.1%	93.9%		49
	ge-III		2.7%	2.7%	5.4%	89.2%	111
Konyagi	i-II	4.8%	89.9%	5.3%			168
	(i)-I	3.1%	43.8%	53.1%			32
	Ø-I		82.9%	17.1%			158
	Ø-II		1.6%	98.4%			61
	u-I		16.0%	71.0%	13.0%		100
	i-III	7.1%	28.6%	7.1%		57.1%	28

Figure 329: Percentage of singular nouns having their plural in various classes

One of the first things to note is that **maŋ*-, while only rarely employed in Bassari and Konyagi, is the main plural class for unprefixed and *o-I* singular nouns in Bedik, and is also used for some *e-II* nouns. In Bassari and Konyagi, **maŋ*- is with few exceptions only used for fruits, grains, and powders. These are amenable to a mass noun interpretation, in line with the basic semantics of the **maŋ*- liquid/powder class. In Bedik, the use of *ma-III* as a large plural class is an innovation. First note that the agreement pattern of *ma-III* has been extended to *ma-I* and *ma-II*. Thus, the only distinction between these three classes is their mutating effect on the noun root. As discussed in section 2.3.1, it has come to be that in Bedik ensuring a change in consonant from singular to plural now outweighs the pressure to use the etymologically correct plural class. As such, *ma-III* was much more effective as a plural class than either *ma-I* or *ma-II* for *o-I* and unprefixed nouns (most of which begin with a grade I consonant). A change from grade I to III ensures a change in consonant whenever possible, whereas a change to grade I or II would not. For *e-II* nouns, the original *ma-I* class was retained in most cases, since this generally results in a consonant change. However the now common *ma-III* was extended in a minority of cases. Note that the majority of Bedik *e-II* nouns which Ferry lists with *ma-III* plurals begin with a nasal, implosive, or /l/. These consonants do not alternate from the singular noun to the plural noun, which is etymologically correct for nouns in the *ma-I* plural class. As discussed in section 2.3.1, there is no way to truly determine the plural class for these nouns, so the rather large figure of 31.7% given in Figure 329 should probably be reduced rather drastically. The Proto-Tenda usage of **maŋ-* would have been just as in Bassari and Konyagi; i.e. only for a small subset of nouns whose plurals could be construed as masses/liquids/powders.

The class **o-*, used for abstract nouns and long things in the singular, is employed as a rare plural class in Bedik and Konyagi. In Bassari it is very common for *e-II* nouns. However, recall that **ma-* naturally develops to *o-I* in Bassari, being distinguished from the reflex of **o-* only by its determiner. In fact both of these determiners, *ol* and *oŋ*, are innovations which co-opt the final consonants of other classes' determiners. We would expect both to have ˣ*on* (cf. *a̰n* for the *a̰-I* class). The fact that these classes remain distinct confirms that these determiners were innovated before the monophthongization of **wa-* to *o-*. While we could technically say that many original **ma-* plurals of **er-* nouns were "reassigned" to **o-*, in truth all that happened was that they came to be used with a different determiner. The use of *ol* vs. *oŋ* for Bassari *e-II* nouns is mainly determined by semantics. The plural *ol* class is used for animals, and *oŋ* for all other nouns. This distinction follows from the original usage of the **o-* class as a plural for animals. In Bedik and Konyagi, almost all **o-* plurals are animals. Like **maŋ-*, this was probably originally a collective class that came to be used as a plural class (recall that singular **o-* is used for expanses of land and abstract nouns, which are not prototypically singular, but consistent with the usage of collective classes in other languages like Bantu **bu-*).

The distribution of the two "true" non-personal plural classes **ma-* and **max-* is difficult to determine. All three languages agree that **ma-* was the main plural of **er-*. Konyagi suggests that **max-* was the plural of **o-*, and as this singular class was lost in Bassari, Konyagi is our only reliable source of evidence for the original plural of **o-*. For *(i)-I* (mostly from **ji-*), Konyagi is evenly split between the two, and the few *i-I* nouns in Bassari mostly take **max-*. For unprefixed nouns, Bassari uses **max-* overwhelmingly, while Konyagi is split mainly based on the initial consonant of the singular noun. Unprefixed nouns with a grade I consonant mainly use **ma-*, while those with a grade II consonant (mainly borrowings) use **max-*. It is likely that both **ma-* and **max-* were used for **ji-* and unprefixed nouns originally. The singular class **geŋ-* also uses **ma-* and **max-* for some nouns, while using its ɓ-initial plural **ɓeŋ-* for others. This pattern suggests that **ɓeŋ-* was a more recent innovation than the other ɓ-initial classes, and did not fully replace the original plurals in **ma-* and **max-*.

The plurals of **fa-*, **ʃaŋ-*, **xoC-*, and **xaC-* were all formed by stacking **ma-* or **max-* on the singular prefix, just as in the modern languages.

5.5 Language-specific classes

Some classes are attested in only one language, with Konyagi having the most.

Konyagi:
xu-III: A small class containing only four nouns: *xu-mpên* 'light,' *xu-mbàr* 'meeting,' *xu-ndə́gá* 'washing' and *xu-pàʏ́* 'dowry.' Like *xu-II*, these are mostly deverbal. This class could be reconstructed as **xoŋ-* or **xuŋ-*, and it is unclear if it has any connection to **xoC-*.
si-III: Santos gives five nouns in this class: *si-mbánk* 'pawn sp. for game,' *si-nkôŋ* 'chicken sp.,' *si-pǽrǽrǽw* 'giraffe,' *si-tórò* 'striped mongoose,' *si-mpæ̀ỹə́ ~ si-mpə̀ỹá* 'rite sp.,' and

si-yǽv ‘advice.’ The last has a grade I consonant, but the rest show grade III (though *si-ɓánk* ‘pawn sp.’ is also possible). This class could be reconstructed as **ʃiŋ-*.
i-I: This class contains exclusively tools: *i-sə́də̃tá* ‘key,’ *i-líyá* ‘tool,’ *i-xèrá* ‘stylus/pencil,’ *i-fæ̀læ̀xá* ‘winnowing basket,’ etc. Unlike *(i)-I*, the prefix cannot be dropped. The plural of this class is *vi-I*, also unique to Konyagi. If these classes existed in Proto-Tenda, they could have had the forms **(C)i-/ɓi-* or **(C)e-/ɓe-*.
æ-I: This is another small class, with only seven nouns given, most of which are temporal: *æ-sâ* ‘rainy season,’ *æ-lú* ‘full rainy season,’ *æ-ryæ̀f* ‘end of rainy season,’ *æ-ỹánk* ‘dry season,’ *æ-ræ̀yímà* ‘Friday,’ *æ-rə̀yḛ̂l* ‘heaven,’ *æ-sèry* ‘skill.’ It has no plural. It could be reconstructed as **(C)a-*, though it is likely grammaticalized from some preposition (like *gæ-III*, see Figure 284).
xæ~kæ-I/II: This class contains only a few words, all with spatio-temporal reference. The prefix can be either *xæ-* or *kæ-* on each, and while three nouns use grade I, one uses II (or III) optionally, and one obligatorily. Santos mentions only grade II for these two nouns, but /m/ and /t/ could just as well be grade III. The nouns given are: *xæ-ryə̀nkw* ‘before,’ *xæ-w̃ə̀l̰ì* ~ *xæ-mə̀l̰ì* ‘after,’ *xæ-ræ̀c* ‘that day,’ *xæ-tæ̀c* ‘at that time/there,’ *xæ-ræ̀rə́ná* ‘the third day.’ This class could be reconstructed as **ka(C)-*, though like *æ-I* it could be grammaticalized from some preposition.

Bedik:
ɓə-I=le: This is a small class, and takes the same agreement as unprefixed nouns. Most of the nouns in this class are rather common: *ɓə̰-hə̰́ɓ* and *ɓə-dã́r* ‘river,’ *ɓə-məʃ* ‘mouth,’ *ɓu-lú* ‘song,’ *ɓə-yə̰́m* ‘cold,’ *ɓə-yĩ́kḛ́* ‘heat,’ *ɓə̰-hə̰́d* ‘limit/boundary,’ *ɓə-lí* ‘year,’ *ɓu-rù* ‘rainy season,’ and *ɓə-ʃḛ̀ɓ* ‘tail.’ Where cognates of these nouns are found in Bassari and Konyagi, they are for the most part unprefixed. There are also some seemingly singular nouns prefixed with *ɓə-*, but which take the agreement pattern of the *ɓə-I* personal plural class: *ɓə-dã́ñ* ‘*Striga* sp. (weed),’ *ɓə-cáng* ‘mythical bird,’ *ɓə-ʃámb* ‘group/crowd.’ Bassari has even more nouns of this type (with *ɓə-I* agreement), most of which are vines or mass nouns: *ɓə-ʃə̰̀n* ‘charm/medicine,’ *ɓə-ʃḛ̀ɓḛ̀* ‘boiled rice,’ *ɓə-ʃḛ̀ɓḛ́l* ‘moustache,’ *ɓə-táfȅ* ‘amulette,’ *ɓo-xóʃá* ‘peanut sauce,’ *ɓə-yə̰̀ng* ‘*Cissus producta* vine,’ *ɓə-xùl* ‘*Luffa aegyptiaca* vine,’ *ɓə-lâpè* ‘*Cissus quadrangularis* vine.’ It is hard to see how the Bedik *ɓə-I* singular class could have been innovated, so it is probably inherited. It is unclear if this class represents the same class as the *ɓə-I* nouns which take *ɓə-I* agreement, but its resemblance to the personal plural class is probably coincidental.

Bassari:
a̰-I=in: This small class has the agreement pattern of unprefixed nouns. Some members refer to family relations, all of which require a suffixed possessor: *a̰-ɓín-* ‘sibling,’ *a̰-ɓí-* ‘daughter,’ and (from Winters and Winters) *a̰-sə̃ñi-* ‘son.’ These were probably originally unprefixed nouns that acquired the personal prefix *a̰-*. These familial nouns have a unique plural *ɓo-I*. However most *a̰-I=in* nouns refer to plants (mainly grasses); e.g. *a̰-fòkə̀r* ‘*Striga* sp. (weed),’ *a̰-lèrḛ́rḛ́* ‘*Imperata cylindrica* grass,’ *a̰-ʃùrúrú* ‘*Kyllinga cyperus* grass.’ It seems that all of these plant nouns are deverbal (though some have inexplicable suffixes), and contain the infinitive prefix *a̰-*; e.g. *a̰-lə̰̀ká-dã́rám* ‘to stick to the trunk’ and *a̰-fòkə̀r* ‘to prop up.’ The origin of this infinitive prefix *a̰-* is unclear— presumably it is not related to the personal singular class prefix.

5.6 Summary of Proto-Tenda noun class system

The Proto-Tenda noun class system can be reconstructed as in Figure 330. Classes supported by only one branch are given in parentheses (<I> = *i or *e, <U> = *u or *o).

sg.	pl.	semantics
a̟-	ɓə-	personal
gaŋ-	ɓaŋ-	trees/plants, flat things, augmentative, misc.
goŋ-	ɓoŋ-	misc., pejorative
((C)I-)	(ɓI-)	tools
geŋ-	ɓeŋ-	misc.
er-	ma-	round things, fruits, misc.
o-	max-	abstract concepts, long rigid things, expanses of land
Ø		misc. (most borrowings are in this class)
ji-		animals, incl. ‘sheep’ and ‘dog’
	o-	animal plural, used for some animals in different classes
(C)i-?	ma-/max-?	various inanimates, used as agr. for unprefixed nouns?
(ɓə-)		misc.
fa-	+ ma(x)-	animals, perhaps singular of *ña-* collective
xoC-		‘fire, smoke,’ a few abstract nouns
xaC-		misc.
(xUŋ-)		misc. abstract nouns
ʃaŋ-		animals, misc.
(ʃIŋ-)		animals, misc.
(ñaŋ-)	ɓə̟ŋ	diminutive (Bassari-Bedik)
(faŋ-)		diminutive (Konyagi)
(bə-)		personal augmentative (Konyagi)
maŋ-		liquids (including some powders), languages
ña-		slimes and masses of plant fibers
gə̟ŋ-		beer, ‘night, powder’

Figure 330: Reconstructed Proto-Tenda noun class system

This is a rather large inventory of classes, though nowhere near as large as that of Proto-Bainunk-Kobiana-Kasanga. Note that of the plural classes, most were formed by stacking *ɓə-* on the singular class marker, and **o-* was probably originally collective/singular. At some earlier point in the history of these languages, there were probably only three plural classes: **ɓə-* for people, and **ma-* and **max-* for all other nouns.

5.7 Cognate noun classes in other languages

No other language group is sufficiently closely-related to Tenda so as to be useful in aiding significantly in the reconstruction of the Tenda class markers. Nonetheless some connections can be made with other Atlantic groups which confirm some of the classes arrived at through Tenda-internal reconstruction.

Pozdniakov and Segerer (2017) treat Biafada-Pajade (BP) as Tenda’s closest relative. The evidence for this classification is far from clear (a closer connection between BP and WBKK seems possible), but there are some striking similarities between plural classes in

Tenda and BP. Biafada has both *maa-I* and *ma-II* plural classes (cf. Tenda **ma-* and **max-*), as well as the personal plural *bə-I* (cf. Tenda **ɓə-*, note that this class in other families does not use this vowel). Furthermore, BP uses *ba-* prefixed to the full singular noun to form many plurals, just as Proto-Tenda uses **ɓ-*. For the singular classes, there are few connections to be made[151]. Biafada has *ha-II* (cf. Tenda **xaC-*), but the semantic connection is tenuous, as well as a class *ji-I~jə-I* for dog-sized animals, equivalent to WBKK **ji-* as well as Tenda **ji-*. The widespread m-initial liquid class is also found in Biafada, where it is notably nasal-final *ma-III*, just like Tenda **maŋ-*.

The two animal classes **fa-* (FS **fan*, BKK **fa-*, Cangin **f-*, perhaps Wolof *w-* and BP **waN-*) and **ji-* have connections across Atlantic. **xoC-* used for 'fire, smoke' may be connected to BKK **kuN-* used only for 'fire,' though the final consonant of the Tenda marker could not be a nasal. There is perhaps a connection between the Fula-Sereer augmentative **ɣan* and Tenda **gaŋ-*. There is a phonological similarity between Tenda **ña-*, Biafada-Pajade **ña-*, and (Wolof)-BKK **ñaN-*, but no semantic connection. Recall that the Tenda class is a collective class for slimes, whereas the BP and WBKK classes are plural classes (also singular with 'nose' in both groups and 'meat, body' in BP).

The most notable etymological connection is for the singular class **er-*, seemingly cognate with Bantu class 5 **di-*, having similar semantics (also Fula-Sereer **re*). The Bantu plural of class 5 is class 6 **ma-*, being strikingly similar to Tenda **ma-* and **max-* (recall that **er-* / **ma-* is a singular/plural pair in Proto-Tenda).

5.8 Analogical changes in nominal mutation

The only major analogical change in the nominal system involves Bedik number mutation. Otherwise, analogy has played a relatively minor role in reshaping the mutation alternations that naturally arose in the nominal systems of each language.

As discussed in section 2.3.1, Bedik plural forms often show an etymologically unexpected root-initial consonant. Many plurals nouns which were once in the **ma-* or **max-* classes are now in the Bedik *ma-III* class, which was originally not a plural class at all (see Figure 277 for some examples). This innovative use of *ma-III* as a plural class has affected almost all *o-I* singular nouns (original plural **max-*) and unprefixed nouns (original plural **ma-* or **max-*), as well as a sizeable minority of *e-II* nouns (original plural **ma-*). This reassignment was facilitated by the fact that many common **max-* plurals would have mutated in a way that made them indistinguishable from a **maŋ-* class noun (/p, t, c, k, kw, m, ñ, ŋ, ŋw/ all appear in both grades II and III). The advantage of employing *ma-III* as opposed to *ma-I* or *ma-II* is that it ensures a change in consonant from singular to plural in more series. Furthermore, adjectives agreeing with the plural of an *e-II* noun apparently ignore the mutating effect of the plural class marker (*ma-I*, *ma-III*, or *o-I*), with mutation instead determined by a requirement to be different from the consonant used in the singular adjective form. Figure 278 is repeated below to demonstrate this effect.

[151] A connection is tempting between the mysterious Bedik singular *ɓə-* and Pajade *bə-* (from **ɓə-*) used mainly for some trees, but the semantic connection is probably untenable. Bassari *ɓə-* contains many vines, but not trees. However for Bedik *ɓə-mə̀ʃ* 'mouth' and *ɓə-ʃɛ̰̀ɓ* 'tail,' there is in Pajade *pə-məs* and *pa-sabɛ*. These are not in earlier Pajade **ɓə-*, but **bu-* and **ba-*. Perhaps some association can be made between Bedik *ɓə-* and these Pajade forms (borrowing?) but it is not at all clear.

e-II sg.	pl. class	"expected" pl.	pl.	
i-gāf i-párámẹ̀	ma-III	×ma-ngāf ma-párámẹ̀	ma-ngāf ma-fárámẹ̀	'big meal w/o sauce'
i-cẹ̄r i-ɓálà	o-I	×ọ-ʃẹ̄r u-ɓálà	ọ-ʃẹ̄r u-málà	'black chicken'
i-gàs i-ɓálà	ma-I	×ma-ɣàs ma-ɓálà	ma-ɣàs ma-málà	'black face'
e-cəl e-járárà	ma-I	×ma-ʃəl ma-yárárà	ma-ʃəl ma-njárárà	'pretty nose'

Figure 278: Bedik adjectives mutating irregularly to show number alternation

In Bedik and more rarely Bassari, the voicing of *x to /ɣ/ has caused several roots to be reanalyzed as participating in the /ɣ~g~ng/ series, even though /g/ could not arise from *x or *kk by regular sound change. For example, in Bedik the adjective 'new' is *-ɣàʃá~gàʃá~ngàʃá*, descended from the root *-*xaʃ*, cf. Konyagi *-x~kàsək* and Bassari *-x~k~ngáʃáx*. While the voicing of intervocalic *x and development of grade III /ng/ are the result of sound change in Bedik, we would expect this to result in a /ɣ~k~ng/ alternation for this adjective.

Finally it is necessary to discuss one sort of analogical change that did *not* take place (or took place in perhaps only a few words). Existing presentations of the Bassari mutation system (Sapir 1971, Ferry 1991, Storch 1995, Winters and Winters 2004, Wilson 2007, and many publications that cite Sapir e.g. Churma 1988) give two mutation series /w̃~ɓ~m/ and /ỹ~ƴ~ñ/ which do not exist. For Bedik, Ferry lists /l~ɗ~n/ (repeated in Sapir 1971), which exists in Bassari, but not Bedik. The relevant existing mutation series are:

	Bassari						Bedik	
grade I	w̃	ɓ	n	l	ỹ	ƴ	l	ɗ
grade II	m	ɓ	n	ɗ	ñ	ƴ	l	ɗ
grade III	m	m	n	n	ñ	ñ	n	n

It is conceivable that due to the overlap in grade III between the Bassari nasal and implosive series, these series could "merge." In this hypothetical scenario, grade I of grade III /m, ñ/ would always be /w̃, ỹ/, and grade II would be /ɓ, ƴ/. The specific analogies would involve applying the grade III → grade I alternations from the *m, *ñ-initial roots to the *ɓ, *ƴ-initial roots, and vice versa for the grade III → grade II alternations. Again, these analogies did not take place. Ferry is certainly aware of the facts regarding these consonants, writing for the labial series in Bassari, "L'alternance régulière des trois degrés est rarement observée. On peut trouver ɓ/m ou w̃/m, mais le passage de ɓ a w̃ ne se rencontre qu'en dérivation[152]" (1991: 928). She provides two examples of this phenomenon.

ạ-w̃ặy	'return'	ạ-ɓạyí	'remain'
ạ-w̃ăc	'call'	e-ɓăcá	'wives' calling out of their husband's lineage'

The first of these is not an example of consonant mutation, or at least not a regular one. These are both verbs, cited in the (grade I) infinitive form. Thus mutation cannot account for why 'return' has /w̃/ and 'remain' has /ɓ/. These are quite possibly completely unrelated verb roots. The second example involves derivation from a verb 'call' to a noun. It seems that the verb was reinterpreted as /ɓ/-initial when it was nominalized as an *e-II* noun, made possible by the fact that /m/ is the grade III alternate of both /m/ and /ɓ/ in grade II. There is also the *e-II* noun

[152] "The regular three-degree alternation is only rarely observed. One can find ɓ/m or w̃/m, but the change from ɓ to w̃ is encountered only in derivation."

e-ɓóng 'dew' which when compared to Konyagi *i-mə̀nkw* (*i-II*) suggests a similar reanalysis of an originally *m-initial root (perhaps facilitated by a co-occurring **maŋ-* form of the noun, in which the /m/ would be ambiguous). However it should be noted that in Fula and Sereer, a number of roots have variants with /m/ and /ɓ/, both within and across dialects/languages (e.g. Sereer *moos* and Fula *ɓoos-* 'massage'). It is certainly possible that 'call' or 'dew' similarly had two variants. The single root 'call' is the only case of a three-way /w̃~m~ɓ/ alternation in all of Ferry (1991), and nothing similar is found for the palatal series[153]. Similarly no forms exist for the supposed Bedik series /l~ɗ~n/— a fact which Ferry acknowledges: "On n'a donc pas de exemple de réalisation des trois degrés [l, ɗ, n] avec un même radical mais on observe 2/3 et 1/3[154]" (1991: 1074). Thus while the data themselves are not in question, there is a problem with the way that Bassari and Bedik mutation has been presented schematically. It is not the case that because sound A and sound B both alternate with sound C that all three must be in the same mutation series. Unfortunately these misleading mutation tables have been repeated in all existing literature on Bassari and Bedik.

6 Origin of verbal mutation

The origin of mutation in the verbal system is quite distinct between Bassari-Bedik and Konyagi. In Bassari-Bedik, certain pre-verbal morphemes became grammaticalized as prefixes, leaving the root-initial consonant in a lenition environment (grade I), while other forms which lacked these pre-verbal morphemes left the consonant in word-initial position, where it remained unlenited (grade II). Due to the lack of comparative evidence, we can unfortunately only speculate about the origin of the complicated Konyagi verbal mutation system.

6.1 In Bassari-Bedik

For Bassari and (from the information available) Bedik, the conditioning of mutation on verbs can be summarized rather neatly. Wherever certain inflectional morphemes (*k(ə)* and in Bassari also *ba̟* and *do*) accompany the verb, it takes grade I, and all other verb forms take grade II. These grade-I-triggering morphemes are almost certainly auxiliary verbs which have become grammaticalized. When the sequence AUX + PRO + VERB became grammaticalized, the entire complex became a single prosodic word, placing the initial consonant of the verb in a word-internal, post-vocalic environment, as most of the subject pronouns are vowel-final.

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153 Ferry (1991: 943) does present one example for the palatal series which does not truly exemplify the phenomenon in question. The example is the two verbs *a̟-ƴ̃è̟m* 'be still' and *a̟-ƴè̟m* 'be cold,' but of course this does not involve mutation in different grades, as both of these are infinitive forms, taking grade I. These two verbs may in fact be etymologically unrelated, cf. Konyagi *i-ñɔ́w̃* 'be still' and *i-ƴæ̀m* 'be cold.' Even if they are truly variants of the same root, in Fula and Sereer co-existing root variants with /ñ/ and /ƴ/ (or devoiced /ƈ/ in Sereer) are common (e.g. Sereer *ñim ~ ƴim* 'taste' and *riñaɓoox ~ riƈaɓoox* 'move out of the way'), and this Bassari pair would simply be another such example. She also proposes that *e-ƴùwún* 'ash' is derived from *a̟-ƴ̃ùw* 'be sweet' but this connection seems unmotivated.

154 "There is then no example of all three degrees [l, ɗ, n] being realized within a single root, but we do observe 2/3 and 1/3"

	Bassari sg.	Bedik sg.	Bassari pl.	Bedik pl.
1st (excl.)	-mè-	-mé̟- / mé-	-mi-	-ɓé-
1st incl.	-xè- -é (dual)	-(ƴ)é- ... -e (dual)	-nè- -é	-né- -e
2nd	-ƴ-	-ƴ- / é-	-n-	-né- / ń-
3rd	-xò-	-wó- / ó-	-xəní-	-né- / ń-

Figure 331: Subject pronouns in Bassari and Bedik (Ferry 1991: 24-25)

The exceptions are the 2nd person singular pronoun *-ƴ*, and the 2nd person plural *-n*. These were almost certainly **-ƴƴə* and **-nə* historically— cf. Konyagi free 2nd person pronouns *wə̀jə́* (sg.) and *wṵ̀ḻə́* (pl.). While this account can explain the use of grade I for most verb forms, there is at least one form in each language where the historical auxiliary and pronoun appear after the root, rather than before it. Ferry (1991: 33-34) terms these forms the "narrative perfect," and they also take grade I, e.g. Bassari *a̟-fêl **f**êl-k-ò* 'he has said it' and Bedik ***r**ē-k-ò* 'he has said.' Synchronically, we could attribute mutation in these forms to the presence of the morpheme *-k*, which triggers grade I mutation as a prefix as well. But historically, a post-verbal element would naturally have no effect on the initial consonant of the verb. Two plausible explanations are available for these forms: first, that this construction was innovated after the establishment of the verbal mutation patterns, and grade I was employed because of its use in all other forms with *k-*, or second, that the mutation grade was analogically changed to grade I to pattern with other verb forms containing this affix.

Explaining the use of grade II outside of these constructions requires two assumptions. First, when a pronoun and verb co-occurred without an auxiliary, they did not coalesce into a single phonological word, as this would have resulted in the same lenition seen in the forms with auxiliaries. Second, that at least some word-initial consonants did not regularly lenite. This second assumption is partially supported by the historical development of initial consonants outside of the verbal system, as discussed in section 3.1.2.6. Here, we found that a number of singleton consonants which lenited in non-initial position did not lenite word-initially. Figure 314 is repeated below, showing the singleton fortis consonants which remained as such in each language.

	p	t	c	k	b	d	j	g	ɓ	ɗ	ƴ	m	n	ñ	ŋ
Ba.	—	—	—	y	y	y	y	y	(y)	—	(y)	y	y	—	?
Be.	—	?	—	y	y	y	y	y	(y)	(y)	(y)	(y)	—	(y)	(y)
Ko.	—	?	—	y	y?	?	?	?	—?	—?	—?	—	—	—	—

Figure 314: Tenda unlenited consonants in word-initial position by regular sound change

We would of course assume that when the verb root appeared word-initially, these same consonants would remain unlenited, equivalent to the grade II consonants which arose from historical geminates. There are however two ways in which the modern use of grade II in these verb forms does not follow from regular sound change. First, some initial consonants *did* in fact lenite word-initially (*p, *t, *c > /f, s, ʃ/, and in Bassari *ñ, *ɗ > /ỹ, l/), and yet these lenited consonants do not appear in verb forms which take grade II[155]. For Bassari, we would

[155] Recall however that /l/ does appear in Bedik verbs, part of the regular /l~l~n/ series arising from *n. This use of /l/ in grade II is not irregular, as it is shared between nouns and verbs. For the reason why /l/ is used in grade II even in the nominal system, see section 4.

have expected regular sound change to yield a “grade II prime” which was employed only in the verbal system, and differed in some respects from the grade II employed in the nominal system.

Grade I	f	s	ʃ	x	xw	w	r	y	ɣ	ɣ	w̃	n	ỹ	ɣ̃	ɣ̃	ɓ	l	ƴ
*Grade II′	f	s	ʃ	k	kw	b	d	j	g	gw	m	n	ỹ	ŋ	ŋw	ɓ	l	ƴ
Grade II	**p**	**t**	**c**	k	kw	b	d	j	g	gw	m	n	**ñ**	ŋ	ŋw	ɓ	**ɗ**	ƴ

Figure 332: Expected Bassari “grade II′” *compared with attested* grade II

Presumably, this grade II′ did in fact exist at some point, but due to its similarity to the nominal grade II, the lenited consonants in this series were analogically replaced by the fortis consonants (given in bold in Figure 332), extending a more phonetically consistent pattern at the expense of a pattern in which a minority of the consonants were phonetically irregular. In Bedik it is only /p, t, c/ that would need to be analogically restored, and because initial lenition of *p, t, c is shared between all Tenda languages, this analogical process might have operated only once in Proto-Bassari-Bedik. The second complication is that continuants did presumably exist as phonemically distinct from stops even before the lenition sound changes. Thus, while a hypothetical verb root *ya~ja-* could have come from **ja-*, there should also be the possibility of a historical root **ya* which would yield *ya~ya-* by natural sound change, since there is no reason to suspect that singleton *y would harden word-initially. However, we saw in section 3.1.2.6 that for non-verbs, Bassari and Bedik roots beginning in /w, r, ɣ/ are exceedingly rare, whereas /b, d, g/ are common (see Figure 308). Even /y/ is less common than /j/ in Bedik. The reason for the rarity of these continuant consonants in word-initial position is unknown, but if this same pattern held for verbs, there would have been extremely few voiced-continuant-initial verb roots to begin with, and mutation alternations would be introduced analogically into these few roots (thus hypothetical *re~re-* from **re* would be replaced with *re~de-*, since *d-initial roots were overwhelmingly more common). Thus, the only “grade II′” lenis consonants that would have appeared in a significant number of roots would have been the voiceless continuants /f, s, ʃ, x/ and perhaps /y/, and these would have been outnumbered by the mutating roots which showed the same grade I~II alternations seen in nouns. Thus the extension of the nominal grade II mutation pattern to the verbal grade II′ pattern likely affected a relatively lower percentage of verb roots than we might have at first assumed.

To summarize, grade I in Bassari-Bedik verbs arose naturally when the root-initial consonant was placed in intervocalic, word-medial position. Grade II did not arise in the same way as in the nominal system, where it arose from geminates. Rather, most initial consonants were originally fortis (i.e. not continuants), and remained as such in word-initial position. Because original geminates were all degeminated, these word-initial fortis consonants became indistinguishable from the grade II consonants. The minority of initial consonants that *did* lenite or were continuants to begin with were analogically replaced by fortis (grade II) consonants, extending the mutation pattern employed in the nominal system rather than carrying on two slightly different patterns of fortition in the nominal and verbal systems.

6.2 In Konyagi

The situation in Konyagi is much more complicated, and here we can unfortunately only speculate about the various historical triggers of mutation. The triggers of mutation in the verbal system are repeated below:

- All "processive" and "inflectional" forms take grade III
- All negative forms take grade II
    - Except 3rd person plural forms, which are preceded by an optional subject marker, and take grade I
    - And "minimal mood" forms, which make use of an auxiliary *ntə́-*, with the verb subject to the same mutation patterns as affirmative forms
- All imperative forms take grade II
- All verbs with a full pre-verbal subject pronoun (as opposed to a suffixal subject marker) take grade I
- For all other verbs (affirmative, non-imperative verbs not preceded by a full subject pronoun, and neither "processive" nor "inflectional"), those with 3rd person subjects take grade III (and no subject-marking suffix), and all others take grade I
    - Except that in the "minimal mood," 1st person inclusive forms take grade III

Some of these verbal categories have no equivalent in Bassari-Bedik (processive, inflectional, minimal mood), and thus there is no obvious comparative evidence for the way mutation arose in these forms. Perhaps the processive and inflectional forms were once marked with some nasal prefix, or perhaps mutation arose in these forms by some sort of analogy. For the verbs with a pre-verbal subject pronoun, grade I is to be expected since these pronouns are all vowel-final. The use of grade III in marking 3rd person subjects is almost certainly the result of an earlier subject-marking nasal prefix. Whereas all other persons make use of suffixal subject markers, in the 3rd person forms no such suffix is present, but instead the initial consonant is mutated to grade III (e.g. *yə̀də̂-də́-**fú**-xò*, a 1st sg. form of 'give' vs. ***ɲj**ə̀də̂-də́-xò*, the equivalent 3rd sg. form). Perhaps this nasal prefix is related to the 3rd sg. pronoun *ùmə́*. The use of grade II in negative and imperative forms is particularly hard to explain. Unlike in Bassari-Bedik, almost all initial consonants lenited in Konyagi, and so grade II in verbs is presumably the result of geminate consonants, just as in the nominal system. We might assume that some oral consonant prefix once marked negation in Konyagi, but this does not explain the use of grade I in the 3rd plural forms, and furthermore it is extremely unlikely that the imperatives were marked by any sort of prefix, since the imperative is not marked by a prefix in any language of the area. I can unfortunately offer no reasonable guess as to how grade II mutation arose in Konyagi verb forms. Overall, there is simply not enough relevant comparative evidence to shed light on the historical origin of verbal mutation in Konyagi.

7 Synchronic analysis of mutation

Most of what we could say about the synchronic analysis of Tenda mutation can essentially be lifted from the discussions of Fula-Sereer and Kobiana-Kasanga mutation in chapters 2 and 3. Nonetheless, especially for Bassari and Bedik, there are some important differences with these other mutation systems that bear on their potential synchronic treatments.

In all three languages, mutation in the nominal system is triggered on roots by an immediately preceding overt noun class prefix. As such, nominal mutation is compatible with any number of analytical approaches, including the docking of a phonological feature such as [+nasal] to the right edge of prefixes. At least in Bassari and Bedik, the alternations themselves are phonetically quite amenable to a featural affixation analysis, as almost all series are quite "well-behaved." If grade II is taken as underlying, any issue of series overlap is avoided, since the grade II members of each series are distinct in all three languages. Grade I would be induced by a feature [+continuant], and grade III by [+nasal]. All that remains to account for nominal mutation in this analysis would be to define the features of each consonant in each language in such a way that the change of a single feature would induce the appropriate mutation change. This is undertaken for Bassari in Figure 333. Because place features never change within a mutation series, they are omitted from the chart, and the labiovelars are omitted to conserve space.

	p,t,c,k	b,d,j,g	f,s,ʃ,x	w,r,y,ɣ	m,n,ñ,ŋ	w̃,ỹ,ɣ̃	mb,nd,nj,ng	ɓ,ɗ,ƴ	l
[continuant]	-	-	+	+	-	+	-	-	+
[voice]	-	+	-	+	+	+	+	+	+
[nasal]	-	-	-	-	+	+	+	-	-
[sonorant]	-	-	-	-	+	+	-	+	+

Figure 333: Featural specification of Bassari consonants under a featural affixation analysis

The mutation system of Bassari is repeated below:

Grade I	f	s	ʃ	x	xw	w	r	y	ɣ	ɣ	w̃	n	ỹ	ɣ̃	ɣ̃	ɓ	l	ƴ
Grade II	p	t	c	k	kw	b	d	j	g	gw	m	n	ñ	ŋ	ŋw	ɓ	ɗ	ƴ
Grade III	p	t	c	ng/k	ngw/kw	mb	nd	nj	ng	ngw	m	n	ñ	ŋ	ŋw	m	n	ñ

Only four features are required to account for the observed alternations. By starting with the grade II consonants and changing the [continuant] feature to [+], the appropriate grade I consonants emerge. By changing [nasal] to [+], we are left with the appropriate grade III consonants. The voiceless stops cannot change in grade III because no consonants with the desired featural specification exist in the language (e.g. voiceless nasals or voiceless prenasalized stops), and of course the nasals /m, n, ñ, ŋ/ do not change because they are already [+nasal]. Some specific points involving individual series:

i) /n/ does not change in grade I simply because no consonant such as /l̪/ exists in the language. Thus the change in [continuant] is not possible, since no consonant with the appropriate featural specification exists. Of course it must be ensured that place features can never change, e.g. by an inviolable constraint in a constraint-based analysis.
ii) Similarly, /ɓ, ƴ/ do not change in grade I because no consonants exist in the language which differ from them only in being [+continuant]. /l/ on the other hand has exactly this relation with /ɗ/.
iii) The fact that grade II /k/ sometimes alternates with /ng/ in grade III is somewhat difficult to account for. Perhaps we could resort to proposing that /ng/ is optionally unspecified for the feature [voice].

With the exception of the /x~k~ng/ alternation, Bassari nominal mutation is accounted for rather neatly by this featural affixation analysis. The phonological features assigned to each phoneme are mostly in line with their phonetic character. The identification of implosive stops as [+sonorant] might at first seem odd, but this position is argued for by Clements and Osu (2002) among others. The only sticking point is the fact that /w, r, y/ are [-sonorant]. This would only be a problem for a theory that requires a sort of strict equivalence between phonetic and phonological features.

A similar analysis of Konyagi would present a few more featural quirks: /r/ is [-voice], and Konyagi /v, ry/ are [+sonorant] even though /w, r/ are [-sonorant]. Furthermore the prenasalized stops would require some rather opaque featural specifications— /mp, nt, nc, nk/ would essentially be treated as if they were /mb, nd, nj, ng/, and /mb, nd, nj/ as if they were underlyingly /mɓ, nɗ, nƴ/. The Bedik /l~l~n/ series which requires a special explanation in a historical account (see section 4) can be handled without issue in this sort of synchronic account. Bedik /l/ would be treated just like /ɗ/ but with an additional distinguishing feature (perhaps [lateral]). As long as /n/ is unspecified for this feature, and /l/ is taken as an underlying consonant in grade II, the Bedik mutation series behaves as expected.

	m,n,ñ,ŋ	ɓ,ɗ,ƴ	l
[continuant]		-	+
[voice]	+	+	+
[nasal]	+	-	-
[sonorant]	+	+	+
[lateral]		-	+

Figure 334: Featural specifications for Bedik consonants (where different from Bassari)

This account does not at all parallel the historical origin of the /l~l~n/ series, in which /l/ comes from earlier [l̠], being the lenition of *n, but this need not concern a strictly synchronic analysis.

Verbal mutation is one of the greatest challenges to a featural affixation analysis for Fula-Sereer and Kobiana-Kasanga, since in those languages mutation is not consistently accompanied by overt affixes, nor would any proposed featural affix function in a way expected of an overt affix. However in Bassari-Bedik, these obstacles are removed. Here, we have seen that verbal mutation to grade I is strictly correlated with the presence of certain overt affixes on the verb (*k(ə)*, and in Bassari also *bạ*, and *do*, though recall that we may not have a full picture of the Bedik verbal system). While these affixes are not immediately adjacent to the verb, it is reasonable to propose that they are in fact two-part affixes, consisting of the segmental affix as well as a prefix [+continuant]. Verbal mutation to grade I would simply involve a sort of multiple exponence. Despite the much more complicated conditions on verbal mutation in Konyagi, it is in fact also amenable to a featural affixation analysis. Each mutation trigger can be translated into a featural prefix which in some cases is accompanied by an overt segmental morpheme. The relevant verbal prefixes would be: [+nasal] 'processive,' [+nasal] 'inflectional,' [+nasal] '3rd person subject,' appearing in the same paradigms as overt subject suffixes for other persons, and all segmental subject markers would be accompanied by a prefix [+continuant]. There would also be a 1st person inclusive prefix [+nasal] used only in the minimal mood. For Konyagi this analysis is somewhat less satisfying than for Bassari-Bedik, since it relies on some conspicuous coincidences (why should so many subject markers happen to be bipartite, with a prefixal [+continuant] component?), but the analysis is nonetheless entirely workable.

There is nothing in the Tenda languages which would preclude proposing the same sorts of analyses explored for other Atlantic languages in chapters 2 and 3, in which grammatical features rather than linearized floating phonological features are responsible for mutation. However it is noteworthy that a featural affixation analysis like that sketched above can be successful in accounting for mutation in Tenda, whereas for Fula-Sereer and Kobiana-Kasanga such an analysis is largely incompatible.

8 Conclusion

The basic historical processes which gave rise to mutation in the nominal systems of the Tenda languages are by now familiar to us, having clear parallels in the other Atlantic mutation systems discussed in chapters 2-4. As in Fula, Sereer, Wolof, and Kobiana-Kasanga, a system of (C)V(C)- noun class prefixes interacted with following root-initial consonants to yield the modern mutation alternations. Where the prefix-final consonant was a nasal (perhaps always *ŋ), nasal grade III arose, and where it was an oral consonant, it assimilated completely, creating a geminate that hardened and gave rise to grade II. Where the prefix was vowel-final, the following consonants were subject to the general lenition sound changes that affected all post-vocalic consonants in each Tenda language. To a large extent, this three grade mutation system was probably already in place at the Proto-Tenda stage. However, the development of certain mutation series (namely /l~l~n/ in Bedik and those arising from *ƴ, *j, *y, *ɣ, and *w in Konyagi) suggest that the prefix-final consonants could remain unassimilated in Proto-Tenda, perhaps dependent on speech rate or register. Further analogical changes played a rather small role in the development of nominal mutation in each language. The origin of mutation in the verbal system is however quite unique among Atlantic languages, at least for Bassari-Bedik. Here, grade II arose not from a preceding oral consonant, but simply because certain verb forms were unprefixed, and many word-initial consonants did not lenite. After a general degemination change in each language, these unlenited verb-initial consonants merged with the grade II consonants, and subsequently the verb-initial consonants which *did* lenite adopted the more regular grade II mutation pattern from the nominal system.

Chapter 6: Implications for the genetic relation of Atlantic languages

This chapter will address the genetic relations of the Northern Atlantic languages among themselves and with other African languages. The focus of chapters 2-5 has been establishing the historical origin of consonant mutation in the Atlantic languages. This endeavor has relied heavily on understanding the history of noun class in these languages, including reconstructing the class systems of each subgroup. We have also established a number of sound changes, sound correspondences, and cognate sets in various Northern Atlantic language families through comparison of lexical material. This puts us in a good position to assess the evidence for the genetic relatedness of these languages. The languages of the proposed Northern Atlantic group are presented in Figure 335, organized by subgroup and omitting languages which are no longer spoken.

