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A Historical Account of the Fula and Sereer Consonant Mutation and Noun Class Systems

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A Historical Account of the Fula and Sereer Consonant Mutation and Noun Class Systems

The two related languages of Fula (also Fulfulde, Peul) and Sereer (also Serer, Seereer) are well-known for their systems of initial consonant alternation, or “mutation,” by which the initial consonant of both nominal and verbal roots is dependent on its morphological environment. For example:

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
</tr>
</thead>
<tbody>
<tr>
<td>a xaw-a</td>
<td>‘o haw-ii</td>
</tr>
<tr>
<td>a nqaw-a</td>
<td>‘be kaw-ii</td>
</tr>
<tr>
<td>o-koor</td>
<td>gor-ko</td>
</tr>
<tr>
<td>goor</td>
<td>wor-ɓe</td>
</tr>
<tr>
<td>fo-ngoor</td>
<td>ngor-koň</td>
</tr>
</tbody>
</table>

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 arose in each language. I will begin by examining the mutation systems synchronically. With the empirical facts established, I will propose 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 hypothesized to have taken place in each language. Finally, I will propose a preliminary synchronic analysis for both languages guided by these historical facts, which aims to more elegantly account for the observed mutation patterns in each language.

Specifically, I propose that the proto-language marked noun classes morphologically with a set of C₁V(C₂) proclitic markers. Depending on the identity of C₂, 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 the proto-language, despite the fact that similar mutation systems exist in the surrounding related 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, often yielding rather different outcomes. After the sound changes of nasalization and fortition operated in Fula, the proclitic noun class markers became suffixes, whereas in Sereer, they remained in pre-nominal position, but underwent a great deal of erosion.

1 Sources

My principal source for the Sereer data is El-Hadji Malick Loum, a native speaker of the Saalum (Saloum) dialect. Data on the Siin (Sine) dialect comes from Crétois’s (1972-77) multi-volume dictionary, as well as McLaughlin’s (1994) dissertation. 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 (2000).

2  Synchronic background
2.1 Phoneme Inventories

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

<table>
<thead>
<tr>
<th>labial</th>
<th>coronal</th>
<th>palatal</th>
<th>velar</th>
<th>glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>egressive stop</td>
<td>voiceless</td>
<td>p</td>
<td>t</td>
<td>c</td>
</tr>
<tr>
<td>voiced</td>
<td>b</td>
<td>d</td>
<td>j</td>
<td>g</td>
</tr>
<tr>
<td>continuant</td>
<td>voiceless</td>
<td>f</td>
<td>s</td>
<td>h</td>
</tr>
<tr>
<td>voiced</td>
<td>w</td>
<td>r</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>implosive stop</td>
<td>voiceless</td>
<td>ɓ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>ɗ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prenasalized 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></td>
</tr>
<tr>
<td>lateral continuant</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: 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], <y’> = [ɭ], <ñ> = [ɲ]. The prenasalized stops are all homorganic. For convenience, the glottal stop will occasionally be written as <ʔ> in this paper. 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].

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

<table>
<thead>
<tr>
<th>labial</th>
<th>coronal</th>
<th>palatal</th>
<th>velar</th>
<th>uvular</th>
<th>glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>egressive stop</td>
<td>voiceless</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
</tr>
<tr>
<td>voiced</td>
<td>b</td>
<td>d</td>
<td>j</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>continuant</td>
<td>voiceless</td>
<td>f</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>w</td>
<td>r</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>implosive stop</td>
<td>voiceless</td>
<td>ɓ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>ɗ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prenasalized stop</td>
<td>mb</td>
<td>nd</td>
<td>nj</td>
<td>ng</td>
<td></td>
</tr>
<tr>
<td>nasal</td>
<td>m</td>
<td>n</td>
<td>ñ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lateral continuant</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Consonant phoneme inventory of Sereer
The orthographical notes regarding Fula are true also for Sereer. In addition, \( <x> = [\chi] \), and \( <\text{nq}> = [\text{NG}] \). 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 Nominka dialect lacks the distinction between the voiced and voiceless implosives, and has merged /ng/ and /\text{nq}/ to /ng/.

The languages share a simple vowel system consisting of five qualities, /a, e, i, o, u/, all with contrasting long and short versions, for a total of ten vowel phonemes.

Both languages exhibit systems of initial consonant mutation (ICM), in which the initial consonant of a root can vary depending on its morphological environment. These systems will be explored in detail below.

### 2.2 Fula initial consonant mutation

#### 2.2.1 Basic alternations

Initial consonant mutation in Fula involves changes in continuancy and nasality. The ICM system is generally schematized as a set of three consonant “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.”

<table>
<thead>
<tr>
<th>Grade</th>
<th>Voiceless</th>
<th>Voiced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lab. pal. vel.</td>
<td>cor. lab. vel. pal.</td>
</tr>
<tr>
<td>Continuant (I)</td>
<td>f s h r w /\text{w/y} y</td>
<td></td>
</tr>
<tr>
<td>Stop (II)</td>
<td>p c k d b g j</td>
<td></td>
</tr>
<tr>
<td>Nasal (III)</td>
<td>p c k nd mb ng nj</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3: The basic ICM system of Fula*