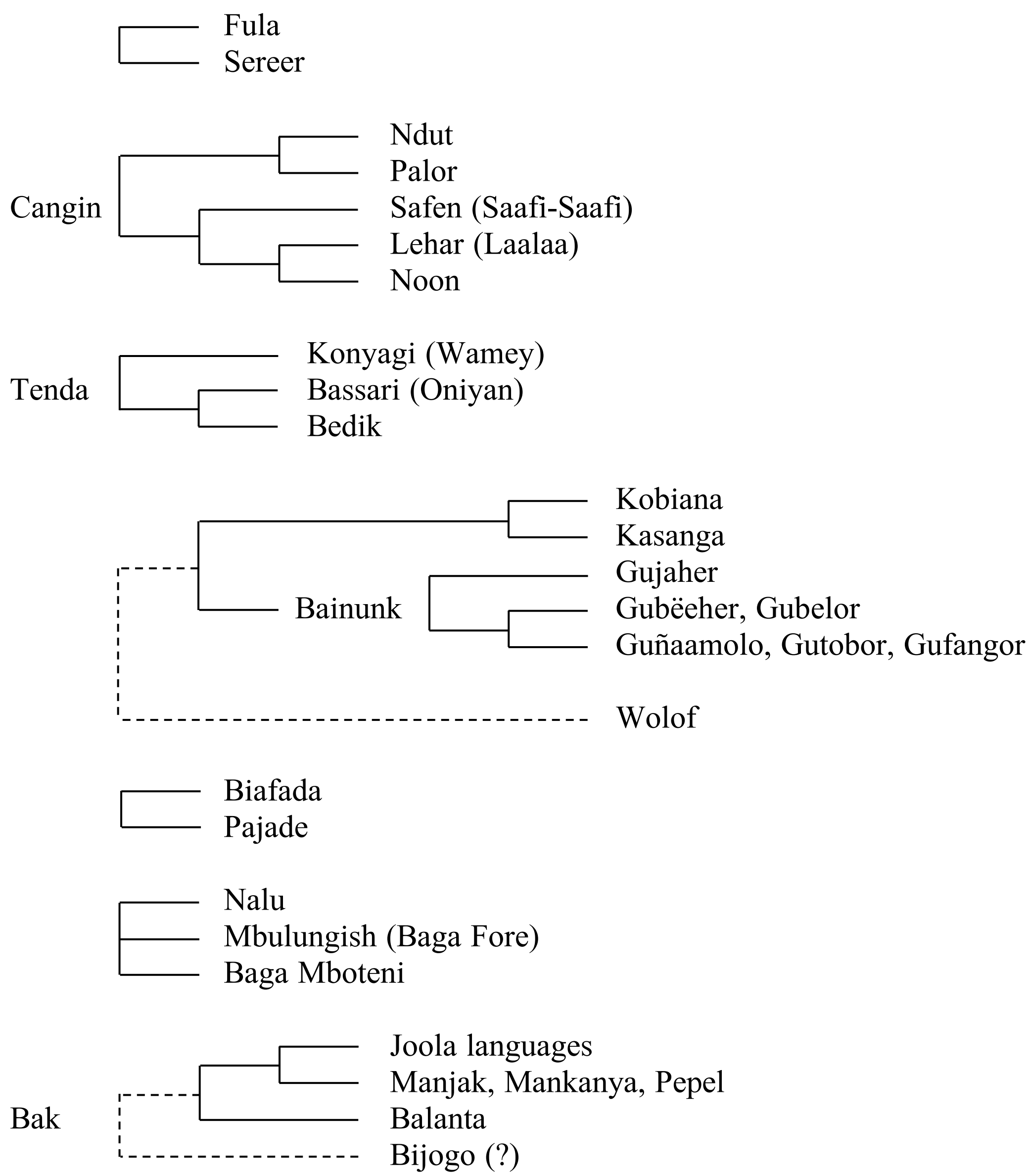

Figure 335: Language groups within Northern Atlantic

The Cangin languages do not exhibit mutation, and as such have been only rarely mentioned in the preceding chapters. All Proto-Cangin reconstructions in this chapter are my own[156]. The three languages Nalu, Baga Mboteni, and Mbulungish are generally taken to be a genetic unit, but are very poorly documented. I unfortunately have nothing to say about this group, except that they have very small inventories of noun classes, and no consonant mutation. I will have nothing to say about the internal organization of Bak, including whether Bijogo belongs in it, as argued by Pozdniakov and Segerer (2017) (Sapir 1971 had considered it an isolate within Atlantic, and the issue is far from resolved). All discussion of Bak is only in the context of comparison with the non-Bak languages. Finally, the Southern Atlantic languages will not be discussed at all. These are the Mel languages (Temne, Baga languages, Bullom languages, Kissi), Sua, Gola, and Limba. With the exception of Sua (spoken in Guinea Bissau) and the Baga languages (spoken adjacent to the Nalu-Mbulungish group), these are all spoken far to the southeast of the Northern Atlantic languages. As far as I know no current scholars support a genetic unit comprising all of the Atlantic languages.

Regarding the genetic affiliation of the Northern Atlantic languages, the following questions emerge:

1) Which Northern Atlantic languages are related to each other? Do they form a valid genetic unit together?
2) What subgroups can be identified within Northern Atlantic? Do the non-Bak languages form a genetic unit to the exclusion of Bak?
3) Are any/all of the Northern Atlantic languages related to Niger-Congo languages (which we can define as all languages demonstrably related to Bantu)?

No scholarly consensus exists for any of these questions. Dimmendaal (2008: 841-2) gives the following assessment of current opinion regarding Atlantic:

> "The status of Greenberg's Atlantic group within Niger-Congo is still unclarified. [...] The internal diversification within this presumed primary branch indeed is so huge that some scholars would argue that "Atlantic" is primarily an areal grouping representing a number of independent, early descendants of Niger-Congo; a few have challenged this view and would go as far as saying that some of the languages originally included in this family may not even belong to Niger-Congo."

The various possibilities for genetic relations involving Northern Atlantic languages relative to Benue-Congo are schematized in Figure 336. Other proposed branches of Niger-Congo including all Southern Atlantic languages are omitted from this figure— these possible family trees are not meant to be comprehensive.

[156] Cangin sources used throughout this chapter: Morgan (1996) for Ndut, D'Alton (1983) for Palor, Mbodj (1983) for Safen, Dièye (2011) for Lehar; Noon data is from my own fieldwork on the dialect spoken in the village of Lalane, and some forms from the Padee and Thiès dialects from Soukka (2000). Some Ndut forms from an unpublished wordlist by Doneux (available in the RefLex database) are also given, though these seem to have many inaccuracies when compared with Morgan and D'Alton. These forms will be marked with a raised (d). Some Safen forms from Stanton (2011) and Williams and Williams (1993) are also given, indicated with a raised (s) and (w) respectively. Cangin reconstructions are explained and supported in Appendix C.

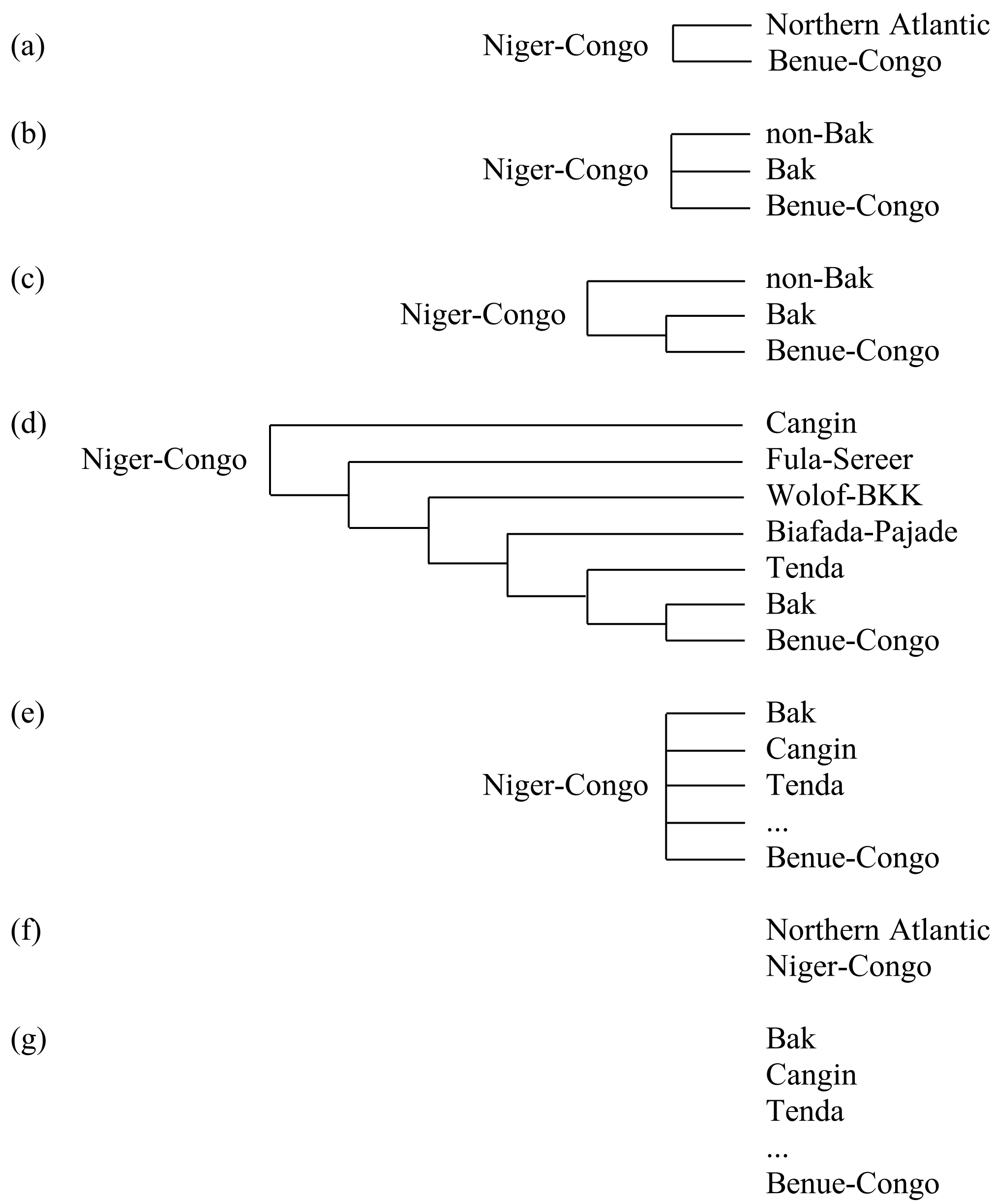

Figure 336: Possibilities for genetic relations involving Northern Atlantic languages

For (c) Bak and non-Bak might be switched, and for (d) the Northern Atlantic groups might be rearranged in any order. Variations on (g) could have certain Northern Atlantic groups in two or more separate families, unrelated to Benue-Congo. The remaining possibilities involve including some Northern Atlantic groups in a subgroup with Benue-Congo, and others in one or more sister subgroups or unrelated subgroups.

The specific proposals (i.e. those that go beyond off-hand remarks) both for and against different genetic affiliations are in fact quite few, but most argue for a tree consistent with (a) in Figure 336. After some initial hypotheses by Westermann (1928) and Greenberg (1963), the first proposal of any significant length is that of Sapir (1971), whose classification continues to be cited even in recent work, if only to provide a genetic classification for one language or another in otherwise synchronic research. Since Sapir, the only notable proposals for the unity of Northern Atlantic are by Doneux (1975, 1978, 1991), Wilson (2007), who retains Sapir's classification, and most recently Segerer (2010) and Pozdniakov and Segerer (2017, building on earlier proposals by both authors). Notable counterarguments are found in Bennett and Sterk (1977) and Childs (2003), who reject the genetic unity of Atlantic as a whole and, while not explicitly stated, do not support the unity of Northern Atlantic either. Childs (2003: 50) sums up the "non-unitary" position neatly, writing, "Neither lexicostatistical data nor shared innovations (nor reconstructions) seem to favor treating Atlantic as a genetic group. The culture of lumping and inertia are the only factors favoring its continuance." Three main types of evidence are presented in the existing classifications: lexical evidence, evidence from noun class, and evidence from consonant mutation. Other morphological evidence does not feature prominently. This chapter will look at each of these three types of evidence, assessing for each their conclusions regarding the above questions, and comparing against the existing proposals.

1 Areal considerations

To set the stage for this discussion, it will be useful to review the patterns of language contact in this area. With the exception of various dispersed Fula dialects, all of the Northern Atlantic languages are spoken in a rather small area, mostly comprising the west and south of Senegambia and most of Guinea Bissau. Little is known about the long-term history of this region, but there is no evidence that points to any of the Northern Atlantic languages being recent introductions, though there has certainly been movement within the area. Dimmendaal (2008: 846) cites Muzzolini (1993) in proposing that West Africa as a whole was "sparsely populated" until around 12,000 years before the present. Even if this date is taken as the beginning of large-scale habitation of the region, 12,000 years is certainly longer than the time depth of any established genetic grouping among the world's languages, and thus we may in theory be dealing with languages whose genetic affinity cannot be determined. Furthermore there is no way of knowing whether the large-scale population of this region was by groups speaking related or unrelated languages, and of course even the "sparse population" which may have already been established at this time would have spoken languages that might have survived even into the present. With the high degree of linguistic diversity in this relatively small area, and given what we know from modern patterns of contact and multilingualism in the area, we can be reasonably sure that at all stages of the history of the Northern Atlantic languages, language contact has played a major role in their development, both in the form of borrowing and the diffusion of typological features. The oral histories of the region, while by no means reliable as sources for specific historical events, paint a picture of extended contact between distantly related or unrelated groups that goes back many years. For example the Sereer and Joola consider themselves to have a "cousin" relationship, and their histories tell that they once lived together before splitting off many years in the past. Currently, Sereer and Joola are spoken in entirely non-contiguous regions, and the languages themselves are at best extremely distantly related. But it is significant that the languages spoken in the area between Sereer and Joola are Mandinka and Wolof, both of which we know were not originally spoken here (Wolof coming from the north, and Mandinka from the east). Perhaps this oral history recalls a time when Sereer and Joola were in contact, before being split by Mandinka and later Wolof incursions.

The effects of contact in this area can take many forms, and can be quite extreme. Some of the best examples come from the highly linguistically-diverse Casamance region, in which (until recently) no single language has been established as culturally dominant, and distantly-related or unrelated languages are often in very close contact. The situation in the

Casamance might serve as a model for the situation which held more broadly among Northern Atlantic languages and neighboring languages in the past, before the large-scale spread of regional languages like Mandinka, Wolof, and Fula. Some rather drastic effects of contact are found in the Bayot language, and to a lesser extent Joola Kujireray. Bayot (Diagne 2009) behaves in many respects like a normal Joola language, with its noun class system and most other morphology being cognate with Joola. However a large portion of its vocabulary, including rather basic terms, as well as most of its pronominal system cannot be connected with Joola or any other language (Segerer 2016 gives a figure of 12~18% cognacy with Joola). With a better understanding of its history, Bayot might be classified as a "mixed language" resulting from intense contact between Joola and some now-lost isolate language (Segerer 2016). For Joola Kujireray (Watson 2015), we have a much better understanding of its history. Kujireray is spoken in the village of Brin (Jirer), adjacent to the Bainunk village Djibonker (Jibëeher). Its structure is unremarkable for a Joola language, but much of its basic vocabulary is Bainunk. Cobbinah (2013: 62) writes that "Speakers of Gubëeher are aware of the lexical parallels between their language and Joola Kujireray; some even go so far as to say that the latter is a "mix" of Joola Eegimaa, Joola of Affiniam and Baïnounk Gubëeher." Brin was until recently a Bainunk village, and has essentially the same cultural practices and clan names as neighboring Djibonker. Cobbinah reports that "inhabitants [of Brin] remember that their great-grandparents still used to speak Baïnounk." Instances of rapid language shift are not uncommon in the Casamance, and may well have been common in the history of other Northern Atlantic languages, in the most extreme cases resulting in the large-scale adoption of linguistic material from an unrelated or distantly-related language. Even in less drastic cases, patterns of borrowing are sometimes quite different from what we might expect based on experience with better-known contact scenarios. We will see in section 3.5 that Bainunk languages and Kobiana have borrowed some very basic vocabulary from Bak languages, as well as some grammatical affixes. This is despite the fact that borrowings do not make up a large percentage of the overall vocabulary of any of these languages. In the history of these languages there does not seem to have been any large-scale borrowing akin to the effect of French on English, or Chinese on Japanese and Korean, and yet even words for 'water,' 'person,' and 'tree' are borrowed between languages. In these languages it does not seem that borrowing is generally driven by necessity (i.e. borrowing a word for which no word already exists in the language), cultural dominance (though cultural prestige certainly plays a role in these borrowing patterns), or even the desire to be understood. Large-scale multilingualism is prevalent in this area, such that the use of language is disproportionately influenced by its status as a tool for establishing cultural identity, rather than the practicalities of ensuring comprehension between speakers. In this context the motivations for borrowing are not well understood, but seem to often have more to do with cultural expression than more practical considerations. The effect is that unrelated languages can remain very much distinct from each other in most regards, while also sharing some very basic vocabulary and even (to a much lesser extent) some morphology. Of course, more expected consequences of close language contact are also seen in this area, notably the sharing of typological features. For example the vowel system of Bainunk Gubëeher and Guñaamolo is essentially identical to that of most Joola languages. For more on language contact in the Casamance, see Lüpke and Storch (2013).

When considering the history of the Northern Atlantic languages, it is important to not be misled by expectations based on families such as Indo-European, Austronesian, and Bantu, where related languages have spread over a wide geographical area, and thus the effects of contact and genetic inheritance are generally easier to distinguish. Here we are dealing with a group of languages which have been spoken in roughly the same area for thousands of years, and thus have potentially influenced each other at every stage throughout their history. It may not be that the situation in the Casamance is closely paralleled among all other Northern Atlantic languages, but when dealing with language contact throughout a period of many millennia, it becomes very hard to say with any certainty what the degree and nature of contact was between any two languages at any given time. Assuming that a Casamance-like situation did hold between languages at various times in the past, it would become nearly impossible to distinguish borrowings from cognates the farther into the past we venture.

2 Evidence from mutation

Consonant mutation is a particularly conspicuous feature of a number of Northern Atlantic languages, and as such has attracted the attention of linguists attempting to classify these languages genealogically. However it must be stressed that consonant mutation, like ablaut, the use of noun classes, or SVO word order is a typological feature, and as such the mere existence of the phenomenon in a group of languages says nothing about their genetic relatedness. To assert mutation as a marker of genetic relatedness, one must show that each modern system is descended from one original mutation system that was present in a putative Proto-Northern-Atlantic, and developed by certain phonological and/or analogical innovations into each modern language. Chapters 2-5 examined the origin of consonant mutation in the various Northern Atlantic languages, and found that this "common inheritance" scenario cannot be supported. Rather, we are able to identify the specific sound changes and historical triggers that gave rise to mutation in each language, and find that these are not shared between the Northern Atlantic languages, but instead represent independent innovations within each language or language group. Even among the rather closely-related Fula and Sereer, it is not possible that their mutation systems were inherited from a single Proto-Fula-Sereer mutation system. The sound changes required to yield each modern system are incompatible between each language, and can only have occurred after the breakup of Proto-Fula-Sereer. Figure 337 presents the multiple origins of consonant mutation across the Northern Atlantic family, with the origin of each mutation system marked by a diamond.

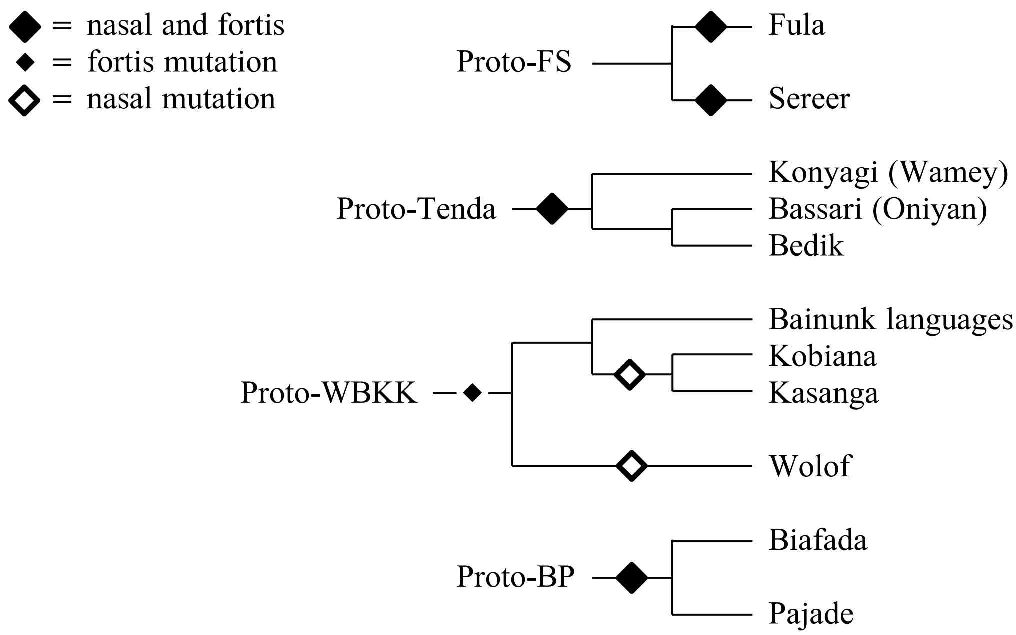

Figure 337: Multiple origins of consonant mutation in Northern Atlantic languages

We can somewhat tentatively propose that Proto-Wolof-BKK had geminate mutation for a few noun classes (see chapter 4 section 3.8), indicated with a small diamond, with the later development of nasal mutation in Kobiana-Kasanga and Wolof being separate innovations, indicated with hollow diamonds. Note also that the mutation system of Proto-Tenda was not fully-formed, in that sequences of consonants across morpheme boundaries could remain unassimilated in at least some contexts, allowing for the divergent development of particular consonant sequences in each branch (see chapter 5 section 4). The origin of Biafada-Pajade mutation can only be speculated on here (see Appendix A), but it does seem that a very phonetically straightforward mutation system was a feature of Proto-BP, leaving only traces in modern Pajade.

Existing literature has for the most part assumed that the various mutation systems of the Northern Atlantic languages are inherited from a common source. We will briefly discuss these proposals before summarizing the arguments from the preceding chapters for why mutation was in fact innovated separately in multiple families.

2.1 Atlantic mutation in the existing historical literature

With few exceptions (notably Doneux 1975), scholars have generally assumed that mutation in the Atlantic languages is inherited from a common source. Several proposals exist which seek to reconstruct this supposed parent system and derive the modern alternations in each language from it. These are: Holst (2008), Fisher (2015), Stewart (2002, 2007), who traces mutation back to Proto-Niger-Congo, and Pozdniakov (1987). I have not been able to examine the last of these, but the others employ a common strategy in their historical treatment of mutation. Rather than reconstructing the phonological history of the various established subgroups, these studies examine the phonetic nature of the modern mutation alternations in each language and attempt to deduce from them a single original mutation system. They do not propose specific morphemes that triggered mutation in this original system, nor do they trace the development of the original mutation series into each modern language through the proposal of specific regular sound changes. Furthermore, these studies do not deal with alternations existing in proposed cognates, but only with the abstract phonetic alternations. If mutation did exist in a supposed Proto-(Northern-)Atlantic, we would ideally be able to reconstruct specific roots with their initial consonants in three different grades, and show how each of these three forms descended into the modern languages. Furthermore, it would be desirable to present the specific sound changes that operated in each language on the initial consonants involved in mutation, and show that these same sound changes operated in other environments (i.e. morpheme-internally). No such proposals are made in the existing studies. Of course it is not difficult to propose in very broad terms that grade I is due to lenition (or no change), grade II due to gemination, and grade III due to nasalization. However without tracing the specific history of each mutation system, it is impossible to determine whether these changes could have taken place in a common ancestor, or were parallel independent developments in different groups.

Even in the absence of specific historical proposals, scholars have commonly assumed that the mutation systems of Atlantic languages descend from some common source. Anderson (1976: 111-2) writes, "[consonant mutation] must in any case have been a property of the proto-language which was ancestral to the entire northern group of West Atlantic, and perhaps to common West Atlantic itself." It is also often assumed that mutation alternations were once more robust in all languages. Ternes (1990: 14) writes that in Fula "a fair number of consonants do not take part in the alternation any more." In fact the non-alternating Fula consonants were never subject to mutation, and in one case mutation was introduced in an originally non-alternating consonant (/ʔ/ in Pulaar, see chapter 2 section 4.9.2). Pozdniakov and Segerer (2017: 5) speculate that Cangin once exhibited mutation, and Storch (1995: 52) goes so far as to reconstruct a mutation system for Cangin. At best, there were once some alternations involving the historical **n-* singular noun class in which certain initial consonants were prenasalized, but even this is speculation and not supported by evidence from modern Cangin languages. The mere presence of a typologically-similar consonant mutation system has been taken as evidence of genetic relatedness, as assumed by Westermann (1928: 71) and Greenberg (1963: 25-27). The differences between these systems (or even the lack of such a system) are explained away as the erosion of an originally more robust proto-system. But of course typologically-similar systems cannot be taken as evidence of relation unless these systems can be shown to be cognate, which the existing proposals of common (Northern) Atlantic mutation have been unable to convincingly show.

2.2 The independent origins of mutation systems within Atlantic

The specific origin of consonant mutation in each of Fula, Sereer, Kobiana-Kasanga, Wolof, and Tenda has been the topic of the previous 4 chapters. The historical accounts presented for each of these languages (or language groups) are entirely incompatible with the idea that mutation in the Northern Atlantic languages was inherited from some common source. We have seen that mutation is the result of regular sound changes that operated both within and across morpheme boundaries. When each subfamily is carefully examined, it becomes clear that the particular sound changes that resulted in mutation were specific developments of each language or family.

One particularly clear example concerns the origin of nasal mutation in Kobiana-Kasanga. When we examine the noun classes that trigger nasal (grade III) mutation in Kobiana-Kasanga and their cognates in Bainunk, it is clear that these class prefixes must have been realized as CVN- in Proto-BKK, with no change in the following consonant. Consider the effect of Proto-BKK **siN-* and **ñaN-* on following continuants in each modern language. In Kobiana, the classes *si-III* and *ña-III* trigger grade III mutation, requiring the change of grade I /f, h, s, h/ to /pp, tt, cc, kk/. In chapter 3 section 3.1.2.1 we saw that Proto-BKK *p, t, c were realized as continuants root-initially. In order to say that nasal mutation was present in Proto-BKK, we would require at least a change of *[f, r̥, s] to *[mp, nt, nc] (root-initial *k did not spirantize to [x] in Proto-BKK)[157]. However in Bainunk there is no evidence of this sort of alternation having existed. In Guñaamolo, the classes *siN-* and *ñaN-* induce no change in these continuants (modern /f, l, s/) nor in any other continuant. The nasal is still realized on the prefix as nasalization of the vowel. In Gubëeher there is also no change in these continuants, and the nasal of the prefix is deleted. Gujaher retains the nasal in most environments, but it seems to have assimilated to root-initial /l/.

Guñaamolo		Gubëeher		Gujaher	
sin-lo̟dd	'wall'	si-lo̟d	'wall'	cil-la̟d	'wall'
sin-li̟ib	'root'	si-liin	'spiderweb'	cin-sukay	'to accompany e.o.'
sin-suul	'smell'	si-fooŋ	'rancid smell'	ciŋ-foot	'odor sp.'
ñan-luf	'tailors'	ña-liina	'students'	ñan-saw	'hunters'
ñan-saajum	'doctors'	ña-lax	'smiths'		
ñan-ha̟ri	'sorcerers'	ña-si̟ŋ	'crab sp. (pl.)'		
ñan-faañ	'smiths'	ña-so̟og	'slaves'		

Figure 338: Realization of siN- *and* ñaN- *before continuants in Bainunk*

Thus there is no evidence that Proto-BKK made use of nasal mutation at all. On the contrary, the Bainunk outcomes would be impossible if already in Proto-BKK there was a mutation alternation between continuants and prenasalized stops or geminate stops. For example, 'wall' must be reconstructed as **sin-r̥o̟dd* and not ˣ**si-nto̟dd* or ˣ**si-tto̟dd* (cf. Kobiana *-h~ttedd* 'build' seemingly from this same root). Compare also the cognate term 'comb': Gujaher *ran-sip* = Kobiana *sá-cciipp*, in which the Gujaher form could only arise from an originally unaltered post-nasal *s. The hardening of post-nasal continuants and subsequent development of NT to TT is a later development exclusive to Kobiana-Kasanga. As no nasal mutation existed in Proto-BKK, Kobiana-Kasanga nasal mutation certainly cannot be inherited from some even more distant ancestor language.

Even between Fula and Sereer, we must conclude that mutation arose due to separate sound changes in each language, rather than being inherited from Proto-Fula-Sereer. The arguments from chapter 2 section 4.6 are summarized here. In each language, grade II was triggered by oral consonants (*l, *x, *k at the end of certain class prefixes) when they preceded the lexical root. Grade III was triggered by nasal consonants (perhaps only *n at the end of certain class prefixes and pronouns). Thus mutation arose due to regular sound changes affecting consonant clusters, and where these clusters occurred across morpheme boundaries, alternations could occur depending on the identity or presence of the first morpheme. However the specific sound changes affecting clusters in Fula and Sereer are in fact quite distinct, and

[157] Note that even this change would not truly qualify as mutation, as the continuants and stops would simply be allophones.

thus could not have taken place in PFS. The divergent outcomes of these XC and NC sequences (where X is an oral consonant and N a nasal) are given in Figure 339[158].

Sereer	Fula	Sereer	Fula
*X-w > b	*X-w > b	*N-f > mb	*N-f > p
*X-r > t	*X-r > d	*N-s > s	*N-s > c
*X-y > y	*X-y > j	*N-h > ng	*N-h > k
*X-ɣ > k	*X-ɣ > g	*N-x > nq [NG]	*N-x > k
*X-b > p	*X-b > b	*N-y > y	*N-y > nj
*X-d > t	*X-d > d	*N-ɓ > ƥ	*N-ɓ > ɓ
*X-j > c	*X-j > j	*N-ɗ > ƭ	*N-ɗ > ɗ
*X-g > k	*X-g > g	*N-ƴ > ƈ	*N-ƴ > ƴ
*X-s > s	*X-s > c		
*X-ɓ > ƥ	*X-ɓ > ɓ		
*X-ɗ > ƭ	*X-ɗ > ɗ		
*X-ƴ > ƈ	*X-ƴ > ƴ		

Figure 339: Disparate outcomes of mutation sound changes in Fula and Sereer

For the oral consonants (X) it is possible that they had resulted in root-initial geminates already in PFS. However they could not have induced changes in voicing or continuancy. Thus *X-w could have been [ww], but not ×[bb], as in Sereer *X-w becomes /b/ and *X-b becomes /p/ (impossible if both were [bb]). For the nasal consonants (N), there may have been place assimilation, but no hardening or voicing changes. Thus *N-f might have been [mf] or at best [mpf], but cannot have been [mp] or [mb], as in Sereer *N-f becomes /mb/ but *N-p becomes /p/ (impossible if both were [mp]); and it could not have been [mw], as in Fula *N-f becomes /p/ but *N-w becomes /mb/. Note also the development of the palatal continuants *s and *y after a nasal. In Sereer the nasal deletes entirely with no change to the consonant, which would be impossible if the nasal had induced some phonemic change already in PFS. Essentially, PFS may have exhibited a rather transparent assimilation process for CC sequences, but this could not yet be considered true mutation. Furthermore, in Sereer the final consonant of the class marker **ɣol* vocalized (perhaps a regular change in Sereer after a round vowel and before a consonant, see chapter 2 section 6.2.1.6), and thus did not trigger grade II, whereas in Fula it remained a consonant and triggered grade II just like **ɣal* (modern Sereer *(g)o-I* and *(g)a-II* vs. Fula *II- -gol* and *II- -gal*). These disparate outcomes would be impossible if *l already triggered hardening in PFS. Thus no mutation system existed in Proto-Fula-Sereer, with each modern system developing due to language-specific sound changes. Of course this entails that neither system was inherited from some more distant ancestor.

Besides the incompatibility of the sound changes which led to mutation in different languages, we also find that the specific triggers of mutation are entirely different between languages. For example, in Fula in Sereer verbs alternate between only grades I and III, with the historical trigger of grade III being the final nasal segments of plural pronouns— grade I is unmutated (see chapter 2 section 5). In contrast, Bassari-Bedik verbs alternate between only grades I and II, with the historical trigger of grade I being certain pre-verbal auxiliaries that grammaticalized in such way that the root-initial consonant was intervocalic, inducing regular

[158] In both languages: *X-T and *N-T develop to T (voiceless egressive stop); *N-D develops to ND (voiced prenasalized stop); *N-w, *N-r, *N-ɣ become /mb, nd, ng/; *X-f, *X-h, *X-x become /p, k, q/ (/k/ in Fula).

lenition— in verbs grade II is unmutated (see chapter 5 section 6.1). These subfamily-specific explanations are entirely sufficient to account for the modern mutation patterns, and proposing a Proto-Northern-Atlantic mutation system operating on verb roots would be not only needlessly complicated, but unable to explain the modern mutation triggers.

Perhaps a more convincing argument could be made in the nominal system, where the triggers of mutation are essentially the same in each language; i.e. noun class markers. To argue that the modern mutation systems are all descended from a single original system, we would need to propose that the Proto-Northern-Atlantic language had a noun class system in which each class enforced a particular mutation grade, just as in the modern languages. Thus, where a cognate noun class is found between two groups, it ought to enforce the same type of mutation. We will see in section 4.2.1 that there are in fact very few cognate noun classes between Northern Atlantic groups, but one particular cognate class that *can* be found serves to demonstrate the implausibility of a reconstructed Proto-Northern-Atlantic noun class system in which mutation operated. The noun class in question is Fula-Sereer **re* and Tenda **er-*, both used for smallish round objects (rocks, fruits, etc.). This class marker is found throughout Niger-Congo with basically the same semantics (Bantu class 5 **ri-/i̯-*). Thus if a Proto-Northern-Atlantic language existed, it would have contained this class. In Fula-Sereer this class is reconstructed as **re* (see chapter 2 section 6.2.1.7), and like all vowel-final class markers it has no effect on root-initial consonants in either Fula or Sereer; i.e. it triggers the unmutated grade I. On the other hand, the Tenda class can be reconstructed as **er-* (see chapter 5 section 5.1.3), and this final *r assimilated to root-initial consonants, yielding a geminate; i.e. it triggers grade II in all Tenda languages. If mutation existed in the common ancestor of Fula-Sereer and Tenda, there is no way to explain why Fula-Sereer **re* triggers grade I and Tenda **er-* triggers grade II. The proto-class in question would have assigned a particular grade in Proto-Northern-Atlantic, and so we would expect to see this same grade assigned in each branch. On the other hand, the modern mutation alternations are easily explained if mutation arose separately in Tenda, Fula, and Sereer. In Fula and Sereer it is perfectly natural that a marker of the shape /re/ would trigger grade I, and in Tenda it is perfectly natural that a marker of the shape /er/ would trigger grade II.

There is in fact one case in which evidence from mutation can help to establish a distant genetic relationship. We saw in chapter 4 (sections 3.5 and 3.8) that both earlier Wolof and Proto-Bainunk-Kobiana-Kasanga made use of a very basic mutation system involving the gemination of at least some root-initial consonants after certain noun class prefixes. Crucially, the two prefixes that had this effect in Wolof have possible cognates in BKK: for Wolof "fortis" *b-* there is BKK **ba^X-*, and for Wolof diminutive *s-* we can (very tentatively) propose a connection with BKK **si^X-* used for 'eye.' Furthermore the alternations in question are compatible with the idea that they existed already in Proto-Wolof-BKK. Gemination/fortition could affect only /f/ and /s/ in Wolof (becoming /p/ and /c/). Voiced stops and /t/ may have originally been geminated, but Wolof does not allow initial geminates, and as such no trace of mutation could remain for these consonants. Crucially, *h and the voiced continuants *w, *y, *l are not affected by this geminate/fortis mutation in either Wolof or BKK. Only because we are able to identify cognate mutation triggers and reconstructable mutation grades are we able to treat these mutation patterns as evidence of these languages' genetic relatedness.

While the various mutation systems of Northern Atlantic languages arose independently in a genetic sense, it is quite likely that they came about under strong areal pressure. Across the entire region, there was a drive to eliminate consonant clusters, both within and across morphemes[159]. The specific sound changes that served to eliminate these clusters were different in each language, but could involve the deletion of a consonant, the assimilation of C_1 to C_2, or the development of prenasalized stops from NC sequences. Even languages that did not develop mutation underwent these sorts of changes, as seen for Joola Eegimaa in Figure 172. Furthermore, the languages in question had a typologically similar starting point, having a large inventory of CV(C)- noun class prefixes, and roots with simple onsets (i.e. no clusters, geminates, or prenasalized consonants). The inevitable result of the areal tendency towards cluster simplification was that root-initial consonants that were once preceded by a range of possible prefixes or other grammatical morphemes (pronouns, auxiliaries, etc.) came to exhibit alternations in different morphosyntactic environments.

3 Lexical Evidence

The type of evidence that has featured most prominently in existing genetic classifications of Atlantic involves assessing shared lexical material between languages. After some early but influential proposals by Westermann (1928) and Greenberg (1963), the first notable study is Sapir (1971), which is perhaps the most influential categorization of Atlantic languages, continuing to be cited to this day. Sapir's approach was to assemble short wordlists for each language, compare impressionistically the number of words which appear to be cognate between each language, and from these numbers formulate a hypothesis of genetic relation and subgrouping. More recently, Pozdniakov and Segerer (2017) take a more refined approach to this lexically-based methodology, arriving at somewhat different conclusions. We will assess the proposals of Sapir and Pozdniakov and Segerer in this section, and then proceed to a more general assessment of the role of lexical data in determining genetic relationships within and outside of Atlantic.

3.1 Sapir (1971) and cognate percentages from short wordlists

3.1.1 Sapir's study

At the time of Sapir's study, data on many Atlantic languages was becoming available for the first time. There was naturally a desire to recruit this data in a hypothesis of the genetic organization of Atlantic, which was at the time still considered by some to be a unified family. Sapir's conclusions are by his own admission only to be taken as a starting point, but his classification of Atlantic has been repeated at least partially in perhaps the majority of subsequent research on Atlantic languages, often without comment. As such it is imperative that we understand the nature of Sapir's conclusions, and what value should be assigned to his proposed classification. We will see that there are severe limitations both to the methodologies and the data used in the study, and as such its conclusions are not particularly valuable.

[159] In at least Proto-Tenda, Wolof, Proto-Bainunk-Kobiana-Kasanga, and Proto-Fula-Sereer, there is a contrast between CVC and CVCC roots. These root-final CC sequences cannot be reconstructed as anything more complicated than geminates or prenasalized stops for most groups, but at least for Fula-Sereer, a wide range of clusters was possible (see chapter 2 section 4.7.1). It may well be that all groups once had a wider range of root-final CC clusters that simplified to geminates and prenasalized stops, such that the original cluster is unrecoverable from the modern languages. This paints a picture of the area in which there were at one time significantly more permissive phonotactics— many roots had final consonant clusters, and grammatical morphemes like noun class prefixes were maximally CVC-, as opposed to the more common (C)V- prefixes found elsewhere in Niger-Congo.

I. Northern Branch
 A. Senegal languages
  Fula, Sereer
  Wolof
 B. Cangin languages
 C. Bak languages (Joola, Manjak cluster, Balanta)
 D. Eastern Senegal-Portuguese Guinea Languages
  Tenda languages
  Biafada, Pajade
  Kobiana-Kasanga, Bainunk
 E. Nalu, Mbulungish, Baga Mboteni
II. Bijogo
III. Southern Branch
 A. Sua
 B. Mel languages (incl. Gola)
 C. Limba

Figure 340: Sapir's (1971) classification of Atlantic languages

Sapir's approach was to assemble wordlists for each language for the Swadesh "first 100" list using available data, and then determine what percentage of the lexical items were cognate between each pair of languages. From this set of percentages, subgroupings were formed where higher rates existed between pairs or groups of languages. One major issue is that Sapir did not have a full 100 word list for each language. Though he does not give numbers for each language, he notes that the average length of each wordlist was 80-85 out of the full 100, and much lower in some cases. Because pairwise comparisons require the attestation of the target word in both languages, actual comparable word pairs between some languages was sometimes extremely low— 32 in at least one case! Conclusions drawn from a comparison of 100 sets of words should be met with skepticism, but for only 32 (of which 6 were marked as "cognates"), the results are close to meaningless. Of course, we must also be skeptical of the quality of some of these wordlists, which were unfortunately not made available in the publication. In such preliminary lists of only a handful of words, there will inevitably be errors in identifying certain phonemes, vowel qualities, etc., not to mention potential miscommunications in the elicitation context.

Another problem is that the way in which Sapir identified potential cognates is far from satisfying. He gives the following note on his methodology:

> "As a rule of thumb matches were accepted as putative cognates if each phoneme in a *CVC* sequence was either identical in the compared forms or varied by no more than a single phonetic feature. Thus *b=p* and *p=f* were accepted, but not *b=f*. *N=N* was always accepted, but *N=NC* was accepted only if homo-organic, i.e. *m=mp* but not *m=ŋg* etc. When an identical match was found between contiguous but not closely related languages (e.g. Non : Wolof) the cognate was rejected as a loan." (1971: 49)

First, there is no insistence on regular sound correspondences— admittedly such stringency would be nearly impossible when dealing with short wordlists. Secondly, this method of weeding out borrowings is unlikely to be successful[160]. Especially in this region, languages often exhibit many chronological strata of borrowings, most dating from before the operation of various sound changes. Thus in Sereer, we find *jaad* 'palm rat' and *hup* 'exceed' borrowed from Wolof **jaad* > *jaar* and **hëpp* > *ëpp*. Sapir's method would erroneously identify these as cognates. Conversely, some true cognates exhibit identical segments between languages simply because no relevant sound change has operated in either language (e.g. Sereer *gas* 'dig,' cognate with Fula *'as-* (PFS **ɣas*), and possibly also cognate with Wolof *gas*). Most importantly, it is unreasonable to assume that for languages which are so extremely divergent (as Sapir himself (1971: 46) acknowledges), we should expect the majority of cognates to resemble each other after thousands of years of change in such a way that they could be identified by simply eyeballing the modern forms, with no reconstruction of the lower-level subgroups[161].

As a result of these major shortcomings, the numbers at which Sapir arrives are at times highly inaccurate, even given his rather limited goals. His percentages for the languages examined in this study, along with the Cangin language Noon, Pajade, and Joola Gusilay are given in Figure 341 (note that the percentages are mirrored along the diagonal axis).

	Fula	Ser.	Noon	Wol.	Bai.	Kob.	Paj.	Bas.	Bed.	Koñ.	J. Gu.
Fula		37	12	24	11	12	12	16	14	12	18
Sereer	37		10	25	12	16	14	15	15	14	19
Noon	12	10		17	9	10	12	10	9	10	11
Wolof	24	25	17		13	11	13	13	12	11	15
Bainunk	11	12	9	13		36	24	22	20	25	16
Kobiana	12	16	10	11	36		22	18	20	23	15
Pajade	12	14	12	13	24	22		22	27	22	18
Bassari	16	15	10	13	22	18	22		65	37	12
Bedik	14	15	9	12	20	20	27	65		39	11
Konyagi	12	14	10	11	25	23	22	37	39		11
Joola Gusilay	18	19	11	15	16	15	18	12	11	11	

Figure 341: Sapir's Swadesh list cognacy percentages for various Atlantic languages

For comparison, I have assembled full Swadesh 100 word lists for each language using modern sources (lists are given in full in Appendix B), and determined percentages of shared vocabulary from these lists. The percentages are based on true cognates for languages within established branches (as defined in Figure 335), and otherwise on pairs that I consider to be reasonable candidates for cognacy, though I do not take a stance on whether they are truly cognate or resemble each other for some other reason. The percentages given in the second

[160] Not to mention that only identifying loans between "not closely related languages" as part of a process meant to provide a genetic classification of languages assumes the very conclusions that the process seeks to establish. We must infer from Sapir's statement that if certain languages were taken beforehand to be "closely related," potential borrowings were ignored and instead treated as cognates.

[161] As a point of comparison, the identification of cognates between Albanian and other Indo-European languages is all but impossible without a sophisticated knowledge of various Indo-European branches, knowledge of the history of borrowing from related languages, and a sizeable corpus of lexical material. It would be fruitless to attempt such a task with only a short wordlist at one's disposal. Albanian was not widely recognized as being Indo-European at all until Bopp (1854), by which time the larger part of the entire field of linguistics had been focused on Indo-European comparative linguistics for over 50 years.

table include less convincing pairs, borrowings[162], and those that I consider to be false cognates— essentially the most generous count that I find to be reasonable based on "eyeballing" alone[163].

	Fula	Ser.	Noon	Wol.	Bai.	Kob.	Paj.	Bas.	Bed.	Koñ.	J. Ee.
Fula		35	16	7	4	8	8	11	9	11	7
Sereer	35		12	5	3	6	10	11	9	11	5
Noon	16	12		6	5	7	8	10	8	10	8
Wolof	7	5	6		6	8	10	9	7	8	4
Bainunk Gub.	4	3	5	6		30	11	4	5	4	4
Kobiana	8	6	7	8	30		16	6	9	8	5
Pajade	8	10	8	10	11	16		19	21	22	6
Bassari	11	11	10	9	4	6	19		61	34	6
Bedik	9	9	8	7	5	9	21	61		34	6
Konyagi	11	11	10	8	4	8	22	34	34		6
Joola Eegimaa	7	5	8	4	4	5	6	6	6	6	

Below are the percentages if we include borrowings, false cognates, and very tenuous connections:

	Fula	Ser.	Noon	Wol.	Bai.	Kob.	Paj.	Bas.	Bed.	Koñ.	J. Ee.
Fula		39	20	14	9	9	14	12	11	12	11
Sereer	39		18	14	8	7	15	12	11	12	10
Noon	20	18		11	10	12	10	10	8	11	11
Wolof	14	14	11		14	12	16	12	10	11	7
Bainunk Gub.	9	8	10	14		37	17	7	7	8	13
Kobiana	9	7	12	12	37		20	7	11	11	7
Pajade	14	15	10	16	17	20		25	26	31	10
Bassari	12	12	10	12	8	7	25		65	37	8
Bedik	11	11	8	10	8	11	26	65		35	9
Konyagi	12	12	11	11	8	11	31	37	35		10
Joola Eegimaa	11	10	11	7	13	7	10	8	9	10	

All three percentages for comparison: left-hand number is the revised percentage, superscript is the number including borrowings, etc., subscript is Sapir's number:

[162] Only relatively recent borrowings can be easily disqualified as cognates. There are almost certainly older borrowings between certain groups that I have been unable to identify, and have instead considered as reasonable cognates. This is especially relevant between Pajade and the Tenda languages, where it very likely that many of the forms that I have considered as reasonable cognates are in fact borrowings (see Appendix A).

[163] Though note that these counts also include likely cognates that would probably not be identified by eyeballing, e.g. Fula *debbo* = Noon *ɓeti* 'woman,' from PFS **ox-rew* and PC **ɓe-reɓ* respectively. The percentages are further helped by allowing multiple synonyms to be considered, e.g. while *rokk-* and *hokk-* 'give' and *jaang-* 'be cold' are the most common Fula (Pulaar dialect) words for these terms, *yeɗ-* 'give' and *ɓuuɓ-* 'be cold' were also considered, and taken as cognate with Noon *eɗ* 'give' and Sereer *ɓuuɓ* 'be cold' respectively. These truly are the highest I believe the numbers could reasonably go.

	Fula	Ser.	Noon	Wol.	Bai.	Kob.	Paj.	Bas.	Bed.	Koñ.	J. Ee.
Fula		35^{39}_{37}	16^{20}_{12}	7^{14}_{24}	4^{9}_{11}	8^{9}_{12}	8^{14}_{12}	11^{12}_{16}	9^{11}_{14}	11^{12}_{12}	7^{11}_{18}
Sereer	35^{39}_{37}		12^{18}_{10}	5^{14}_{17}	3^{8}_{12}	6^{7}_{16}	10^{15}_{14}	11^{12}_{15}	9^{11}_{15}	11^{12}_{14}	5^{10}_{19}
Noon	16^{20}_{12}	12^{18}_{10}		6^{11}_{17}	5^{10}_{9}	7^{12}_{10}	8^{10}_{12}	10^{10}_{10}	8^{8}_{9}	10^{11}_{10}	8^{11}_{11}
Wolof	7^{14}_{24}	5^{14}_{17}	6^{11}_{17}		6^{14}_{13}	8^{12}_{11}	10^{16}_{13}	9^{12}_{13}	7^{10}_{12}	8^{11}_{11}	4^{7}_{15}
Bainunk Gub.	4^{9}_{11}	3^{8}_{12}	5^{10}_{9}	6^{14}_{13}		30^{37}_{36}	11^{17}_{24}	4^{7}_{22}	5^{7}_{20}	4^{8}_{25}	4^{13}_{16}
Kobiana	8^{9}_{12}	6^{7}_{16}	7^{12}_{10}	8^{12}_{11}	30^{37}_{36}		16^{20}_{22}	6^{7}_{18}	9^{11}_{20}	8^{11}_{23}	5^{7}_{15}
Pajade	8^{14}_{12}	10^{15}_{14}	8^{10}_{12}	10^{16}_{13}	11^{17}_{24}	16^{20}_{22}		19^{25}_{22}	21^{26}_{27}	22^{31}_{22}	6^{10}_{18}
Bassari	11^{12}_{16}	11^{12}_{15}	10^{10}_{10}	9^{12}_{13}	4^{7}_{22}	6^{7}_{18}	19^{25}_{22}		61^{65}_{65}	34^{37}_{37}	6^{8}_{12}
Bedik	9^{11}_{14}	9^{11}_{15}	8^{8}_{9}	7^{10}_{12}	5^{7}_{20}	9^{11}_{20}	21^{26}_{27}	61^{65}_{65}		34^{35}_{39}	6^{9}_{11}
Konyagi	11^{12}_{12}	11^{12}_{14}	10^{11}_{10}	8^{11}_{11}	4^{8}_{25}	8^{11}_{23}	22^{31}_{22}	34^{37}_{37}	34^{35}_{39}		6^{10}_{11}
Joola Eegimaa	7^{11}_{18}	5^{10}_{19}	8^{11}_{11}	4^{7}_{15}	4^{13}_{16}	5^{7}_{15}	6^{10}_{18}	6^{8}_{12}	6^{9}_{11}	6^{10}_{11}	

Figure 342: Swadesh list cognacy percentages using data from modern sources

In general, Sapir's percentages are much higher than they ought to be, with the principal reason presumably being the small size of his wordlists for some languages. The vocabulary that is shared between pairs of languages tends to be the most basic of the 100 word list (e.g. 'head, eye, tongue, star, see' but not 'ash, louse, cloud, swim'). When only 30 pairs of words can be compared between two languages, these are much more likely to include the most basic words, which will over-represent cognate pairs. This may help to explain why, for example, Bainunk and Konyagi are said to have 25% shared lexicon, when this percentage was found to actually be 4% when comparing the full 100 word lists from modern sources ('egg, head, eye, bite'). However this explanation does not apply to some of Sapir's other inflated percentages. For Fula and Wolof he gives 24%, when the actual number is closer to 7%. These are the two languages for which Sapir would have had the best lexical documentation, and it is likely that he calculated this percentage from the full 100 word pairs. Sapir's percentage is almost twice what we could arrive at with even with the most generous and uninformed identification of cognates possible. I cannot speculate as to why this number is so high (and equally high between Wolof and Sereer), but it has had the unfortunate consequence of perpetuating a spurious Wolof-Fula-Sereer grouping that has been cited in numerous subsequent publications (e.g. Anderson 1976, Bendor-Samuel 1989, Renaudier 2012). In a few cases Sapir's percentage is actually too low, as for Noon and Fula which he gives as 12%, but is in fact 16%. In a way, it is surprising that more of his numbers are not lower than they ought to be, since by his stated method he could not have identified valid cognates such as Kobiana *sí-ggəh* = Wolof *bët* 'eye,' or Noon *toɓ* = Konyagi *rə̀v* 'rain.' One can only assume that his actual method of identifying cognates was in fact much laxer than that stated in the quote above.

There are of course numerous problems with using short wordlists in discussions of genetic affiliation, many of which Sapir himself acknowledges. It must be kept in mind that as larger sets of lexical data are considered, the percentages of shared lexicon between any two languages will almost inevitably decrease, since it is generally the more basic vocabulary that is more likely to be shared between related languages. In modern linguistics, it is generally agreed that the utility of 100-word lists in establishing genetic subgroups is limited at best and misleading at worst (see e.g. Dunn 2014). Nonetheless, there is definite value in presenting these percentages, provided they are accurate, and are interpreted for what they are. These percentages can serve as a useful "at-a-glance" comparison of the degree of lexical similarity between large sets of languages, and can inform more sophisticated hypotheses that can be supported by careful historical argumentation. The problem with Sapir's conclusions is not so much the fact that he chose to use Swadesh 100 word lists for genetic comparison, as he admits the limits of this approach, and suggests that his conclusions should only be taken as a starting point. Rather, the essential problem is that what purports to be a set of percentages based on the 100 most basic words of each language is in fact a set of percentages based on the 30 most basic words in some cases, 40 in others, 60 in others, etc. This misleads linguists into believing that these languages are on the surface more similar to each other than they in fact are, even if they know not to conflate surface similarity of common lexical items with genetic relatedness. More specifically, it inflates percentages between languages with smaller sets of attested pairs, giving the impression that the Atlantic languages as a whole share more cognate vocabulary than they actually do, and that the degree of similarity within established subgroups like Fula-Sereer is not so different from that of dubious groups such as Sapir's "Eastern Senegal-Portuguese Guinea languages" which includes BKK, Tenda, and Biafada-Pajade.

3.1.2 Contextualizing lexical percentages: comparison with Indo-European

Impressionistically, the revised percentages in Figure 342 seem extremely low when comparing between languages in different established subgroups. The highest is 21% between Pajade and Konyagi (which have been in close contact for many years; the number is similarly high for Pajade with the other two Tenda languages), followed by 16% between Fula and Noon, and all others are barely over 10%, with some as low as 3% or 4%. However, without context, it is hard to know what to make of these numbers. To interpret them, it will be illustrative to compare these Northern Atlantic percentages with percentages of cognate basic vocabulary from Indo-European languages.

Dyen, Kruskal and Black (1992) undertake a lexicostatistical study of the modern Indo-European languages, providing shared cognate percentages for all pairs of languages in the same way that Sapir (1971) does for Atlantic. Their aim is to assess the validity of lexicostatistical methods in genetic subgrouping, but for our purposes their data provides a valuable source of information on the sorts of percentages found in language groups whose history is much better understood. It must be noted that there are two important differences in Dyen et al.'s methods when compared with Sapir (1971) and my own revised counts in Figure 342. Most importantly, they use Swadesh 200 word lists for all languages, rather than the 100 word lists used to obtain the Atlantic percentages. This inevitably has the effect of lowering the obtained percentages in all cases when compared with percentages from 100 word lists. Grant (2010: 295) confirms that the words in the Swadesh 100 word list are much more likely to contain cognates between two related languages than those in the next 100. Secondly, Dyen et al. are able to identify cognates and exclude borrowings with the aid of over two hundred years of established scholarship— it seems unlikely that a significant number of cognate pairs will have been misidentified in their study. For the Northern Atlantic languages, outside of established subgroups, we must essentially make our best guess as to whether two forms might be cognate, in the best cases aided by rather limited hypotheses regarding expected sound correspondences between groups. It is possible that certain pairs which appear to be entirely unrelated based on our current knowledge are in fact cognate, which might raise the percentages somewhat. However, I doubt that this methodological shortcoming will have underrepresented the percentages for the Northern Atlantic languages to any significant degree, since I (and certainly Sapir in his study) have been extremely permissive in identifying potential cognate pairs. If anything, the Northern Atlantic numbers are more likely to be inflated, since for these languages we have no principled way of distinguishing true cognates from particularly ancient borrowings.

A small portion of the percentages obtained in Dyen et al. (1992) are presented in Figure 343. The first table gives percentages among and between the Celtic and Romance languages, and the second gives a representative sample of languages from different branches of the entire Indo-European family. All of Dyen et al.'s data is from modern languages.

	Ir.	We.	Br.	Ro.	Vl.	Sa.	It.	Fr.	Wa.	Pr.	Ca.	Sp.	Po.
Irish		35	32	16	15	17	19	18	18	18	17	18	17
Welsh	35		63	19	19	20	21	19	20	20	18	19	20
Breton	32	63		21	21	22	23	21	21	22	21	21	22
Romanian	16	19	21		72	59	66	58	58	62	58	59	62
Vlach	15	19	21	72		54	59	51	53	56	54	53	54
Sardinian	17	20	22	59	54		75	67	65	68	64	65	65
Italian	19	21	23	66	59	75		80	77	82	76	79	78
French	18	19	21	58	51	67	80		89	90	71	73	72
Walloon	18	20	21	58	53	65	77	89		84	70	70	69
Provençal	18	20	22	62	56	68	82	90	84		74	73	73
Catalan	17	18	21	58	54	64	76	71	70	74		72	73
Spanish	18	19	21	59	53	65	79	73	70	73	72		87
Portuguese	17	20	22	62	54	65	78	72	69	73	73	87	

	Ir.	It.	Ro.	Ic.	En.	La.	Sl.	Hi.	Pa.	Pe.	Gk.	Ar.	Al.
Irish		19	16	19	18	17	19	12	10	11	14	12	10
Italian	19		66	25	25	22	25	18	12	14	18	15	12
Romanian	16	66		22	23	18	23	17	9	14	16	14	11
Icelandic	19	25	22		55	19	24	15	10	14	20	16	11
English	18	25	23	55		20	25	15	9	14	16	13	12
Latvian	17	22	18	19	20		36	15	10	14	15	13	13
Slovak	19	25	23	24	25	36		20	13	16	17	15	14
Hindi	12	18	17	15	15	15	20		15	19	13	12	11
Pashto	10	12	9	10	9	10	13	15		31	9	9	7
Persian	11	14	14	14	14	14	16	19	31		13	13	10
Greek	14	18	16	16	16	15	17	13	9	13		19	12
Armenian	12	15	14	14	13	13	15	12	9	13	19		8
Albanian	10	12	11	11	12	13	14	11	7	10	12	8	

Figure 343: Cognate percentages from IE languages based on Swadesh 200 word lists

Chang et al. (2015) propose a date of around 5500-6500 years in the past for the breakup of Indo-European. If between the branches of IE, languages generally have ~15% or more cognate vocabulary in a 200 word list, what are we to make of the fact that across the different branches of Northern Atlantic, languages generally have less than 10% potential cognate vocabulary in a 100 word list? Consider also that the Northern Atlantic languages are and have been spoken in relatively close proximity for thousands of years, whereas the various branches of Indo-European spread out over a massive area millennia ago, and most IE sub-branches have not been in meaningful contact for just as long. While this sort of lexical data can by no means disprove a genetic relation between any two groups within Northern Atlantic, the extremely low percentages for potential cognates between basic vocabulary items suggest that we may be dealing with genetic relations that go back farther than can be reasonably established by the traditional methods of historical linguistics. At least based on lexicostatistical data alone, we must seriously entertain the possibility that some or all of these Northern Atlantic language groups are not related at all.

3.2 Pozdniakov and Segerer (2017)

Pozdniakov and Segerer's (2017) classification of Atlantic continues to rely largely on lexical evidence. However their approach is a marked improvement over that of Sapir (1971), in that all available data is considered (rather than only 100 word lists), and they aim to weed out borrowings by establishing sound correspondences, rather than by eyeballing. Within the established lower-level families, this approach is largely successful. However in proposing higher-level groupings, their conclusions are, I believe, far too optimistic when faced with the realities of the data. P&S's main proposals are: (i) Sapir's "Northern Atlantic" (with the new inclusion of Bijogo within Bak) forms a valid subgroup; (ii) Sapir's "Southern Atlantic" languages do not form a valid genetic group with Northern Atlantic (i.e. there is no "Atlantic language family" in the traditional sense); (iii) there is a primary branching in Northern Atlantic between the Bak languages and all of the other languages. P&S refer to the traditional "Northern Atlantic" group as simply Atlantic. It must be stressed that P&S's historical analysis is a notable improvement over previous work, and much of their discussion on the lower-level subgroupings is commendable. Their discussion of the Bak group in particular is an excellent overview. However the evidence that they present for higher-level groupings is not particularly convincing.

The way in which P&S present the Northern Atlantic lexical data is somewhat misleading, and gives the illusion that the commonalities among the Northern Atlantic languages are greater than they in fact are. One problem with some of the proposed cognates for higher levels of P&S's Atlantic is that the given modern forms can at times have a rather loose semantic connection to the meaning of the reconstructed proto-form, with no indication given of this discrepancy. As an example, one of the eight pan-Atlantic roots listed in their Table 42 (p. 33) is given as **jok?* 'see' (question mark is P&S's). However few of the modern Northern Atlantic forms given are in fact the word for 'see' in those languages. Instead, P&S give the following forms for each branch (the bullet points are my own comments):

Fula-Sereer *jak*

- Unclear this refers to— not found in Seydou (1998) for Fula, and I have not encountered any similar native root for Sereer, though Crétois (1972) gives the Wolof borrowing *jak* with the same meaning as in Wolof (see below).
- 'See' is Sereer *gi'* or *ga'*, Fula *yi'-*, reconstructable as **ɣi'*.

Tenda-Jaad *jeek?*

- Unclear what modern forms this refers to.
- Pajade *jeen* 'see'
- Biafada *leeg* 'see' (unrelated to the Pajade root)
- Tenda **-nụ* 'see' for all three languages, also Bassari *-ɣàt*

Nyun-Buy *njug?*

- Unclear what this refers to. There is no similar root in Kobiana-Kasanga, Gubëeher, or Guñaamolo.
- Kobiana *-ppeg* 'see'
- Kasanga *-pog* 'see'
- Guñaamolo *-fẹg* 'see'
- Gubëeher *-wụl* 'see'
- Gujaher *-wul* 'see'

Wolof *jàkk*

- Meaning is 'look face to face'
- 'See' is *gis*

Manjak *jʊk*

- Meaning is 'learn' in Buis (1990)
- 'See' is *win*

Joola *jʊk*

- This is indeed 'see,' e.g. Eegimaa *-jux*

The other forms given are Nalu *yɛk* and Bijogo *joŋ*, which I cannot comment on. The table gives the impression that these are the basic words reconstructable for 'see' in each subgroup, but this is not the case. A similar problem is found for 'tree trunk' in the same table, for which some of the modern forms mean 'tree' and others 'trunk.' Of course there is no problem with proposing that modern forms with different meanings are cognate, but it must be made clear that a series of semantic shifts is being proposed. A connection between two words *jàkk* 'look face to face' and *jʊk* 'learn' should be met with much more skepticism than a connection between two words meaning 'see.'

Another issue is that often a form will be given for an entire subgroup without making clear that it is in fact found in only one language, and when there is often a more basic form that can be reconstructed for the subgroup as a whole. Thus, for 'to hear ~ to feel,' a Cangin form *yeg* is given in P&S's Table 6 (p. 6). This word *yeg* is to my knowledge found only in Safen, and means 'be informed.' The Cangin root for 'to hear' is **keloH* and is found in all Cangin languages including Safen— Safen *yeg* is borrowed from Wolof (perhaps through Sereer). This problem is especially pronounced for P&S's proposed Tenda-Jaad group (Tenda with Biafada-Pajade), where the majority of the forms given are in fact found in only Tenda or only Biafada-Pajade. P&S's presentation gives the impression that each of the Tenda-Jaad forms is a reconstruction for the family as a whole, when in fact there are relatively few good cognates to support this proposed subgroup. Finally, while reconstructed forms are often given for individual subgroups, these reconstructions are not explained or supported in the article. This omission is understandable, as to justify and explain each reconstruction would perhaps distract from the main arguments of the article. Nonetheless, by providing a reconstructed form for an entire subgroup, readers are liable to get the impression that the form is found throughout the family. While this is true for some roots, for others the reconstructed form is in fact based on a word found in only one modern language. For example, for 'to hit' a Tenda-Jaad reconstruction **laɓ* is given. I can find no similar root within Tenda in Ferry (1991) or Santos (1996), nor for Pajade in Meyer (2001). Perhaps the reconstruction is based on the Biafada form *-laabb* 'hit (hammer)' given in Wilson's wordlist, but without further information on how the reconstructed form was arrived at, the reader is left to guess— or even worse is misled into assuming that the root is found throughout all Tenda languages, Biafada, and Pajade.

3.2.1 Sound correspondences

One of Pozdniakov and Segerer's (2017) stated goals is to establish sound correspondences between Atlantic languages, thereby distinguishing true cognates from borrowings. P&S give one example of an Atlantic sound correspondence, which they reconstruct as Proto-Atlantic *ʈ (they doubtless have others, but this is the only one provided). This sound is presumably meant to be similar to Manjak /ʈ/, pronounced as [t͡ɹ̥] in some dialects. Their table is reproduced below with the Bak languages omitted.

	'star'	'to fly'	'to die'	'to rot'	'three'	
Proto-Atl.	*k^{w}ʊʈ	*yiiʈ	*keʈ	*pʊʈ	*taʈ	*ʈ
Nyun	huur	yiir	cir	pʊr		r
Kobiana	a-woolu	k-il		wul		l
Basari			a-ʃʌ̀s	a-wə̀r	sàs/tàs	r/s
Bedik	ɛ-kɔ́r		ɔ-ʃʌ́s	u-bʊ́r	sás/tás	r/s
Biafada	wweela			bwəl		l
Jaad	puoor			pər		r
Sereer		yet		fot		t
Nalu	hooθ	yeeθ-en				θ

Figure 344: P&S's (2017) Table 1: A regular sound correspondence in Atlantic (w/o Bak)

There are numerous issues with this table, which we will now examine in detail. When each subgroup is reconstructed, we find that the given roots in fact contain entirely different final consonants within each subgroup. Quite to the contrary of P&S's stated goal, this table rather neatly demonstrates the difficulties in establishing regular correspondences between Northern Atlantic groups.

For Bainunk-Kobiana-Kasanga one of these roots *-*ki̟d* 'fly' is almost certainly not related to 'fly' in any other group, and is included due to a missegmentation. Another root *-*futt* 'rot' does not have the same final consonant. 'Star' and 'fly' end in *d. Final stop voicing is unlikely, and a connection with a proto-sound *ʈ cannot be supported. 'Three' ends in *r̥, the lenition of earlier singleton *t. 'Die' is inconclusive, but most likely ended in *r. Thus there are three or four distinct final consonants represented, and no regular sound correspondence. Support for all of these reconstructions is found in chapter 3 section 3.1.2.

- Kobiana *a-wóol* 'star,' Guñaamolo *gu-huur*, Gujaager *gu-xuur* are cognate, and the final consonant is the regular sound correspondence for PBKK *d. The vowel correspondence is irregular.
- Kobiana 'fly' is *-h~kkil*. This cannot be segmented morphologically. It is cognate with Gubëeher *bu-ci̟r* 'jump,' Guñaamolo *bu-hi̟ir* 'fly,' Gujaher *-cir* 'fly,' and can be

reconstructed as *-*kɨd* for Proto-BKK. The BKK root *-*kɨd* is almost certainly not related to any of the other Atlantic roots given for 'fly.'

- Gubëeher has *-cɨir* 'die,' not found in Guñaamolo. Gujaher has *-ciid*, which seems to show an irregular development of *r to /d/ (note that this change is regular in Kasanga and the Bainunk variety recorded in D'Avezac's wordlist, which has < *biequidagou*>)
- The Bainunk form given for 'rot' is Guñaamolo *-pur*. This is cognate with Gubëeher and Gujaher *-put* 'rot,' and can be reconstructed as proto-BKK **futt*. Final *tt regularly becomes /r/ in Guñaamolo (see Figure 167). This root does not contain the same final consonant as that of 'star, fly, die.' There is another root for 'rot' found in Gubëeher, *-bur*, cognate with Kasanga *-bul*, and reconstructable as BKK *-*bud*. Doneux's Kobiana form *wul* is presumably related to this second root (note that Kobiana /b/ is often [β], and even closer to [w] before a round vowel). My Kobiana consultants knew only *-b~mboh* 'rot,' which could not be from either of these two BKK roots.
- 'Three' is Kobiana *-h~tteh*, Kasanga *-taar*, Bainunk *ha-lall*. The consonants are straightforwardly reconstructable, though the Kobiana vowel is irregular. The PBKK form is *-*r̥Vr̥*.

For Tenda two roots are *r-final, and two are *r̥-final. These sounds are distinct phonemes, and these phonemes were never derived from each other. Thus there is no regular sound correspondence here (or at least two of the four must be set aside). Support for these reconstructions is found in chapter 5, section 3.1.2.

- 'Star' can be reconstructed as **er-xor* without complication (Konyagi *i-kòl*).
- 'Die' can be reconstructed as *-*ʃər̥* without complication.
- 'Rot' can be reconstructed as *-*wər* without complication (Konyagi *-w~gəl*).
- 'Three' can be reconstructed as *-*r̥ar̥* (Konyagi *-r~tæ̀r*), with only the vowel tenseness in question.

For Sereer, the final consonant of 'three' is /d/, for 'star' it is /r/, and for 'fly, rot' it is /t/, descended from PFS *d, *r, and *t(t) respectively. Thus there is no regular sound correspondence here.

- Sereer 'star' is *o-xoor*, cognate with Fula *hoodere*, from a PFS root *-*xoor*.
- 'Three' is *daduk* in the personal class, and *tadik/tadak~q* in other classes. Sereer has not undergone voicing of any consonants since PFS, and so the second /d/ can only be from *d. Fula has *tati*, with the final /t/ being the result of a regular final devoicing of PFS *d (see chapter 2 section 3.3.2). This numeral can be reconstructed as **tad-*, with the initial consonant of Sereer *daduk* arising in analogy with /d/-initial roots (both /t/ and /d/ correspond to /t/ in grade II).
- Note that alongside Sereer *fot* 'rot' there is *foor* 'be ripe' (cognate with Fula *woor-* 'be nearly ripe'). It is likely that the first is derived from the second historically with a consonantal suffix (cf. Fula intensive *-t*), as **foor-t* or **foor-d* would both regularly develop to *fot*.

Thus a more accurate table can be given as follows for the non-Bak languages:

	'star'	'to fly'	'to die'	'to rot'	'three'	
BKK	*-hood/huud	*-ki̘d	Gub. -ci̘ir	*-futt, *-bud	*-r̥Vr̥	*d, r̥, tt
Tenda	*-xor	—	*-ʃər̥	*-wə̘r	*-r̥ar̥	*r, r̥
Fula-Sereer	*-xoor	Ser. yet	—	Ser. fot	*-tad-	*r, d, t(t)
Biafada	wweela	—	—	bwəl	—	l
Pajade	pu-oor	—	—	pər	—	r

Figure 345: Critical revision of P&S's (2017) Table 1

No regular sound correspondence can be established for the final consonants of these roots. In fact these five roots have five entirely distinct sound correspondences across the languages in question.

Perhaps the most important takeaway from this exercise is that it is not fruitful to compare all languages of a potential Northern Atlantic family without first undertaking a thorough reconstruction of each subgroup. By first comparing Kobiana and Kasanga with the Bainunk languages, reconstructing Proto-Bainunk-Kobiana-Kasanga, and establishing sound correspondences between each language (as undertaken in chapter 3), we can understand the origin of modern /l/ and /r/ in each language (see chapter 3, section 3.1.2.3), and see that Proto-BKK **-hood/huud* 'star,' **-futt* 'rot,' and **-r̥Vr̥* 'three' do not end in the same consonant. When we do take into account the reconstructed forms of Proto-BKK, Proto-Tenda, Proto-Cangin, and Proto-Fula-Sereer, some of P&S's proposed Atlantic cognates are rendered rather less convincing. For example, in their Table 42 (p. 33) they present a Tenda root **mbal* as descended from a Proto-Atlantic form **wal* 'hair,' cognate with (among others) Wolof *kawar* and Sereer *wil*. The form in Bedik is *gu-mbál* 'hair,' which no doubt inspired the given Proto-Tenda reconstruction. However we saw in chapter 5 (section 3.1.2.4) that most instances of Bedik /l/ are descended from Proto-Tenda *n (probably phonetically [l̪]), and indeed the Bassari form is *e-mbǎ̘n* 'hair,' showing the expected Bassari reflex of *n, and requiring a reconstruction of **-wa̘n* for Proto-Tenda (the root is not found in Konyagi or Biafada-Pajade). Recall that Proto-Tenda tense vowels almost certainly were earlier long vowels, and we now have a form *-*waan* to compare with the other branches. Needless to say, this form is significantly more different from the reconstructed Atlantic **wal* than P&S's provided form **-mbal*, and we must seriously doubt whether Tenda **-wa̘n* should be connected at all with Sereer *wil*, etc.

As we will see in section 3.3, we generally do not find regular sound correspondences between phonologically-similar roots across Northern Atlantic. Nonetheless, by reconstructing the proto-forms of each established branch, we can form better hypotheses about which modern forms might be related. A good example involves the word for 'head.' In most Northern Atlantic languages, the root for 'head' begins with a velar consonant and ends in a labial continuant: Noon *haf*, Kobiana *bu-góf*, Joola Eegimaa *fu-xow*, Konyagi *æ-nkæ̀f*, etc. In Sereer we find *xoox* 'head' and in Fula *hoore* (pl. *ko'e*) 'head.' The Fula-Sereer forms seem similar enough to the others to consider a possible cognate relationship. For the final consonant, it is certainly possible for [χ] to become [f] after a round vowel (cf. English [x > f] in *laugh*, *cough*), or perhaps for [f] to dissimilate to [χ] in this environment (cf. Dutch *lucht* 'air' from **luft*). For the initial consonant, we find both voiced and voiceless consonants for this root in different languages. Doneux (1975: 116) considers these forms to all be cognate. However when we take into account the phonological history of each branch, it becomes clear that the Fula-Sereer term cannot be cognate with the others.

Tenda	BKK	Wolof	Cangin	Fula-Sereer	
*-ɣəַ̟r̥	*si-ggir̥	†gët (pl.)	*ɣi̟d/ɣad	*-ɣid	‘eye’
*-ɣam	Ko. -gom		*ɣam	*-ɣam/ɣom	‘dance’
*gaŋ-nəf	*ki-nuf	nopp	*nuf	*ru-nof	‘ear’
*-a	*-ah	-(k)u ?	*-ox	*-oox	anticausative

Figure 346: Northern Atlantic forms showing non-cognacy with Fula-Sereer *-xoox *‘head’*

Some of the best cognate candidates between Northern Atlantic languages are ‘eye, dance, ear,’ and the anticausative/middle suffix. Most of these must be rejected if Sereer *xoox* and Fula *hoore* are to be taken as cognate with the forms of ‘head’ in the other branches. The initial consonant of ‘head’ is a voiced velar in all non-Bak[164] groups, and from ‘eye, dance’ we would expect a voiced velar in Fula-Sereer as well. From ‘ear’ and the anticausative suffix we see that there is no change in either direction between [f] and [χ] after a round vowel in Fula-Sereer or any other branch. Thus neither the initial nor the final consonant of Fula-Sereer ‘head’ lines up with the other languages, and it must be rejected as a possible cognate. Without the intermediate reconstructions, this assessment would not be possible.

The establishment of regular sound correspondences is essential in reconstructing the histories of the various language groups within Northern Atlantic, and understanding the phonological history of each group is helpful in distinguishing between potential cognates and chance resemblances (like Fula-Sereer *-*xoox* above) when comparing between groups. However P&S do not give a clear indication of their views on the reconstruction of these lower-level families (at least outside of Bak), and so it is often difficult to follow their reasoning behind associating certain forms from different language groups. Furthermore, despite their stated goal, P&S do not seem to consistently insist on regular sound correspondences when identifying cognates between language groups. The non-Bak cognates given in their Table 6 (reproduced in the next section) have many questionable consonant correspondences, e.g. Tenda-Jaad *ng corresponds with other branches’ /g/ in ‘hear’ and with /n(n)/ in ‘inherit;’ Wolof *yomb* ‘be easy’ is taken as cognate with Cangin *yoɓ*, and the homophonous Wolof *yomb* ‘calabash’ is taken as cognate with Cangin *gum* (found only in Palor). Overall, it seems doubtful to me that P&S have relied on any particularly strict sound correspondences in identifying most of their proposed cognates between different Northern Atlantic groups. That said, they certainly cannot be faulted for failing to rely on regular sound correspondences if such correspondences are in fact impossible to establish. The truth is that the number of convincing cognates found across Northern Atlantic groups is very small— I have identified 65 as cognate candidates in Figure 349 in section 3.3 below, and a number of these are likely borrowings. With so few reasonable comparisons to be made, it is all but impossible to hope to establish solid sound correspondences— in the best cases we may have two or three potential cognates to support a proposed sound correspondence. It may be that P&S would propose many more Atlantic cognates in addition to the ones provided in P&S (2017), but if we assume that they have chosen their most convincing examples to present in the article, the outlook seems rather bleak for establishing satisfying reconstructions for a putative Proto-Northern-Atlantic backed by regular sound correspondences.

[164] For Bak we can note that other branches’ initial voiced velars in ‘eye, sing, head’ correspond with Joola *k, and final /f/ in ‘ear, head’ corresponds with Joola Ø or /w/ (see Figure 349). Thus we find support for the cognacy of Joola ‘head’ with the forms in other branches.

3.2.2 Genetic unity of the non-Bak languages

One of Pozdniakov and Segerer's (2017) most important claims is that all of the non-Bak languages of Northern Atlantic form a genetic unit. They present two sorts of evidence for this claim: first that this branch innovated a consonant mutation system (we have seen in section 2 and throughout chapters 2-5 that these are in fact separate innovations), and second that they share some common lexical innovations. I find the lexical evidence to be unconvincing, and this section will examine it in some detail. P&S present the lexical evidence for the non-Bak subgroup ("Northern Atlantic" in their terminology) in their Table 6 (p. 6), reproduced below.

	Tenda-Jaad	Peul-Ser	Cangin	Wolof	Nyun-Buy
'to bear child'	*ɗəm	rim-	lim	doom	dim
'to hear~feel'	*yeng	yeg	yeg	yëg	yeg
'to bite'	*ŋat	ŋat		matt	ŋar
'old'	*ɗæf	rap		ràpp	def
'fool~stupid'		ɗof	dɔf	dof	dof
'stranger'		*gen-	xan-eel	gan	gənaal
'pestle'		kur-?	kuɗ	kuur	huur
'to hit'	*laɓ	daw	laɓ		law-n
'to last'	*ɓiñ	miñ-	mañ		miñ
'easy'		yoɓ	yoɓ	yomb	yomb
'calabash'	*gwom	*gomb	gum	yomb	
'lightning'	*beleñ	meleñ	ɓ/meleñ	melax	
'to inherit'	*dəng	don-	dɔn	donn	
'bow'	*kala-	kali	xalə	xala	
'to wound'	*gañ	gaañ-	gañ-	gaañu	
'luck'	*mal?	mal/mud	muɗ	muur	
'to dance'	*mbɛs-	mbet	ɓec	fecc	
'day'	pis	bes	bes	bés	
'early'	*tii	tel	teel	teel	

Figure 347: P&S's (2017) Table 6: Lexical innovations in Northern Atlantic

Very few of these proposed innovations hold up under scrutiny. Many involve borrowings— keep in mind that there has been extensive borrowing throughout the years between Wolof and Fula-Sereer, Cangin and Sereer, and Cangin and Wolof— and others rely on unsupported phonological associations between rather distinct sounds in different groups. We will now examine each of these proposed cognates.

'<u>Bear child</u>': Good cognate candidate

- Tenda *-*rəm*, BP *-*rəm*, BKK *-*di̜(i)m* 'family,' FS **rim* likely related
- Cangin **li̜m* possibly borr. Sereer *rim*
- Wolof *doom* 'child' likely unrelated (vowel very different)

'<u>Hear/feel</u>': Likely cognate between Wolof and BKK, otherwise borr. Wolof

- Sereer *yeg* 'be informed' borr. Wolof *yég* 'be informed'
- Safen *yeg* 'be informed' borr. Sereer or Wolof
- BKK **ye̜(e)g* 'hear' likely cognate with Wolof (PBKK)

‘<u>Bite</u>’: Good cognate candidate

- Wolof *màtt* does not fit— no evidence for m:ŋ correspondence, and Wolof has abundant initial /ŋ/. Wolof *ŋet* ‘gnaw’ is perhaps a better candidate.

‘<u>Old</u>’: Good candidate between BKK, Tenda, Biafada-Pajade, but perhaps found in Manjak

- Sereer *rap* ‘be frayed/used’ borr. Wolof *ràpp* w/ same meaning— semantically quite distinct from ‘be old (of a person)’
- One of Bassari-Bedik *-*raf* and Konyagi -*dæ̀f* (irregular initial correspondence) likely related to PBKK *-*def* and BP *-*raf*
- Manjak has -*t͡r̥af*, which may be related, and would exclude this from being a non-Bak innovation

‘<u>Fool</u>’: Borrowed from Wolof

- Sereer *dof* ‘be crazy/stupid’ borr. Wolof *dof* w/ same meaning
- Cangin (Noon *dof*) borr. Wolof
- Not aware of this BKK word. Unrelated roots used in Kobiana (-*yingo* ‘be crazy,’ *si-ccóo(n)* ‘madness’), Gubëeher (-*gaar* ‘be stupid,’ idiom using verb ‘run’ used for ‘crazy’), and Guñaamolo (-*gaala* ‘be stupid,’ -*lo̤bula* ‘be crazy’)

‘<u>Stranger</u>’: Good candidate— perhaps related between Sereer and WBKK, but also Bantu

- Sereer root *genar* ‘guest’ perhaps related to Wolof *gan* ‘guest’
- BKK *-*gVnaal* ‘guest/stranger’ perhaps cognate w/ Wolof
- Cangin (found only(?) in Ndut *xan-eel*) seems unrelated (note Cangin *ɣ > Ø in Ndut, cannot derive from a voiced velar)
- The widespread Bantu root **gènì̧* ‘guest/stranger’ is a likely cognate. Thus this root is probably inherited from Niger-Congo, and not an innovation of any Atlantic family.

‘<u>Pestle</u>’: Seemingly a *Wanderwort*

- Also found in Manjak *pə-wont͡r̥*, Joola Kasa *hunt*, and perhaps Mandinka *kudaa*

‘<u>Hit</u>’: I can only find this in Cangin (**laɓ*)

- Not aware of any similar Tenda root, in Biafada there is -*laabb* ‘hit with hammer’
- Not found in in Seydou’s (1998) comprehensive dictionary of Fula verb roots, not found in Sereer to my knowledge. Wherever it is found, *daw* seems a phonetic stretch vs. /laɓ/.
- Not found in Gubëeher, Guñaamolo, Kobiana

‘<u>Last</u>’: Good candidate for at least Sereer and Bainunk

- Vowel in Cangin **maañ* vs. Sereer, Bainunk *miñ* is problematic
- Gubëeher, Guñaamolo -*miñ* (not in KK) perhaps connected with Sereer *miñ* (not in Fula)
- Konyagi -*ɓìỹə́* likely to be coincidence, initial consonant does not match. Recall that in Konyagi there is no mutation alternation between /m/ and /ɓ/, and wherever we see /ɓ/ there is no possibility that it could derive from anything but *ɓɓ.