Only the consonants connected with a line alternate with each other; 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 /\text{ʔ}~/g~ng before /a/. All consonants not given in Figure 3 (/l/, /t/, nasals, and implosives) do not participate in mutation, 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 morphological environment. Mutations are found 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.
<table>
<thead>
<tr>
<th>singular</th>
<th>plural</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>reu</td>
<td>ndew</td>
<td>‘follow’</td>
</tr>
<tr>
<td>war</td>
<td>mbar</td>
<td>‘kill’</td>
</tr>
<tr>
<td>fen</td>
<td>pen</td>
<td>‘lie’</td>
</tr>
<tr>
<td>socc</td>
<td>cocc</td>
<td>‘scrub’</td>
</tr>
<tr>
<td>yolb</td>
<td>njolb</td>
<td>‘be loose’</td>
</tr>
<tr>
<td>‘and’</td>
<td>ngand</td>
<td>‘know’</td>
</tr>
<tr>
<td>haad</td>
<td>kaad</td>
<td>‘be bitter’</td>
</tr>
</tbody>
</table>

*Figure 4: Fula verbal number mutation*

In addition, relative forms of verbs require grade III, unless the subject agreement marker is preposed and singular (in effect, only 3rd person singular relative forms do not trigger mutation to grade III, though the exact conditions on mutation in relative verbs differs slightly by dialect). For example: *mi war-ii* ‘I have come’ vs. *nde ngaru mi* ‘when I came’ (from De Wolf 1995: xl; Gombe dialect). These two morphological triggers (subject number 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. 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 Arnott 1970: 88 and De Wolf 1995: xxxii) 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.

---

1 Throughout this paper, 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 †*socc*. 

6
<table>
<thead>
<tr>
<th>Zero</th>
<th>Continuant</th>
<th>Stop</th>
<th>Nasal</th>
<th>Semantics</th>
<th>Grade</th>
<th>Dialect</th>
</tr>
</thead>
<tbody>
<tr>
<td>-o</td>
<td>-jo / -wo</td>
<td>-dɔ / -ko</td>
<td>-dɔ</td>
<td>person</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>-ɓe</td>
<td>-ɓe / -’en</td>
<td>-ɓe</td>
<td>-ɓe</td>
<td>person pl.</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>-el</td>
<td>-yel</td>
<td>-gel</td>
<td>-ngel</td>
<td>dimin.</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>-al</td>
<td>-hɔl</td>
<td>-kal</td>
<td>-kal</td>
<td>dimin.</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>-um</td>
<td>-yum</td>
<td>-gum</td>
<td>-ngum</td>
<td>dimin.</td>
<td>II N</td>
<td></td>
</tr>
<tr>
<td>-oñ</td>
<td>-hoñ</td>
<td>-koñ</td>
<td>-koñ</td>
<td>dimin. pl.</td>
<td>III</td>
<td>N</td>
</tr>
<tr>
<td>-a</td>
<td>-wa</td>
<td>-ga</td>
<td>-nga</td>
<td>augm.</td>
<td>III N</td>
<td>P</td>
</tr>
<tr>
<td>-ii</td>
<td>-yii</td>
<td>-giı</td>
<td>-ngiı</td>
<td>augm.</td>
<td>III P</td>
<td></td>
</tr>
<tr>
<td>-o</td>
<td>-ho</td>
<td>-ko</td>
<td>-ko</td>
<td>augm. pl.</td>
<td>III N</td>
<td></td>
</tr>
<tr>
<td>-re / -de</td>
<td>-re</td>
<td>-de</td>
<td>-nde</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ri / -di</td>
<td>-ri / -di</td>
<td>-di</td>
<td>-ndi</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-a²</td>
<td>-wa</td>
<td>-ba</td>
<td>-mba</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-e</td>
<td>-ye</td>
<td>-ge</td>
<td>-nge</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-o</td>
<td>-wo</td>
<td>-go</td>
<td>-ngo</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-u</td>
<td>-wu</td>
<td>-gu</td>
<td>-ngu</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-al</td>
<td>-wal</td>
<td>-gal</td>
<td>-ngal</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ol</td>
<td>-wol</td>
<td>-gol</td>
<td>-ngol</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-a</td>
<td>-ha</td>
<td>-ka</td>
<td>-ka</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-i</td>
<td>-hi</td>
<td>-ki</td>
<td>-ki</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-o</td>
<td>-ho</td>
<td>-ko</td>
<td>-ko</td>
<td>leaves I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ol</td>
<td>-hol</td>
<td>-kol</td>
<td>-kol</td>
<td>II N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-am</td>
<td>-jam</td>
<td>-dɔm</td>
<td>-dɔm</td>
<td>liquids III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-um</td>
<td>-jum</td>
<td>-dũm</td>
<td>-dũm</td>
<td>II N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-e</td>
<td>-je</td>
<td>-dɛ</td>
<td>-dɛ</td>
<td>pl. II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-i</td>
<td>-ji</td>
<td>-dĩ</td>
<td>-dĩ</td>
<td>pl. II</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5: 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. Historically, these suffix grades arose due to interactions between the final segment of the stem and the initial segment of the suffix. Figure 6 shows examples of different nouns and adjectives in the ngu class, with their corresponding plurals in the di class, taking different grades of these same suffixes.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
<th>suffix grade</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>mol-u</td>
<td>mol-i</td>
<td>zero</td>
<td>‘foal’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>balee-wu</td>
<td>balee-ji</td>
<td>continuant</td>
<td>‘black’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ngor-gu</td>
<td>gor-di</td>
<td>stop</td>
<td>‘male’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ndulu-ngu</td>
<td>dulu-di</td>
<td>nasal</td>
<td>‘wild pig’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: Suffix grades of ndu and di

---

² Gombe has -ga, -nga for -ba, mba in this class. See section 4.10.2 for an explanation.
While we will make reference to these suffix grades, a comprehensive account of these alternations will not be given here, as they arose historically after the changes that led to initial consonant mutation.

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-dam* dam ‘the salt,’ *jaaw-ngal* ngal ‘the guinea fowl’). The one exception is the article for the singular personal noun class ‘*o* (not †*ɗ*). Fula noun classes are referred to by these determiners; thus, the liquid class is the *dam* 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 no matter what grade is called for.

<table>
<thead>
<tr>
<th><em>ndi</em> nouns (grade III)</th>
<th><em>ngal</em> nouns (grade II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ngaa-ri ‘bull’</td>
<td>gerto-gal ‘fowl’</td>
</tr>
<tr>
<td>njum-ri ‘honey’</td>
<td>jardu-gal ‘pipe’</td>
</tr>
<tr>
<td>kaa-ndi ‘lion’</td>
<td>koy-ngal ‘foot’</td>
</tr>
<tr>
<td>coo-ndi ‘powder’</td>
<td>cay-al ‘bamboo fence’</td>
</tr>
<tr>
<td>ndoo-ndi ‘ash’</td>
<td>dew-gal ‘marriage’</td>
</tr>
<tr>
<td>mbom-ri ‘girl’</td>
<td>baas-al ‘need’</td>
</tr>
<tr>
<td>ley-di ‘earth’</td>
<td>liw-al ‘hawk’</td>
</tr>
</tbody>
</table>

*Figure 7: 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.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
<th>dimin. sg.</th>
<th>dimin. pl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>hon-ndu</td>
<td>koll-i</td>
<td>koll-el</td>
<td>koll-oñ</td>
</tr>
<tr>
<td>gor-ko</td>
<td>wor-be</td>
<td>gor-gel</td>
<td>ngor-koñ</td>
</tr>
<tr>
<td>gerl-al</td>
<td>gerl-e</td>
<td>gerl-el</td>
<td>ngerl-oñ</td>
</tr>
<tr>
<td>bal-ol</td>
<td>bal-i</td>
<td>bal-el</td>
<td>mbal-oñ</td>
</tr>
<tr>
<td>cuur-ki</td>
<td>cuur-dë</td>
<td>cuur-gel</td>
<td>cuur-koñ</td>
</tr>
<tr>
<td>yees-o</td>
<td>jees-e</td>
<td>jees-el</td>
<td>njees-oñ</td>
</tr>
<tr>
<td>sekk-ere</td>
<td>cekk-e</td>
<td>cekk-el</td>
<td>cekk-oñ</td>
</tr>
</tbody>
</table>

*Figure 8: 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.

<table>
<thead>
<tr>
<th>fully-mutating noun</th>
<th>sg. nde class (I)</th>
<th>pl. de class (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>waan-ere</td>
<td>baañ-e</td>
<td>‘cloud’</td>
</tr>
<tr>
<td>rott-ere</td>
<td>dott-e</td>
<td>‘backside’</td>
</tr>
<tr>
<td>yah-re [yaare]</td>
<td>jah-e</td>
<td>‘scorpion’</td>
</tr>
<tr>
<td>yit-ere</td>
<td>git-e</td>
<td>‘eye’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>partially-mutating noun</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>barma-nde</td>
<td>barma-ɗe</td>
<td>‘wound’</td>
</tr>
<tr>
<td>daa-nde</td>
<td>daa-ɗe</td>
<td>‘neck’</td>
</tr>
<tr>
<td>jaa-nde</td>
<td>jaa-ɗe</td>
<td>‘grass for cattle’</td>
</tr>
<tr>
<td>gaaña-nde</td>
<td>gaaña-ɗe</td>
<td>‘injury’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>fully-mutating verb</th>
<th>sg. verb (I)</th>
<th>pl. verb (III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>war</td>
<td>mbar</td>
<td>‘kill’</td>
</tr>
<tr>
<td>reen</td>
<td>ndeen</td>
<td>‘supervise’</td>
</tr>
<tr>
<td>yaaj</td>
<td>njaaaj</td>
<td>‘be wide’</td>
</tr>
<tr>
<td>’aam</td>
<td>ngaam</td>
<td>‘be lazy’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>partially-mutating verb</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>bacc</td>
<td>mbacc</td>
<td>‘descale’</td>
</tr>
<tr>
<td>dill</td>
<td>ndill</td>
<td>‘move/vibrate’</td>
</tr>
<tr>
<td>jat</td>
<td>njat</td>
<td>‘stretch’</td>
</tr>
<tr>
<td>gukk</td>
<td>ngukk</td>
<td>‘reject’</td>
</tr>
</tbody>
</table>

Figure 9: Fully- and partially-mutating voiced-initial Fula roots

The nouns in Figure 9 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 are known as 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.

<table>
<thead>
<tr>
<th>fully-mutating root</th>
<th>sg.</th>
<th>pl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>fayan-ɗe</td>
<td>payan-e</td>
<td>‘cooking pot’</td>
</tr>
<tr>
<td>(no voiceless coronal continuant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ced-ɗo</td>
<td>seb-ɓe</td>
<td>‘warrior’</td>
</tr>
<tr>
<td>huur</td>
<td>kuur</td>
<td>‘cover (v.)’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>partially-mutating root</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>putt-ere</td>
<td>putt-e</td>
<td>‘fart/lie (n.)’</td>
</tr>
<tr>
<td>taf</td>
<td>taf</td>
<td>‘forge (v.)’</td>
</tr>
<tr>
<td>caɓ</td>
<td>caɓ</td>
<td>‘catch (v.)’ (Nigerian dialects)</td>
</tr>
<tr>
<td>kuur</td>
<td>kuur</td>
<td>‘separate (v.)’</td>
</tr>
</tbody>
</table>

Figure 10: 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, it can be grouped in with all other voiceless-stop initial partially-mutating roots. No corresponding fully-mutating coronal roots exist simply because no voiceless coronal continuant exists in the language. 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, creating eight additional mutation series, as follows:

<table>
<thead>
<tr>
<th>Grade I</th>
<th>Voiceless</th>
<th>Voiced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lab.</td>
<td>cor.</td>
</tr>
<tr>
<td>Grade I</td>
<td>p</td>
<td>t</td>
</tr>
<tr>
<td>Grade II</td>
<td>p</td>
<td>t</td>
</tr>
<tr>
<td>Grade III</td>
<td>p</td>
<td>t</td>
</tr>
</tbody>
</table>

*Figure 11: 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. 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 with regards to 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.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulaar</td>
<td>‘ar ngar ‘come’</td>
</tr>
<tr>
<td>Niger</td>
<td>war mbar ‘come’</td>
</tr>
<tr>
<td>Gombe</td>
<td>war ngar ‘come’</td>
</tr>
</tbody>
</table>

*Figure 12: Mutations arising from *ɣ~g~ng*

These differences arose due to the development of the earlier voiced velar continuant *ɣ* (see section 4.10.2).

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-do* ‘person’ is either *yim-be* or *him-be*. 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 initial consonant mutation**

2.3.1 **Basic alternations**

As in Fula, the Sereer ICM 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.

<table>
<thead>
<tr>
<th>Grade</th>
<th>lab.</th>
<th>cor.</th>
<th>pal.</th>
<th>vel.</th>
<th>uvu.</th>
<th>implosive</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>b</td>
<td>f</td>
<td>w</td>
<td>d</td>
<td>r</td>
<td>j (s)</td>
</tr>
<tr>
<td>II</td>
<td>p</td>
<td>p</td>
<td>b</td>
<td>t</td>
<td>t</td>
<td>c</td>
</tr>
<tr>
<td>III</td>
<td>mb</td>
<td>mb</td>
<td>mb</td>
<td>nd</td>
<td>nd</td>
<td>nj</td>
</tr>
</tbody>
</table>

*Figure 13: The basic ICM system of Sereer (Siin dialect)*

Some things to note: 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 typologically rare set of 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.

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.

<table>
<thead>
<tr>
<th>singular</th>
<th>plural</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>hum</td>
<td>ngum</td>
<td>‘tie’</td>
</tr>
<tr>
<td>fool</td>
<td>mbool</td>
<td>‘jump’</td>
</tr>
<tr>
<td>war</td>
<td>mbar</td>
<td>‘kill’</td>
</tr>
<tr>
<td>reef</td>
<td>ndeef</td>
<td>‘follow’</td>
</tr>
<tr>
<td>bet</td>
<td>mbet</td>
<td>‘surprise’</td>
</tr>
<tr>
<td>gar</td>
<td>ngar</td>
<td>‘come’</td>
</tr>
<tr>
<td>daan</td>
<td>faan</td>
<td>‘sleep’</td>
</tr>
</tbody>
</table>

*Figure 14: Sereer verbal mutation*

Unlike in Fula, relativization has no effect on mutation—subject number agreement is the only factor.
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. Siin lacks the augmentative gi- class, and has only the variant a- of the ga- augmentative, while Saalum lacks the fo- liquid class.

<table>
<thead>
<tr>
<th>Sg. Noun</th>
<th>Adj Grade</th>
<th>Determiner</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-</td>
<td>o-</td>
<td>II</td>
<td>ox-e</td>
</tr>
<tr>
<td>Ø-</td>
<td>Ø-</td>
<td>III</td>
<td>n-e</td>
</tr>
<tr>
<td>Ø-</td>
<td>fa-</td>
<td>any(n.)/III(adj.)</td>
<td>f-e(e)/fan-e³</td>
</tr>
<tr>
<td>fa-³</td>
<td>fa-</td>
<td>III</td>
<td>f-e(e)/fan-e</td>
</tr>
<tr>
<td>Ø-</td>
<td>Ø-</td>
<td>I</td>
<td>l-e</td>
</tr>
<tr>
<td>o-</td>
<td>o-</td>
<td>I</td>
<td>ol-e</td>
</tr>
<tr>
<td>a-</td>
<td>a-</td>
<td>II</td>
<td>al-e</td>
</tr>
<tr>
<td>a-</td>
<td>a-</td>
<td>III(n.)/II(adj.)</td>
<td>al-e augment.</td>
</tr>
<tr>
<td>(g)a-</td>
<td>a-</td>
<td>III</td>
<td>al-e</td>
</tr>
<tr>
<td>gi-</td>
<td>a-</td>
<td>III</td>
<td>al-e</td>
</tr>
<tr>
<td>o-</td>
<td>o-</td>
<td>III</td>
<td>ong-e/onq-e⁴</td>
</tr>
<tr>
<td>fo-</td>
<td>(f)o-</td>
<td>I</td>
<td>ol-e</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pl. Noun</th>
<th>Grade</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø-</td>
<td>Ø-</td>
<td>I</td>
<td>w-e</td>
</tr>
<tr>
<td>Ø-</td>
<td>Ø-</td>
<td>II</td>
<td>k-e</td>
</tr>
<tr>
<td>a-</td>
<td>a-</td>
<td>II</td>
<td>ak-e</td>
</tr>
<tr>
<td>xa-</td>
<td>xa-</td>
<td>II</td>
<td>ax-e</td>
</tr>
<tr>
<td>(g)a-</td>
<td>a-</td>
<td>III</td>
<td>ak-e augment.</td>
</tr>
<tr>
<td>gi-</td>
<td>a-</td>
<td>III</td>
<td>ak-e augment.</td>
</tr>
<tr>
<td>fo-</td>
<td>fo-</td>
<td>III</td>
<td>n-e</td>
</tr>
</tbody>
</table>

Figure 15: Noun class system of Sereer

Prefixes appear on both nouns and adjectives, 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. There are also a set of enclitic determiners which agree in noun class with the noun they follow. In some cases, these bear a resemblance to the noun class prefixes, 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 NP, not the noun itself. These determiners are bimorphemic, consisting of a noun class prefix followed by a vowel-initial determiner root. In Figure 15, the definite determiner -e is given, but there are a number of other determiner roots (e.g. -aa ‘that,’ -um ‘which,’ -aaga ‘yonder’). As in Fula, classes are referred to by their definite determiner (e.g. the personal

---

3 Nouns in the fe class do not truly have a prefix, but the prefix fa- has been fossilized as part of the stem in some of them (e.g. fañilik ‘elephant’ and fanqon ‘death’). The form of the determiner is fee in Siin, and fe in Saalum; fane is used in Nominka and rarely in Saalum.