‘<u>Easy</u>’: Likely unrelated

- Cangin **yooɓ* likely borr. Sereer *yooɓ*
- Not found in Gubëeher, Guñaamolo, Kobiana
- Wolof *yomb* difficult to connect due to final consonant

‘<u>Calabash</u>’: Unlikely

- Cannot find a similar word in Sereer (*o-saxal*) or Fula (*horde*)
- Palor *gu̹m* found nowhere else in Cangin, normal Palor word is *if* (cognate with Ndut *if*)
- Wolof *yomb* is phonologically quite distant from Bedik *gi-ngó̤m*, Bassari *a-ngòw̃*

‘<u>Lightning</u>’: At best two distinct roots, phonologically hard to reconcile

- *m*-initial roots are difficult to connect to *ɓ*-initial roots
- Konyagi *-ɓìlìñə́t* and Palor *ɓḭrḭñ* is possible
- Wolof *mellax* seems especially unlikely (final /x/)
- Seems to have a sort of ideophonic value in the area: Wolof *mellax* also ‘sparkle,’ Sereer *melec* ‘sparkle,’ Lehar *miiliic* ‘shine’

‘Inherit’: Perhaps related between Fula and Wolof

- Fula *ron-* perhaps connected with Wolof *donn*
- Cangin term is **lam* across the entire family, likely borrowed from Sereer *lam*. If any language uses *don* it must be borr. Wolof.
- Bassari *-rə̰́ng*, Pajade *-rəŋ* are almost certainly not related to the others

‘Bow’: This word is a Mande borrowing, cf. Susu *xali*, Bambara *kála*

‘Wound’: Perhaps related between Bedik and another language (Wolof?), otherwise borr.

- Fula-Sereer *gaañ* likely borr. Wolof, or vice versa
- Palor *gaañ* certainly borrowed (found in no other Cangin language)
- Bedik *-ɣàñè* perhaps related to Wolof

‘Luck’: Very unlikely cognate

- Can’t find this root in BKK
- Sereer *muud* ‘lucky break’ is a clear Wolof borrowing (**muud* > *muur*)
- As is Palor *mṵud* and Safen *mud*, whether from Wolof or through Sereer
- Very hard to connect Fula-Sereer **mal* with Wolof **muud*
- The Tenda-Jaad form given is presumably based on Bedik *o-mə́l* ‘be clean/lucky.’ This is in fact from **-mən*, based on the straightforward Bassari cognate *a̰-w̃ə̀n* ‘be clean.’

‘Dance’: Borrowed from Wolof

- Can’t find this root in Tenda or Biafada-Pajade
- Not in Fula. Sereer uses *fec* borrowed from Wolof *fecc*.
- Not a native root in Cangin— disparate initial consonants in Palor *ɓec*, Ndut *bec*, Safen *mbec* cannot be reconciled, and are suggestive of borrowing. Probably borrowed from Wolof at various points in the past, possibly through Sereer (grade III *mbec*).

‘Day’: Borrowed from Wolof

- *bes* is used only in some Sereer dialects (native words are *ñaal*, *kom*), borrowed from Wolof *bés* (note that Sereer *bes* has an irregular initial consonant for a *ne* class noun)
- Cangin forms are also almost certainly borr. Wolof. Ndut-Palor uses native **noɣ* ‘sun’ for ‘day,’ likely also the case in Safen-Lehar-Noon in the past before replacement with the Wolof borrowing.
- Can’t find this root in Tenda or Biafada-Pajade— ‘day’ in all bears no resemblance to *pis*

‘Early’: Borrowed from Wolof

- Sereer *teel* borr. Wolof *teel*. Cangin (Palor and Noon *teel*) borr. Sereer or Wolof.
- Pajade *-tii* is a verbal derivational affix, almost certainly unrelated

With borrowings and other tenuous connections excluded (as well as the Niger-Congo root ‘guest’), we are left with the following table:

	Fula-Ser.	Cangin	Tenda	Wolof	BKK	Biaf.-Paj.
'bear child'	*rim	*lị̇m	*-rəm		*-dị̇(i)m 'fam.'	*-rəm
'hear' (Wo. 'be informed')				yég	*-yẹ̇(e)g	
'bite'	*ŋat		*-ŋar̥, -ŋatt	ŋet 'gnaw'	*-ŋar̥	*-ŋar̥, -ŋatt
'old'			BB *-raf		*-def	*-raf
'to last'	Ser. miñ				Bai. *-miñ	
'lightning'		Pa. ɓịrịñ	Ko. -ɓìlìñə́t			
'inherit'	Fu. ron-			donn		
'to wound'			Be. -ɣàñè	gaañ		

Figure 348: Critical revision of P&S's (2017) Table 6

All of the above-mentioned problems aside, it is true that some lexical roots can be found across non-Bak groups that are not found in Bak (see Figure 349 below). However we could also single out Wolof, or Cangin, or any other Northern Atlantic group and present a list of lexical roots with wide distribution in Northern Atlantic that do not appear in that group. As we will see in the next section, the number of widely-attested Northern Atlantic roots that appear in Bak is entirely comparable to the number that appear in other groups, and as such it is difficult to make a convincing argument from lexical evidence that the non-Bak languages should be part of a genetic grouping to the exclusion of Bak.

3.3 Shared lexical roots within Northern Atlantic and Niger-Congo

This section will examine the particular lexical items and roots which I believe can be taken as reasonable candidates for cognates within and outside of Northern Atlantic. Figure 349[165] presents the roots which appear in more than two subgroups[166] and which are not obvious borrowings. It must be stressed that these have been arrived at essentially by eyeballing (between reconstructed forms where possible), and are not proposed as definitive cognates, but are presented as a list of roots with essentially the same meaning and conspicuously similar forms. The reason for these resemblances may be chance in some cases, borrowing in others, and cognacy in yet others. In a few cases multiple unrelated words from the same family or language are given for consideration. For example, for 'tongue' Kobiana *jaarə́(m)* and Bainunk *bu-lemes* are given. However these two forms cannot be cognate, as no r:l correspondence exists between Kobiana and Bainunk. It may be that one of these words is cognate with the widespread root of the shape /ɗVm/, but not both (or else one was borrowed from another Niger-Congo language). Similarly, within BKK, three unrelated roots for 'rot' are given: Kobiana *-boh* (suggesting PBKK **-bor̥* or **-box*), Kasanga *-bul* (suggesting PBKK **-bod*), and Bainunk *-put* (suggesting PBKK **-futt*). While none of these roots can descend from the same BKK root, any of them might be related to the various forms of 'rot' outside of BKK.

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[165] Notes: (1) Manjak 'speech' (2) Wolof 'food,' Gubëeher 'taste,' Tenda 'gnaw,' Manjak 'chew' Bantu 'meat,' others 'eat' (3) Fula, Sereer 'milk (v)' (4) Cangin 'belly' (5) Tenda 'girl,' Bantu 'bear child' (6) Wolof also *gënn* 'mortar,' Cangin also **m-ṵn* 'flour' (7) Wolof 'temple' (8) Wolof 'gnaw,' Pajade *ŋat* 'break w/ teeth' (9) Fula, Sereer, Kobiana, Bassari, Bedik 'cough up phlegm,' Konyagi 'spit,' Wolof 'ideophone for clearing throat'—clearly ideophonic (10) Fula 'throat,' Cangin also **ɣun* 'throat' (11) Guñaamolo 'family' (12) Sereer 'perform ceremonial wrestling dance,' Bassari 'dancing place' (13) Sereer *ŋaβ* 'bite (for animal),' *ŋaaβ* 'overfill mouth,' Kobiana 'yawn,' Wolof, Fula 'gape,' Cangin 'hold between teeth' (14) Fula, Sereer, Guñaamolo, Bedik, Konyagi, Joola, Mandinka 'bark,' Wolof 'leaf,' Cangin 'bark' and 'leaf,' Bassari 'strip bark,' also Manyanya *ka-huub* 'bark' (15) Tenda 'evening,' Manjak 'noon,' also Manjak *be-no* 'sun,' *u-no* 'day, sun' (16) Gubëeher 'clean ears' (17) non-standard Sereer word found in Crétois (1972) from unidentified dialect (18) Tenda 'sheep' (19) Joola 'weave,' Pepel 'weaver' (20) Konyagi 'red ant sp.,' Manjak 'small ant' (21) Bedik 'be quiet' (22) Joola 'big' (23) Sereer 'take big bite' (24) Fula, Sereer, Pajade 'spin thread,' Sereer form found in D'Avezac (1845), Crétois has *mod* 'braid, make rope' (25) Also known as 'middle,' usually also serves as the reflexive suffix. For Manjak, *-a* is called 'passive' by Karlik (1972).

A lone asterisk in a proto-language's column indicates that the root is found in only one daughter language, or that its form cannot be reconstructed with confidence. It is not meant to indicate that the root must have necessarily been present in the proto-language.

Joola F. = Fonyi, E. = Eegimaa (Banjal).

All verbs are cited in grade I for Tenda, Kobiana, Sereer, and Fula.

[166] Biafada and Pajade are included, but for Biafada the available lexical data is very limited (~500 words, cf. Meyer's (2001) ~3500 entry dictionary for Pajade). The relatively small number of forms identified for Biafada should not be taken as indicative of the language as a whole. Nalu-Mbulungish is unfortunately not included due to a lack of available data. In the short wordlists available for these languages, a number of these roots do appear. For the purposes of assembling this list, Wolof and Bainunk-Kobiana-Kasanga were considered as separate subgroups. Some roots appearing in only BKK, Tenda, and Biafada-Pajade are given in Figure 353.

	Proto-FS	Fula	Sereer	Cangin	Wolof	Proto-BKK	Kobiana	Gubëeher	Guñaamolo
eye	*-ɣid	yitere	a-ngid	*ɣi̟d/ɣad	b-ët/gët	*si-ggi̟r̥	sí-ggəh	si-ji̟l	si-gi̟l
tongue[1]	*-ɗe(le)m	ɗemngal	ɗelem	*pe-ɗem	làmmiñ	*	jaarə́(m)	bu-lemes	bu-lemes
eat/chew[2]	*ñaam	ñaam-	ñaam	*ñam	ñam	*-ñaam	-ñaam	-ñama	-ñaamla
breast[3]	*ɓir-	ɓir-	ɓir	*ɓi̟iɓ	ween ?	*	bu-bín		
three	*tad-	tati	tadik		ñ-ett	*-r̥ar̥	-héh	-lall	-lall
four	*nahi-	nai	naxik	*nixiid					
sing	*ɣim	yim-	gim			(*-yi̟n	-yin	-yi̟n)	
dog	*	ɓoosaaru	o-ɓox	*ɓuh					
intestine[4]	*		laaw	*loox					
child[5]	*-ɓiy	ɓiɗɗo	o-ɓiy						
wing	*	wibjo, wiifoongo		*paɓ					
sleep	*ɗaan	ɗaan-aa-	ɗaan						
guest/stranger	*		genar (pl.)		gan	*gVnaal	ú-gunaal	(u-jinaer)	Guj. u-jinaal
cow	*ɣe-naak	nagge	naak	*-noɣ	nag				
elephant	*fan-ñiiɣ	ñiiwa	fañiig		ñey	*		ja-ñi̟x	ja̟nni̟ig
blow nose	*ñisɓ-d-oox	ñittaa-	ñiitoox	*ñi̟ind	ñand	*-ñiir̥	-ñiih	-ñiil	-ŋiil
pound[6]	*’un	’un-	’un	*ho̟ɗ	*hol > wol	*-hun		-hun	-hun
jaw[7]	*ɣal-GaXɓ-	gaɓɓugal	a kaβaar	*kaɓaɓ ?	kaabaab	*	Ka. gu-habar	gu-xa̟ba̟at	gu-ka̟ba̟la̟ar
bite[8]	*ŋat	ŋat-	ŋat		ŋet	*-ŋar̥	-ŋah	-ŋal	
phlegm[9]	*xaax-d-oox	haakt-aa-	xaaqoox		xaax	*-kaak(k)	-haakk	gu-xaax	
smoke	*-suuC	cuurki	o-suun		suur (v)	*	á-cculugg		
new	*xVs	hes-	xas	*has	*hees > ees				
see	*ɣi~ɣa	yi’-	gi’, ga’	*ɣot	gis				
swallow[10]	*	holonde		*hon	*honn > wonn				
dig	*ɣas	’as-	gas	*hac	gas				
bear child[11]	*rim	rim-	rim	*li̟m		*-di̟(i)m		-di̟im	ba-di̟m
dance[12]	*ɣam, ɣom	’am-, wom-	gom	*ɣam		*	-gom		
bite/gape[13]	*	ŋaaɓ-aa-	ŋaβ, ŋaaβ	*ŋaɓ	ŋàpp	*	-ŋaappə(n)		
year	*-hiid	hitaande	o-hiid	*kV-(h)i̟d	at				
tree	*-reex ?	leggal	ndaxar	*ki-rik					
bird	*	sondu/colli		*sel					
bury	*’uwb ?	’ubb-,’uw-	’uup	*hu̟umb		*-hu̟bb	-wubb	-hu̟b	-wu̟bb
be able				*mi̟n	mën	*-min	-min	-min	-min
resemble	(*nand)	(nand-)	(nand)	*mand	mel	*mi(n)d	-minda	-mi̟ir	-mi̟ir
knife	*		japil	No. je̟pi̟l		*	jóppul		
be short				*luH		*-dox	-loh	-dox	-doh

	Biafada	Pajade	Proto-Tenda	Bassari	Bedik	Konyagi	Joola	Manjak	Bantu
eye	gəra	maa-sɛ	*-ɣə̟r̥	a-ngə̟́s	gi-ngùs	i-nkə́r	F. ji-ki̟l	pə-kəs	*jį́cò
tongue[1]	bu-deema	pə-deemɛ	*-ɗim	a-nîw̃	i-ɗém	ryə́w̃	E. fi-rim	pə-rim	*dímį̀
eat/chew[2]			*-ñamm	-ỹămá	-ñám			ñaam	*ɲàmà
breast[3]	bbəl	pə-bər	*er-ɓərə	e-ɓə̀r	e-ɓə̄r	i-ɓə́lə́	E. fi-il	pi-əl	*béèdè
three			*-r̥ar̥	-sà̟s	-sás	-ræ̀r			*tátù
four	nnihi~nihi	man-ne	*-nax	-nàx	-lá	-l̰æ̀x			*nàį̀
sing	jəm	cim	*-yə̟m	-ỹúw	-yùm	-yə́w̃	F. -ci̟m		*jímb
dog		ci-baa	*			i-vé		ʊ-bʊs	*búà
intestine[4]							F. mu-law		*dà
child[5]	nə-mbe	nəm-be	*	a̟-ɓí	hé̟ɓè̟				*bį́-ad
wing	ge-bwaho	mam-paafo	*gaŋ-waf	a-mbàf	ga-mbáf	(æ-mpæ̀w̃)			*bàbá
sleep	daanəh	datta	*-ɗakk	-lâ̟k	-ɗāk	-ryǽk			*dá-ad
guest/stranger									*gènį̀
cow	nnaga	ku-naa							(Amo fə̀-ná)
elephant			*	e-ñàmb	ge-ñò	i-ñí	E. e-nix, F. e-ñaab		(Humono è-ñì)
blow nose		ñinkət	*-ñVtt	-ỹə̀t	-ñētà				
pound[6]		wuud							
jaw[7]		ma-kalabaaso							
bite[8]	ŋar	ŋas, ŋat	*-ŋar̥, -ŋatt	-ɣ̃á̟s, -ɣ̃àt	-ŋás, -ŋát	-w̃æ̀r, -w̃æ̀t			
phlegm[9]			*-xax	-xăx	-hàh	-xàx			
smoke	fu-cu	ku-ci	*-ʃən (v)	-ʃə̟́n	-ʃə̀l	-sə́l̰			
new			*-xaʃ	-xáʃàx	-ɣàʃá	-xàsə́k			
see			*	-ɣàt					
swallow[10]	ŋun	ŋun	*-xon		-hòl	-xòl̰			
dig			*-wə̟cc ‘dig up’		-wīc	-wə́c			
bear child[11]	ləm	rəm	*-rəm	-rôw̃	-rə̀m	-lə́w̃			
dance[12]	gam	kam	*-ɣam	a-ngàw̃á		-wæ̀w̃	F. bo̟om ? (Huluf -gom)		
bite/gape[13]									
year									
tree			*gaŋ-r̥əx	a-tə̆x	ga-tò				
bird	gu-ncudu	ku-cid	*-ʃəɗ	a-cə̟́l	e-cə̀ɗ	sə́ry			
bury									
be able	mənr	mən							
resemble	meel	miir	*-mənd	-w̃ə̆ndə̂r	-mə̀ndə̀l	-w̃ə́nt			
knife									
be short			*			-lə́kw			

	Proto-FS	Fula	Sereer	Cangin	Wolof	Proto-BKK	Kobiana	Gubëeher	Guñaamolo
bark/leaf[14]	*-xoɓ	koɓal	o-xoβ	*huɓ	xob	*			gu-kub
sun/day[15]	*	naange		*noɣ		*bu-nẹgg	bu-négg	bi-nẹg	
ear[16]	*ru-nof	nofru	nof	*nuf	nopp	*ki-nuf	si-núf	-nufạla	Guj. ci-nuf
head				*ɣaf	b-opp/gopp	*bu-gof	bu-góf	bu-gof	bi-gof
tooth	*re-ñiiñ	ñiinde	ñiiñ		(b-ëñ/gëñ?)				
liver/heart	*re-xeeñ	heeñere	xeeñ	*keeñ		*		bu-ciiñ	bu-kiiñ
star	*-xoor	hoodere	o-xoor	*Hul		*-hVVd	a-wóol		gu-huur
rain[17]	*	toɓ-	doɓ	*toɓ	taw				
pestle	*ɣal-'un	'unugal	a-'un	*kuɗ	*kuud > kuur	*-hụ(n)d	a-wúnd	bu-hụur	bu-hụur
goat[18]	*fan-be	mbeewa	fambe	*pe	béy	*		fẹebi	†fa-bẹ
cloth[19]	*		liir	*lịil		*	sa-líih	bu-lịit	bu-lịir
baobab	*-ɓVk	ɓokki	βaak	*ɓoɣ		*			si-bokk
Cola cord.	*		mbamb			*	ú-mbon	si-bạmb	
egg					nen	*-niin	a-níi(n)	bu-niin	bu-niin
finger	*ru-xol	honndu	nqol	*kun		*-kunum	á-kkunu(m)	gu-xunum	gu-kunum
sneeze	*		disoox	*tịs	tisóoli	*		-tisya	
ant[20]	*-ñuuñ-	ñuuñu	ñiiñax	*ñịiñ		*-ñuuñ	já-ñuuñ		a-ñuuñ
be mute[21]	*muum	muum-ɗ-	muum		muuma	*		-mụmune	
scar/brand	*ñaas-	ñaas-t-	ñaas		ñaas				
older sibling[22]	*ox-maaɣ	mawɗo	o-maag		mag				
feather					dunq	*	gú-lung		
open mouth[23]	*	ŋaañ	ŋaaŋ			*ŋaaŋ	-ŋaaŋ	-ŋaaŋun	
rot/be ripe	*	woor-	foor, fot			*	-boh, Ka. -bul	-put, -bur	-pur
rear/raise				*koɗ					
honey/bee	*-yuum	njumri	yuum	*kV-(V)ụm		*-yVm	*ja-yum > joom	a-yum	a-yom
fishnet	*		mbaal		mbaal	*		ja-mbaal	
sitting mat					basaŋ	*	básə(n)	ram-basa	ram-basaŋ
cotton[24]	*	mott-	<mod>			*-mo(o)tt	ja-móott	ja-moot	bu-mott
horse	*ɣun-pVs	puccu	pis	*panịs	fas				
causative	*-in	-in	-in	(*-ịɗ)	(-al)	*-un	-ən	-un	-un, -in
anticausative[25]	*-oox	-aa~o	-oox	*-ox	-(k)u	*-ah	-a	-ah	-aa
reversive	*-it	-it	-it	(*-ịs)	-Ci	*-ur̥	-əh	-ul	-ul
negative			-eer	*-ɗii	-ul	*-iid	-ii(l)	-r	-r
manner pref.			n-		n-	*n-	n-	n-	

	Biafada	Pajade	Proto-Tenda	Bassari	Bedik	Konyagi	Joola	Manjak	Mandinka
bark/leaf[14]		ka-ɲubɛ	*-xVɓɓ	-xóɓə́tá	ga-ngóɓə̄tél	væ-kùɓ	F. ka-kub	ka-wəb	húbúmbu
sun/day[15]	nnaga		*-nəkka	e-nə̀ká		æ-nə́kà	F. fu-nak	pə-nak	
ear[16]	ge-nəfa	ko-nəfa	*gaŋ-nəf	a-nə̀f	ga-nə̄f	æ-nə́f	E. ga-nnu		
head	boofa (maa-gafa)	po-ofɛ	*-ɣaf	gə̀f	gə̀f	æ-nkæ̀f	E. fu-xow	Mank. kow	
tooth		maa-ñɛ	*-ñVngạ	ỹə̣̀ngə̣̆	gi-ñángà		F. ka-ñịiŋ	Mank. niŋ	ñíŋ
liver/heart		pə-seeñi					E. fi-iñ	Pepel fɪñ	
star	wweela	pu-oor	*er-xor		e-kór	i-kòl	E. e-ut		
rain[17]			*-r̥əɓ	-sə̣́ɓ	-sɯ́ɓ	-rə́v	F. ka-lub	sʊb	
pestle		pu-unt	*-xondə	i-ngònd	e-gōnd	xòntə́	Kasa hunt	pə-wont͡r̥	kudaa
goat[18]	ndaf ?	wan-daafɛ ?	*ji-fe	i-fêỹì	jə-fè	i-fé		u-pɪ	(baa)
cloth[19]							F. -liir	Pepel liir	
baobab			*gaŋ-ɓakk	a-màk	ga-mák		F. bu-bak	bə-bak	
Cola cord.			*gaŋ-wamb	a-mbàmb	ga-mbàmb		E. bu-bạm		
egg	nnaña	maa-ninɛ	*er-nịn		i-líl	i-nìl̰		Pepel neen	
finger								pə-konj	-kóndiŋ
sneeze		tisoŋ					F. -tiso		tisoo
ant[20]	gu-ññuñu	ku-ñiñi	*-ñVññ	gi-ñìñ	e-ñíní	æ-ñúñ		u-nuʌn	
be mute[21]		ku-miim	*		-mòm		F. -mumun		múumúnee
scar/brand							F. -ñaas		
older sibling[22]	may						F. (mạk)	tr̥ə-mak	
feather	bu-lungu	kan-tunkɛ	*-rong	e-ndòngw	ge-ndóng	u-lə́nkw		ka-lung	
open mouth[23]							F. -ɲaaŋ		
rot/be ripe	bwəl	pər	*-wə̣r	-wə̣́r	-wɯ́r	-wə́l		Mank. -poot͡r̥	
rear/raise		kud	*-x{o/u}ɗ	-xʷə̀l		-xwə́ɗ	F. -kur	kus	Bam. kólo
honey/bee							F. ji-kụm		
fishnet							F. yumbaal		
sitting mat	gə-mbasa	kam-basa	*	bàʃạ́ní		æ-mbæ̀sæ̀l̰	F. ka-basa	u-basa	basa
cotton[24]		muut	*ña-mədd			yæ-w̃ə̂d		pə-muət͡r̥	
horse		ŋa-fas	*		fándàc	i-pǽl̰æ̀cə́	F. e-piling	u-mpəlinc	
causative		-aan	*-Vn(n)	-ə́n	-ə̣́n	-Vl̰	F. -en	-an	
anticausative[25]		-a	*-a	-á	-ạ̀	-ạ́	E. -o	-a	(Bantu *-ik)
reversive	-ətt	-ət	*-ətt	-ə́t	-ə̀t	-(x)ə́t	E. -ul	-es	(Bantu *-ud)
negative							E. -it		

Figure 349: Cognate candidates in Northern Atlantic

First it must be noted that despite the organization of the chart, there is no reason to single out Bak from the rest of the Northern Atlantic groups. In Figure 349, most of the roots with a Bak match are found on the second pair of pages, but if the chart were organized differently it could just as easily single out Wolof, or any number of individual languages. Of the 65 items given, 38 are found in Bak, 37 in Wolof, 58 in Fula-Sereer, and about 40 in Cangin, BKK, Biafada-Pajade, and Tenda. Of all of these subgroups, I am most likely to have missed connections from Bak, since I have had the least exposure to this language family, have for the most part only considered Joola Fonyi, Joola Eegimaa, and Manjak (from rather short lexical sources), and furthermore am dealing only with modern forms since I have undertaken no reconstructive work on this family. By the same token, the fact that a possible connection is given for 58/65 terms in Fula-Sereer is almost certainly because this is the family with which I have had the most exposure and for which (in addition to Wolof) I have the largest lexical resources.

Along with the lexical roots, five potentially cognate affixes are presented. Of these only the first three seem to be particularly good candidates for cognacy. The causative has /n/ in most languages, and the reversive contains /t/ (*r̥ is a lenited *t in BKK). The anticausative might be derived from /ox/ in most branches if we assume that the uvular fricative caused the coloring of the vowel to /a/ in some branches (as undoubtedly occurred in Fula). This anticausative suffix can perhaps be compared with the Proto-Bantu velar **-ik* suffix having the same meaning. Of course, evidence from forms with a single consonant is rather weak.

It is very likely that at least some of these lexical roots are borrowings. Good candidates are ‘knife, sitting mat, fishing net, (spin) cotton, cloth,’ not only because they are the sort of terms likely to be diffused with the spreading of these technologies, but because the phonological forms within established families are sometimes inconsistent, and cannot be reconstructed for the family. ‘Elephant,’ ‘horse,’ and ‘eat’ (assuming this is related to Bantu **ɲàmà*[167]) are well-established as *Wanderwörter* in Africa, being found in languages outside of even the broadest definition of Niger-Congo[168]. It may be significant that 44 of the 65 terms given in Figure 349 are nouns, which are generally thought to be more susceptible to borrowing. Surface-similar Mandinka forms are given for nine of the items. As Mande is arguably not Niger-Congo at all, the fact that these Mandinka forms resemble some or all of the Northern Atlantic forms is a clear indication that these items can be and have been spread by areal influence (or else that coincidence is sufficient to yield resemblances between unrelated forms). I have very little exposure to Mandinka, and thus other relevant forms are likely to exist that have escaped my notice. Omitted from Figure 349 are some other roots that are likely widespread borrowings, appearing in Mande languages of the area as well as Northern Atlantic languages: *karanga* ‘louse,’ *maano/maalo/maaro*, ‘rice,’ *guro/guru/kola* ‘cola nut,’ *xali/xala* ‘bow,’ *daa* ‘pot,’ etc. There are also some roots that appear throughout the languages of Guinea and southern Senegal, and seem to be likely borrowings: *waf/wap* ‘sell,’ *neem/niim* ‘die/disappear,’ *ʃam-* ‘panther,’ *jaagal*, etc. ‘jackal,’ *mundum*, etc. ‘hyena,’ *sVñVl* ‘porcupine’ (also found in Wolof), *bif/buf* ‘stoke fire/bellows.’ Terminology for castes is almost certainly borrowed: *lawbe* ‘woodworker,’ *gVwVl* ‘griot,’ etc.

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[167] Cf. also Mundabli (Bantoid: Voll 2017) *ɲām* ‘fufu’ (p. 44).

[168] E.g. Laal (isolate: Chad) *ɲé* ‘elephant,’ cf. Lua (Adamawa: Chad) *ɲī,* pl. *ɲí:gɨ̄* ‘elephant’ (Boyeldieu et al. 2006). De Wolf (1971: 55) reconstructs *-*ni* ‘elephant’ for Proto-Benue-Congo. Similar words for ‘horse’ are found throughout the Sahel region, for example in all Central Chadic languages (Afro-Asiatic), for which Gravina (2014: 156) reconstructs **pɨrɨsʸ*, e.g. Daba *pìlís*. This word is borrowed from Semitic, cf. Arabic *faras* ‘horse.’ Hausa (Afro-Asiatic) has *ná:mà:* ‘animal.’

There are very few roots that can be connected with a Proto-Bantu form to suggest a connection with Niger-Congo at large, but they do certainly exist. 'Tongue, breast, guest, three, four' seem particularly strong, and 'dog, sleep, child' are also unlikely to be coincidental across all of these languages. 'Eye' is rather speculative, as the Bantu form is quite distinct from the North Atlantic forms (see the first entry in Figure 349), but the Bantu form could be the result of palatalization of both consonants. 'Sing, wing, intestine' involve rather large phonetic differences, and may quite possibly involve coincidental resemblances, both within Northern Atlantic and when compared with the Bantu roots. Similar forms for *na(C)* 'cow' and *ñi(C)* 'elephant' are common in Benue-Congo languages outside of Bantu, though they are not found in Bantu itself. Throughout Northern Atlantic we find further isolated forms that can be compared with Bantu roots.

		Proto-Bantu	
Manjak	-re	*dí	'eat'
Manjak	-rʊm	*dúm	'bite'
Joola (many)	-rum		'bite'
Fula-Sereer	*ɗik	*bàdí	'two'[169]
Sereer	gin	*gí	'egg'
Fula-Sereer	*tuhud	*tʊ̰́id	'spit'
Cangin	*tuɣud		'spit'
Cangin	*lɨ̰n	*dìm	'cultivate'
Wolof	di	*dì	'be'
Kobiana	-min	*mɨ̰̀n	'swallow'
Biafada	†bu-ri[170]	*tí	'tree'
Tenda	*-xey	*ké	'dawn'
Ndut-Palor	key		'tomorrow'

Figure 350: Resemblances between Bantu and isolated Northern Atlantic forms

Of course when comparing a Bantu form with a form found in only one or two Atlantic subgroups over such an incredible time depth, the chance of coincidental resemblance is high. One important point about these broader Niger-Congo roots is that they cannot be used as evidence for the genetic unity of Northern Atlantic as a family. If for example 'tongue' is indeed inherited from a putative Proto-Niger-Congo in all of the Northern Atlantic branches (see the second entry in Figure 349), this only argues that they belong within Niger-Congo, not that they form a subgroup to the exclusion of the other Niger-Congo languages.

When comparing individual forms from two language groups, they often appear to be more similar than would be expected by pure chance. But conspicuously, there is not a high degree of regularity in the sound correspondences between these forms. Take for example roots with initial voiceless back fricatives. Proto-Fula-Sereer, earlier Wolof (and the modern Saalum dialect), and Proto-Cangin all have a contrast between a glottal /h/ that patterns with

[169] Assuming that the Bantu form contains a frozen class 2 prefix **ba-*, cf. also **bìdí* 'two' and class 8 **bɨ̰~bi-*

[170] Found in Koelle's *Polyglotta Africana*. Modern *bu-r*, in the *bu-I* class. Grade I /r/ in Biafada is always from Proto-BP *r̥, the lenition of earlier *t.

the velar consonants, and a distinct uvular /x/[171]. Proto-Bainunk-Kobiana-Kasanga has at least glottal /h/ and velar /k~x/ (cf. Gubëeher /h/ vs. /x/), and Proto-Tenda has only velar /x/. When comparing between roots with an initial back fricative in one or more branches, no clear sound correspondences emerge.

FS	Wolof	Cangin	BKK	Tenda	
*-xoɓ	xob	*huɓ	Guñ. gu-kub[172]	*-xVɓ	'leaf/bark'
*xaax-	xaax		*-kaakk	*-xax	'phlegm'
*'un	*hol	*hoɗ	*-hun		'pound'
*-'un	(*kuud)	(*kuɗ)	*-hu̟(n)d	*-xondə	'pestle'[173]
*'uwb		*hu̟umb	*-hu̟bb		'bury'
*-xol		*kun	*-kunum		'finger'
*-xeeñ		*keeñ	Guñ. bu-kiiñ		'liver/heart'
*xVs	*hees	*has		*-xaʃ	'new'
(F. hol-)	*honn	*hon		*-xon	'swallow'
*-hiid	at	*-(h)i̟d			'year'
*-xoor		*Hul	*-hVVd	*-xor	'star'

Figure 351: Potential cognates with root-initial voiceless back fricatives

No less than six sound correspondences are encountered across these 11 forms (though perhaps the correspondence for 'star' can be combined with 'new, swallow'):

PFS	Wo.	Ca.	BKK	
x	x	h	k	'leaf, phlegm'
Ø	h	h	h	'pound, pestle, bury'
x	?	k	k	'finger, liver/heart'
x	h	h	?	'new, swallow'
h	Ø	h?	?	'year'
x	?	H	h	'star'

Figure 352: Sound correspondences for root-initial voiceless back fricatives

There are no obvious conditioning environments that can account for these discrepancies, and we certainly cannot reconstruct five or six voiceless back fricatives. Similar problems exist for

[171] This distinction is maintained in modern Sereer. For Cangin, there are three regular sound correspondences, each supported by a roughly equal number of cognate sets:

Proto-Cangin	Ndut-Palor	Safen-Lehar-Noon
*h	h	Ø
*x	h	k
*H	h	h

*H may be a separate phoneme, or more likely is the result of dialect borrowing at some point in the history of Safen-Lehar-Noon. *x never appears root-initially, where it had probably merged with *k already in Proto-Cangin.

[172] The Guñaamolo word is probably borrowed from Joola *ka-kub*, but excluding this form still leaves us with a unique sound correspondence between the other groups.

[173] The initial consonant of the Wolof and Cangin forms is almost certainly a class prefix.

coronal consonants and vowels as a whole. For root-final inconsistencies (like in ‘sleep’), we might appeal to differing suffixal “root extensions,” but for initial correspondences this explanation is not available. We must conclude that many of the forms listed cannot be true cognates. If we insist on regular sound correspondences among cognate forms in a putative Northern Atlantic language family, we must accept that a large number of the forms in Figure 349 resemble each other for reasons other than cognacy, whether that be chance or borrowing.

There are certainly some very compelling connections to be made between lexical roots in Northern Atlantic languages. At least the roots ‘tongue, breast, three, four’ establish a clear connection with Niger-Congo, whether this be areal or a true genetic relationship. Roots like ‘ear, head, bite, new, star, goat’ appear throughout Northern Atlantic exclusively, with shapes that cannot be attributed to coincidence. When dealing with such basic vocabulary in multiple language groups, genetic inheritance seems a more likely explanation than borrowing. However the good candidates for pan-Northern-Atlantic cognates are quite few, and do not show regular sound correspondences.

3.4 Shared lexicon as evidence for subgrouping

Within each of the established Northern Atlantic genetic groups (as defined in Figure 335), numerous lexical items are shared between languages which are found nowhere outside of the group. Even setting aside morphological evidence, the number of unique shared lexical items within each group is so high that lexical evidence alone is probably sufficient to establish each group as valid, and none of these “lower-level” groupings have to my knowledge been questioned. A natural next step is to compare between these established groups to determine if certain of them share a significant amount of lexical material to the exclusion of other groups. We saw in section 3.1 that when comparing vocabulary in 100 word lists, no such patterns emerged, and the potential cognate percentages were equally low between most groups. In section 3.3, no such patterns emerged when considering all roots with a wide distribution among Northern Atlantic languages. There are however a number of roots which appear to be shared by only two groups, and we might hope that when examining these, some higher-level subgroups emerge. In fact they do not. Though the distribution of these less widely-distributed roots throughout Northern Atlantic may help to bolster the claim that the family as a whole is a genetic unit, it does not single out any two groups as particularly similar. Wherever group A and B share some number of unique roots, similar numbers of unique roots can generally be found between groups A and C, A and D, etc.

To illustrate this situation, we will examine the Tenda family. In the existing literature, Tenda has been grouped with Biafada-Pajade and in turn with Fula-Sereer in Segerer (2010) (the grouping with Fula-Sereer is retracted in Pozdniakov and Segerer 2017) and with Bainunk-Kobiana-Kasanga and Biafada-Pajade in Sapir (1971) and Wilson (2007: 35). Figure 353 gives potential cognates that are uniquely shared between Tenda and each of Fula-Sereer, Bainunk-Kobiana-Kasanga, Biafada-Pajade, Wolof, and Cangin; and between all three of Tenda, BKK and Biafada-Pajade.

Potential cognates found only in Tenda and Fula-Sereer[174]:

[174] Cangin **meed* ‘be used to,’ **ñafad* ‘shoe,’ **ɓasi̟l* ‘have children,’ **ɓaat* ‘add,’ **lam* ‘inherit,’ **Huluɓ* ‘river’ are probably borrowed from Sereer. Cangin **ɓo-ox* ‘bathe’ and **ma-on* ‘tear’ can be reconstructed as **ɓoɣ-ox* and **ma-ɣon*, and may be cognates, or borrowed from Sereer.

Fula	Sereer	Proto-Tenda	Konyagi	Bassari	Bedik	
ɓuuc-aa-	ɓuus	*-ɓu̧ʃ	-vús	-ɓûʃ	-ɓùʃ	'suck'
faɗo	o-ñafaf	*-fȩɗ(ɗ)	-fæ̀ry	ɓa-pȩ̀ɗ	gi-pə̧́ɗ	'shoe'
ƴakk-	ƴax	*-ƴakk	u-yàkàlḛ́l	-ƴák	-ƴàk	'chew'
gongol	o-gooniit	*-ɣon(n)	u-wə́n	a-ng^{w}ə̀n	ge-ngól	'tear (crying)'
ɓal-w-	ɓaal	*-ɓan	-væ̰̀l	-ɓ~mànạ̀x	-ɓ~málà	'(be) black'
happere	xaβ	*-ɣa̧ɓ	u-nkwàv	o-ŋá̧ɓ	e-géɓ	'yam'[175]
yaw-	yaf	*-yaf-	-yàfâŋ	-yàf		'despise'[176]
	dox	*-ɗox	-ryə́xw	-lòx^{w}		'burn'
ɓesngu	βasil	*-ɓaʃ		o-ɓâʃ	u-ɓàʃ	'offspring'
ŋuur-	ŋuur	*-ŋə̧ra		-ɣ̃ə̧̀rá	-ŋə̧̀rȩ̀	'growl/groan'
yupp-	yip	*-yi̧ppətt		-yìpə́t	-yìpə́t	'pour (out)'
ñaande	ñaal	*-ñan *or* -ƴan		e-ñàn	gi-ñál	'day/sun'
	mer	*-mər		-w̃ər	-mə́r	'be used to'
	fox	*-foxa		-fòx^{w}á	-fōwà	'clap'
ñisɓ-aa-	ñisiɓ	*-ŋoʃəɓa		-ɣ̃òʃə́ɓá	-ŋóʃə̀ɓà	'sniffle'
	ɓaat	*-ɓətt		-ɓə̧́t	-ɓə́t	'do again'
	ɓaat 'add'	*-ɓə̧tt		-ɓə̧́t	-ɓúút	'grow in size'
faɗɗ 'hit'	faɗ	*-foɗ	-fóry			'slap'
	ɓog	*-ɓoggən	-vəgwə̰́l			'bathe'
	lam	*-rəm[177]	-lə́w̃	(-rə̧́ng)		'inherit'
ŋoos	ŋoos		i-ŋóc~i-ŋwə́c			'scratch'
	ƴook			-ỹôkà		'see from far'
sekkere					o-ʃék	'cheek'
	o-xuluɓ				ɓə̧-hə̧́ɓ	'river'

Potential cognates found only in Tenda and Bainunk-Kobiana-Kasanga:

BKK	Proto-Tenda	Konyagi	Bassari	Bedik	
*-gu̧	*-ɣi	i-gè	-ɣì	-y~gȩ́	'be'
*u-nam	*-nam	i-næ̀w̃ 'be chief'		a-lám	'king/chief'
*gu-kuus	*-xoʃ	u-xósós	e-kóʃ	e-kòʃ	'elbow'
*-kki̧d				go-kə̧̀r	'monkey'
*ñungul 'be dirty'				-ñúúŋəl	'be ugly'
KK *-ʃen	*-ʃan	æ-cǽ̰l	e-cán	bāʃàl	'dawn/morrow'
KK *ta-pper		(i-fæ̀ry)	sàpàr	i-tápár	'foot'
KK *-xatt(-Vgg)	*xat-təx	xæ-tə́x	o-kàtə̀x	gu-kāt	'hole'
Ko. -s~ccupp	*-ʃif		-ʃìf	-ʃȩ́f	'pound in mortar'
Ko. -ñam, Ka. -ñem 'hurt'			e-ñèw̃		'wound'
KK *a-ddem			e-dèw̃		'chin'
Ko. -l~ndu 'draw water'			a-ndú		'well'
Ko. ŋan	*-ŋan	i-ŋæ̰̀l	-ɣ̃àn	-ŋál	'love'[178]

[175] Probably borrowed from Mande, cf. Susu *xabe*.
[176] Also Pajade *yaf*. The final *-aŋ* of the Konyagi form is characteristic of borrowings from Malinke, but I cannot find this word in any Manding variety.
[177] Or *-*rə̧ŋ(g)* if the Bassari form is cognate, which would make a connection with Sereer much less likely.
[178] Note also Manjak *ŋal*, likely unrelated.