4 The Siin dialect described by McLaughlin has onqe, while all other dialects have onge, including Siin as described in Crétois.
singular is the oxe class), but the augmentative, liquid, and diminutive plural classes do not have unique determiners, and thus must be referred to by their prefixes, gi-, ga-, and fo- (further disambiguated as ‘fo- liquid’ and ‘fo- diminutive’).

Examples from each basic class (i.e. not diminutive or augmentative) of an NP containing a noun, the adjective ran ‘white’ and the definite determiner are given below:

<table>
<thead>
<tr>
<th>sg. noun</th>
<th>adj.</th>
<th>det.</th>
<th>pl. noun</th>
<th>adj.</th>
<th>det.</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-tew</td>
<td>o-tan</td>
<td>oxe</td>
<td>rew</td>
<td>ran</td>
<td>we</td>
</tr>
<tr>
<td>nduus</td>
<td>ndan</td>
<td>ne</td>
<td>tuus</td>
<td>tan</td>
<td>ke</td>
</tr>
<tr>
<td>saate</td>
<td>fa-ndan</td>
<td>fe</td>
<td>caate</td>
<td>tan</td>
<td>ke</td>
</tr>
<tr>
<td>xomb</td>
<td>ran</td>
<td>le</td>
<td>a-qomb</td>
<td>a-tan</td>
<td>ake</td>
</tr>
<tr>
<td>o-box</td>
<td>o-ran</td>
<td>ole</td>
<td>xa-Þox</td>
<td>xa-tan</td>
<td>axe</td>
</tr>
<tr>
<td>a-caang</td>
<td>a-tan</td>
<td>ale</td>
<td>a-caang</td>
<td>a-tan</td>
<td>ake</td>
</tr>
<tr>
<td>a-ngas</td>
<td>a-tan</td>
<td>ale</td>
<td>kas</td>
<td>tan</td>
<td>ke</td>
</tr>
<tr>
<td>o-nqool</td>
<td>o-ndan</td>
<td>onge</td>
<td>xa-qool</td>
<td>xa-tan</td>
<td>axe</td>
</tr>
<tr>
<td>fo-jem</td>
<td>(f)o-ran</td>
<td>ole</td>
<td>xa-cem</td>
<td>xa-tan</td>
<td>axe</td>
</tr>
</tbody>
</table>

‘the white woman’
‘the white knife’
‘the white village’
‘the white turtle’
‘the white dog’
‘the white heron’
‘the white well’
‘the white moon’
‘the white salt’

*Figure 16: 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 (onge) 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.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
<th>dimin. sg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>daɓ</td>
<td>a-taɓ</td>
<td>o-ndaɓ</td>
</tr>
<tr>
<td>o-koor</td>
<td>goor</td>
<td>o-ngoor</td>
</tr>
<tr>
<td>wil</td>
<td>a-bil</td>
<td>o-mbil</td>
</tr>
<tr>
<td>o-ɓay</td>
<td>xa-ɓay</td>
<td>o-ɓay</td>
</tr>
<tr>
<td>a-baɓ</td>
<td>a-baɓ</td>
<td>o-mbaɓ</td>
</tr>
<tr>
<td>mbaal</td>
<td>paal</td>
<td>o-mbaal</td>
</tr>
<tr>
<td>muus</td>
<td>muus</td>
<td>o-muus</td>
</tr>
</tbody>
</table>

‘navel’
‘man’
‘hair’
‘hand/arm’
‘tree hollow’
‘sheep’
‘cat’

*Figure 17: 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 9 and Figure 11), 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 10).
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. That said, taken as a whole these roots are statistically under-represented in the lexicon, especially in noun classes which require grade I. Nonetheless, it is necessary to add the following five mutation series to account for these roots:

<table>
<thead>
<tr>
<th>Grade I</th>
<th>p</th>
<th>t</th>
<th>c</th>
<th>k</th>
<th>q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade II</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td>q</td>
</tr>
<tr>
<td>Grade III</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td>q</td>
</tr>
</tbody>
</table>

The alternative would be to lexically specify these roots as exceptionally non-mutating.

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 Wolof.

2.3.5 Diminutive and augmentative mutation

As seen in Figure 18, 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.