Potential cognates found only in Tenda and Biafada-Pajade[179]:

Proto-Tenda	Bassari	Bedik	Konyagi	Pajade	Biafada	
*-yi̟kk/-ye̟kk	-yíkà̟	-yíké̟	-yǽk	jaak	jook	‘be hot’
*-xi̟	-xí	-hí	-xí	maa-ɛ	he~ke~nke	‘two’
*-rə̟nn	a-ndə̟̀n	gu-ndə̟́n	lə̀n	pə-rənnɛ	bu-lənna	‘snake’
*-ri̟	-rǐ	-rì	-lí	rii	lii	‘do/make’
*-romm-ax	-rǒmàx	-rōmà		room	loom	‘(be) short’
*-ɗam	-làw̃	-ɗám	-ryæ̀w̃	dam	dam	‘kill’
*-ŋakk	-ɣ̃àk	-ŋák	-ɣ̃æ̀k	ŋak	ŋakk	‘be sharp’
*-yVnn	-yìn	-yēn	-yə̀n	yin	yinn	‘breathe’
*-xVɗ		-háɗɛ̀	-xèry	kad	haad	‘guard’
*a̟-ɗi̟yVr	a̟-lìyér	a-ɗìyàr		u-diɛr	u-diigal	‘stranger’
*məʃ		ɓə-mə̀ʃ	w̃ə́s	pə-məs	mməsə	‘mouth’
*-rəŋ(g)	-rə̟́ng		-lə́w̃[180]	rəŋ		‘inherit’
*-rəɗɗ	-rə́ɗ	-rə̀ɗ		rəd ‘plant a stake, build’		‘plant crops’
*ʃVɓ	ʃé̟ɓ	ɓə-ʃè̟ɓ	sǽv	pa-sabɛ		‘tail’
*-mə̟C	-wə̟́ɗá̟	-mə̟̀ɗ	-w̃ə́j	med		‘knot (v)’

Potential cognates found only in Tenda, Biafada-Pajade, and BKK:

BKK	Proto-Tenda	Konyagi	Bassari	Bedik	Pajade	Biafada	
*-r̥uf	*-r̥əf	-rə́f	-sə́f	-sə̀f	səf	rəf	‘sew’
*-munr	*gə̟ŋ-mə̟ɗɗ	u-mə́ɗ	e-mə̟́ɗ	ge̟-mɯ́ɗ	mədd		‘night’[181]
*-def	*-raf	(-ryæ̀f)	-ràf	-ráf	raf	laf	‘be old’[182]
*-de̟en	*gaŋ-ri̟n		a-ndín	gi-ndìl	bə-riin		‘kapok tree’
*ngV		gà		ngə	nka	nga	‘and’
*-gid	*-ɣə̟r	(i-gæ̀ry)	-ɣə̟́r	-ɣɯ̀r	kər	gudd	‘run’
*ñan-kin(d)	*er-ʃən	i-cə̀l̰	e-cén	e-cə̀l	ña-siiñ	ña-sin	‘nose’[183]
*ŋam/ŋom	*-ŋam	-ɣ̃æ̀w̃	-ɣ̃àw		ŋam		‘be far’
Bai. -fer[184]	*-feʃ		-fĕ̀ʃ	-fɛ̀ʃ	faas	faas	‘be white’
KK *-yebb	*-ye̟ɓɓ/yaɓɓ?	-yǽɓ			yabb	yabb	‘be many’

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[179] For the lexical connections between Biafada-Pajade and Tenda, we must be especially suspicious of borrowing. Recall that Pajade is spoken adjacent to the Tenda languages. If Proto-Biafada-Pajade was spoken adjacent to Proto-Tenda, there is a high likelihood that they would borrow from each other (even some basic vocabulary, see section 3.5). Considering that the morphology of these two groups is very different (e.g. the noun class systems are extremely distinct, see section 4.2, as are the pronoun systems), the shared roots between the two are suspiciously similar. Often the reconstructed Proto-BP and Proto-Tenda forms are segment-for-segment identical (see Appendix A). This is suggestive of the sort of borrowing we see between e.g. Joola and Bainunk languages, but having taken place many years in the past. The majority of unprefixed nouns in Tenda are borrowed, and thus we must be suspicious of ‘snake, mouth, tail.’ ‘Stranger’ is almost certainly borrowed from Pajade into Bassari-Bedik. The BP root has *g (regularly deleted in Pajade), so this should also be present in Bassari as /ɣ/ if these are true cognates. Furthermore the word is derived from a PB root (Pajade *dii* ‘to welcome/ host’), not present in Tenda. Pozdniakov and Segerer (2017: 22) provide a similarly-sized list to support their Tenda-BP subgroup.

[180] Or else this is from a root *-*rəm* and can be connected with Sereer *lam*.

[181] BKK ‘dark,’ e.g. Kobiana *-mudd*, Pajade ‘become night’

[182] cf. also Manjak *-t͡r̥af*

[183] Also perhaps Wolof *bakkan b-* if the first syllable is the historic prefix **ba*^{X}-

[184] Recall that final BKK *s becomes /r/ in Bainunk, see Figure 166.

Potential cognates found only in Tenda and Wolof[185]:

Wolof	Proto-Tenda	Konyagi	Bassari	Bedik	
fukk	*-fo̟x/fu̟x	i-pə́xw	f~po̟x/pux	ma-fú/pó	‘ten’
xooj ‘dunk’	*-xoƴƴ	-xòƴ	-xòƴ	-hʷóƴ	‘wet (tr. v)’
der	*-ɗVr	æ-ndíl	a-nǎr	ga-nàr	‘skin’[186]
gub ‘mow’	*-ɣu̟bb	i-gùb	-ɣə̟́b	-ɣúb	‘break stalks/gather’
tànn	*-r̥an	-ræ̀l̰		-sál	‘choose’
mbar	*-ɓarə	u-væ̀lə́			‘scabbard’
daŋ	*-ɗoŋ		-lòɣ̃	-ɗòŋ	‘be thick/viscous’
saamaar ‘sword’			a-cə́màr	ga-cə́már	‘scabbard’
càmm, der. sàmm ‘herd’		u-sæ̂w̃			‘livestock’
càkkar		i-cǽkǽry			‘rafters’
lem ‘honey’		-lə́m			‘be sweet’
tuñ ‘lip’			e-têỹ		‘mouth/beak’
xam			-xàm		‘know’
gaañ				-ɣàñè	‘hurt/wound’
butti				-bʊ̀t	‘eviscerate’
xol ‘heart’				i-kò̟l	‘chest’

Potential cognates found only in Tenda and Cangin:

Cangin	Proto-Tenda	Konyagi	Bassari	Bedik	
*haƴ	*-xa̟ƴ	-xày	-xà̟ƴ	-hé̟ƴ	‘lean (tr)’
*eɗ	*-yVɗ(ɗ)	-yə́ɗ	-yìl		‘give[187]’
*ngu̟ɗ ‘cut’	*-ɣu̟ɗ	-gwə̂ry[188]		-ɣùɗ	‘pierce’
*wax	*-fakk		-fàk	-fák	‘heal’
*key	*-xey		-xèy	-hé	‘dawn’ (C. ‘tomorrow’)
Palor ɓi̟ri̟ñ		-vìlìñə́t			‘lightning (v)’

Figure 353: Potential cognates between Tenda and other Northern Atlantic groups

Tenda seems to share roughly the same rather low number of potential cognates with Fula-Sereer, Bainunk-Kobiana-Kasanga, Biafada-Pajade, and Wolof. The number is lower for Cangin, but these are among the best potential cognates out of all those presented in Figure 353. Based on this lexical evidence, we cannot make an argument for any subgroup intermediate between Northern Atlantic and Tenda. The same holds true for all other language groups within Northern Atlantic— similar numbers of potential cognates can be identified between almost any two groups, and thus lexical data is not able to suggest any convincing subgroups.

[185] Fula-Sereer **gaañ* ‘hurt,’ **gub* ‘mow,’ and Sereer *xooƴ* ‘dunk in water’ are probably borrowed from Wolof.
[186] Also Pajade *kun-daar* ‘skin’
[187] Also Fula *yeɗ-* ‘give’
[188] Found in *æ-nkwə̂ry-gwə̂ry* ‘bostryche perce-bois (beetle sp.)’

3.5 Contact: borrowing and other areal effects

Whenever we find resemblances between lexical items across languages, we must consider the possibility of borrowing. As we saw in section 3.3, the widespread Northern Atlantic roots show very little regularity in sound correspondences, which should immediately lead us to suspect borrowing. The challenge is that of the few roots with broad attestation across the Northern Atlantic languages, most are rather basic terms, such as body parts ('eye, head, ear, tooth'), natural features ('sun, star, rain, bark/leaf'), notable animals ('cow, bird, goat, ant'), and common verbs ('swallow, dance, bite, be able'). These are not terms that we expect to be easily borrowed, and so their appearance in multiple Northern Atlantic language groups leads us to suspect inheritance from a common source. Given these two opposing intuitions, we must ask whether it is really so unlikely that these basic lexical items could have been borrowed between groups, perhaps some time in the distant past. To help answer this question, this section will examine some better-understood patterns of borrowing between Northern Atlantic groups. We will see that Northern Atlantic languages have indeed borrowed some very basic vocabulary from each other.

The phenomenon of borrowing basic linguistic material is well-attested in the languages of the world, and is termed "core borrowing" by Haspelmath (2009). He notes that core borrowing generally takes place when the donor language has an especially high level of cultural prestige. Core borrowing is greatly facilitated by multilingualism, but can occur even in its absence. The three Northern Atlantic contact situations we will examine in this section all involve core borrowing, and in all three the donor language is/was culturally prestigious and likely spoken by speakers of the borrowing language. We must also be aware of the existence of *Wanderwörter* that can appear in unrelated languages within an often rather wide area, even in the absence of multilingualism. While *Wanderwörter* are in some cases related to technologies or cultural practices, Haynie et al. (2014) show that a number of common animals and plants are also *Wanderwörter* in Australia and the Americas. In Australia even 'ear' is a *Wanderwort* with particularly wide distribution (2014: 15). We saw in section 3.3 that some of the best candidates for Northern Atlantic cognates are also found in Mandinka ('bark/leaf, tooth, sneeze,' in addition to technologies like 'sitting mat, bow, pestle'), heavily suggesting that some of these common Northern Atlantic roots are indeed *Wanderwörter*. The two trees 'baobab' and '*Cola cordifolia*' also seem like good candidates, especially given the irregular sound correspondences in these words even between closely related languages (e.g. Sereer *ƥaak* 'b. tree', *ɓaak* 'b. fruit' Fula *ɓokki* 'b. tree,' *ɓoh-re* 'b. fruit').

The distant histories of cultural contact between speakers of the various Northern Atlantic languages are not at all well understood, but we have no reason to doubt that the same sorts of contact scenarios that allowed for borrowing of core linguistic material between Wolof and Fula-Sereer (section 3.5.1), Sereer and Cangin (section 3.5.2), and Bak and BKK languages (section 3.5.3) would have existed in this area even farther in the past. Given the possibility that these languages have been spoken in much the same relatively small geographic area for many thousands of years, we must suspect that borrowing of core vocabulary has been an important linguistic force throughout these languages' histories. Whether or not borrowing could account for all of the similarities in basic vocabulary between Northern Atlantic groups is debatable, but even if many of these vocabulary items are indeed cognate, it does not necessarily prove the genetic unity of Northern Atlantic. We must also consider the possibility that some inherited Niger-Congo vocabulary was retained in the Northern Atlantic area due to geographical pressure, while being lost in the rest of Niger-Congo.

3.5.1 Wolof and Fula-Sereer

Approximately 20% of modern Sereer vocabulary is borrowed from Wolof. Borrowings between Wolof and Sereer are in almost all cases identifiable as originating in Wolof, which is now and has been for some time a language of wider communication in the area between the Senegal and Gambia rivers. Some of these borrowings may be rather recent, as they show no evidence of having occurred before the operation of any sound changes in either language.

Sereer	Wolof	
a-teere	téere	'book'
laxas	laxas	'wrap around'
ndawal	ndawal	'meat'
lab	lab	'drown'
o-noon	noon	'enemy'
xaarit	xarit	'friend'
leer	leer	'light'
xaal	xaal	'watermelon'
jaayoox	jaayu	'swing'
wala	wala	'or'
balaa	bala(a)	'before'
tax	tax	'cause'
bug	bëgg/bugg	'like/love/want'
o-qaaq	xaax	'coward'
war	war	'must'
gim	gëm	'believe'
ñak	ñàkk	'lack'
yar	yar	'raise child'
lak	làkk	'language'
o-soow	soow	'buttermilk'
fec	fecc	'dance'
bac	bàcc	'thresh'

Figure 354: Wolof borrowings in Sereer

Others are clearly from farther in the past, as they are post-dated by various sound changes in each language, or show phonological associations that are not made in more recent borrowings (notably many Wolof stops are borrowed as implosives in Sereer, which were the more frequent series of stops in Sereer before the historical operation of geminate hardening).

Sereer	Wolof	
o-ɓek	bekk	'piece'
god	gor < *god	'chop'
xooƴ	xooj	'dunk'
a-qaal	gaal	'boat'
fog	bokk	'share/be related'
faax	baax	'be good'
xeef	xeeb	'underestimate'
o-furtu	mburtu	'lamb'
jof	jub	'be straight/fair'
wid	wër < *wëd	'go around'
foɗax	forax < *fodax	'be sour'
foƭosoox	fottosu	'snap fingers'
gidim	gërëm < *gëdëm	'thank'
ɗof	dof	'be crazy'
ɗas	das	'hide'
soƭoq	soddax	'swallow down windpipe'
diɓ	dëbb	'stab/pound'
meeɓ	meeb	'lift'
faƴ	faj	'heal'
xaɓ	xëb	'foam (v)'
jaaɗ	jaar < *jaad	'palm rat'

Figure 355: Earlier Wolof borrowings in Sereer

These are still clearly identifiable as borrowings, as they do not appear outside of the area where Wolof is spoken (i.e. sometimes in Cangin languages and Pulaar north of the Gambia, but not other languages or dialects).

There are also a large number of roots which seem to be reconstructable to Proto-Fula-Sereer, but which also appear in Wolof. Note that all of the Fula words given in Figure 356 appear in Pulaar (Senegambian Fula) as well as the Maasina (Mali) and Nigerian dialects, where recent borrowing from Wolof is not a possible explanation.

PFS ?	Sereer	Fula	Wolof	
*song	song	song-	song	‘attack’
*-ɣoor	o-koor	gorko/gorɗo	góor	‘man’
*-neew	o-neew	nebbam	niw	‘cream’
*ƴuug	ƴuug	ƴuug-ee-	joogare	‘hunch back’
*jang	jang	jang-	jàng	‘learn/read’
*xuuf	xuuf	huuf-t-	xuuf	‘shave off/skim off’
*xaac	xaacoox	haac-	xaacu	‘shout’
*hool-oox	hooloox	hool-aa-	(w)óolu < *hóolu	‘trust’
*bon	bon	bon-	bon	‘be wicked’
*so(o)cc	sooc	socc-	socc	‘scrub’
*fen	fen	fen-	fen	‘lie’
*gaañ	gaañ	gaañ-	gaañ	‘injure’
*feeñ	feeñ	feeñ-	feeñ	‘appear’
*-ɣawul	o-kawul	gawlo	géwël	‘griot’
*ño’	ño’	ño’(-t)-	ñaw	‘sew’
*tooñ	tooñ	tooñ-	tooñ	‘wrong (v)’
*looƴ-oox	looc̓-oox	looƴ-aa-	lóoj-u	‘retch/gag self’
*lim	lim	lim-	lim	‘count’
*xeƴ	xec̓	heƴ-	xéy	‘fit’
*jaɓ	jaβ	jaɓ(-n)-	jaf	‘burn/catch fire’
*ŋaax	ŋaax	ŋaak-	ŋaax	‘bray’
*wis	wis	wis-	wis	‘scatter/sprinkle’

Figure 356: Early borrowings between Wolof and Fula-Sereer

It is unlikely that these represent cognates between Wolof and Fula-Sereer, as they are in most cases conspicuously phonetically similar. Rather, these are borrowings from a time when Fula was spoken exclusively in and around northern Senegal, before its spread east- and southward, which had probably already begun in the 5th century AD, but certainly no later than 1000 years ago (Clark 2005: 532). Migrations into the Casamance region and northern Guinea (outside of the Wolof-speaking area) may have taken place even earlier (Clark 2005: 533). For these more ancient borrowings, it is difficult to identify the language of origin[189]. It is quite possible that some of these are borrowings between Wolof and Proto-Fula-Sereer. Regardless of the exact chronology, we can be sure that borrowings between Wolof and Fula-Sereer have a history stretching far into the past, and involving some rather basic vocabulary items.

3.5.2 Sereer and Cangin

As discussed in section 3.4, seemingly-related lexical roots can be found between any two language groups within Northern Atlantic. Between Cangin and Fula-Sereer, the number of related roots is especially high. These are given in Figure 357[190]. Most of these roots are found only in Cangin and Fula-Sereer, but a few have wider distribution and are included because they are phonologically extremely close in these two groups when compared with other languages (e.g. ‘griot, year’).

[189] Admittedly, some of these might be borrowings from Fula into Wolof at a later period. However those with [+ATR] mid vowels must have originated in Wolof.
[190] See footnote 156 in this chapter for the sources of Cangin data.

Sereer	Fula	Proto-Cangin	Noon	Lehar	Safen	Ndut	Palor	
βook	ɓowngu	*ɓuk	ɓok	ɓok	ɓok	(d)ɓuk f-	ɓuk f-	'mosquito'
rew (pl.)	rewɓe (pl.)	*ɓe-reɓ	ɓeti, ɓeda̟ɓ	ɓete	ɓitiɓ	ɓeleɓ	ɓeleɓ	'woman'
o-gooniit	gongol	*ma-(ɣ)(o)on	moon m-	moon			moon m-	'tear'
o-hiid	hitaande	*kV-(h)i̟(i)d	ki̟is k-	ki̟is	kiis k-	ki̟il	ki̟il	'year'
ɓog-oox	—	*ɓo(ɣ)-ox	ɓook	ɓook	(s)ɓok	(d)ɓooh	ɓooh	'bathe'
o-kulook 'bride'	—	*kVlook	ki̟lo̟ok	ci̟look	kilok		ku̟lok	'marry'
o-ñafaɗ	faɗo	*ñVfaɗ	ñafaɗ, ñooɗ			ñofaɗ	ñafad	'shoe'
ligit	liige 'c. field'	*li̟ki̟t	li̟ka̟t	li̟ka̟t			likit 'thread'	'cotton'
ɓaat	—	*ɓaat	ɓaat	ɓaat	ɓaat	ɓaat	ɓaat	'add'
piis 'draw line'	—	*fi̟is	fi̟is	fi̟is	fiis	(d)fi̟is	fi̟is	'write'
rim	rim-	*li̟m	li̟m	li̟m	(w)rim		li̟m	'give birth'
lam	—	*lam	lam	lam	lam		lam	'inherit'
soɗ	soɗ-	*soɗ	soɗ	soɗ		(d)sodd	soɗ	'fill (bag)'
fool	fol- 'skip'	*fool	fool 'run'	fool 'run'		fool	fol 'skip'	'jump'
yooɓ	—	*yooɓ	yooɓ	yooɓ		yooɓ	yop	'be easy'
mer	—	*meeɗ	meeɗ		meeɗ	(d)meed	meed	'be used to'
o-sis	—	*ma-(C)is	miis m-	miis	miis m-	miis m-	miis m-	'milk'
mbaal	mbaalu	*mbaal	baal		mbaal		mbal	'sheep'
faal	—	*waal	waal	waal	waar			'Wolof'
gawul (pl.)	gawlo	*ɣawu̟l	hool	ha̟wu̟l	hawur			'griot'
ɓasil	ɓes-n-	*ɓasi̟l			ɓasil	ɓa̟si̟il	ɓasi̟l	'have children'
ɗing	—	*ɗi̟ng	ɗi̟g~ɗi̟ŋ	ɗi̟ŋ			ɗig~ɗiŋ	'fence (v)'
giiñ	—	*ɣi̟iñ	hi̟iñ	hi̟iñ			i̟iñ	'roll couscous'
a-siik	—	*si̟ik		si̟ik			si̟ik	'male animal'
a-keβ	—	*keɓ		keɓ			keb	'fence (n)'
o-roon	—	*loon			roon		loon	'bowl'

Sereer	Fula	Proto-Cangin	Noon	Lehar	Safen	Ndut	Palor	
hul	huur-	*(h)u̟ul	u̟ul	u̟ul	’ul			‘cover’
’iin	—	*(h)i̟in	i̟in-uk	i̟in-uk	’iin			‘groan’
duxud[191]	tuut-	*tuɣud	toos	toos	tuhus		tuul	‘spit’
seek ‘dry season’	—	*seek	seek	seek			seek	‘stop raining’
siɗ	seɗ-	*si̟ɗ	si̟ɗ	si̟ɗ			si̟d	‘strain (liquid)’
waƴ	waaƴ-	*wVƴ	wuƴ	woƴ			waj	‘boil’
diid	—	*ti̟it	ti̟it		tiit			‘fear’
o-naq ‘sorcerer’	—	*na(a)H	nah	nah		(d)naah ‘spell’		‘fortune teller’
a-’eel	—	*eel			(s)eel		eel	‘cloud’
ɓak	—	*ɓak	ɓak				ɓa̟ki̟ɗ ‘move’	‘set aside’
ɓek	—	*ɓek			ɓek		ɓek	‘put into’
jir	—			ja̟ɗ	jir	(d)je̟r	je̟ɗ~je̟r	‘be sick’
xil	har/hir-		hi̟l	hi̟l			xi̟r	‘snore’
ɓuus	ɓuuc-aa-				ɓuus	(d)ɓaas		‘suck’
weƴ	weƴ-				(w)yec		wec	‘swim’
a-ɗeem	—				ɗeem		deem	‘bat (animal)’
laβ	laɓi ‘knife’		kalaɓ	koloɓ				‘sword’
xomb	—		hoom	hom				‘turtle’
a-koɗu	—	hoɗ	hoɗ					‘pigeon’
ɗap	—					(d)ɗap	ɗap	‘hide (under)’
ɗiis ‘mend net’	—					ɗi̟s ‘sew’	ɗi̟s	‘sew calabash’
jof ‘be straight/fair’	—	jof						‘be good’
o-xuluɓ	—			huluɓ		hu̟lu̟ɓ ‘ravine’	xulub	‘river’
o-taan ‘ancestor’	taaniraaɗo ‘grandparent’		taan(um)	taantaan	tanum		taan	‘maternal uncle’

Figure 357: Lexical similarities between Cangin and Fula-Sereer

[191] The wordlist in D’Avezac (1845) has <touhoude>, and despite the innacuracy of many of its transcriptions, initial /d/ and /t/ are not confused. Based on the Fula form we can assume that the Sereer word was originally t-initial, with /d/ introduced analogically.

Some of these may be true cognates, but it is almost certain that most of them are borrowings from Sereer into either Proto-Cangin or later Cangin languages[192]. Especially telling is that most of these words are found in Sereer but not Fula, which would be unusual if these were true cognates between Proto-Fula-Sereer and Proto-Cangin, but is unremarkable if these are borrowings from Sereer[193]. Cangin speakers consider themselves ethnically Sereer[194], and have been in intense cultural contact with Sereer speakers throughout the history of the Cangin language family. Here we see that borrowing of vocabulary (some of it for rather basic terms) can be easily mistaken for cognacy without an understanding of the patterns of social interactions between the relevant groups. We must suspect that patterns of interaction similar to that between Sereer and Proto-Cangin speakers might have existed between other groups even farther in the past, which could certainly account for much of the shared lexical content between various language groups.

3.5.3 Bainunk-Kobiana-Kasanga and Bak languages

Some of the most extensive cases of language contact among Northern Atlantic languages are found in the Casamance region of southern Senegal and the north of neighboring Guinea Bissau. Here the linguistic diversity is higher than anywhere else in the Northern Atlantic area, with numerous Bainunk and Joola languages, Manjak, Mankanya, Balanta, Fula, Mandinka, and in recent years Wolof being spoken in close proximity. There are at least two examples of potential mixed languages, being Bayot (Joola with some isolate: Diagne 2009, Segerer 2016) and Joola Kujireray (Joola Banjal with Bainunk: Watson 2015). Even in less drastic contact scenarios, basic linguistic material including grammatical affixes and common lexical roots can be borrowed between languages. This phenomenon can be seen between Joola languages and Bainunk-Kobiana-Kasanga throughout the history of these families. Some examples are given in Figure 358.

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[192] The following aspects of Cangin historical phonology are useful in understanding some of these borrowing patterns. PC had no [g], only [ng], [ɣ], and [k]. PC had a phoneme *d, once probably [d] but later realized as a continuant, perhaps [ð] (becoming /l/ in Ndut-Palor and /s/ in Safen-Lehar-Noon— Pozdniakov and Segerer 2017 suggest [ɬ]). PC had *r only intervocalically, eventually merging with *l in Ndut-Palor and *t in Safen-Lehar-Noon. Foreign non-initial /r/ is generally borrowed as /ɗ/ in modern Lehar-Noon, where it has an intervocalic allophone [r]. PC *ɣ becomes /h/ in Safen-Lehar-Noon and is lost in Ndut-Palor.

[193] Fula and Sereer must have already been quite distinct before the breakup of Cangin, as the diversity among the Cangin languages is much less than between Fula and Sereer, suggesting a much later date for Proto-Cangin than for Proto-Fula-Sereer.

[194] Tellingly, this misled European linguists into assuming that the Cangin languages were dialects of Sereer, which delayed their investigation into the mid-20th century. Even today Cangin speakers generally report their native language as “Sereer,” at least in European languages.

Joola Eeg.	Joola Fonyi	Gubëeher	Guñaamolo	Kobiana	
Basic verbs:					
-lob	-lob	-lo̟b	-lo̟b		‘speak’
-ssaw		-saw	-saw		‘hunt’
ba-ccam	ba-caam	ba-caam	ba-caam	ba-ccáa(m)	‘pay/money’
-pu̟r	-pu̟r	-fu̟r	-fu̟rap	-f~ppul	‘leave’
-boñ	-boñ	-bu̟ñ		-b~mbuñ	‘send’
Body parts:					
	e-si̟gir	e-sigir			‘heart’
fu-boŋ	fu-boŋ	bu-bong	bu-boŋ		‘thigh’
	bu-bil	gu-bi̟il	gu-bil		‘lip’
ga-moy	ka-moy	gu-moy	gu-moy		‘eyelash’
-may	-may	-may		(Ka. -may)	‘left (hand)’
Common animals:					
e-jjamen	e-jaameen		fa-jaamen		‘goat’
a-sum	e-fala	a-sum	ko-fali		‘donkey’[195]
e-tuxun		tukund	tuhun	á-ttuu(n)	‘turtle’
fu-ñal	ju-ñaal, e-ñal	a-ñaal, a-ñal	ku-ñaala	ú-ñal	‘worm’
e-mu̟nduŋo	e-mu̟nguno	mu̟ndum	mu̟dum	muddú(m)	‘hyena’[196]
Other common words and non-lexical morphemes:					
ma-rem ‘drink’				má-le(m)	‘water’[197]
a-rafuxow		u-raagof			‘person’[198]
bu-nunux		si-nunuxen			‘tree’
-um	-um	-um	-um	-ə(m)	instrumental suffix
pe	pe	pe		pɛ	‘all’

Figure 358: Borrowing of basic vocabulary between Joola and Bainunk-Kobiana-Kasanga

See also section 4.3 for the borrowing of noun classes between BKK and Bak languages. Some of these items must have been borrowed after the breakup of each proto-language, but others (e.g. ‘pay, leave, send’) are likely borrowings between Proto-Joola and Proto-BKK. Consider also the following Manjak borrowings in Kobiana:

195 Mandinka *fali* ‘donkey’

196 This root seems to have even wider distribution in West Africa. It might even be connected with Bantu **m-bùngú* ‘hyena.’

197 ‘Water’ is a nominalization of ‘drink’ in Kasanga (*a-yaab* ‘water,’ *-yaab* ‘drink’) and Bainunk (Gubëeher *baa-ruux* ‘water,’ *-ruux* ‘drink’). Joola Eegimaa [r] is from common Joola *d, Kobiana /l/ is from PBKK *d.

198 Semi-calqued: Joola Eegimaa *fu-xow* ‘head,’ Gubëeher *bu-gof* ‘head.’

Kobiana	Manjak		Kobiana	Manjak	
ká-ccakk	ka-cak	'shoulder'	gu-lung	ka-lung	'feather'
gu-mál	u-mal	'lip'	ú-ñal	u-ñal	'earthworm'
ká-mbakkah	ka-mbakat͡r̥	'cheek'	jɛɛ(n)	u-jaan	'rooster'
ú-nkonk	u-kʊnk	'eyebrow'	kubɔ́mpali	u-bɔpal	'frog'
sí-ŋaw	ka-ŋau	'tendon/vein'	-fil	fəl	'throw'
ká-ttɔkk-ttɔkke	ka-tɔktɔkan	'armpit'	-h~kkus	kus	'raise child'
a-ccàng	bə-cang	'nest'	-lɛs	lɛs	'remember'
bu-fɛ́hɛr	bə-fɛt͡r̥ar	'friend'	-b~mbo	bɔ	'suck'
pú-fər	pə-fər	'room'	-z~njupp	jɪpan	'talk'
ú-ntab	u-ntab	'village'	-wézah	wɛjət͡r̥	'think'

Figure 359: Manjak borrowings in Kobiana

The contact situation between these languages has been commented on in section 1 above as well as section 3.1.3 in chapter 3. An important point to reiterate is that this sort of contact can result in the borrowing of extremely basic vocabulary items even while the overall percentage of borrowed vocabulary remains relatively low. The close relationship that holds between various BKK and Bak languages today must have existed well into the past, and we have no reason to preclude the possibility of similar relationships between other Northern Atlantic languages and proto-languages at various times in the past.

3.5.4 Geographically-biased shared retentions

Even when dealing with inherited material among related languages, contact can account for similarities between more distantly-related members of the family. We often find that linguistic features are shared between two languages A and C that we know are less closely related than A and B. These features can be lexical items, phonological features, morphology, grammatical patterns, etc. One explanation is that these features were present in proto-ABC, and while they were lost in B, the continued contact between A and C afforded by their geographical proximity caused these features to be preserved. Of course, these shared retentions between A and C are not evidence of a closer genetic relationship, but it is often impossible in practice to distinguish between a shared innovation and this sort of shared retention in scenarios where the subgrouping is in question. A good example of this phenomenon can be seen within the Bainunk-Kobiana-Kasanga group, where Bainunk Gujaher shares many vocabulary items and other linguistic features with Kobiana-Kasanga, to the exclusion of the other Bainunk languages. Geographically, Gujaher is spoken in an area adjacent to the Kasanga area, and close to Kobiana (see Figure 2 in the introduction).

Gubëeher	Gujaher	Kobiana	
u- -Vŋ	kaN-	kaa-III	2nd pl. subj.
i-	maN-	ma-III	1st sg. subj.
u-d̟aaka	u-jinaal	ú-gunaal	‘guest/stranger’
gucum (Joola E. ka-jom)	jukum	bókku(m)	‘tomorrow’
-n̟aar	-nan	-nan	‘give’
gu-babar (Joola E. ga-babar)	$^{(w)}$gu-tageba	gú-haaguba	‘plank’[199]
gu-rij̟end	$^{(w)}$gu-yaxum	gi-yáhəm	‘thorn’
ba-melmec	ba-jil	bé-gər	‘pepper’
maregen (Joola Kasa ma-łegen)	gu-jan̟d	gu-zén	‘truth’
-xonet	-ñungul	-ñungəl	‘be dirty’
-ñaax	-jid-ah	-z~njidd-a	‘be enough’
-hup	$^{(w)}$-fub-ax	-f~ppubb	‘pour’
bu-d̟aan	$^{(w)}$ci-wac	si-wácc	‘spring/pond’
-yool	$^{(w)}$-sap	-s~ccapp	‘drip’
-jahin	-baabən	-b~mbaabə(n)	‘help’
-x~keec	-ñañ	-ñaañ	‘write’
-sikk	-sip	-s~cciip	‘comb’
bu-laax	ci-nuf	si-núf	‘ear’
nuun	e̟na	yen	‘mother’
gu-fonk (gu-moy ‘eyelash’)	gu-xaf	gú-haf ‘eyelash’	‘eyebrow’
post-verbal subj. marker in neg. perf.	pre-verbal markers in neg. perf.		
overt 3rd sg. marker in negative	no 3rd sg. marker in negative		
1st pl. incl/excl distinction	no incl/excl distinction		

Figure 360: Shared linguistic markers between Bainunk Gujaher and Kobiana

By the standard family tree model, Gujaher is no more closely related to Kobiana than Gubëeher is, since both Gubëeher and Gujaher are descended from the same Proto-Bainunk language, itself a sister language of Proto-Kobiana-Kasanga. Nonetheless, we can find many cognates and other linguistic markers that are shared between Gujaher and Kobiana-Kasanga, but not the other Bainunk languages. In some cases, this can be explained as an innovation that was adopted by both Gujaher and Kobiana-Kasanga (e.g. the word for ‘plank’ borrowed from Manjak). But in most cases, we must assume that the innovation was in fact the loss and replacement of a Proto-BKK form, with this innovation spreading over a geographic area containing most of the Bainunk languages, but not Gujaher and Kobiana-Kasanga.

On a broader scale, these patterns of geographically-influenced shared inheritance may be able to explain why some roots appear throughout Northern Atlantic, but not Benue-Congo[200]. If we assume for the sake of argument that the various Northern Atlantic language groups represent two or more separate primary branches of Niger-Congo (see (e) in Figure 336), we would still expect some roots to be found only among these branches due to their extreme geographic proximity. By the same pressures that resulted in the shared Gujaher-Kobiana cognates in Figure 360, some of the widespread Northern Atlantic roots could be

[199] Borr. Manjak *ka-takəba*

[200] Comparison with other Niger-Congo families is of course desirable, but I have little knowledge of these groups. Regardless, this argument is intended to account for roots that are found only among Northern Atlantic languages. Any root that is in fact found outside of Northern Atlantic is simply irrelevant to this particular phenomenon.

shared Niger-Congo cognates that were lost in other Niger-Congo branches, but retained under areal influence among the various subgroups in the Northern Atlantic area. It is perhaps relevant that (aside from Kordofanian) all of the non-Atlantic Niger-Congo branches are spoken in a contiguous area separate from the Atlantic languages. Indeed, existing attempted classifications of Niger-Congo such as that proposed in Williamson and Blench (2000) group most of the Niger-Congo branches together in a single node which is a sister to "Atlantic" (also excluding Mande and Kordofanian). If such a genetic grouping is indeed accurate, the loss of various Proto-Niger-Congo vocabulary items across all of the non-Atlantic Niger-Congo languages would only require changes in a single node of the tree.

3.6 Conclusions

It is quite difficult to know what to make of the lexical similarities between the various Northern Atlantic groups. The number of shared lexical roots found across all families is extremely low, and among basic vocabulary lists the cognate percentages are considerably lower than for Indo-European, which has a time depth of 5000 years at the very least. Nonetheless some very basic lexical roots do appear throughout Northern Atlantic, and it is certainly understandable why this lexical evidence has led numerous scholars to assert the genetic unity of the entire group. However, among these roots consistent sound correspondences generally cannot be found between the established families.

With regard to subgrouping, the lexical evidence does not convincingly argue for any higher-level groupings among Northern Atlantic families. Potentially cognate vocabulary can be found between almost any two groups that is not found in others, but never in any particularly high volume.

Assessing the lexical evidence is made much more difficult by the potential for borrowing and other contact-based effects. Borrowing of basic vocabulary is attested between numerous Northern Atlantic groups, and some good candidates for Northern Atlantic cognates seem to be *Wanderwörter* found in Mande languages of the area and even father afield. Elsewhere in the world, we can often distinguish between borrowing and inheritance of vocabulary based on a knowledge of when the language groups in question were in contact. However due to the small geographic area in which the Northern Atlantic languages are spoken, we must consider the effects of language contact at all times throughout these languages' histories. In this region we only have a good idea of population movements from at best the past 1000 years— before that we are almost entirely in the dark about which population groups might have been in contact, for how long, and to what degree.

Because the modern Niger-Congo languages outside of Northern Atlantic are spoken far away from, and in an area that is not contiguous with the Northern Atlantic area (assuming that Mande is excluded from the family), lexical evidence is somewhat more convincing in establishing a connection with Niger-Congo at large. Even though there are very few lexical similarities with other Niger-Congo groups, these similarities can be taken as good evidence of a genetic relationship. Thus we must consider that some of the few lexical roots specific to Northern Atlantic were likely inherited from Niger-Congo, and lost in the (perhaps genetically unified) remaining Niger-Congo languages. Such roots would not be evidence of the genetic unity of Northern Atlantic.

Finally it must be stressed that meaningful comparisons both within and outside of Northern Atlantic are only possible once we have a thorough understanding of the phonological history of each language group. Sound correspondences can be established which allow for the reconstruction of proto-forms for each group, often revealing phonemic distinctions no longer found in the modern languages (e.g. Cangin *ɣ), and clarifying the status of sounds that cannot be easily compared across Northern Atlantic when taking the modern forms as a starting point (notably coronal consonants, see e.g. Figure 162 for BKK). When dealing with initial consonants, it is especially important to understand the effect of mutation. Doing so allows us to determine the historically original root-initial consonants, and rules out certain connections between words that might have seemed reasonably relatable based only on the modern forms.

4 Evidence from noun class

Noun class has long been taken as the single most distinctive feature of Niger-Congo languages, and has featured prominently in arguments justifying the genetic unity of the family[201]. Güldemann (2011) writes that "[noun class] was and is the best non-lexical diagnostic for genealogical classification in the Niger-Congo domain since Westermann (1935)." Certainly it is true more broadly that morphological evidence is given much more weight than lexical evidence in establishing genetic relationships between languages, since morphology is much less likely to be borrowed. For this reason the noun class systems of the various Northern Atlantic languages are of paramount importance in determining their genetic relationships both to each other and other African languages. We will begin this section with an examination of Doneux (1975), being the only notable attempt to connect the noun classes of all of the Northern Atlantic languages historically[202]. We will see that Doneux's proposals are far too permissive both phonologically and semantically in associating classes between languages, and cannot be upheld. We will then compare the class systems of the Northern Atlantic languages to each other and Benue-Congo. While convincing etymological links between certain classes found in Northern Atlantic groups and Benue-Congo can be identified, there is much less evidence that links the Northern Atlantic languages together in a single genetic group. Evidence from noun class supports a link between Wolof and BKK, and perhaps between this larger group and Biafada-Pajade, but not Northern Atlantic as a whole. Finally we will examine the phenomenon of noun class borrowing, and discuss the extent to which it can account for similarities in noun class systems between languages.

4.1 Doneux (1975)

The only extensive treatment of Atlantic noun classes from a diachronic perspective is Doneux (1975). He assumes the genetic unity of Atlantic (excluding Mel), proposes that all Atlantic noun class systems are descended from a single Proto-Atlantic noun class system, and links almost every modern noun class to this original reconstructed system. He ends by equating these reconstructed Proto-Atlantic classes to classes in Benue-Congo (1975: 114). Some of the ideas in this paper are quite valid, and had not been clearly expressed in the literature up to this point. Most notably, he argues that initial consonant mutation and noun class prefixes are closely tied together, with mutation arising from class prefixes with different shapes[203]. He argues against Greenberg's view that Proto-Atlantic made use of initial

[201] Tellingly, the most controversial inclusion in Greenberg's Niger-Congo family has been the Mande languages, which is one of the only groups that does not employ a noun class system (along with Ijoid and Dogon).
[202] A more recent overview is Pozdniakov (2015), who also includes a reconstruction of the Proto-Atlantic class system. This reconstruction is quite different in a number of ways from that of Doneux, but they agree in the proposal of polymorphemic class markers and the connection of each Atlantic class with classes elsewhere in Niger-Congo— both points that I will argue against in this section.
[203] A rather preliminary form of this argument was put forward much earlier by Klingenheben (1924/5) with regards to Fula and Biafada.

consonant mutation, proposing instead that it had only class prefixes, the final segments of which gave rise to mutation in various languages. This insight is essentially correct, though he does not make it clear at what point or points in the family tree mutation would have arisen. However the actual reconstructive work in this paper is heavily flawed, and almost none of his specific conclusions can be supported.

4.1.1 Methodology

First it should be noted that Doneux's conclusions are often misled by inaccurate or insufficient data. He notes in the introduction that many of the languages that he discusses are rather poorly documented, both in terms of quantity and (he speculates) quality. These concerns are well-founded, and the effects of these deficiencies manifest themselves in various places throughout the paper. Some forms are given with the incorrect noun class, e.g. Sereer <*ngid n-*> for *a-ngid ale* 'eye' and <*xox ol-*> for *xoox le* 'head,' which form the basis for various proposed comparative associations. In other cases he notes classes which do not exist, such as an *aN-* class in Kobiana, for which he gives the single noun <*an-daaku*> for *a-ndaakkú* 'lizard.' This is the only noun in Kobiana with a grade III consonant after a prefix *a-*, and is in the *a-I* agreement class. The initial consonant is entirely exceptional, and there is really no evidence that an **aN-* class ever existed. This single form is part of his parade example (1975: 54) for the important claim that prefixes come in three varieties (*a-*, *a-a-*, and *a-N-* for this super-class). For Sereer he cites a class *l-* with grade II mutation (103) which simply does not exist in any form. Quite the opposite problem is also found in a number of cases, where an existing class is ignored or a likely connection missed, presumably due to the lack of available data. This issue is particularly common for the Cangin and Bainunk groups. For example, in discussing the personal plural class, he is unaware that *ɓ-* is the synchronically-active class in the Cangin languages Safen, Lehar, and Noon. He cites only Ndut <*bəəwə*> 'people' (which is in fact *ɓəə*, with a definite form *ɓəəwə*) as a clue to the tentative existence of his *bV- personal plural class in Cangin, when in fact the connection between Proto-Cangin **ɓ-* and other Atlantic *ɓV-* personal plural classes is quite clear. For Bainunk, he cites the tree class *si-* found in Guñaamolo and Gutobor (61), but is unable to connect it to any other language, while also making the erroneous (or at best misleading) claim that Bainunk languages use a multitude of classes indiscriminately to mark trees. In fact the Bainunk class **ki-* from which Guñaamolo *si-* is descended (and which contains almost all trees) is one of the few Bainunk classes with a compelling connection outside of Wolof-BKK (see chapter 3 section 6.8). In Fula the tree class is *ki*, and in Cangin the word **ki-rik* 'tree' is in the **k-* class.