<table>
<thead>
<tr>
<th>sg.</th>
<th>diminutive</th>
<th>augmentative</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-kaas ole</td>
<td>o-ngaas onge</td>
<td>ga-ngaas ale</td>
</tr>
<tr>
<td>pis ne</td>
<td>o-mbis onge</td>
<td>ga-mbis ale</td>
</tr>
<tr>
<td>o-cax ole</td>
<td>o-njax onge</td>
<td>ga-njax ale</td>
</tr>
<tr>
<td>teex ne</td>
<td>o-ndeex onge</td>
<td>ga-ndeex ale</td>
</tr>
<tr>
<td>o-qir ole</td>
<td>o-nqir onge</td>
<td>ga-nqir ale</td>
</tr>
</tbody>
</table>

We must therefore acknowledge the existence of distinct mutation patterns that operate only in the case of diminutives and augmentatives.
2.3.6 Dialect differences and mutation involving /s/

As seen in Figure 13, the consonant /s/ sometimes takes part in a mutation series s~c~nj, and in other cases 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/.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>soble le</td>
<td>soble ke</td>
<td>‘onion’</td>
</tr>
<tr>
<td>suk le</td>
<td>a-suk ake</td>
<td>‘male animal’</td>
</tr>
<tr>
<td>siñeel le</td>
<td>siñeel ke</td>
<td>‘porcupine’</td>
</tr>
<tr>
<td>saax le</td>
<td>a-caax ake</td>
<td>‘land’</td>
</tr>
<tr>
<td>saate fe</td>
<td>caate ke</td>
<td>‘town’</td>
</tr>
<tr>
<td>saafu le</td>
<td>caafu ke</td>
<td>‘soap’</td>
</tr>
</tbody>
</table>

Figure 21: 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.

<table>
<thead>
<tr>
<th>verb</th>
<th>sg. n. (ne)</th>
<th>pl. n. (ke)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>sec‘ ‘be sunny’</td>
<td>njec‘</td>
<td>cec‘</td>
<td>‘sun’</td>
</tr>
<tr>
<td>sox ‘husk’</td>
<td>soq</td>
<td>soq</td>
<td>‘millet husking’</td>
</tr>
<tr>
<td>siñiñ ‘smile w/ teeth’</td>
<td>ciññ</td>
<td>ciññ</td>
<td>‘a smile w/ teeth’</td>
</tr>
<tr>
<td>sal ‘branch out’</td>
<td>a-sal</td>
<td>a-sal</td>
<td>‘branching stick’</td>
</tr>
<tr>
<td>sooc ‘brush/scrub’</td>
<td>a-sooc-oor</td>
<td>a-sooc-oor</td>
<td>‘tooth-cleaning stick’</td>
</tr>
<tr>
<td>sum ‘be hot’</td>
<td>a-sum-aan</td>
<td>a-sum-aan/a-cum-aan</td>
<td>‘warmth’</td>
</tr>
</tbody>
</table>

Figure 22: 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 njec‘ conforms to the mutation series s~c~nj, whereas in soq the /s/ is invariant. In ciññ, 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 II. 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 Nominka /s/ is reported to be completely invariant (Renaudier 2012: 19).

The distinction between velars and uvulars has been partially neutralized in Saalum. The phonemes /x/ and /h/ have completely collapsed to /x/, and the phonemic distinction between /ng/ and /nq/ is beginning to collapse. /k/ and /q/ are in general completely distinct, though some

---

5 The explanation for this exception is that both words (siñiñ and ciññ) are borrowed from Wolof.
6 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.
words show free variation between the two (e.g. dakoox or daqoox ‘return,’ a-keñ or a-geñ ‘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.

<table>
<thead>
<tr>
<th>root in Siin</th>
<th>Saalum I</th>
<th>Saalum II</th>
<th>Saalum III</th>
</tr>
</thead>
<tbody>
<tr>
<td>hiic</td>
<td>o-xiic ‘jujube’</td>
<td>kiic ke ‘j. trees’</td>
<td>ngiic ne ‘j. tree’</td>
</tr>
<tr>
<td>habas</td>
<td>xabas ‘burp (v)’</td>
<td>qabas ke ‘burps (n)’</td>
<td>nqa b as ne ‘burp (n)’</td>
</tr>
</tbody>
</table>

Figure 23: Equivalents of h~g~ng in Saalum

In all cases, x-initial verb roots alternate with /nq/ in the plural in Saalum, and never /ng/. Nominka 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 Nominka show no voicing distinction— they are all voiced. Contrary to McLaughlin’s (1994) findings, Saalum does exhibit this distinction, though perhaps not in all sub-dialects.

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 pattern of the language.

3 Historical background
3.1 Current literature

Much of the current understanding of the genetic situation in West 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 the Northwest Atlantic group. He further groups Sereer and Fula together with Wolof to form the Senegal branch of Northwest Atlantic. 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 essentially on lexico-statistics, but takes into account known sound correspondences to obtain much 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. 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 is 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 seems to assume 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 an excellent 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 explain the shape of class markers and the nature of mutation systems across many Atlantic languages, and which in many cases have been borne out by later research with access to additional data. He proposes that the proto-language must have made use of noun class prefixes of the form V-, C V-, N V-, and N-, with later developments of N V N- and C- in some languages. He assumes that mutation was not a feature of the protolanguage, 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 postnominal determiners, alongside the erosion of the original prefixes (more so 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 seen in the familiar 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 can in most cases not be supported. 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. Furthermore, we will see that the Fula suffixes must not have descended from earlier determiners, but from the class prefixes themselves (see section 6.6). 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 85). Consequently, while it may be the case that some PFS class markers were at some earlier time polymorphemic, evidence from Fula and Sereer lend no direct support to this theory, 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 and class markers in Atlantic are completely correct, we will see that many 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 in tact in each language. Both authors also assume that PFS exhibited initial consonant mutation. We will see that both of these assumptions must be false. 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). Unfortunately, many of Pozdniakov’s
proposed sound correspondences do not hold up (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 turn out to be false, 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 time7.

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, much 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 apparently
supported by archeological and anthropological evidence (see McLaughlin 1994: 8). However, it
is not clear whether the two peoples spoke a totally common language at the time of the Sereer
migration, or whether the two languages had already begun to develop independently.
Impressionistically, the two languages seem more different 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. As more words are considered, this percentage
inevitably decreases substantially. Of the first 200 Sereer nouns in the ole class collected from
Mr. Loum, 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 this to the 89% lexical overlap shared by French and Italian,
or even the 71% shared by Spanish and Romanian (Ethnologue), and it becomes clear that
despite being each other’s closest relative, Fula and Sereer have diverged significantly since they
split.