However more damaging than these shortcomings in the available data are the highly speculative and generally unmotivated methodologies for associating classes from different languages. Four issues are most notable: erroneous segmentation, overly permissive phonological associations, over-reliance on shared semantic properties, and over-reliance on phonological similarity. The first of these issues, erroneous segmentation, results from looking for fossilized class prefixes. In some cases he includes too much in the prefix, e.g. in segmenting *ga-rab* 'tree' in Wolof. In truth the first /a/ is part of the stem, with only the /g/ being from the original prefix. Recall from section 2.2.2.3 in chapter 4 that the original plural is *yarab*, showing the /a/ as part of the root, and furthermore from earlier attestations we know that the singular was †*g*^{w}*arab,* with the original prefix being **gu-*, cognate with BKK **gu-*. In other cases he finds class prefixes where none were ever present. He segments Wolof *w-uy* 'baobab fruits' as evidence for a vegetable plural **w-* class, but this /w/ is in fact part of the stem, and there is no surviving plural prefix[204]. Compare the many other /w/-initial roots in Figure 220, most of which are not vegetable. These are simply unprefixed /w/- or *h-initial roots. In Bassari he finds a prefix ñV- in words like <*ɛ-ñɔ-yʌn*> 'fly' (Ferry has *ɛ-ñɔ̀ŋʌ̀n*, cf. Bedik *gí-ñɤ̀hòm*), where there is really no reason to suspect that the stem historically contained a prefix. While it is of course true that prefixes can become fossilized, he is far too permissive in identifying any stem-initial consonant or syllable as a historical prefix. Another issue with segmentation involves splitting the prefixes themselves. Doneux proposes that Proto-Atlantic made use of a pre-prefixal augment, as in Proto-Bantu. This allows him to treat a number of classes as related which are in fact totally distinct. For example, Sereer *le* and *ole* are supposedly the same class, but with *ole* showing the vocalic augment. In fact these two classes come from **re* and **ɣol* in PFS, and have no relation to each other. Doneux's idea of the augment is simply untenable, and there is no evidence in any Atlantic language for anything which resembles the behavior of the augment in Bantu.

The second issue is overly permissive phonological associations. That is, Doneux finds ways to ignore or explain away phonological differences between markers so that they can be proposed as cognates. First, he proposes that prefixes in the proto-language could take three forms: one being the plain prefix, one with a following *-a-*[205], and one with a following *-N-*. No explanation is given for why this unparalleled system would have existed, and generally there is no expectation that classes descended from these original prefix variants should have anything in common semantically. Thus prefixes of the form *CV-*, *Ca-*, and *CVN-* can be treated as the same class. In this way he treats the following Kobiana classes as variants of the same proto-class:

	semantics:
†ji-I	dog-sized animals
ji-I	'hand'
ja-I	collective for plants
ja-I	plural for humans
†ja-III	insects, 'snake, crocodile'

Those with *ji-* come from the basic prefix **jV-*, while those with *ja-* come from the **jV-a-* form. He seems unaware of the fact that *†ja-III* triggered grade III, so the original final nasal is ignored. The proposal of the segmentable element *-N-* allows him to indiscriminately ignore marker-final nasals when connecting classes. For example Kobiana *ku-I* used only for 'thing' and *ku-III* used only for 'fire' are supposed to be variants of a single original class (1975: 51), despite having no semantic connection. However even this "three prefix form" hypothesis is not consistently followed. In dealing with s-initial classes, he treats Kobiana *si-III* (used for string-like objects) and *sa-III* (used for flat, leaf-like objects) as variants of the same original class, despite the fact that his proposal does not allow for prefixes of the form *sV-a-N-*. Beyond the /a/ vs. all other vowels distinction, he makes no distinctions between vowels, for example equating the Joola *e-* and Manjak *u-* classes (1975: 78-79). In effect the vowel of

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[204] More accurately, the original prefix **i-* is still present in the full plural form *i wuy*, see ch. 4, section 2.2.2.2.
[205] Oddly, he invokes this **-a-* as the original trigger of grade II mutation, proposing that the "tense" quality of the vowel strengthened following consonants. For him the difference in the Kobiana *a-I* and *a-II* classes is that the first is from **a-*, while the second is from **a-a-*. Of course this is not true— grade II nominal mutation arose in all cases due to final consonants of certain class markers, never a vowel. There is no general connection between grade II classes and prefixes containing /a/ in any language.

prefixes is ignored for the purpose of establishing cognacy, along with the final nasal and/or mutating effect of the class, leaving the burden almost entirely on the initial consonant of class markers. But even here there are no strict criteria for associations between classes. Consonants can differ without explanation, for example he connects Kobiana *gu-I* and Bainunk *gu-* with an original class **kV-*, equivalent to Manjak *ka-* among other classes (1975: 71-72). But Kobiana and Bainunk both retain /k/-initial markers as well as /g/-initial markers, and there is no proposal for how original *k became /g/, or how modern /k/-initial markers would have arisen. He also allows for the unprincipled loss of initial consonants, even in languages that show no general tendency to erode marker-initial consonants. For example he proposes that the Kobiana tree class *u-III* should be connected with classes of the shape *bu-* and *ba-* in Bak and Biafada-Pajade (1975: 62), despite the fact that Kobiana does not delete initial consonants, and in fact has a class *bu-I* as well as *ba-I*, *ba-II*, and *ba-III*. Put rather bluntly, there seems to be nothing to stop a class marker of any form from being associated with any other class. Reconstructing intermediate forms might have alleviated this problem somewhat, but this is not undertaken. As it is, Sereer *ne* (for which the modern determiner prefix is simply *n-*) can be connected with any class, but if the PFS forms **rin* and **ɣun* are first reconstructed, the possible cognates are much more limited.

The final two broad issues are over-reliance on shared semantic properties, and over-reliance on phonological similarity. The first of these involves asserting the cognacy of semantically similar classes while essentially ignoring their phonological form. This is most clearly seen for the human classes (discussed below), but also for example in equating Kobiana *u-III* with Joola *bu-* used for trees. The more common problem is over-reliance on phonological similarity, by which classes with a similar initial consonant are assumed to be cognate despite there being no overlap at all in the meaning of the classes. This is seen within a single language for the Kobiana /j/-initial classes mentioned above. Another particularly egregious example is the equation of the Bedik diminutive singular class *ña-III* with Kobiana *ñi-III* and *ña-III*, plural classes for string-like things and flat leaf-like things respectively. He goes on to make the rather peculiar suggestion that all /ñ/-initial classes are derived from the ancestor of a Benue-Congo noun root **ña-* meaning ‘mother,’ just as all /s/-initial classes are derived from **sa-* ‘father.’

In some cases it is not at all clear why two classes are proposed as cognates. For example Fula *ndu* and Sereer *ole* are claimed to be cognate (67), with the only reason given that they both trigger grade I. In fact Sereer *ole* is cognate with Fula *ngol* (from **ɣol* see chapter 2 section 6.2.1.6), and the original **ru* class was lost in Sereer, with the nouns reassigned to the *ne* class. There are numerous cognates between Fula *ngol* and Sereer *ole*, and furthermore these classes are much more similar phonologically, such that even a cursory comparison would favor this connection over the one proposed by Doneux. Overall there is simply no consistency in the criteria used for associating classes, and Doneux’s proposals for reconstructed classes must be rejected in almost all cases.

4.1.2 Case study: Doneux’s human class

We end this section with an examination of Doneux’s proposed Proto-Atlantic personal class, in which most of the above-mentioned problems are manifested. Doneux reconstructs **kV-* or **gV-* as the personal singular class. Based on the evidence he gives, it is not clear why the alternate form **gV-* must be proposed, but it is probably in order to suggest a connection with the Benue-Congo personal class. He begins by discussing the Sereer and Fula forms. He seems to think that the Sereer marker is synchronically a suffix, citing the agreement as a suffix *-ox*, and a form <*tew ox-*> 'woman' for *o-tew* in the *oxe* class (no doubt due to the confusing citation conventions used in Crétois 1972). Nonetheless the form of the agreement prefix (on the determiner) is segmentally accurate, and he attributes it to the spirantization of original *k in this marker. However there is no evidence in the history of Sereer for the spirantization of *k or any other stop, and besides, the phonologically velar fricative counterpart to /k/ is /h/, and not uvular /x/. For Fula he seizes upon the form *-ko*, ignoring that this is an irregular form of the suffix (with *-o~jo~ɗo* being the regular forms). The forms given for the Fula-Sereer markers demonstrate a larger pattern of assuming that the Sereer markers are "inverted" from the corresponding Fula ones, such that CV markers in Fula are VC in Sereer. This idea is simply incorrect— original markers never change their order of segments in Sereer (cf. **ɣol* becoming a prefix *(g)o-* on nouns, and *ol-* on the determiner). The original form of the PFS class marker can in fact be reconstructed as **ox* with a final uvular consonant (see chapter 2 section 6.2.1.4). The /k/ in the exceptional form *-ko* of the Fula *'o* class is probably from a resegmentation of *gay-naak-o* 'cowherd.' This PFS marker is possibly grammaticalized from the root **xoox* 'head' which has no cognates outside of FS.

He then mentions the Wolof personal class *k-*, containing only *nit* 'person' and *këf* 'thing' (he mentions only *nit*). He makes the entirely unexplained claim that *k cannot surface in Wolof unless it was prenasalized (a claim also made for Fula, again with no evidence), and thus the prefix is reconstructed with the form *n-k-. This initial nasal is connected with the word 'person,' which he falsely segments as <*n-it*>. The form *góor g-* 'man' is also cited as possibly having the alternate prefix form **gV-*, but we know from comparison with PFS **ox-ɣoor* 'man' that this /g/ is almost certainly part of the root historically.

He skips over Cangin due to a lack of evidence, but mentions that the Ndut personal class marker appears to be *-a*. This is in fact a definite marker. The personal class in Cangin is *y-*, including in Ndut, though the two nouns 'person' and 'woman' use **ɓ-* even in the singular.

He then turns to Tenda, noting that the personal singular class is *a-I* in all of these languages. However based on the single form *hál* 'person' in Bedik (cited as <*x-al*>), he proposes that the original marker was **kV-* or **gV-*. There is no reason to segment the initial /h/ from this root in Bedik, and in fact it remains part of the root when placed in other class, as *ña-kál* 'pupil.'

For Kobiana and Bainunk the prefix is *u-*, with no trace of a consonant in any position. Nonetheless Doneux equates this class with the Proto-Atlantic class. Proto-BKK has multiple *k- and *g-initial classes, all of which retain their consonants in all modern languages. The personal class in Biafada is also *u-I*, and *u-* in Pajade. He gives no explanation for these forms, but also includes them as descendants of this proto-class.

Finally in the Bak languages, Joola has *a-* and Manjak *na-*. He links these to the verbal agreement marker for this class **a-*, but finds possible support for an original velar in Balanta **ha-*. The nasal in the Manjak-cluster languages is not explained.

For the plural of this personal class, Doneux reconstructs **ba-*. This is one of the few classes for which a pan-Atlantic connection with Benue-Congo must be seriously considered. Nonetheless there are some untenable claims made in Doneux's analysis of the Atlantic classes. First is the reconstruction of egressive *b rather than implosive *ɓ. Doneux makes it clear that he considers the implosive an innovation of Fula and Tenda "within certain contextual conditions." He is unaware of the class **ɓ-* in Cangin, but furthermore seems to misunderstand the history of implosives in these languages. Egressives never become implosives in the history of Fula-Sereer, Tenda, or Cangin, though the opposite direction of change certainly took place in Biafada-Pajade and perhaps also in the distant history of Wolof-BKK and/or Bak, which do not have this contrast. For Wolof *ñ-* he proposes decomposing the marker into *n-y-* without justification, and sees a connection with **ba-* as unlikely. He does not mention the rather conspicuous similarity between Wolof *ñ-* and Bainunk *ñaN-* used on most personal plural nouns. More important is the attempt to associate Kobiana *i-I* and Bainunk *iN-* with this original **ba-* class. Doneux proposes that the original consonant was lost in this subgroup. However as mentioned above, BKK retains prefix consonants, including *b in a number of classes. No attempt is made to explain the discrepancy in the vowel between BKK and other subgroups. The final nasal in Bainunk *iN-* is not explained, except by Doneux's general idea that final-nasal forms are variants of basic prefixes without the nasal. He cites Gutobor *i-raagof* 'people' as an "exceptional" form with *i-*, based on a misunderstanding of Bainunk phonology. Deletion of prefix-final nasals is completely regular before continuants. Given the fact that class prefixes in all Atlantic languages are monosyllabic, it is hard to imagine two prefixes of a more different shape than *ba-* and *iN-*.

Doneux's proposal regarding the Proto-Atlantic personal class does not hold up at all under scrutiny, and his methodologies are such that it would seem impossible to have a personal class of any shape that could not be connected to this putative proto-class. Similar issues can be found for all of his proposed classes. Later work by Pozdniakov (1988) on the Fula-Sereer class system cites Doneux as a starting point, building off of his basic ideas and methodologies. Pozdniakov and Segerer (2017) cite Doneux's (1975) reconstruction of Proto-Atlantic noun classes approvingly.

4.2 Potential noun class cognates

4.2.1 Across Northern Atlantic and with Niger-Congo

While efforts such as Doneux (1975) to identify cognates for nearly every noun class in each Atlantic language cannot be supported, there are certainly connections to be made both within and outside of Northern Atlantic for a number of classes. For comparison, the Proto-Bantu class system is given in Figure 361 (Meeussen 1967, locative classes 16-18 omitted, only common sg./pl. pairings presented).

	sg. classes:			pl. classes:		
	NP	agr.[206]		NP	agr.	semantics[207]
1	mu-	(j)u-	2	ba-	ba-	personal
3	mu-	gu-	4	mi-	gi-	plants
5	i̧-	di-	6	ma-	ga-	round, misc. (*ma- liquid)
7	ki-	ki-	8	bi̧-	bi̧-	misc., languages
9	N-	ji-	10	N-	ji̧-	animals
11	du-	du-	13	tu-	tu-	long & thin
12	ka-	ka-				diminutive or augmen.
14	bu-	bu-				abstract, mass, dimin pl.
15	ku-	ku-				'arm, leg, ear, armpit'
19	pi̧-	pi̧-				diminutive

Figure 361: Proto-Bantu noun class system

[206] NP forms used on nouns and adjectives, agreement forms used as subject agreement, on numerals and quantifiers, and certain other situations. Agreement patterns for classes 1 and 2 are somewhat more complicated.
[207] For a more comprehensive list of semantic subfields for each class, see Katamba (2003: 115).

The classes which can be reasonably hypothesized as cognates between various Northern Atlantic groups and with Bantu are given in Figure 362. Less convincing connections are given in parentheses.

FS	Cangin[208]	BKK	Wolof	Biaf.-Paj.	Tenda	Bantu	note
F. **III-ɗam**	***m-**	***ma-**	m-	***maŋ-**	***maŋ-**	***ma-**	liquid
***ɓe**	***ɓ-**	Ko. **bi-**[209]		***ɓə-**	***ɓə-**	***ba-**	personal pl.
F. **II-ki**	(*k-)	***ki-**[210]	(g-)[211]			*ki-	trees
*fan	*f-	***fa-**	(w-)	(*wan-)	***fa-**	(Amo **fə̂-**)[212]	animals
*re					*er-	*i̯-/di-	fruits, etc.
		***ji-**	j-	***ji-**	***ji-**	***N-/ji-**	animals
				***maa-**	***ma-**	***ma-**[213]	pl.
				***maC-**	***max-**	***ma-**	pl.
		***u-**		***u-**		(***mu-/ju-**)	personal sg.
		*bu-	b-	*bu-	(*o-)	(*bu-)[214]	'head,' etc.
		*gu-	g-	(*go-)		(*mu-/gu-)	very tentative
		***ki-**				***ku-**	'ear, arm, leg'
		***ñaN-**	**ñ-**	***ña-**			pl.
(*ɣun)				(gu-III)	(*goŋ-)		some animals

Figure 362: Potential etymological connections for Northern Atlantic noun classes

[208] The Proto-Cangin noun class system is given in Appendix C. A connection between the reconstructed class **n*- and Bantu class 9 **N*- also used for animals seems far too speculative. 'Tree' is **ki-rik* in the **k*- class, but otherwise **k*- is not used for trees in any Cangin language, with **k*- mostly containing other miscellaneous nouns.
[209] Used with only a single noun, 'child,' and not found in Kasanga or Bainunk.
[210] Recall from chapter 3 section 6.1.8 that this reconstruction is uncertain— this class may have been **si*-.
[211] This connection is rather unlikely. Wolof *g*- (earlier g^w- as in Dard 1825) is related to BKK **gu*-, and in fact the word g^w*-arab* 'tree' clearly contains this prefix. However, it is true that at least one *k*-initial class must have fallen together with original **gu*-, and the possibility that one of these was **ki*- cannot be excluded (see chapter 4 section 3.7.1.3).
[212] In the Kainji (Benue-Congo) language Amo (Anderson 1980), a large class *fə*- contains mainly animals: *fə̂-náwà* 'animal,' *fə̂-ná* 'cow,' *fə̂-bɔ́* 'fish,' *fə̂-rɔ̂ɔ* 'elephant, *fə̂-yɨ́í* 'snake,' etc. De Wolf (1971: 170) notes a few f-initial noun classes in other BC languages, which he takes as descended from Proto-BC **pi*-.
[213] De Wolf (1971: 52) reconstructs **à*- for this plural prefix, and assumes that the Bantu form is an innovation. However unlike with class 1 and 3 *mu*-, there is in fact good evidence that the nasal in plural *ma*- is not specific to Bantu. A number of the non-Bantu Benue-Congo languages that De Wolf examines use *ma*- or *mə*- as a plural class. Still others have *na*- (and in these languages *na*- is also the liquid class, from **ma*-). Throughout all of De Wolf's (1971: 165-168) discussion of the innovative Bantu nasal class markers, he mentions only classes 1, 3, 9, and 10— the plural class *(m)a*- is conspicuously absent. Note also that Greenberg (1963: 35), who takes the /m/ in Bantu classes 1 and 3 as innovative, does not say the same for plural **ma*-. In Gur, Miehe et el. (2012) reconstruct class 6 **ŋa* as the plural of class 5 **d̨i*, though most Gur languages have *-a* for this class. Miehe (1991: esp. 366-370) argues that the nasal in this class (and others) is not a specifically Bantu innovation, and was present in Proto-Niger-Congo.
[214] Bantu class 14 **bu*- has no semantic overlap with these Atlantic classes. It is used for abstract notions, some mass nouns, and as the diminutive plural. However, elsewhere in Benue-Congo the class has a somewhat wider usage. De Wolf (1971: 57) reconstructs the following nouns in Proto-BC **bu*-: 'bow, face, forehead, medicine, mushroom, palm tree, rock/stone, stick/whip, canoe/boat, firewood, night/day, salt, sheep, wind.' When these are considered, a connection with the Northern Atlantic classes seems plausible, but still rather unlikely, as the Northern Atlantic classes are much larger, and semantically centered on round objects, of which there are only a few in De Wolf's BC **bu*-.

The semantic domains given in the "note" column are in many cases only salient subdomains of the given class for each language. Classes for which this semantic domain applies to all or almost all of the class are given in bold.

Associations beyond those given in Figure 362 are either semantically incoherent, or involve drastic phonetic discrepancies. The only two further connections which seem reasonable are Tenda **xaC-* with Biafada *ha-II*, and Tenda **xoC-* with BKK **kuN-*. The first of these is based entirely on phonetic resemblance (grade II classes are rare in both families), having no semantic overlap at all (Wilson gives only *ha-bbə* 'sea' for Biafada, and the class is not found in Pajade). The second is based on the existence of 'fire' in each class, but is probably phonologically untenable (the final consonant in Tenda **xoC-* cannot be a nasal). Konyagi *xu-III* is a phonological match for BKK **kuN-*, but has no semantic overlap.

I have not undertaken a reconstruction of the Bak class system, so comparisons with this family are rather tentative. Nonetheless, there seem to be few plausible connections. We find liquid *mu-* in Joola (Manjak *m-*, Pepel *mun-*) and in Manjak the personal plural *ba-*. Manjak plural *mə-* can be compared with Bantu class 6 **ma-* and the seemingly cognate markers in Tenda and Biafada-Pajade. Joola *bu-* (Manjak *bə-*) contains mainly trees and plants, and is unlikely to be connected with Wolof-BKK **bu-* which does not contain plants in any language. Biafada *bu-I* is used for plants and trees, but is also seemingly the largest class in the language, used for a wide range of nouns. Its use as the tree class is quite possibly due to influence from Manjak/Mankanya (tree class *bə-*), from which it has borrowed extensively. In Pajade, the cognate class *pə-* has e.g. 'head' (*poofɛ*) but not 'tree' (*matə*)[215]. A connection between Joola *fu-* (Manjak *pə-*) with *bu-* in these other groups seems much more plausible, as both are used for round objects. Manjak has a plural class *i-* which can perhaps be compared with Wolof-BKK **i-*, but here we are dealing with only a single segment and a class with very broad semantics.

The majority of classes in each established family have no apparent connection to a class in another Northern Atlantic language. Figure 363 gives the number of classes in each established group for which no convincing hypothesis can be made for cognacy with a class in another Northern Atlantic group[216].

Proto-FS	Proto-Cangin	Proto-BKK	Wolof	Proto-Tenda	Biafada
12/18	6/10	44/54	5/10	14/22	13/22

Figure 363: # of classes in each subgroup w/ no reasonable cognate in N. Atlantic

These counts are in fact rather generously low, in that they ignore the effect of historical classes which fell together. For example, the large majority of Wolof nouns in the *m-* class are not liquids ('panther, year, grass, granary,' etc.), and probably represent another original class with no cognate in other groups. Wolof *w-* contains few animals, and is at least in part descended from an earlier *u-* class (cf. †*u-yoon* attested in de Villeneuve 1785 for modern *yoon w-* 'way'), which cannot be connected with *fa-* in other groups. The same can be said of

[215] There is however a small Pajade singular class *bə-* which contains some trees. In Pajade /b/ comes from *ɓ, and *b becomes /p/, so here we are dealing with two classes **ɓV-* and **bu-*. It may be that the first of these was a tree class in Proto-Biafada-Pajade, and this could conceivably be connected with the Bak class.

[216] These counts exclude diminutive and augmentative classes (which are highly divergent even among closely related languages), the innovative Tenda *ɓ-* plural classes, and unprefixed classes in Tenda and Biafada. Connections between BKK and Wolof are also ignored for the purposes of this chart, since Wolof-BKK can probably be accepted as a valid subgroup.

Cangin *f-*, in which most nouns are non-animals ('house, feather, bed, face, cold,' etc.), and *k-* in which only the noun 'tree' is evidence for cognacy with Fula and BKK *ki*— most other nouns are unrelated ('waist, bracelet, pot, mouth, nose,' etc.). Of course, just as it may be that some of the connections drawn in Figure 362 do not represent true cognates, it may be that some true cognate classes remain unidentified. For example it is entirely possible that Cangin *k-* is related to one or all of Fula-Sereer **ɣal*, **ɣol*, **ɣun*, **ɣo*, and **ɣe*. However these sorts of laxer hypotheses of relatedness must be met with a great deal of skepticism. Class markers are composed of few segments to begin with, and if we restrict ourselves to comparing only the initial segments of markers and allowing for any conceivable phonological transformation between these segments, we fall prey to the same methodological problems discussed for Doneux (1975) in the previous section. My point here is not that the markers of these various class systems could not be genetically related, but that for the large majority of individual classes, there is no convincing proof that they are related to a class in another family.

Of the classes presented in Figure 362, most suggest connections with Niger-Congo more broadly, with only a few found exclusively in Northern Atlantic. Of this first group, the most conspicuous are the liquid class and the personal plural class. Classes of the shape *ma-* and *ɓa-* with these meanings are found pervasively throughout Niger-Congo languages, and are by far the two clearest inclusions in a putative Proto-Niger-Congo class system. The class of the shape *re-* or *ri-* (Bantu class 5) is not far behind, with its semantic center being singular round objects including fruits. The plural of Bantu class 5 **di-* is class 6 **ma-*, seemingly equivalent to one or both of the Tenda and Biafada-Pajade plural classes of the same shape (though to my knowledge the existence of two plural classes **ma-* and **maC-* has no parallel outside of these two groups). The **ji-* classes used for (mostly dog-sized) animals have a likely cognate in Bantu class 9. While the Bantu nominal prefix is *N-*, this seems to be an innovation of Common Bantu. Bantu uses **ji-* in agreement, and other Benue-Congo languages have *i-* on the noun (De Wolf 1971 reconstructs **ì-* for Proto-BC). Note however that the Benue-Congo class is much larger than the Northern Atlantic ones, and the existence of the initial *j reconstructed for the Bantu marker is uncertain[217].

The *ki-* tree class and *fa-* animal class are less clear. Most Bantu languages use class 3 **mu-* for trees, but languages throughout Common Bantu can be found which use class 7 **ki-* (e.g. Kinyarwanda *igi-ti*, Gogo *ki-biti*, Sotho *se-fate*, Bwari *ki-ti*, Lala *ci-ti*, Lenje *ci-samo*, Yeyi *si-te*, Mbunda *ci-ti*, Zimba *ki-ti*, Barondo *k-e*, pl. *b-e*), as do a number of other Benue-Congo languages: Abo *ì-kὲέ*, pl. *bì-έέ*, Bokyi/Nki *kè-cí*, Bafut *ke-ti*, Uwet (closely related to Efik) *ke-de*[218]. A connection with the Northern Atlantic classes of the shape *ki* thus seems plausible. A class *fa-* is not found in common Bantu, though some Grassfields Bantu languages (part of Bantoid, but not Bantu proper) use Proto-Bantu diminutive class 19 **pį-* for animals, e.g. Kom *fɨ-* as in *fɨ-bu'* 'gorilla,' *fɨ-chue* 'antelope,' *fɨ-nyuny* 'bird,' etc. (Jones 2001). Elsewhere in Benue-Congo, the Kainji language Amo (Anderson 1980) uses a class *fə-* for many animals, including *fə̂-ná* 'cow' and similarly-sized animals characteristic of the Northern Atlantic *fa-* classes. A connection with the Northern Atlantic *fa-* classes certainly seems possible, though admittedly less likely than for the other classes mentioned above. It must also be kept in mind

[217] Within Bantu, an initial consonant is found in very few languages. De Wolf (1971: 51) does reconstruct **zi-* as the Proto-BC agreement marker for this class, though of all of the BC languages he examines, only two have a marker with a reflex of this proposed consonant: Humono (Cross-River) has *jé/jị́* as an agreement marker, and Kagoro (Plateau) has *dyì* (apparently as an agreement suffix of some sort, though no examples are given).

[218] These are some of the languages listed in Johnston (1919) which use class 7 for the word 'tree' (Proto-Bantu **-tí* for most). I have confirmed these with modern sources where possible, but most are not marked for tone, and may have other phonological inaccuracies. For our purposes, the clear presence of the prefix **ki-* with a plural **bi-* can be taken as sufficient evidence of the use of this class.

that the Fula-Sereer classes are phonologically distinct from those of Tenda and BKK, as they contain final consonants (**fan* and **hiX/kiX*, where X is an oral consonant).

Some other connections between Bantu and Northern Atlantic are more tenuous. In BKK there is a class **ki-* used only for 'arm, leg, ear' (distinguished from the tree class **ki-* by having a different plural). In Bantu, class 15 **ku-* is also a small class used for 'arm, leg, ear' (as well as 'armpit,' and rarely other isolated nouns in certain languages), and so an etymological connection seems quite plausible, though the vowel is of course a problem. As mentioned in footnote 214, the *bu-* classes do not line up well semantically, and thus should probably not be taken as related. A connection between Wolof *g-* (from **gu-*) and Bantu class 3 **mu~gu-* can be considered due to the fact that both are used for trees. However this is not the case for BKK **gu-* with which the Wolof class is cognate, and given the fact that Wolof has greatly reduced the number of classes present in Proto-Wolof-BKK, it seems much more likely that the use of *gu-* for trees is in innovation of Wolof based on its original function as a class for long rigid objects. When the trees are set aside, the semantics of Bantu class 3 (De Wolf reconstructs **ú-* for Proto-BC with **gu-* agreement) do not line up at all with the Wolof or BKK class. The personal singular class might be taken as related between various Northern Atlantic languages and Benue-Congo, but here there are a number of complications. There is evidence for markers of the shape /u/, /gu/, /mu/, and /a/ in BC. De Wolf (1971: 51) reconstructs **ù-* for the noun prefix, with **gwu* and **à-* in agreement— *mu-* is taken to be a Bantu innovation, though its source is unclear[219]. In Northern Atlantic, BKK and Biafada-Pajade have **u-*, Tenda has **a̧-* (earlier **aa-*), and Joola has *a-* (but note Manjak *na-*). Those of the shape *u-* could be connected with BC, but here we are dealing with a single segment in noun class systems that make use of for the most part only three vowels. Note that a number of Plateau languages within Benue-Congo use *a-* as the prefix on the noun, but De Wolf (1971: 87) takes this to be an innovation of this sub-branch of Plateau. In Gur, languages use either *-a* or *-ʊ* as the personal singular class marker. Thus a connection between Bak and perhaps Tenda with other Niger-Congo personal singular class markers is plausible. Finally we can note that one of the five plural classes that De Wolf (1971: 52) reconstructs for Proto-BC is **í-* (equivalent to Bantu classes 4 and 10), used for a number of singular classes. As mentioned above, Wolof-BKK has a plural class **i-*, as does Manjak (*i-*), but other than being plural there is no specific semantic connection to be drawn, and of course these might simply be chance resemblances.

Even in the best cases, we must allow for the possibility of chance resemblance between these Atlantic and Benue-Congo markers, as they are composed of very few segments (maximally CV- in BC, with only three possible vowels), and the semantic overlap is generally only partial. Nonetheless, taken together it is hard to argue that BC does not share at least some inherited class markers with the various Northern Atlantic groups. These connections between Northern Atlantic and Benue-Congo noun classes are important arguments for the inclusion of the Northern Atlantic languages in Niger-Congo, but crucially they cannot be used as evidence for the genetic unity of Northern Atlantic.

When these broader Niger-Congo classes are set aside, we are left with very few reasonably connected classes between Northern Atlantic groups (treating Wolof-BKK as a legitimate genetic group). Of these, three are found only between Biafada-Pajade and Wolof-BKK (plural **ña(N)-*, personal sg. **u-*, and **bu-*, assuming these last two are distinct from the

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[219] Within Northern Atlantic, Bainunk has *mu-* as an allomorph of the personal singular class, used for example in the relative marker, and in Wolof the 3rd singular subject pronoun is *mu*. Drawing a connection with Bantu is highly speculative as these are not used on nouns, but if they can be connected it might suggest the use of a pronoun **mu* that served as the source of the innovative Bantu marker.

BC classes mentioned above). These will be discussed in the following section, and may well indicate a genetic grouping between these two groups. If the animal classes of the shape *fa-* and *ji-* are taken to be separate from the BC classes, they could be proposed as Northern Atlantic innovations[220], but of course the possibility of cognacy with BC markers makes it hard to use these classes as evidence for the coherence of Northern Atlantic. Finally, there is Tenda **goŋ-*, and Biafada-Pajade **guN-*, which could conceivably be connected with Proto-Fula-Sereer **ɣun-*. Phonologically, the connection seems rather good. However the semantic connection is tenuous at best. In Tenda this is a rather small class with very broad semantics (see chapter 5 section 5.1.8), but there are two animals 'snake' and 'monkey' in Bassari. In Biafada-Pajade **guN-* is used mainly for insects and some birds (including the word 'bird'), and in Fula-Sereer **ɣun* has mostly larger animals (e.g. 'horse,' 'sheep,' but also 'mosquito'). An etymological connection between these three phonologically-similar markers seems quite a stretch, but is conceivable based on the occurrence of some animals in each class.

Thus there is very little evidence for common innovations within Northern Atlantic in the realm of noun class. Given the relative stability of Niger-Congo noun classes compared to other linguistic features of the family (verbal morphology, lexicon, etc.), the differences between the various Northern Atlantic groups are much more remarkable than the little that they share.

4.2.2 Evidence for subgrouping: Wolof, Bainunk-KK, and Biafada-Pajade

As discussed in chapters 3 and 4, evidence from noun class heavily suggests the grouping of Wolof with Bainunk-Kobiana-Kasanga. More detailed arguments are given throughout chapter 4, section 3.7, but a summary of the potential class cognates between Wolof and BKK is given in Figure 364.

Wolof	earlier Wo.	BKK	
b-	*bV-	*bu-	very large class with broad semantics— contains fruits, 'head'
b-	*bV^{X}-	*ba^{X}-	both classes trigger fortition, less common than *bu-
y-/i-	*i-	*i-	plural of BKK *bu-, Wolof b-
k-	*kV-	*ku-	used only for 'thing' and in Wolof also 'person'
ñ-	*ñV-	*ñaN-	personal plural
g- < †g^{w-}	*gu-	*gu-	long rigid objects, very common class
g-N	*gVN-	*guN-	'honey' and some deverbal nouns
g-N	*kVN-	*kaN-	(rather speculative)
m-N	*mV-	*ma-	liquids
j-	*jV-	*ji-	animals
j-	*jV-	*ja-	collective class for fruit (Wolof) and grass/leaves (BKK)
s-N	*sV^{X}-	*si^{X}-	Wolof diminutive, BKK 'eye'

Figure 364: Possible cognate noun classes between Wolof and Bainunk-Kobiana-Kasanga

Some of these are more likely cognates than others, but taken as a whole the two class systems are remarkably similar given the extremely low level of lexical overlap between Wolof and BKK. All but two modern Wolof classes (*w-*, *l-N*) have reasonable cognates in BKK. If we take seriously the idea that evidence from the noun class system is a much better indicator of

[220] Though note that this *ji-* class is not found in Fula-Sereer, Cangin, or to my knowledge Bak, and *fa-* cannot be securely connected with the w-initial classes in Wolof and Biafada-Pajade, not to mention the final nasal in Fula-Sereer and Biafada-Pajade.

genetic relation than lexical evidence (and I believe we should), Wolof-BKK is by far the best candidate for a higher-level grouping between two established Northern Atlantic language groups.

Noun class also provides some compelling but conflicting evidence for the genetic affiliation of Biafada-Pajade. On the one hand, this group shares two plural-marking strategies with Tenda that are unique within Northern Atlantic. First is the use of two distinct plural classes of the shape *ma-*, being **ma-* and **max-* in Tenda, and *maa-I* and *ma-II* in Biafada. Plural classes of the shape *ma-* are common throughout Niger-Congo (notably Proto-Bantu class 6 **ma-*), but the use of two *ma-* prefixes, one with grade I and one with grade II is certainly distinctive. Second is the use of a *ɓ-initial prefix stacked on the entire singular noun. In Biafada this is *ba-*, and in Tenda *ɓ replaces the initial *g of singular class markers (see chapter 5 section 5.4.1). In both cases, this strategy seems to employ the original personal plural prefix (**ɓə-* in Tenda and *bə-I* in Biafada), though the discrepancy in Biafada between *bə-* and *ba-* is unexplained. On the surface these strategies seem quite similar, but it must be noted that in Tenda it is used very specifically with only *g-initial singular classes (most of which are rather common), whereas in Biafada it is seemingly employed with rarer singular prefixes and unprefixed nouns (similar to the use of the plural suffix **-aŋ* in BKK). In Pajade the use of the prefix *ba-* (or *be-*) on the singular noun has become standard, with only personal nouns and a small number of other nouns employing prefix alternations. Thus the use of "ɓ-stacking" is in fact quite distinct between the two groups, and probably could not be reconstructed to a putative Proto-Tenda-BP. Rather, it is more likely that this phenomenon was spread areally between the two groups, probably originating in Tenda where it affects a much larger percentage of the lexicon. Note that personal plural **ɓa-* is found throughout Niger-Congo, and thus is not an innovation shared by these two groups. It is however perhaps noteworthy that they both use the vowel /ə/ for this personal plural prefix. Finally, it can be noted that the *ma-* liquid class marker is nasal-final in both Tenda and Biafada-Pajade, unlike in Wolof-BKK. However the seemingly-related Fula *ɗam* class (perhaps from **man*, see chapter 2 section 6.2.4.1) also induces nasalization. The parallels in plural marking between Tenda and Biafada-Pajade are certainly conspicuous, but do not constitute particularly strong evidence for a genetic relation, as both phenomena in question (the use of *ma-* as a common plural class and ɓ-stacking) employ markers that are inherited from Niger-Congo. Nonetheless two details of these plural-marking strategies (two *ma-* classes, one inducing fortition, and the vowel /ə/ in the personal plural prefix) are somewhat conspicuous.

Stronger, but still rather tentative evidence of genetic relation can be found between the noun class systems of Biafada-Pajade and Wolof-Bainunk-Kobiana-Kasanga. There are at least five classes which are potentially cognate between them, and found only in these two groups among the Northern Atlantic languages.

Biafada	Pajade	BKK	Wolof	
u-I	u-	*u-		personal sg.
bu-I	pə-/pi-	*bu-	b-	
ña-I	ña-	*ñaN-	ñ-	plural
gə-I	—	*ga-		plural
—	pa-	*ba^{X}-	b-	
gə-I	ko-	*gu-	g-	(highly speculative)

Figure 365: Possible cognate classes specific to Biafada-Pajade and Wolof-BKK

The resemblance in the personal singular class is significant when compared with Tenda *a̟- and Bak (Joola *a-*, Manjak *na-*). Since neither Biafada nor BKK erode initial consonants, this resemblance goes beyond the single vocalic segment. Thus, here we have an excellent match both phonologically and semantically. Of course, if this personal class is to be connected with the Benue-Congo personal class (as discussed in the previous section), the BKK and Biafade-Pajade markers would not be evidence for subgrouping. The second potential cognate class **bu-* is notable for containing a cognate 'head' in all branches, as well as the term 'sun.'

Biafada	BKK	Wolof	
boofʌ (pl. maa-gəfʌ)	*bu-gof	bopp b- (< *bV-gopp, pl. †gopp)	'head'
bu-nagʌ	*bu-ne̟gg	jant b-	'sun'

Otherwise the *bu-* classes are rather large and have very broad semantics, so a clear connection is difficult to establish. If **bu-* can be connected with Bak (Joola *fu-*, Manjak *pə-*), and/or Benue-Congo **bu-*, it is not good evidence for the relatedness of WBKK and BP[221]. The two plural classes are significant simply because no other Northern Atlantic language has a ñ-initial plural class, and only Bak has a g-initial plural class (Joola *gu-* / *ku-*). Semantically their only connection is that they are plural classes, and there is the further complication that BKK **ñaN-* is nasal-final while Biafada-Pajade *ña-* is not. However it is noteworthy that the possibly cognate root 'nose' appears in *ña(N)-* in both families, being the only such singular noun in BKK and one of only a few in BP.

Gubëeher	Guñaamolo	Gujaher	Kobiana	Kasanga	Biafada	Pajade	
gu-cind	ñan-kindeŋ	gu-ñan-kin	gu-ñí-kkə(n)	gu-ñi-kən	ña-sin	ña-siiñ	'nose'

In Pajade there is a very common class *pa-* (Proto-BP *b > p, so **ba-* or **pa-* are both possible) which we might connect with WBKK **ba*^{X}-. Semantically both classes are rather broad, so it is difficult to connect them on these grounds. However Pajade *pa-* is notable for triggering historical grade II in at least some roots— one of the only classes to do so in Pajade. Deverbal examples yield alternations:

pa- noun		verb	
pa-cukɛ	'stopper, fastener'	suk	'close'
pa-kubɛ	'cough'	wub	'cough'
pa-pədɛ	'packet, envelope'	fəd	'wrap up'
pa-taarɛ	'watching the fields'	raar	'guard, watch over'
pa-təfɛ	'spring'	səf	'well up'
pa-təmɛ	'fruit, child'	rəm	'bear child'
pa-təpɛ	'bundle of hay'	rəp	'cut with sickle'
pa-təsə	'tiredness'	rəs	'be tired'
pa-tuuɛ	'theft'	ruu	'steal'

Figure 366: Pajade deverbal pa- *nouns with mutation*

[221] There is also a possible connection to made with Tenda **o-*, which is used for fruits and 'sun' in Konyagi. However Bedik retains the marker-initial voiced stops /g, j/, and so the loss of /b/ would be unexpected in the Bedik class *o-I*. Overall, the semantics do not line up well, as Tenda **o-* is used mainly for long rigid objects and expanses of land. However Tenda **o-* is used for abstract nouns, just like Bantu **bu-*.

Thus phonologically the connection with WBKK *ba^X- is perfect, as both could be from an original class of the shape **baC-*. Furthermore the deverbal use of *pa-* is paralleled by BKK *ba^X- used as a common infinitive prefix. Finally there is a possible connection to be made between WBKK **gu-* and Biafada-Pajade **go-* (Biafada *gə-*, Pajade *ko-*), but the semantics do not line up particularly well. WBKK **gu-* is used principally for long rigid objects, whereas BP **go-* is more eclectic, especially in Pajade. However the BP class does contain 'arm, leg, claw,' Biafada 'rib, firewood, branch, sword,' Pajade 'finger, arrow.' There is probably not enough evidence to confidently propose a BP-WBKK grouping, but this hypothesis is I believe more convincing than a grouping of BP with Tenda based on noun class evidence. While there are some lexical roots shared between only BP and Tenda, there are seemingly just as many if not more between BP and WBKK, as well as some grammatical morphemes (see Appendix A).