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 in 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 which
led to these correspondences. This 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 paper. For a discussion of the PFS consonant inventory, see section 4.11.

7 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. box, o...ol to indicate o-
box ‘dog’ with the obligatory prefix/proclitic 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. †o-box-ol). Mukarovsky
additionally cites Pichl (), who erroneously terms the Sereer determiners “suffixes.”
3.3.1 Vowels

Vowels have undergone relatively few changes in both languages. In most cases, a vowel in one language corresponds to the identical vowel in the other language. 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 regular shortening of vowels in Fula before a consonant cluster.

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS root</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-koor</td>
<td>gor-ko</td>
<td>*yoor</td>
</tr>
<tr>
<td>ngaaf</td>
<td>ngaw-ri</td>
<td>*gaafo</td>
</tr>
<tr>
<td>faaɓ</td>
<td>fam-ru</td>
<td>*faaɓ</td>
</tr>
<tr>
<td>naak</td>
<td>nag-ge</td>
<td>*naak</td>
</tr>
</tbody>
</table>

*Figure 24: Outcome of regular vowel shortening in Fula*

However, there are a number of 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.

<table>
<thead>
<tr>
<th>Sereer long</th>
<th>Fula short</th>
<th>Sereer short</th>
<th>Fula long</th>
</tr>
</thead>
<tbody>
<tr>
<td>bɔod</td>
<td>bɔd</td>
<td>‘crawl/slither’</td>
<td>day</td>
</tr>
<tr>
<td>fool</td>
<td>fol</td>
<td>‘jump/skip’</td>
<td>sam</td>
</tr>
<tr>
<td>gooy</td>
<td>woy</td>
<td>‘be depressed’</td>
<td>naf</td>
</tr>
<tr>
<td>fees</td>
<td>wes</td>
<td>‘winnow’</td>
<td>xaɓ</td>
</tr>
</tbody>
</table>

*Figure 25: Irregular vowel length correspondences*

Even across dialects discrepancies in vowel length are sometimes found, and cannot always be explained. However, for the most part vowel length correspondences between the two languages are completely predictable.

There are very few regular sound changes affecting vowel quality. However, there are numerous but 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.

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
</tr>
</thead>
<tbody>
<tr>
<td>yer</td>
<td>yar</td>
</tr>
<tr>
<td>ɗiy</td>
<td>ɗiy</td>
</tr>
<tr>
<td>maar</td>
<td>moor</td>
</tr>
<tr>
<td>sid</td>
<td>sed</td>
</tr>
<tr>
<td>ŋu</td>
<td>ŋo</td>
</tr>
<tr>
<td>pis</td>
<td>puc-u</td>
</tr>
<tr>
<td>yip</td>
<td>yupp</td>
</tr>
<tr>
<td>ŋiũnx</td>
<td>ŋuuñ-u</td>
</tr>
<tr>
<td>Lukuy'</td>
<td>likiy'</td>
</tr>
</tbody>
</table>

*Figure 26: Vowel quality discrepancies in 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 skepticism.

3.3.2 Consonants

Many of the sound changes involving consonants in these two languages involve PFS consonant clusters, and are related to consonant mutation. These changes are discussed in section 4.4. 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’
gim | ylim | *ɣim ‘sing’
gom | wom (Maasina) | *ɣom ‘dance’
waag | waaw | *waɣ ‘be able’
o-maag | maay-o/maaw-o | *maɣ ‘river’

*Figure 27: Development of PFS *ɣ*

In Sereer, *ɣ regularly becomes /g/ in all positions. In Fula, word-initial *ɣ develops in some dialects (e.g. Pulaar) to /y/ before front vowels, /w/ before back vowels, and is deleted before /a/ (/ʔ/ is then inserted due to the constraint against vowel-initial roots). In other 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 becomes /w/ or /y/ are not entirely clear.

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

| Sereer | Fula | Sereer | Fula |
---|---|---|---|
xaad’ | haad’ | ‘be bitter’ | y’ax | y’akk-ude ‘chew’
xeeñ | heeñ-ere | ‘liver’ | sox | sokk-ude ‘de-husk’
xeç’ | hey’ | ‘fit’ | sux | sukk-ude ‘block hole’

*Figure 28: Development of *x in Fula*

Word-initially, *x merges with /h/, and intervocally it becomes /kk/.

Fula has undergone a regular word-final devoicing of *d. Other voiced stops were not affected.

| 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-siïd | ciwt-aa-dô | *siwd ‘twin’
maad | maat | *maad ‘witness/notice/etc.’
mud | mut | *mud ‘sink’

*Figure 29: Final devoicing of *d in Fula*
That this process took place only word finally can be proven by fossilized 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. Importantly, this word-final devoicing rule also applies to noun roots, even though synchronically they are obligatorily followed by a noun class suffix. This is due to the fact that the Fula suffixes were at one time prefixes or proclitics (see section 6.6.1), and only became suffixes some time after this final devoicing.