4.3 Possibility of borrowing

In general, morphology is much more resistant to borrowing than lexical items, and so we would expect shared noun classes to be a more reliable indicator of genetic affiliation than shared lexical material. Nonetheless, borrowing of noun class markers is known to occur cross-linguistically. Aikhenvald (2000: 386) gives some examples of this phenomenon. Within Africa, the Nilotic language Luo has innovated a noun class system under areal influence from Bantu languages, and some of its class markers are borrowed directly from Bantu. The Ubangian language Ndunga has also borrowed some Bantu class prefixes. Borrowing of noun class affixes is apparently rather widespread in Australia. When dealing with non-affixal classifiers, more drastic cases of borrowing can be found, as in the Resígaro (Northern Arawak) language which has borrowed most of its 56 classifiers from the unrelated Bora language. We saw in chapter 3 (section 6.9) that within Northern Atlantic, numerous noun classes have been borrowed between Bak languages and Bainunk-Kobiana-Kasanga. In the face of these examples, we might be tempted to treat similarities in noun class with the same skepticism as similarities in lexical items, which we know can be borrowed even without intense contact between languages. However such a view is not at all warranted. Noun class borrowing is much more limited than lexical borrowing, requires much more intense contact, and is rather easily identifiable in most cases. In this section we will review the cases of noun class borrowing within Northern Atlantic, and then discuss why evidence from noun class should indeed be taken as very reliable evidence for determining genetic relationships within Niger-Congo, despite the possibility of borrowing.

The only clear cases of noun class borrowing are from a Bak language into Bainunk-Kobiana-Kasanga. Bainunk Gubëeher has borrowed Joola *fu-* and *e-*, which in Gubëeher are small classes containing (it seems) only Joola borrowings. Kobiana has borrowed the class *u-* and its plural *ŋu-III* from Manjak (*u-* and *ngə-*, Mankanya *u-* and *ŋ-*). This is a very large class, but consists overwhelmingly of borrowings, mostly from Manjak. Kobiana has also borrowed the appreciably large class *pu-III* from Manjak *pə-*, and it consists mainly of Manjak borrowings in the *pə-* class. A small class **muN-* is used in both Bainunk and Kobiana for a few liquids, and seems to have been borrowed from a Bak language (cf. Joola *mu-*, Pepel *mun-*). It exists alongside the native liquid class **ma-*, and was very possibly borrowed into Proto-Bainunk-Kobiana-Kasanga. In Kobiana, the once-small native class **kaN-* has grown considerably in size due to the borrowing of nouns in the Manjak *ka-* class.

There are also numerous cases where certain semantic subdomains are shared between homophonous Joola and Bainunk-Kobiana-Kasanga non-borrowed classes. A class of the shape *gu-* (Fonyi *ku-*) exists in both families, but is semantically very distinct (plural of mostly round objects in Joola, singular for mainly long rigid objects in BKK). However in both groups it is used as the class for language names, and in BKK also for the noun 'language/speech.' This suggests that the use of *gu-* for languages was a feature of BKK and was adopted by Joola at some point in the past. Joola *ba-* is a sizeable singular class, but is also used as a collective class, and BKK **ba-* is the collective class for fruits, vegetables, and other small round objects, also found on a few singular nouns. Some infinitive class prefixes are also suggestive of areal influence. In both Kobiana and Joola, *ma-* is used as the infinitive prefix for bodily functions. In Gubëeher, *ka-* is used extensively with borrowings (including many from Joola), and in Joola *ka-/ga-* is one of the two most common infinitive prefixes. This phenomenon is further explored in Cobbinah (2018).

We must then consider the possibility of noun class borrowing in the histories of other Northern Atlantic groups. If in the past, various Atlantic languages were in an areal relationship similar to that between Manjak and Kobiana, or Joola and Bainunk, they may very well have borrowed certain noun classes from each other. However it is extremely unlikely that borrowing could account for a significant number of classes in any given language. The most drastic case of noun class borrowing between Bak and BKK is found in Kobiana, and here only three or four (if *mu-III* is included) of the language's nearly 50 classes are borrowed. Even in Joola Kujireray where a large portion of the language's vocabulary is taken from a Bainunk substrate, there is not a single noun class borrowed from Bainunk. Even more importantly, the attested cases of noun class borrowing are for the most part easily identifiable because the nouns on which they appear are overwhelmingly also borrowed from the source language[222]. That is to say, entire nouns are borrowed with their prefix included, and subsequently the prefix becomes integrated into the native class system of the borrowing language. Thus, we should probably not suspect a class of being borrowed unless it contains borrowed nouns from the target language. While identifying these borrowings may be rather difficult in cases of language contact from thousands of years in the past, there does not seem to be any clear instances of noun class borrowing in Northern Atlantic outside of the Bak-BKK cases discussed above. Furthermore it must be stressed that borrowing of class markers is not a common phenomenon in Africa, at least in the reconstructable histories of the various Niger-Congo languages. Thus, when we find a singular-plural pair **er-/ma-* in Proto-Tenda and **ri-/ma-* in Proto-Bantu, the resemblance is almost certainly due to cognacy rather than contact.

4.4 Conclusions

The noun class systems of the Northern Atlantic languages provide perhaps the best evidence for their genetic relationships with each other and Niger-Congo as a whole. While class borrowing is a possibility, it is very unlikely that this phenomenon has had an appreciable effect on any particular language group. Rather, where class markers of a similar shape and with similar semantics are shared between languages, by far the most likely explanation is shared inheritance. The existence of classes within Northern Atlantic with a reasonable connection to Bantu makes a genetic association with Niger-Congo extremely likely. Within Northern Atlantic, noun class evidence makes a very strong case for the subgrouping of Wolof and Bainunk-Kobiana-Kasanga, and tentatively suggests a further connection between this group and Biafada-Pajade. However there is very little evidence from noun class to suggest the genetic unity of Northern Atlantic or even the non-Bak languages as a whole.

222 The exception is liquid **muN-*, which in Bainunk has replaced native **ma-*, and contains non-borrowed roots.

The degree to which the Northern Atlantic noun class systems differ from each other is quite remarkable when compared to what we find elsewhere in Niger-Congo. A useful point of comparison is the Gur language family, for which the noun class system has been reconstructed with a high degree of confidence in Miehe et al.'s (2012) excellent study. Despite the overall low number of lexical cognates with Benue-Congo, Proto-Gur's noun class system is remarkably similar that of Proto-Bantu, so much that Miehe et al. are able to quite comfortably employ the traditional Bantu class numbering system for Gur. Here we are dealing with two families that have diverged over an enormous length of time, and still the majority of their noun classes can be connected etymologically. This is certainly not the case when we compare the Northern Atlantic languages to each other.

One particularly remarkable feature of various Northern Atlantic noun class systems is the high number of classes, especially singular ones. For Proto-Fula Sereer we can reconstruct at least 17 singular classes (at least 4 plural), for Tenda at least 20 singular/collective classes (perhaps only 3 plural classes when *ɓ-stacking is set aside), and most strikingly over 40 singular/collective classes for Proto-BKK (~10 plural classes). Even modern Kobiana makes use of 31 singular/collective classes (38 or more if the prefix on the noun is considered in addition to agreement) — more than triple the ~10 reconstructed for Proto-Bantu. And yet there is not a single class shared between all of the Northern Atlantic languages that can be convincingly proposed as an innovation of a unified Northern Atlantic family.

It is clear that the noun class system consisting of a rather limited number of (C)V- prefixes that can be reconstructed for much of the rest of Niger-Congo cannot have yielded the systems of the various Northern Atlantic languages. The large number of classes often with very specific semantics (as seen most notably in Bainunk-Kobiana-Kasanga), as well as the rather weighty CVC- shape of the class markers combine to suggest a noun class system for the earliest stages of Niger-Congo that had only recently grammaticalized from a large number of independent classifier words, such as those seen in some South American and Mesoamerican languages (see Aikhenvald 2000: 81-97). Kießling (2013) specifically argues that some sort of classifier system must be the ultimate source of Niger-Congo noun class systems. From this starting point, the various branches of Niger-Congo could independently lose different classes, replace others, and create entirely new ones from lexical sources or resegmentation (cf. Fula-Sereer plural **ɗik* from **ɗik* 'two' and Sereer liquid *fo-* from the initial syllable of *foofi* 'water'). The distribution of noun classes in Northern Atlantic is consistent with the idea that Northern Atlantic contains multiple early offshoots of Niger-Congo that inherited a noun class system of some sort, but continued independently innovating their respective systems over a rather large time scale to the point that the modern languages now employ class markers that are on the whole etymologically unrelated, while retaining to various degrees the distinct typological character of the original system. Evidence from the modern class systems does not lend support to the idea that Northern Atlantic existed as an independent genetic group for any appreciable length of time; if it did we should expect to find identifiable shared innovations throughout the group.

5 Overall conclusions

The Northern Atlantic languages are remarkably distinct from each other. Whatever genetic relationships exist between these groups must be extremely distant— perhaps more distant than can be satisfactorily recovered by the tools of comparative linguistics. Kaufman (1990: 23) gives an estimate of 7000-8000 years as the effective limit of utility of the comparative method. Even this estimate seems optimistic, and applies only under ideal conditions. Consider that for Indo-European, in many ways the greatest success of the comparative method, the core of the data used in reconstructing the proto-language consists of large corpora from multiple branches dating from before the 1st millennium. If the estimated time depth of PIE is indeed in the area of 6500 years (Chang et al. 2015), the greatest success of comparative linguistics has "turned back the clock" by only 4000 years[223]. Blust (1984/85: 54) gives an estimate of 6500 years before the present for Proto-Austronesian. We might also compare the extremely securely-reconstructed Bantu family, with an estimated time depth of over 3000 years even for Common Bantu (Ehret 1972: 6). Given the much smaller amount of potential inherited material among the Northern Atlantic languages when compared to these other families, we must seriously consider that time may have eroded any possibility of arriving at a clear understanding of the genetic relations between these languages. Regardless of what genetic relations exist among the Northern Atlantic languages and with the rest of Niger-Congo, it must be stressed that these relationships are extremely distant, and have left very few shared inherited linguistic markers when compared to established language families. To not emphasize this fact risks giving the impression to outside linguists and other scholars that Niger-Congo is analogous to Indo-European, or that Atlantic would be analogous to Slavic. Bainunk, a family that is in fact analogous to Romance in terms of internal diversity, is even treated as a single language in some literature (e.g. Sapir 1971)! Indeed we often find statements in non-linguistic scholarship that asserts the "close relationship" between e.g. Fula and Wolof (for example in Clark 2005: 533). In fact there is at present very little evidence that could convincingly argue for any family tree more specific than the flat Niger-Congo tree (e) in Figure 336. It is difficult to identify a significant number of innovations that are shared between any two Northern Atlantic language groups, much less the family as a whole.

Consonant mutation, which has been taken as a shared innovation of all or a subset of the Northern Atlantic languages in much of the existing literature, must be flatly rejected as evidence of anything more than an areal typological pressure. As argued throughout this study and summarized in section 2, the specific origins of mutation in the various Northern Atlantic groups involve sound changes and historical triggers that cannot be shared between these groups, or in some cases even languages within the same group. Turning to noun class, we saw in section 4 that a convincing link exists between the various Northern Atlantic languages and Niger-Congo more broadly, but there is no good evidence of shared innovations for Northern Atlantic as a whole in the noun class system. Noun class evidence can however argue for the grouping of Wolof with Bainunk-Kobiana-Kasanga, and much more tentatively for a further grouping of Wolof-BKK with Biafada-Pajade. Other morphological evidence has not featured prominently in the existing literature, and as of yet no convincing proposal exists for shared morphological innovations throughout all of Northern Atlantic. Neither can we find any shared sound changes that distinguish the Northern Atlantic languages from the rest of Niger-Congo. Hypotheses of even the most distant relations between languages have traditionally relied on this sort of evidence, and so the absence of such morphological and phonological innovations for Northern Atlantic is a serious challenge to its status as a valid genetic group.

[223] And of course the subgrouping of Indo-European language groups remains largely unresolved (Fortson 2010: 11). The same can be said for the earliest branches of Austronesian and Bantu. Indeed it seems that in general, even where a genetic relation between multiple languages/families can be satisfactorily demonstrated, the subgrouping of these lower-level branches proves rather more difficult. In this context we can understand that the subgrouping of the various Northern Atlantic languages into a single node within Niger-Congo is much more difficult to prove than the fact that they should be included within Niger-Congo at all.

At present the best argument for the theory of a unified Northern Atlantic family relies on lexical evidence— and this evidence is far from unconvincing. Though the number of roots shared across Northern Atlantic is quite small, those that can be found are very basic terms: 'head, ear, liver, bite, new, swallow, dance, bark/leaf, goat, feather' are among the best. However alternate explanations do exist for the distribution of these terms. First, we have seen in section 3.5 that borrowing of core vocabulary is very much possible between languages in this region. The fact that these widespread roots show seemingly irregular sound correspondences makes a borrowing explanation particularly attractive. Secondly, these widespread Atlantic roots may represent retentions from Niger-Congo that were lost in the rest of the family (which together might be taken as a single node in the Niger-Congo family tree), but reinforced through continued contact in the Northern Atlantic area.

In summary, I do not believe that the genetic unity of Northern Atlantic can be maintained without considerably more evidence than has currently been presented. The lexical evidence is certainly intriguing, but has plausible explanations that do not require the existence of a Proto-Northern-Atlantic language. The evidence from noun class is far from what we would expect if such a proto-language did exist, suggesting instead that most subgroups developed independently after branching off from Niger-Congo. Finally, the oft-cited evidence from consonant mutation is no evidence at all, as these systems are demonstrably independent innovations, albeit arising under areal pressure, and could not have been inherited from a putative proto-language.

Appendix A: Biafada-Pajade

Biafada (endonym *ga-njoola*) exhibits consonant mutation in both the nominal and verbal systems in much the same way as Kobiana-Kasanga and the Tenda languages. Biafada is closely related to Pajade (endonym *kan-jad*, aka Badiaranké), spoken rather far to the east near Konyagi and Bassari. Pajade does not use mutation productively, though a few traces exist[224] (see Wilson 1965). The most notable source on Biafada is a 30 page grammatical sketch by Wilson (1993). Wilson's ~500 word list from his fieldwork is available in Segerer and Flavier's online RefLex database. From these sources it is unfortunately not possible to give a satisfying historical account of Biafada mutation of the sort given for the other Atlantic languages in chapters 2-5. The alternations themselves are straightforward, but we cannot with the existing materials identify the historical triggers of mutation, especially in the verbal system. Wilson (1984, 1993) gives the Biafada noun class and mutation systems as follows:

sg. classes	note	Pajade cognate
u-I	personal	u-
(gaa-)	many borrowings	
(w)-II/III		wan-
bee-I	'rice'	?
bu-I	large class , incl. trees	pə-/pi-, bə-
bwa-I	'night, blood' ...	po-
faa-I	'path'	fa(a)-
fu-II	'smoke, fire'	—
gə-I		ko-
ga-III		kan-
gu-III	'bird', insects	kun-
ha-II	'sea'	—
jə-I, ji-I	'dog, monkey'	†ci-
lə-I	'pus' ('honey' in Bassène)	†tu-/ti-
nə-III	diminutive	nən-
nya-I	'nose, body, meat'	ña-
sa-II	'house'	—
ma-III	liquid	man-

pl. classes	pl. of	
bə-I	u-I personal	bə-
bwa-I	mostly gu-III, some others	—
gə-I	(w)-II/III	—
maa-I		maa-
ma-II		ma-
nya-I		—
saa-I	pl. of bu-I	—
ba- + sg.		ba-,be-
bu-I	augmentative	?

224 However Cover (2010) notes that mutation is still seen in Pajade deverbal nouns, giving the example *saj* 'clap,' *ma-taj-i* 'clapping.' It is unknown how productive this process is, or what consonants are subject to alternation.

I	f	r	s	h	l	b^w	b	d	j	g	m	n	ñ	ŋ	w	y
II	p	t	c	k	r	bb^w	bb	dd	jj	gg	mm	nn	ññ	ŋŋ	ww	yy
III	mp	nt	nc	ŋk	nr, nd	mb^w	mb	nd	nj	ŋg	mm	nn	ññ	ŋŋ	ww	yy

The prefixes in parentheses are seen only on agreeing elements, with the nouns themselves being unprefixed. It is possible that Wilson has missed some small classes (note that his wordlist has only one noun each for *bee-I*, *faa-I*, *ha-II*, *lə-I*, *sa-II*, and singular *bwa-I*), or even misidentified the mutation grade triggered by some classes— two issues which are present in his (2007) overview of Kobiana. Bassène (2015) presents an overview of the Biafada class system, and agrees with Wilson in all respects except for having only /i/ in *lə-I* and *ji~jə-I*.

I have included cognate Pajade noun classes where they exist. The remaining Pajade noun class prefixes are *ŋa(n)-* (very rare), and *pa-* (very common). Unprefixed borrowings take a determiner *cen/sen*. Pajade plural marking has been drastically simplified, with most nouns simply taking a prefix *ba-* or *be-* in front of the singular noun. Only personal nouns show a regular change in prefix (*u-* to *bə-*). A small number of nouns retain the historical number alternation, though sometimes with additional plural *ba-/be-* (e.g. *wan-daafɛ/ma-daafɛ* 'goat(s),' *wan-daake/be-ma-daake* 'initiate(s)'). Some nouns have generalized the historical plural form rather than the singular, e.g. *maa-ninɛ* 'egg,' *maa-ñɛ* 'tooth,' *maa-sɛ* 'eye.' Note that Pajade regularly devoices original voiced egressive stops, but original implosives remain voiced. (e.g. personal plural **ɓə- > bə-*). This is true outside of class prefixes as well.

Biafada verbs show alternations in all three grades dependent on tense/aspect/mood, but never person/number. Wilson gives the following 3rd person sg. forms of the verb 'go up':

habitual/future affirmative	nd-ma **k**aj	'he goes/will go up'
habitual negative	nd-add-e **k**aj	'he doesn't go up'
progressive affirmative	**k**aj-ä-ma	'he is/will be going up'
progressive affirmative (L-form)	lee **k**aj-ä	'he is/will be going up'
progressive affirmative (non-initial)	... maa **k**aj-ä	'... he is/will be going up'
progressive negative	al-e **k**aj-ä	'he isn't going up'
nonfuture affirmative	**h**aj-l-e / **h**aj-ma	'he went up (salient / plain)'
nonfuture negative	**h**aj-al-e	'he didn't go up'
hypothetical affirmative (main clause)	äk-ma **k**aj	'he would go up'
hypothetical negative (main clause)	äk-ool-e **k**aj	'he wouldn't go up'
hypothetical affirmative (dep. clause)	**k**aj-äk-d-e	'if he went up/were to go up'
hypothetical negative (dep. clause)	niŋka **k**aj-äk-ool-e	'if he weren't to go up'
conditional affirmative (dep. clause)	**k**aj	'if he goes up'
imperative affirmative	**h**aj-d-a	'go up!' (2nd sg.)
imperative negative	**ŋk**aj-d-o	'don't go up!' (2nd sg.)
potential affirmative	nt-ee **k**aj	'he may go up'
temporal affirmative	**ŋk**aj-ma	'when he went up'
hortative affirmative	maa **h**aj-ä	'he should go up'

Other than the relative prefix (identical to the noun class prefixes), there are no verbal prefixes of any kind (though there are pre-verbal auxiliaries/particles), and subject is marked with pronominal suffixes. Thus verbal mutation is always word-initial except in relative forms. The relative prefix agrees in noun class with the head noun, and the verb mutates as expected based on the mutation grade enforced by the class marker.

The mutation alternations themselves are extremely phonologically basic, with grade II being gemination, and grade III prenasalization. Only the voiceless series show alternations in continuancy. Recall that Wilson transcribes Kobiana voiceless geminates as singletons, and so it is possible that the voiceless stops could be geminate in Biafada as well, but there is no possibility of contrast between singleton and geminate voiceless stops, since the historical singletons have spirantized. Grade I /r/ is from Proto-Biafada-Pajade *r̥ (Pajade /s/), the lenition of earlier singleton *t (just as in Kasanga and Konyagi). The most interesting alternation is /l~r/ in grades I and II (equivalent Pajade /r~t/), presumably from *r~rr.

The Proto-Biafada-Pajade mutation system would have been entirely analyzable as gemination and prenasalization induced by a preceding mora and homo-organic nasal respectively. Voiceless singletons had continuant allophones when not geminated or prenasalized (just as in Proto-Bainunk-Kobiana-Kasanga). Biafada mutation was in fact one of the earliest Atlantic mutation systems to be discussed from a historical perspective. Klingenheben (1924/5) gives an analysis of Biafada mutation based on the wordlist in Koelle's *Polyglotta Africana*. He identifies mutation only in the nominal system, and based on the very limited data available to him incorrectly assumes that there are only two grades. He discards the l~r alternation as a mere vacillation in the pronunciation of a single phoneme, and does not consider it to represent mutation. His examples are all of sg./pl. pairs, and he attributes the alternations to earlier prefix-final consonants that triggered hardening and nasalization. This analysis must of course be correct, though he errs in assuming that plural *ma-II* must have been earlier *maN-*, with the nasal causing hardening. In fact it cannot have ended in a nasal, and is likely cognate with Tenda **max-*. Despite the shortcomings of his analysis, Klingenheben must be commended for realizing that the continuants in grade I were "primary" with the hardened stops and prenasalized consonants being the result of historical consonant clusters.

Though the alternations themselves can be easily understood from a historical perspective, we can unfortunately not say when they arose in the nominal system (i.e. at what point the marker-final oral consonants assimilated to the root, forming geminates), and in the verbal system cannot even identify how they arose at all. Because verbal prefixes do not exist in Biafada, we cannot easily attribute verbal mutation to earlier prefix consonants, as we can in the nominal system. It is not clear that Pajade ever made use of mutation in the verbal system. The only example that Wilson (1965) cites is of *ree* 'come' with an irregular imperative form *teea*. Pajade /t/ is the historical grade II form of /r/ (from *r~rr~nr, *rr > *d > t), as seen in the *pa-II* nouns in Figure 366, but it is not clear why the generally unprefixed imperative form would trigger grade II (Biafada uses grade I). Note that 'come' has an irregular imperative in many languages of the area (Wolof *ñów* 'come,' *kaay* 'come!,' Kobiana *-g~ngoott* 'come,' *jaa* 'come!'). One certainly gets the impression that Biafada-Pajade mutation is a rather recent phenomenon based on the phonetically-straightforward alternations, but there is probably no way to tell without more evidence. Recall that the straightforward gemination alternations of Kobiana-Kasanga can probably be traced back to Proto-Wolof-BKK, so we should not make any assumptions regarding Biafada, especially when the final oral consonants of class prefixes (triggering grade II) cannot be recovered.

Regarding the genetic affiliation of Biafada-Pajade, there is conflicting evidence that might link it with either Tenda or Wolof-BKK. The evidence from noun class is discussed in chapter 6 section 4.2.2. In short, BP shares its most common plural classes with Tenda (Tenda **ma-*, **max-*, and stacking of **ɓ-*), but shares the classes **u-*, **bu-*, and perhaps **ba*^{X}*-*, **ña-*, **gə-* with Wolof-BKK. As the Tenda plural classes in question are inherited from Niger-Congo, the evidence linking BP with Wolof-BKK is perhaps more convincing. The lexical evidence is inconclusive. It must first be stressed that overall, Biafada-Pajade vocabulary is extremely different from that of Tenda, Wolof, and BKK. The number of shared roots that can be found between PB and Tenda and PB and BKK are roughly equal. There are also a number of roots shared by all of Tenda, BP, and BKK (reproduced from Figure 353). Commonalities with Wolof are especially noteworthy, since Wolof is traditionally spoken much farther north than these other groups, and thus these are much less likely to be due to areal influence. Between Wolof and Biafada there are even some shared grammatical morphemes.

Proto-Tenda	Bassari	Bedik	Konyagi	Pajade	Biafada[225]	
*-ɣ́i̟kk/-ɣ́e̟kk	-ɣ́íkà̟	-ɣ́íké̟	-yǽk	jaak	jook	‘be hot’
*-xi̟	-xí	-hí	-xí	maa-ɛ	-he~ke~nke	‘two’
*-rə̟nn	a-ndə̟̀n	gu-ndə̟́n	lən	pə-rənnɛ	bu-lənna	‘snake’
*-ri̟	-rǐ	-rì	-lí	rii	lii	‘do/make’
*-romm-ax	-rǒmàx	-rōmà		room	loom	‘be short’
*-ɗam	-làw̃	-ɗám	-ryæ̀w̃	dam	dam	‘kill’
*-ŋakk	-ɣ̃àk	-ŋák	-ɣ̃æ̀k	ŋak	ŋakk	‘be sharp’
*-yVnn	-yìn	-yēn	-yə̀n	yin	yinn	‘breathe’
*-xVɗ		-háɗɛ̀	-xèry	kad	haad	‘guard’
*a̟-ɗi̟yVr	a̟-lìyér	a-ɗìyàr		u-diɛr	u-diigal	‘stranger’
*məʃ		ɓə-mə̀ʃ	w̃ə́s	pə-məs	mməsə	‘mouth’
*-rəŋ(g)	-rə̟́ng		-lə́w̃	rəŋ		‘inherit’
*-rəɗɗ	-rə́ɗ	-rə̀ɗ		rəd ‘plant a stake, build’		‘plant crops’
*ʃVɓ	ʃé̟ɓ	ɓə-ʃè̟ɓ	sǽv	pa-sabɛ		‘tail’
*-mə̟C	-wə̟́ɗá̟	-mə̟̀ɗ	-w̃ə́j	med		‘knot (v)’

BKK	Proto-Tenda	Konyagi	Bassari	Bedik	Pajade	Biafada	
*-r̥uf	*-r̥əf	-rə́f	-sə́f	-sə̀f	səf	rəf	‘sew’
*-munr	*-mə̟dɗ	u-mə́ɗ	e-mə̟́ɗ	ge̟-múɗ	mədd		‘night/dark’
*-def	*-raf	(-ryæ̀f)	-ràf	-ráf	raf	laf	‘be old’
*-de̟en	*gaŋ-ri̟n		a-ndín	gi-ndìl	bə-riin		‘kapok tree’
*ngV		gà		ngə	nka	nga	‘and’
*-gid	*-ɣə̟r	(i-gæ̀ry)	-ɣə̟́r	-ɣù̀r	kər	gudd	‘run’
*ñan-kin(d)	*er-ʃən	i-cə̀l̰	e-cén	e-cə̀l	ña-siiñ	ña-sin	‘nose’[226]
*ŋam/ŋom	*-ŋam	-ɣ̃æ̀w̃	-ɣ̃àw		ŋam		‘be far’
Bai. -fer	*-feʃ		-fɛ̆ʃ	-fɛ̀ʃ	faas	faas	‘be white’
KK *-yebb	*-ye̟ɓɓ/yabb?	-yǽɓ			yabb	yabb	‘be many’

[225] Wilson’s <ä> [ʌ] which can only appear word-finally and corresponds to /ɛ/ in Pajade (Meyer’s <è>, also generally word-final) is merged with <a> in the available wordlist from Wilson’s field notes. E.g. *nnagä* ‘cow’ in Wilson (1992) is rendered as *nnaga*. Some prefixes are also slightly different, e.g. *ge-* for *gə-* in Wilson (1992).
[226] Also perhaps Wolof *bakkan b-* if the first syllable is the historic prefix **ba*^{X}-

PBKK	Kobiana	Gubëeher	Guñaamolo	Pajade	Biafada	
*-min	-min	-min	-min	mən	mənr	'be able'
*-du̟g-	-l~ndugu	-du̟g	-du̟gi	ruu	lug	'steal'
*-haam	-waamoo(n)	-haam		-wam	woom	'(be) new'
*-ku̟dd	-h~kkudd	-xu̟d	-ku̟dd	wudd	wudd	'cover'
*-di̟in	a-ddíi(n) 'well'		-di̟in	dii	bu-dihi 'well'	'draw water'
*-ki̟d	-h~kkil	-ci̟r	-hi̟ir	siiro		'fly'
*yi̟d(d)	-yidd, Ka. -yil	-yi̟r			yil	'be dry'
*-ppoor̥	tá-ppooh, Ka. sa-poor			ku-piis	gu-mpeera	'flower'
	ñáabəcca, Ka. jaabinca			ku-caa	gu-nca	'twin'
	-g~ngidd			cid	jədd	'close'
	-g~ngidd-əh				jədd-ət	'open'
	-nigg				nəg	'be tired'
	a-ddáaf				raafa	'neck'
	bóolug				bwa-logu	'rainy season'
	a-ttáfo				ga-ntaf	'palm (of hand')
	-ŋaab			ŋaab		'be calm'
	Ka. sa-pec 'broom'			pees		'sweep'
	-l~ndeb			rab		'burn'
	-s~ccaamaal			saam		'hunt'
	-s~ccif			cif		'plant'
	-l~ndoob			deb		'carry on head'

Wolof	Pajade	Biafada	
mën	mən	mənr	'be able' (also Cangin **mi̟n*)
mel	miir	meel	'resemble' (*mVnd* in other groups)
naan	naaŋ	naaŋ	'drink'
tank	pa-takkɛ 'foot'	ge-ranka (pl. ma-tanka)	'leg/foot'
jasig j-		jaasugu	'crocodile'
baat b-		maat	'word'
†buum	puum		'be blind'
bóof	woof		'brood'
f-	f-	f-	locative prefix[227]
moom		mom	's/he'
-am		-am	'his/her'
yéen		een	'you (pl.)'

Especially between BP and Tenda we must consider the possibility that some of these common roots are borrowings. Often the Proto-Tenda and Proto-BP roots (both wider Northern Atlantic roots and ones specific to these two groups) are nearly identical phonologically, which suggests either an extremely close genetic relationship, or borrowing of the sort seen between e.g. Joola and Bainunk languages. We know that the relationship between Tenda and BP cannot be particularly close in absolute terms, since their overall rate of shared vocabulary is rather small, and their grammatical systems (pronouns, verbal inflectional morphology, noun class systems) are almost entirely distinct. Thus we must favor the latter of these two possibilities.

[227] It is often suggested that the Wolof prefix might be connected with Proto-Bantu locative **pa-*.

Proto-Tenda	Proto-BP	Bassari	Bedik	Konyagi	Pajade	Biafada	
*-ɣə̟r̥	*gər̥ä	a-ngə̟́s	gi-ngɯ̀s	i-nkə́r	maa-sɛ	gəra	‘eye’
*-ɓərə	*-ɓər	e-ɓə̀r	e-ɓə̄r	i-ɓə́lə́	pə-bər	bbəl	‘breast’
*-yəm/-jəm	*-jəm ?	-ỹúw	-yɯ̀m	-yə́w̃	cim	jəm	‘sing’
*-ŋar̥, -ŋatt	*-ŋar̥, ŋatt?	-ɣ̃á̟s, -ɣ̃àt	-ŋás, -ŋát	-w̃æ̀r, -w̃æ̀t	ŋas (+ŋat)	ŋar	‘bite’
*-rəm	*-rəm	-rôw̃	-rə̀m	-lə́w̃	rəm	ləm	‘bear child’
*-ɣam/-gam	*-gam	a-ngàw̃á		-wæ̀w̃	kam	gam	‘dance’
*-ʃəɗ	*gun-sVɗ-	a-cə̟́l	e-cə̀ɗ	sə́ry	ku-cid	gu-ncudu	‘bird’
*gaŋ-nəf	*go-nəfa	a-nə̀f	ga-nə̄f	æ-nə́f	ko-nəfa	ge-nəfa	‘ear’
*-wə̟r/-bə̟r	*-bər	-wə̟́r	-wɯ́r	-wə́l	pər	bwəl	‘rot’
*-ýVkk	*-ýVVk	-ýíkà̟	-ýíké̟	-yǽk	jaak	jook	‘be hot’
*-rə̟nn	*bu-rənnä	a-ndə̟̀n	gu-ndə̟́n	lə̀n	pə-rənnɛ	bu-lənna	‘snake’
*-ri̟	*-rii	-rǐ	-rì	-lí	rii	lii	‘do/make’
*-ɗam	*-ɗam	-làw̃	-ɗám	-ryæ̀w̃	dam	dam	‘kill’
*-ŋakk	*-ŋakk	-ɣ̃àk	-ŋák	-ỹæ̀k	ŋak	ŋakk	‘be sharp’
*məʃ	*-məs		ɓə-mə̀ʃ	w̃ə́s	pə-məs	mməsə	‘mouth’
*-yVnn	*-yinn	-yìn	-yēn	-yə̀n	yin	yinn	‘breathe’
*-ŋam	(*-ŋam)	-ɣ̃àw		-ỹæ̀w̃	ŋam		‘be far’
*-rəɗɗ	(*-rəɗ)	-rə́ɗ	-rə̀ɗ		rəd ‘plant stake/build’		‘plant’

Whether due to a particularly close genetic relationship or not, we can be relatively sure that Proto-PB and Proto-Tenda (or already differentiated Tenda languages) were spoken in overlapping or adjacent geographical areas, lending support to the idea that Biafada speakers migrated westward from the original BP homeland.

As with lexical evidence throughout Northern Atlantic, it is hard to know what to make of these connections. Distinguishing between borrowing and inheritance over such large time depths and without knowing the histories of social interactions between groups is often simply not possible. The morphological evidence should be given more weight, and this suggests a connection with Wolof-BKK, but the evidence is very limited. At this time I do not believe that Biafada-Pajade can be confidently subgrouped with any other Northern Atlantic language group, though a connection with Tenda, (Wolof-)BKK, or both certainly seems likely.

Appendix B: 100 word lists

The Swadesh "first 100" list (presumably the same as that used by Sapir 1971) is as follows:

I
you (2nd sg.)
we (inclusive)
this
that
who?
what?
not
all (of a number)
(be) many
one
two
big
long (not 'wide')
small
woman
man (adult male human)
person (individual human)
fish (noun)
bird
dog
louse
tree (not log)
seed (noun)
leaf (botanics)
root (botanics)
bark (of tree)
skin (person's)
flesh, meat
blood
bone
grease (fat, org. substance)
egg
horn (of bull, etc.)

tail
feather (large, not down)
hair (on head of humans)
head (anatomic)
ear
eye
nose
mouth
tooth (front, rather than molar)
tongue (anatomical)
claw/fingernail
leg/foot
knee
hand/arm
belly (lower part of body, abdomen)
neck (not nape)
breast (female)
heart
liver
drink (verb)
eat (verb)
bite (verb)
see (verb)
hear (verb)
know (facts)
sleep (verb)
die (verb)
kill (verb)
swim (verb)
fly (verb)
walk (verb)
come (verb)

lie (on side, recline)
sit (verb)
stand (verb)
give (verb)
say (verb)
sun
moon
star
water (noun)
rain (noun)
stone
sand
earth (=soil)
cloud (not fog)
smoke (noun, of fire)
fire
ash(es)
burn (verb intr.)
path (road, trail; not street)
hill
red (colour)
short
dark
white (colour)
black (colour)
night
hot (warm, of weather)
cold (of weather)
full
new
good
be bent
dry (substance)
name

The wordlists for each of the languages in Figure 342 is given on the following pages. For the lexical sources for each language, see their respective chapters. Following the wordlists is a chart showing the words I have considered cognates or possible cognates between each pair of languages. In this chart, "x" is a cognate or reasonable cognate candidate, "f" is a borrowing or false cognate, "?" means the two forms bear some resemblance, but cognacy seems rather less likely, and "x?" is somewhere between "x" and "?." The number in the "cognt?" row counts all instances of "x(?)," and the "+false" row counts "f" and "?" in addition.

	Fula	Sereer	Noon	Wolof
I | you (sg)	mi/min | a/an	mi | wo	mi | fu	man/ma | yow, nga
we (incl.)	en/enen	’in(o)	ɗoo	nun/nu
this	(NC marker)	keek/keen	wii	bii
that	(NC marker + a)	kaa/kaaga/kaana	waa/wu̟u	bee/boobu/bale
who?	hol/hombo	’an	ɓa	kan
what?	hoɗum/ko	xar	ya	lan
not	-aa	-ee(r)	-ɗii	-ul
all	fof	fop	ɓe̟eɓ, to̟oh	-épp
(be) many	heew-	may	yewin	bare
one	go’o	leng	winnoo	benn
two	ɗiɗi	ɗik	kanak	ñaar
(be) big	maw-	maak/maag	yak	réy, mag
(be) long	juut-, ɓooy-, duur-, yeewn-, tuuy-ee-	jiig	hooɗ	gudd
(be) small	famf-, gall-, tojj-, tokoos-	neew	jutuut	ndaw
woman	debbo	o-tew ox-	ɓeti Ø/f-	jigéen j-
man	gorko	o-koor ox-	ƴaal	góor g-
person	neɗɗo, gimɗo (pl. yimɓe)	o-kiin ox-	ɓo y-	nit k-
fish	liingu/lingu	liβ n-	jën	jën w-
bird	sondu,colli	ndiif n-	sel	picc m-
dog	rawaandu	o-ɓox ol-	baay f-	xaj b-
louse	comci, mbabba hoore	βaal n-	ɗi̟ñ	teeñ w-
tree	leggal	ndaxar n-	kedik k- (pl. tedik t-)	garab g- (pl. †yarab)
seed	foɗɗere, abbere	’ax k-	peoh p-	jiwu j-
leaf	haako	a-taaf al-	to̟oɓ t-	xob w-
root	ɗaɗol, asli	a-paƈ al-	ni̟il	reen b-/w-
bark	koɓal, baajol, balol	o-xoβ ol-	oɓ	àkk w-, xas m-
skin	laral, nguru	fool n-	on	der w-
meat	kusel/husere, teew(u)	ndawal n-, njuƈax n-	kowinoh k- (pl. to... t-)	yàpp w-
blood	ƴiƴam	fo’oy f-/l-/ol-	ñi̟f	deret j-
bone	gi'al	o-xiiƈ ol-	ƴoh	yax b-
grease	ɓellere	a-neer al-	kelif f-	nebbon b-, nékk g-
egg	ɓocc-/bocc-/boof-/woof-	gin l-	wak	nen b-
horn	’allaadu	o-jan ol-	wic	béjjén b-

	Fula	Sereer	Noon	Wolof
tail	laccol	a-las al-	lu̟k	geen g-
feather	leeɓol, sige, ɓoro	a-naf a-	fo̟nu̟f f-	dunq w-
hair	(n)gaasa, leeɓol	wil l-	fen f-	kawar g-
head	hoore	xoox l-	haf	bopp b- (pl. †gopp)
ear	nofru/nowru	nof n-	nof	nopp b-
eye	yitere	a-ngid al-	has	bët b- / gët
nose	hinere	o-ñis ol-	kumun k- (pl. tu... t-)	bakkan ~ bakken b-
mouth	hund-/hunn-/hun-	o-don ol-	ku̟u	gémmiñ g-
tooth	ñiinde	ñiiñ l-	si̟s	bëñ b- / geñ
tongue	ɗemngal	ɗelem l-	peɗim p- (pl. te... t-)	làmmiñ w-
fingernail	feɗ-/fed-	mbaambaañ n-	ƴognaah/co̟gi̟naah	we w-
leg/foot	kosngal/koyngal	o-jaf ol-	kot	tank ~ tànk b-
knee	hofru	nguɓay n-	yi̟’	óom b-
hand/arm	jungo	o-ɓay ol-	yah	loxo b-/l- (pl. †yoxo)
belly	reedu	o-fud ol-	look	biir b-
neck	daande, hoɓɓ-, hoyƴ-	o-cok ol-	koonaah k- (pl. to... t-)	doq g-, pàllanq, baat b-
breast	endu	feen n-	ɓi̟iɓ	ween w-
heart	ɓernde	xeeñ l-	hol	xol b-
liver	heeñere/heyre	xeeñ l-	keeñ	res w-
drink	yar-	yer	an	naan
eat	ñaam-	ñaam	ñam	lekk
bite	ŋat-	ŋat	ɗoɓ	màtt
see	yii-	gi’/ga’	hot	gis
hear	nan-	nan	keloh	dégg
know	’and-	’and	u̟noh	xam
sleep	ɗaan-aa-	ɗaan	neeh	nelaw
die	maay-	xon	kaan	dee
kill	war-	war	ap	rey
swim	lummb-aa-, yin-aa-, wuul-aa-, feer-aa- ...	weyƴ	fe̟ey	féey
fly	diw-	yet	pu̟d	naaw
walk	yaa-	ñaayƴ	ti̟id	dox
come	’ar-	gar	hay	ñëw ~ ñów
lie	lel-aa-	wondoox	faanuk	tëdd

	Fula	Sereer	Noon	Wolof
sit	jooɗ-aa-	moof	yug	toog
stand	dar-aa-	geenoox	tuuk	taxaw
give	rokk-, hokk-, yeɗ-	ci’	eɗ, on	may, jox
say	wii-	lay	wo’	ne
sun	naange	njeƈ n-	noh	jant b-
moon	lewru	o-nqool onq-	ñi̟id	weer w-
star	hoodere	o-xoor ol-	hol	biddéew b-
water	ndiyam	foofi l-/ol-	mo̟o m-	ndox m-
rain	toɓ-	a-teβ al-	toɓ	taw b-
stone	heyre	gac l-, ɓil l-, ɗak l-	atoh f-	doj w-, xeer w-
sand	leydi	lanq k-	maleey m-	suuf s-
earth	leydi	lanq k-	kakeey f-	suuf s-
cloud	ruulde, suurndu, guttere	a-’eel al-	hu̟yi̟ɗ	niir w-
smoke	cuurki	o-suun ol-	iiwil	saxaar s-
fire	jayngol	fiɗel l-/f-	kiwii k- (pl. ti... t-)	safara s-
ash(es)	ndoondi	ndaw n-	wet	dóom b-
burn	dupp-, nucc-, naaw-	kaβ, jaβ, dox	tak	lakk
path	ɗatal	a-ƭat al-	waas	yoon w-
hill	tulde, ferlo	ñaang l-	tagul, tu̟gu̟l	tund w-
(be) red	wojj-	yeeq	yooh	xonq
(be) short	raɓɓ-	raβ	looƴ	gàtt
(be) dark	niɓɓ-	niɓ(aan)	ñu̟us	lëndëm
(be) white	ran-	ran	yaanaaw	weex
(be) black	ɓal-	ɓaal	su̟us	ñuul
night	jamma/jemma	o-yeng	wek	guddi g-
(be) hot	wul-	sum	tam	tàng
(be) cold	jaang-, ɓuuɓ-	ɓut, ɓuuɓ, jogoñ	soos	sedd
(be) full	hebb-	may	li̟if	fees
(be) new	hes-	xas	as	ees, bees
(be) good	moyƴ-	faax	jof	baax
be bent	hog-	tuufoox	ku̟g	lunk
(be) dry	yoor-	weer	su̟'	wow
name	’inde	gon l-	te̟ek	tur w-

	Bainunk Gubëeher	Kobiana	Pajade	Joola Eegimaa
I | you (sg)	me | fi	mé / ma- | áyì	an | en	i̟nje | au
we (incl.)	mino	ngée	mbon	wo̟li / wola(l)
this	NC-N-NC	NC-V, aɲe	we	-e
that	NC-N-NC-VVŋ	NC-V...	we, ŋii	-u / -ua
who?	han	wáa	maa	ai
what?	ho	kée	waa	wa
not	-r, etc.	-iil	re, kaa, kare	-it, etc.
all	pe, tu	l~ndadd	peer	pe
(be) many	ampagai, da̟ja̟ñ	f~ppalakk, h~ttoh, yebb	yabb	e-mmeŋ
one	gugondu̟k	h~tteena	painɛ	y-anur
two	ha-naak	naŋ	maaɛ	su-u̟ba
(be) big	-de̟e(ni)	l~nde	mann, dac	e-bbax
(be) long	bu-ne̟j	yumb	sar	e-xuli
(be) small	-tiini	l~ndiicc	-dobe	e-titti
woman	u-dikaam	u-líkkaam	u-caafɛ	aare
man	u-di̟igen	u-lígeen	u-siɛ	a̟ine
person	wu̟r, u-raagof	u-lí	wu-nə	an
fish	fa-xaat	ka-máafen	iisan	ju-ol
bird	bu-puul	jàkkab	ku-cid	ga-ppu
dog	jixi	jùfaah	ci-baa	e-joba
louse	a-xaranga	jàkkɔrngɔ	p-arankɛ	e-tuñña
tree	si-nunuxen	u-ddó	mat	bu-nunux
seed	(Guñ. a-ru̟gel)	(use pa-III w/ plant name)	pə-yaddə	(Banj. bu-rox)
leaf	gu-luf	sa-ntúfa	ka-taaf	ga-toj
root	gu-nda̟ab	gu-háaw	pə-kaadɛ	fu-war
bark	gu-lak	sa-féfɛn, sa-kkéefehe	ka-ŋubɛ	(Fonyi ka-kub)
skin	gu-pol	sa-ccédd	kun-daar	ga-baŋ
meat	a-har	a-nègg	ña-se	e-llu
blood	gu-leeñ	bi-hèeh	po-adə	fi-si̟m
bone	gu-huun	gu-màab	pi-jeere	ga-vvul
grease	ja-fat	ba-záabe	kum-bajɛ	mu-caul, bu-fat
egg	bu-niin	a-nìin	maa-ninɛ	gu-e
horn	gu-fi̟geet	gu-fíigaal	pə-dikɛ	ga-ssin

	Bainunk Gubëeher	Kobiana	Pajade	Joola Eegimaa
tail	sin-kal	bi-yènd	pa-sabɛ	fu-le̟j
feather	gu-ji̟it	gu-lúng	kan-tunkɛ	ga-ssi̟t
hair	gu-ja̟nd	jèggen	pa-saci	g-al
head	bu-gof	bu-gòf	po-ofɛ	fu-xow
ear	bu-laax	si-nùf	ko-nəfa	ga-nnu
eye	si-ji̟l	si-ggə́h	maa-sɛ	ji-ci̟l
nose	gu-cind	gu-ñìkkən	ña-siiñ	e-ñu̟ndu
mouth	bu-rul	a-ccíh	pə-məs	bu-tum
tooth	gu-ril	bu-gèes	pi-ñɛ, maa-ñɛ	fi-ŋŋi̟ŋ
tongue	bu-lemes	jàarəm	pə-deemɛ	fi-re̟rum (fi-rim ‘voice’)
fingernail	gu-xoyot	gu-ŋùru	ko-fodo	ga-urux
leg/foot	si-di̟ix	a-bbàh, ta-ppér	pa-takkɛ, ko-ore	ga-at ‘leg,’ ga-xa̟gum ‘foot’
knee	bu-guux	a-mùbb	pa-wun	fu-jju̟l
hand/arm	si-lax	ji-hàkk	ko-bəda	e-bongañen ‘arm,’ ga-ñen
belly	bi-ye̟r	a-bbù	pa-kunt	fu-ar
neck	bu-da̟ab	a-ddàaf	pa-co	e-xondor
breast	bu-mind	bu-bìn	pə-bər	fi-il
heart	e-sigir	bàasən	pə-seeñi, kija	e-tixiñ
liver	bu-ciiñ	bi-hìdd	pə-seeñi	fi-iñ
drink	bu-ruux	yaab	naaŋ	ma-rem
eat	bu-fit, gu-filla, sin-ka̟ab	ñaam, h~kkobb	jaa, jaar, bad	fi-tiñ
bite	bu-ŋal	ŋah	ŋas	e-rum
see	bu-wu̟l	f~ppegg	jeen	e-jux
hear	bu-ye̟eg	yeg	yec	e-un
know	bu-nax, bu-yit	l~ndeeh	kab	e-ffas
sleep	sin-ceem	h~kkeem	datta	ga-mmo̟ri
die	bu-ci̟ir	nis	sad	e-cet
kill	bu-hof	makk	dam, dik	e-mux
swim	gu-way	b~mbɛɛ	waj	ga-loy
fly	bu-ci̟r	h~kkil	siiro	e-yi̟t
walk	bu-da̟ak	l~ndekk	yaas	e-jow
come	so!, bu-fu̟rum ‘come from’	g~ngoott	ree	e-jo̟wul
lie	bu-waana	nikka	daaso	ga-ffilo

	Bainunk Gubëeher	Kobiana	Pajade	Joola Eegimaa
sit	bu-noox	yedd	cood	e-robo
stand	bu-lika	h~kkaant	ŋan	e-ilo
give	bu-na̟ar	nan, f~ppadd	nink, cak, jonk	e-sen
say	bu-lo̟b, bu-yen	won	imm	e-lob
sun	bi-ne̟g	bu-nègg	pi-jaadɛ	bu-naa, ti-nax, fu-nax 'day'
moon	ju̟uñ	jáafaañ	faa	fi-eñ
star	gu-ju̟uñ	a-wóol	pu-oor	e-ut
water	baa-ruux	ma-lém	mam-be, mam-biya	m-al
rain	di̟in	dìin	kan-jaf	ga-lub
stone	gu-lo̟r	à-bboong	pa-yankɛ	e-vval
sand	di-kiñaañ	gi-héeñi	ku-yeenə	e-us
earth	di-raax	di-yàah	kum-pədə	e-ttam
cloud	gu-fo̟b	gu-férɛfɛttɛ	niinao	ga-tu̟l
smoke	bi-ho̟or	a-ccúluggu	ku-ci	fa-kkor
fire	kuul	kòoh	nukus	s-ambun
ash(es)	bu-rot	a-ddétt	kun-taanə	bu-kkugay
burn	bu-jaak	l~ndeb	baw, rab	e-saen
path	bi-naal	báah, u-rɔ́ɔ	faa-se	bu-lago
hill	—	u-ntúnda 'mound'	pa-kankənə	e-rijaŋ
(be) red	-ceen	ŋobb	jinn	mu-jju̟gax
(be) short	bu-dox	l~ndoh	room	(Fonyi -ta̟mi, Kasa -tog)
(be) dark	bu-mundiin, bu-mutiin	mudd(əh)	mədd	(Fonyi -ri̟m)
(be) white	-fer	f~ppundu	faas	e-tu̟en
(be) black	-rahi	ñuru	ba(y)	e-ñuget
night	jacet	géndeŋ	pa-jeenɛ	nifux
(be) hot	-du̟xun, bu-wu̟ul	l~ndebən	jaak	e-su̟p
(be) cold	-ŋaarin	ŋahəl, f~ppunəha	ŋaab	e-jje̟bi
(be) full	bu-run	yebb	yabb, nanka	e-mmeŋ
(be) new	-haam	wàamoon	u-wam	e-vvugul
(be) good	-bu̟n	b~mbun, h~ttib	niñ	e-a̟ri
be bent	bu-ŋoodun (tr)	ŋudda	kaŋ, ŋod	e-ñu̟p 'courber'
(be) dry	bu-yi̟r	h~kkerəgg	ŋaañ	e-xay
name	gu-reet	gu-sèh	ko-mic	ga-jow

<table>
<tr><th></th><th>Konyagi</th><th>Bassari</th><th>Bedik</th></tr>
<tr><td>I | you (sg)</td><td>ǽmí | wə̀jə́</td><td>wə́nó, mè | wùj, sàɗí, làɗí</td><td>ɣə́nò, ń-nò | wùj</td></tr>
<tr><td>we (incl.)</td><td>wùl̰ə́</td><td>nè...é</td><td>ne̟...é/ń-né...è</td></tr>
<tr><td>this</td><td>-ŋî</td><td>-(ƴ)ô</td><td>-ó</td></tr>
<tr><td>that</td><td>-ŋî</td><td>-(ƴ)ô</td><td>-ó</td></tr>
<tr><td>who?</td><td>bí-mô</td><td>nò</td><td>lóhò</td></tr>
<tr><td>what?</td><td>bí-yê/yégà ~ yélə̀ ~ yélà ~ yê</td><td>ínè</td><td>ndàné/ndàní</td></tr>
<tr><td>not</td><td>æ̀-ntə́, etc.</td><td>à</td><td>ɗò̃</td></tr>
<tr><td>all</td><td>céw, ndǽŋ, wæ̀l</td><td>ɗék, tá̟k</td><td>dàmí, fùt, mék, pé̟cé̟ŋ, cú</td></tr>
<tr><td>(be) many</td><td>i-ƴǽɓ, kúntúmá, ɗús</td><td>ɓón, mbáŋ, yér, a̟-ỹə̌mb</td><td>hēɓé, kíngírín, ʃò̟bē̟</td></tr>
<tr><td>one</td><td>ryánkò ~ ryámpò</td><td>i-mât</td><td>dīyè̟~rīyè̟~ndīyè̟</td></tr>
<tr><td>two</td><td>xí ~ kí</td><td>kí ~ xí</td><td>hí ~ kí</td></tr>
<tr><td>(be) big</td><td>i-næ̀ỹ</td><td>sə̟̂m</td><td>ráfà, fárámè̟</td></tr>
<tr><td>(be) long</td><td>i-ƴæ̀ry</td><td>a̟-ʃàk</td><td>o-ɣólómb, u-wíʃ</td></tr>
<tr><td>(be) small</td><td>i-ɓá/váák</td><td>a̟-ɓá̟</td><td>u-ɓàkə̀l</td></tr>
<tr><td>woman</td><td>æ-sə̀væ̀lə́, æ̀-nə̀m</td><td>a̟-só̟xá̟r (nə̟̌má̟ ‘mom’)</td><td>a-sóɣár (lɯ́m~nɯ́m)</td></tr>
<tr><td>man</td><td>a-sæ̀n</td><td>a̟-sóʃà̟n</td><td>a-ʃán</td></tr>
<tr><td>person</td><td>a-àl̰/v-æ̀l̰</td><td>a̟-là</td><td>hál</td></tr>
<tr><td>fish</td><td>i-gís/u-wís ~ wæ-yìs</td><td>e-kàn</td><td>i-kàl</td></tr>
<tr><td>bird</td><td>sə́ry</td><td>a-cə̟́l</td><td>e-cə̀ɗ, i-bàbúdó̟</td></tr>
<tr><td>dog</td><td>i-vé/wæ-ɓé</td><td>làŋə́t</td><td>jə-ŋát</td></tr>
<tr><td>louse</td><td>æ-kæ̀rə̀nká</td><td>e-pə̟̀l</td><td>gi-nāñ</td></tr>
<tr><td>tree</td><td>æ-tə́x</td><td>a-tə̌x</td><td>ga-tò</td></tr>
<tr><td>seed</td><td>æ-pírél</td><td>e-nə̟̌gà, e-njílîr</td><td>gi-cò̟nē̟ŋ, go̟-nə̟́g</td></tr>
<tr><td>leaf</td><td>fæ-ryèf ~ u-fæ̀ryèf</td><td>a-pǎ̟t</td><td>ga-ñās</td></tr>
<tr><td>root</td><td>æ-nkàl̰</td><td>a-nə́mbə́t</td><td>ga-ngál (-hal)</td></tr>
<tr><td>bark</td><td>væ-kùɓ, væ-pə̀nkw</td><td>a-kòp (a-kóɓə̀tèn 'bark sp.')</td><td>ga-ngóɓə̄tél</td></tr>
<tr><td>skin</td><td>æ-ndíl</td><td>a-năr, a-njè̟n</td><td>ga-nàr, gi-njə̟́n</td></tr>
<tr><td>meat</td><td>fæ-ỹæ̀r</td><td>ỹàs</td><td>ñás</td></tr>
<tr><td>blood</td><td>sǽt</td><td>o-ʃá̟t</td><td>ma-ƴél</td></tr>
<tr><td>bone</td><td>ỹə̀c</td><td>a-cápâr</td><td>e-ɓéƴ</td></tr>
<tr><td>grease</td><td>u-l̰íryǽx</td><td>o-nǐl</td><td>ga-mbél</td></tr>
<tr><td>egg</td><td>i-nìl̰</td><td>e-ñèŋèn, o-yénèn</td><td>i-líl</td></tr>
<tr><td>horn</td><td>u-w̃ìryə́</td><td>o-pàríx</td><td>mɯ-jɯ́ ~ ɓə̟-njɯ́</td></tr>
</table>

	Konyagi	Bassari	Bedik
tail	sǽvə́t ~ sǽv	e-méɗé, ʃé̟ɓ	e-də́mb, ɓə-ʃè̟ɓ
feather	u-lə̀nkw	o-dòng^{w} (pl.)	ge-ndóng, ga-càm
hair	i-mùl	e-mbă̟n	gu-mbál
head	æ-nkæ̀f	gà̟f	gàf
ear	æ-nə̀f	a-nə̀f	ga-nə̄f
eye	i-nkə́r	a-ngə̟̀s	gi-ngɯ̀s
nose	i-cə̀l̰	e-cén	e-cə̀l
mouth	w̃ə́s	e-tə̂ỹ	ɓə-mə́ʃ ~ mə̀ʃ
tooth	bèñə́	ỹə̟̀ngă̟	gi-ñángà
tongue	ryə̀w̃	a-nîw̃	i-ɗé̟m
fingernail	u-x(w)æ̀ryæ̀l̰	a-cènĕn	ga-cálè
leg/foot	u-xòl̰ə̀nk	ɣónə̟̀ng	i-cò̟ndó̟ŋ
knee	i-kó	e-ɗə̟̂kə́nà	e-ɗə̂kə̀là
hand/arm	i-níl	e-nə́xá̟r, a-tăxà̟n, xèndáyá	e-kònd, i-yál
belly	i-ɗónk	cə̟̀l	ga-céɗ
neck	i-gə́b	e-gə̟̀là̟	bə̟̄dīcè̟, e-gə́lá
breast	i-ɓə̀lə́	e-ɓə̀r	e-ɓə̄r
heart	i-ɓù	e-pút	i-tìl
liver	i-cə̀nj	o-lémbà̟r ~ o-ré̟mbà̟l	i-dámbél
drink	i-cè	a̟-ʃè̟ɓ	u-ʃàb
eat	i-tòk	a̟-ɣ̂àmb	o-só
bite	i-ŋæ̀r, i-ŋæ̀t	a̟-ɣ̃á̟s, a̟-ɣ̃àt	u-ŋás, u-ŋát
see	i-nù	a̟-nùw, a̟-ɣàt ~ ng^{w}àt	u-lū
hear	i-gwə̀ry	a̟-ɣùl	o-hé̟r
know	i-kòl ~ i-kwə̀l ~ i-kò, i-ɣ̂ə̀t	a̟-nàng, a̟-xàm	u-láng
sleep	i-ɗǽk	a̟-ràʃ (a̟-lâ̟k ‘lie down’)	u-ɗāk
die	i-cə́m	a̟-nê̟m, a̟-ʃə̀s	o-ʃə́s
kill	i-ɗæ̀w̃	a̟-làw̃	u-ɗám
swim	i-ɗə́fá	a̟-xàs	u-hás
fly	i-cə́g	a̟-ʃə̟̀g	u-ʃúg
walk	ì-ɣ̂às	ɣ̂è̟ ('go')	o-ɣ̂é
come	i-gèj, i-ɣ̂ìj	a̟-ɣ̂ò̟wú	u-ɣ̂ó̟gú
lie on belly	i-ɓə̀xə̀má	a̟-ɓàf	u-ɓāf

	Konyagi	Bassari	Bedik
sit	i-dáñá	a̤-fìɗo̤rá, a̤-ỹə́wâ, a̤-ỹípà	u-fĩng, o-ñə̀ŋà
stand	i-kál̰	a̤-fə̃r	u-hə̤lə̤n
give	i-ɣ̃ə̀ɗ	a̤-yìl	o-yén ~ o-yə́n
say	i-dèl̰ ~ i-dè, i-pəɣ̀á	a̤-fê̤l, a̤-rè	o-fə̤̃ɗ, o-rē
sun	u-læ̀v	e-ñàn	gi-ñál
moon	u-lèpèrá	o-pă̤cà w̃	mə̤-pè̤cé̤m
star	i-kòl	e-mà̤l	e-kór
water	wə-nkà	mên	mə̤̄ngè̤, mə̤̄n-maŋ
rain	rəv	a-tə̤ɓ	o-ɓə́nd, u-rù
stone	i-táká	e-kà̤ỹ	i-gàñ
sand	i-nkərəɣ̀àlə́	e-ɗìnì	i-níní
earth	i-nkæ̀lə́	e-băr	e-lò
cloud	æ-ŋàr	a-ŋa̤r (e-ɓĕ̤ɗ ‘sky w/ clouds sp.’)	gu-mbə̤́ɗ, ga-cāl
smoke	xwə-cìcə́	o-kʷócə́n	go-kʷə̀c ~ gó-kʷòc
fire	xwə-ɗə̂x	xòɗúx	ñu-kúɗò
ash(es)	i-ɓəl̰	e-ɣ̀ùwún	ɓọ́ɗə́k, i-cọ́rə̀c
burn	i-ŋæ̀g, i-pəɗ	a̤-lə̤kə́n, a̤-lòxʷ, a̤-nəng, a̤-ɓə̤l	o-ɓọ́ɗ, -ɗə́kə̀n, -ɣọ́ɓ, -ŋán, -réɓ, -ʃò
path	kǽlú	e-pə̤ña̤	gábī, ga-ngám
hill	i-kùŋə́, i-mànə́	e-tə̤́nd	ño-kọ̄mọ̀t, i-kūmùt
(be) red	vəntæ̀xə́	wára̤x	wārà
(be) short	i-dəp	rôma̤x	o-ròm
(be) dark	i-məxwə́ry	e-cìw-ʃìwán	o-múɗ
(be) white	i-ɣ́ér	a̤-fẽʃ	o-fèʃ
(be) black	væ̀l̰æ̀xə́	ɓàna̤x	ɓálà
night	u-məɗ	e-mə̤ɗ	gə̤-múɗ
(be) hot	i-ɣ́ǽk	a̤-yíka̤/ñíka̤	u-ɣ́íké̤
(be) cold	i-ɣ̀æ̀m	a̤-yè̤m	ɣ́ə̤́m
(be) full	i-təmpə́	a̤-fôxʷ, a̤-lə̤́ɓ, o-ỹím	u-jùm
(be) new	xàsək	xáʃáx	ɣàʃá
(be) good	i-nəŋ	nə̤ngà, yékàx	o-lə̄ngà, yárárà, yèkə̀là
be bent	i-təfilá	a̤-lêr, a̤-sə̤b, a̤-sŭmb, a̤-xùf	u-sūmb
(be) dry	i-cətə́	a̤-fêr, a̤-ỹàyí	o-wó, yər
name	u-w̃æ̀cə́	o-w̃âc	u-yàt

	Sr Fu	Sr Wf	Sr No	Fu Wf	Fu No	Wf No	Kñ Be	Kñ Ba	Ba Be	Kñ Sr	Kñ Fu	Kñ Wf	Kñ No	Be Sr
I	x	f	x	f	x	f		x	x	x	x		x	
you			?				x	x	x					
we	x						?	?	x					
this						?			x					
that	?		?		?				x					
who?		f												
what?									?					
not														
all	x													
many														
one														
two	x						x	x	x					
big	x	x		x										
long														
small							x	x	x					
woman	x		x		x				x					
man	x	x		x			x	x	x					
person				x?			x							
fish	x								x					
bird					x?		x	x	x					
dog										?				
louse														
tree	x?		x?		x?		x	x	x	x	x		x	x
seed									x					
leaf						x								
root							x							
bark	x		x		x		x	x	x	x	x		x	x
skin									x			x?		
meat							x	x	x					
blood								x						
bone						f								
grease								x						
egg							x	?	?			x		
horn		?												
tail	x						x	x	x					
feather			f				x	x	x			?		
hair		f							x					
head	x		f			x	x	x	x			x	x	
ear	x	x	x	x	x	x	x	x	x	x	x	x	x	x
eye	x	x	x	x	x	x	x	x	x	x	x	x	x	x
nose							x	x	x			x?		
mouth							x							
tooth	x	?		?					x			?		?
tongue	x	?	x	?	x	?	x	x	x	x	x	?	x	x
f. nail									x?					
leg					f			x						
knee									x					
arm						f								
belly									x					
neck									x					
breast	f			f			x	x	x					
heart														
liver	x		x		x				x					
	Sr Fu	Sr Wf	Sr No	Fu Wf	Fu No	Wf No	Kñ Be	Kñ Ba	Ba Be	Kñ Sr	Kñ Fu	Kñ Wf	Kñ No	Be Sr

	Be Fu	Be Wf	Be No	Ba Sr	Ba Fu	Ba Wf	Ba No	Kb Sr	Kb Fu	Kb Wf	Kb No	Kb Kñ	Kb Be	Kb Ba
I				x	x		x	f	f	x	f	f		f
you														
we														
this														
that														
who?														
what?														
not										?				
all														
many														
one														
two														
big										x				
long														
small														
woman														
man														
person														
fish														
bird														
dog														
louse												f		
tree	x		x	x	x		x						?	
seed														
leaf														
root														
bark	x		x	x	x		x							
skin		x?				x?								
meat														
blood														
bone														
grease														
egg		x				x				x		x	x	
horn														
tail														
feather		?				?				?		x	x	x
hair														
head		x	x			x	x			x	x	x	x	x
ear	x	x	x	x	x	x	x	x	x	x	x	x	x	x
eye	x	x	x	x	x	x	x	x	x	x	x	x	x	x
nose		x?				x?				x?		?	?	?
mouth														
tooth	?			?	?									
tongue	x	?	x	x	x	?	x	x	x	?	x	x	x	x
f. nail														
leg														
knee														
arm														
belly														
neck														
breast														
heart														
liver														
	Be Fu	Be Wf	Be No	Ba Sr	Ba Fu	Ba Wf	Ba No	Kb Sr	Kb Fu	Kb Wf	Kb No	Kb Kñ	Kb Be	Kb Ba

	Gb Kb	Gb Sr	Gb Fu	Gb Wf	Gb No	Gb Kñ	Gb Be	Gb Ba	Jo Gb	Jo Kb	Jo Sr	Jo Fu	Jo Wf	Jo No
I	x	f	f	x	f	f		f						
you					?									
we														
this														
that														
who?	?	?		f										
what?			f											
not	x	?		?										
all									f					
many														
one														
two	?				x?									
big	x			x										
long														
small									f					?
woman	x													
man	x													
person	x													
fish														
bird									f					
dog														
louse	x					f							?	?
tree									f					
seed														
leaf	x													
root														
bark											x	x		x
skin														
meat														
blood														
bone														
grease									f					
egg	x			x		x	x	?						
horn	x													
tail												f		
feather														
hair														
head	x			x	x	x	x	x	x	x			x	x
ear										x	x	x	x	x
eye	x	x	x	x	x	x	x	x	x	x	x	x	x	x
nose	x			x?		?	?	?						
mouth														
tooth											?	?	?	
tongue	?	?	?	?	?	?	?	?	?	x	x	x	?	x
f. nail														
leg														
knee														
arm	x			f	f									
belly				?					f					
neck	?													
breast										?				
heart														
liver		x	x		x				x		x	x		x
	Gb Kb	Gb Sr	Gb Fu	Gb Wf	Gb No	Gb Kñ	Gb Be	Gb Ba	Jo Gb	Jo Kb	Jo Sr	Jo Fu	Jo Wf	Jo No

	Jo Kñ	Jo Be	Jo Ba	Pj Gb	Pj Jo	Pj Kb	Pj Sr	Pj Fu	Pj Wf	Pj No	Pj Kñ	Pj Be	Pj Ba
I													
you													
we													
this													
that													
who?													
what?													
not				?		?	?		?				
all				f	f								
many						x?					x?		
one													
two											x	x	x
big							f	f	f				
long													
small													
woman													
man													
person	?	?	?								?	?	
fish													
bird								x		x	x	x	x
dog							x?			f	x?		
louse	f			f		f					f		
tree													
seed													
leaf													
root													
bark	x	x	x		x?		x?	x?		x?	x?	x?	x?
skin									x?		x?	x?	x?
meat											?	?	?
blood													
bone													
grease													
egg				x		x			x		x	x	?
horn													
tail											x	x	x
feather						x			x		x	x	x
hair													
head	x	x	x	x	x	x			x	x	x	x	x
ear	x	x	x		x	x	x	x	x	x	x	x	x
eye	x	x	x	x	x	x	x	x	x	x	x	x	x
nose				x?		x?			x?		x?	x?	x?
mouth											x	x	x
tooth					?		?	?	?		?	?	?
tongue	x	x	x	x?	x	x	x	x	x?	x	x	x	x
f. nail													
leg									x?				
knee													
arm													
belly													
neck								f					
breast	?	?	?		?	x?				?	x	x	x
heart							x						
liver				x	x		x	x		x	?		
	Jo Kñ	Jo Be	Jo Ba	Pj Gb	Pj Jo	Pj Kb	Pj Sr	Pj Fu	Pj Wf	Pj No	Pj Kñ	Pj Be	Pj Ba

	Sr Fu	Sr Wf	Sr No	Fu Wf	Fu No	Wf No	Kñ Be	Kñ Ba	Ba Be	Kñ Sr	Kñ Fu	Kñ Wf	Kñ No	Be Sr	Be Fu	Be Wf	Be No	Ba Sr	Ba Fu	Ba Wf	Ba No	Kb Sr	Kb Fu	Kb Wf	Kb No	Kb Kñ	Kb Be	Kb Ba	Gb Kb	Gb Sr	Gb Fu	Gb Wf	Gb No	Gb Kñ	Gb Be	Gb Ba	Jo Gb	Jo Kb	Jo Sr	Jo Fu	Jo Wf	Jo No	Jo Kñ	Jo Be	Jo Ba	Pj Gb	Pj Jo	Pj Kb	Pj Sr	Pj Fu	Pj Wf	Pj No	Pj Kñ	Pj Be	Pj Ba
drink	x								x																																										x?				
eat	x		x		x		x?															x	x		x				x																										
bite	x						x	x	x	x	x			x	x			x	x			x	x			x	x	x	x	x	x	f		x	x	x										x		x	x	x			x	x	x
see	x	f		f			x	x	x																																														
hear	x							x																					x																	f		f							
know	x								x											x?																																			
sleep	x						x			?	?			?	?														x																										
die			f						x																																														
kill	x						x	x	x																																												x	x	x
swim									x															?																						?			x?		?				
fly							x	x	x																				x										f																
walk									x																				x			f																					?		
come	x								x																																														
lie									x																							f																							
sit									?																																														
stand																																																							
give					x				x				?																																						f				
say					f		x	x	x																?												f																		
sun					x?				x														x?		x?				x		x?		x?				x?	x?		x?		x?									f				
moon									x																																														
star	x		x		x		x			x	x		x	x	x		x	x	x		x	x	x		x	x	x											?	?	?		?	?	?			?	x	x	x		x	x	x	
water									x																																														
rain	f	f	f	x?	x	x?		x		x	x	x?	x					x	x	x?	x								x										f	x	x?	x	x	x	x										
stone				f					x																																														
sand					x?				x																				?																										
earth																													f																										
cloud								?																																?															
smoke	?						x	x	x																												f											?	?	?			?	?	?
fire							x	x	x																				x																										
ash(es)	x?			?																									x?																										
burn									x																																							x?							
path	x																								?				?				?																						
hill																				?																																			
red			f						x																																					f									
short	x								x																?				x																								x	x	x
dark	x																										x		x						?											x?		x?						x?	
white	x								x																										x	x										x								x	x
black	x						x	x	x	x?	x?			x?	x?			x?	x?					x																									?	?			?	?	?
night																																																							
hot							x?	x?	x																						?								f														x?	x?	x?
cold	x						x	x	x																				x?																										
full									?														x?																									x?		?					
new	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								x																	x?		x?							
good		f							x																				x																								?		?
be bent					f				x																				x																	x		x							
dry																?														f	f																								
name								x																																													x?		x?
cognt ?	35	5	12	7	16	6	34	34	61	11	11	8	10	9	9	7	8	11	11	9	10	6	8	8	7	8	9	6	30	3	4	6	5	4	5	4	4	5	5	7	4	8	6	6	6	11	6	16	10	8	10	8	22	21	19
+ false	39	14	18	14	20	11	35	37	65	13	12	11	11	11	11	10	8	12	12	12	10	7	9	12	12	11	11	7	37	8	9	14	10	8	8	8	13	7	10	11	7	11	10	9	8	17	10	20	15	14	16	10	31	26	25
Sapir%	37	25	10	24	12	17	39	37	65	14	12	11	10	15	14	12	9	15	16	13	10	14	12	11	10	23	20	18	36	12	11	13	9	25	20	22	17	15	17	18	13	11	12	13	12	24	18	22	14	12	13	12	22	27	22
	Sr Fu	Sr Wf	Sr No	Fu Wf	Fu No	Wf No	Kñ Be	Kñ Ba	Ba Be	Kñ Sr	Kñ Fu	Kñ Wf	Kñ No	Be Sr	Be Fu	Be Wf	Be No	Ba Sr	Ba Fu	Ba Wf	Ba No	Kb Sr	Kb Fu	Kb Wf	Kb No	Kb Kñ	Kb Be	Kb Ba	Gb Kb	Gb Sr	Gb Fu	Gb Wf	Gb No	Gb Kñ	Gb Be	Gb Ba	Jo Gb	Jo Kb	Jo Sr	Jo Fu	Jo Wf	Jo No	Jo Kñ	Jo Be	Jo Ba	Pj Gb	Pj Jo	Pj Kb	Pj Sr	Pj Fu	Pj Wf	Pj No	Pj Kñ	Pj Be	Pj Ba

Appendix C: Proto-Cangin reconstructions

This appendix explains the Proto-Cangin reconstructions given in Figure 349 and Figure 357. In the second of these the modern forms are given in the figure itself, and for the first of these the modern forms are given in this appendix. Sources for the Cangin data are given in footnote 156 in chapter 6. Ndut and Palor are extremely similar, and might be considered a single language. Noon and Lehar could also be considered a dialect continuum. Soukka (2000) identifies three major dialect groups for Noon: Padee, Sawii, and the "Cangin" dialect spoken in the city of Thiès (*Cangin* being the name of the city in this dialect, whence also the name of the language family). The Noon data given here are from a Sawii dialect. The sound correspondences for the Cangin languages which are not entirely straightforward are:

	Noon	Lehar	Safen	Ndut	Palor
*h	Ø	Ø	Ø	h	x
*ɣ	h	h	h	Ø	Ø
*H	h	h	h	h	x
*x	k	k	k	h	x
*d [ð?]	s	s	s	l	l
*l	l	l	r (l)	l	l
*r	t (d)	t	t	l	l
*#ND	D (ND)	D	ND	D	D
*ND (else)	(N)D~N	D~N	ND~N	D~N	D~N
*u	o	o	o/u	u	u
*i	e	e	e/i	i	i
*oɣ	oh	oh	oh	a	a

Notes:

- *r is only found intervocalically. 'Tree' seems to have *r, but it develops irregularly.
- *x and *d do not occur word- or root-initially (it seems that already in Proto-Cangin they had merged with *l and *k in this position).
- /h/ from all sources is often deleted word-internally in all modern Cangin languages.
- Noon *u, *i > /u, i/ in non-initial syllables (rather than /o, e/)
- Noon, Lehar /ɓ, ɗ, ƴ/ = [wʔ, ʔ, yʔ] in coda position, [w, r, y] intervocalically, [ɓ, ɗ, ƴ] elsewhere
- Ndut, Palor /ɓ, ɗ, ƴ/ = [p, t, c] word-finally. D'Alton often gives word-final /b, d, j/ for *ɓ, *ɗ, *ƴ.
- In all but Safen and Thiès Noon, original prenasalized stops are pure nasals in coda position, and voiced egressive stops in onsets. These can be analyzed as voiced stops underlyingly. In Thiès Noon and Safen they are prenasalized in onset position, and nasals in coda position.
- Proto-Cangin had an ATR distinction in only the high vowels. In Safen this contrast has been lost.

All Cangin languages make use of noun classes, realized as prefixes on agreeing determiners and adjectives (e.g. Noon *kedik-k-ii ki-looƴ-k-ii* ‘the short tree,’ *pabi-f-ii fi-looƴ-f-ii* ‘the short chicken’). These are also fossilized as prefixes on some nouns (e.g. Noon *koɗ k-*, pl. *toɗ t-* ‘pestle’). The Proto-Cangin noun class system is tentatively reconstructed as follows:

sg.	pl.	note
y-	ɓ-	personal
w-	c-	default
m-		liquids
n-		animals, misc.
f-		animals, misc.
k-	t-	
p-		
nj-		diminutive
ku-	tu-	diminutive

The infinitive prefix is *ki-*, also used for languages. Of the singular classes Ndut-Palor retains only *f-*, *k-*, *m-* and the default class (with no prefix), and of the plural classes only *ɓ-* and *y-* (from **c-*, realized as gemination of a preceding consonant in Ndut). Safen has lost *p-* and plural *t-*, as well as the diminutives. There is evidence that most if not all of these prefixes were CV-, but the vowel is difficult to recover for each class, and shows evidence of alternation based on the root vowel already in Proto-Cangin. Synchronically, class is marked mainly in agreement, though the prefixes can be found fossilized on a number of nouns. The proto-class **n-* does not survive in any modern language, but is hypothesized based on the existence of a number of *ND-initial nouns, most of which are animals. Only a couple of *ND-initial verbs can be reconstructed, and thus it seems that roots did not begin with prenasalized stops. Thus the nouns with initial prenasalized stops likely contained the class prefix **n-*. In Noon, Lehar, and Safen, an element *n-* is used as a hiatus filler in a number of environments, including those in which the class prefix **n-* would have appeared historically (e.g. Noon *gumuu-n-ii* ‘the hyena’). Mbodj analyzes this *n-* as a synchronic noun class in Safen. In Safen there are two class prefixes that are not reflected in the reconstructed system: *r-* and *nd-*. Unlike all other classes, these are not fossilized on any nouns. The *r-* class contains few nouns, including some Sereer borrowings (e.g. *salma r-* = Sereer *a-salma al-* ‘staff sp.’), but might also be the irregular development of the **t-* class based on *toho r-* (cf. Padee Noon *tohoo t-*). The *nd-* class is small and seems to contain only borrowings.

Notes on the forms given on the next page:

- More often than not, where a word is not given it is not found in the available sources (rather than the language using an unrelated word)
- Noun class markers (found in agreement) are given after the noun. Where no noun class is given, the noun is in the “default” class (**y-* for humans and **w-* for non-humans, with no agreement marker on the suffixed determiner)
- Noun classes are not available for Lehar (nor for ‘cow,’ ‘horse,’ and ‘finger’ in Safen)
- For ‘leaf/bark’: Noon *tọoɓ* ‘leaf,’ *oɓ* ‘bark,’ also Padee Noon *puuɓ p-* ‘leaf’; Safen ‘bark’; Ndut ‘leaf’
- For ‘hold in teeth’: Noon *ŋaaɓ* ‘take big bite,’ Safen *ŋaɓ* ‘put in mouth’

	Noon	Lehar	Safen	Ndut	Palor	
*ɣi̟d/ɣad	has	kuu-koas	has	i̟l	’i̟l	‘eye’
*pe-ɗem	peɗim p-	pi̟ri̟m	peɗem	pereem	pereem	‘tongue’
*ñam	ñam	ñam	ñaam	ñam	ñam	‘eat’
*ɓi̟iɓ	ɓi̟iɓ	ɓi̟iɓ	(w)ɓip	ɓi̟iɓ	ɓi̟iɓ	‘breast’
*nixiid	nikiis		nikis	iniil	iniil	‘four’
*ɓuh		ɓu̟u	ɓuh f-	ɓuh f-	ɓux f-	‘dog’
*loox	look	look	rook	loo	loo	‘intestine’
*paɓ	paɓ		paɓ	(d)pab	pap	‘wing’
*-noɣ	enoh f-	enoh	’inoh	fana f-	fana’ f-	‘cow’
*ñi̟ind	ñi̟id-uk	ñi̟id-uk			ñi̟id~ñi̟in	‘blow nose’
*hoɗ	oɗ	oɗ	’oɗ		xoɗ	‘pound’
*kaɓaɓ ?		kaaɓ ‘cheek’	kaɓaɓ k-		kabaap	‘jaw’
*has	as	as	’as	has	xas	‘new’
*ɣot	hot	hot	hot	ot~ol-	od~ol-	‘see’
*hon	on	on	’on	(d)hon	xon	‘swallow’
*hac	ac	ac	’ac	hac	xac	‘bury’
*li̟m	li̟m	li̟m	(w)rim		li̟m	‘bear child’
*ɣam	ham	ham				‘dance’
*ŋaɓ	ŋaaɓ	ŋaɓ	ŋaɓ	ŋaɓ		‘hold in teeth’
*kV-(h)i̟d	ki̟is k-	ki̟is	kiis k-	ki̟il	ki̟il	‘year’
*ki-rik	kedik k-	kedek	kiɗig k-	kilik	kilik k-	‘tree’
*sel	sel	sel	sel			‘bird’
*hu̟umb	u̟ub~u̟um		uumb			‘bury’
*mi̟n	mi̟n		min	mi̟n	min	‘be able’
*mand	mad~man	man		mad~man	mad~man	‘resemble’
*luH-	looƴ (lohoƴ)	looƴ	(s)rohoƴ	(d)luh	lux	‘be short’
*huɓ	to̟oɓ t-, oɓ	po̟o	(w)’op	huɓ		‘leaf/bark’
*noɣ	noh	noh	noh	(d)na’	na’	‘sun’
*nuf	nof	nof	(w)nœf	nuf	nuf	‘ear’
*ɣaf	haf	haf	haf	’af	’af	‘head’
*keeñ	keeñ	keeñ	keeñ k-	(d)keeñ		‘liver’
*Hul	hol	ol	hor	hul	xul	‘star’
*toɓ	toɓ	toɓ	toɓ	tooɓ		‘rain’
*kuɗ	koɗ k-	koɗ		kuɗ k-	kuɗ k-	‘pestle’
*pe	pe’ f-	peɗ	peh f-	pe f-	pe f-	‘goat’
*li̟il	li̟il	li̟il		li̟il	li̟il	‘cloth/rag’
*ɓoɣ	ɓoh	ɓoh	ɓoh	ɓa	ɓa’	‘baobab’
*kun	jokun j-	jokon	ndukun	kun	kun	‘finger’
*ti̟s	tes	ti̟s	(s)tisoh	(d)ti̟s	ti̟s	‘sneeze’
*ñi̟iñ	ñi̟iñ	ñi̟iñ	ñiñoh f-	(d)ñi̟iñ f-	ñi̟in f-	‘ant’
*koɗ	koɗ		koɗ	koɗ	kod	‘rear/raise’
*kV-(C)u̟m	ku̟um k-	ku̟um		(d)ku̟um k-	ku̟um k-	‘honey’
*pani̟s	pe̟ni̟s f-	pa̟ni̟s	panis	pa̟ni̟s f-		‘horse’
*-i̟ɗ	-i̟ɗ	-i̟ɗ	-iɗ	-i̟ɗ	-i̟ɗ	causative
*-ox	-uk	-ok	-uk	-oh	-ox	anticausative
*-i̟s	-i̟s	-i̟s	-is	-i̟s	-i̟s	reversive
*-ɗii	-ɗii		-ɗi			negative

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