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

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>FPS root</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>fod</td>
<td>fot</td>
<td>*fod</td>
<td>‘be equal’</td>
</tr>
<tr>
<td>fool</td>
<td>fol</td>
<td>*fo(o)l</td>
<td>‘jump/skip’</td>
</tr>
<tr>
<td>fop</td>
<td>fof</td>
<td>*fop/fof?</td>
<td>‘all’</td>
</tr>
<tr>
<td>faaɓ</td>
<td>fam-ru</td>
<td>*faaɓ</td>
<td>‘frog’</td>
</tr>
<tr>
<td>fel</td>
<td>wel</td>
<td>?</td>
<td>‘be good’</td>
</tr>
<tr>
<td>feed</td>
<td>weet</td>
<td>?</td>
<td>‘dawn’</td>
</tr>
<tr>
<td>faŋ</td>
<td>waŋ</td>
<td>?</td>
<td>‘hate’</td>
</tr>
<tr>
<td>foor</td>
<td>woor</td>
<td>?</td>
<td>‘be (nearly) ripe’</td>
</tr>
<tr>
<td>waag</td>
<td>waaw</td>
<td>*waawγ</td>
<td>‘be able’</td>
</tr>
<tr>
<td>war</td>
<td>war</td>
<td>*war</td>
<td>‘kill’</td>
</tr>
<tr>
<td>wudɓ</td>
<td>wudɓ</td>
<td>*wudɓ</td>
<td>‘be ruined by termites’</td>
</tr>
<tr>
<td>wel</td>
<td>wel</td>
<td>*wel</td>
<td>‘be sharp’</td>
</tr>
</tbody>
</table>

Figure 30: Correspondence sets involving initial labial continuants

All three correspondence sets also exist in non-initial position. 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 separate development of consonant clusters (see section 4.8), and *ɣ in each language.

4 Historical account of mutation
4.1 Typological overview

A typological survey of ICM can be found in Iosad (2009). Historically, ICM systems arise when some morpheme (often grammatical), be it a prefix, proclitic, or free word, induces some sound change in the following lexical morpheme. The most famous case is that of the Celtic languages, in which the final segment of a word can determine the voicing, nasalization, and/or continuancy of the initial segment of the following word at some later period. Many other examples exist from unrelated languages.
In these examples from Burmese (VanBik 2002), the historical causative prefix *s- induced devoicing and aspiration (indicated in the orthography with <h>) of the root-initial consonant.

4.2 Underlying assumptions

In Fula and Sereer, the ICM systems involve changes in continuancy, nasality, and (for Sereer) voicing. Thus, we must consider all of the following possible historical effects of a preposed morpheme 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 proposition 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:

<table>
<thead>
<tr>
<th>symbol</th>
<th>type of consonant</th>
<th>refers to</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>voiceless egressive stop</td>
<td>p, t, c, k, q</td>
</tr>
<tr>
<td>B</td>
<td>voiced egressive stop</td>
<td>b, d, j, g</td>
</tr>
<tr>
<td>F</td>
<td>voiceless continuant</td>
<td>f, s, h, x</td>
</tr>
<tr>
<td>W</td>
<td>voiced continuant</td>
<td>w, r, y, ɣ</td>
</tr>
<tr>
<td>M</td>
<td>nasal</td>
<td>m, n, ñ, ŋ</td>
</tr>
<tr>
<td>MB</td>
<td>voiced prenasalized stop</td>
<td>mb, nd, nj, ng, nq</td>
</tr>
<tr>
<td>B</td>
<td>voiced implosive</td>
<td>b̪, d̪, ẙ</td>
</tr>
<tr>
<td>P</td>
<td>voiceless implosive</td>
<td>p̪, f̪, c̪</td>
</tr>
</tbody>
</table>

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.

---

8 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.
4.3 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 3, Figure 11, Figure 13, and Figure 19), 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. The first: certain noun classes require the initial consonant to be a stop, and in Sereer furthermore this stop must be voiceless, or /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 must have triggered the fortition (i.e. hardening, and in Sereer devoicing) of the following consonant. Historically speaking, grade II is truly “fortition grade” in both languages.

The second: plural verbs and certain noun classes require a restricted set of root-initial consonants which excludes B, F, W, and in Sereer Ɓ. 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.
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 were simply unaffected by them. 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 developments of each of the grade I sounds when they were preceded by a morpheme that triggered nasalization.

4.4 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, 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:

---

9 Underlying /q/-initial roots are extremely rare in Sereer. No verb roots are /q/-initial, and only two noun roots are unambiguously /q/-initial (o-qol ‘field’ and o-qir ‘whip’).

10 This series does not exist in some dialects (e.g. Pulaar) which reanalyzed all ?-initial roots as participating in the ?~g~ng series (see section 4.10.2).
Outcomes which are different between the languages are bolded. In Sereer, *y and perhaps *s were not affected by either sound change.

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. Thus, there is a limited set of six singular/plural pairs which can appear in each language for verbs. Furthermore we predict that each singular/plural pair in one language should correspond to exactly one singular/plural pair in the other. For example, any verb with an initial voiceless continuant in Sereer will correspond with a voiceless continuant in Fula, and in Sereer the plural form will have an initial prenasalized stop, while in Fula it will have 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. Once again, this predicts a limited set of six singular/plural pairs with regards to consonant class.

<table>
<thead>
<tr>
<th>III</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg.</td>
<td>pl.</td>
</tr>
<tr>
<td>P</td>
<td>pis</td>
</tr>
<tr>
<td>MB</td>
<td>(+b)</td>
</tr>
<tr>
<td>P</td>
<td>ñook</td>
</tr>
<tr>
<td>M</td>
<td>mol</td>
</tr>
</tbody>
</table>

Sereer animal (in ne class)  
<table>
<thead>
<tr>
<th>III</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg.</td>
<td>pl.</td>
</tr>
<tr>
<td>P</td>
<td>pis</td>
</tr>
<tr>
<td>MB</td>
<td>mbaal</td>
</tr>
<tr>
<td>P</td>
<td>ñook</td>
</tr>
<tr>
<td>M</td>
<td>mol</td>
</tr>
</tbody>
</table>

Fula animal (in ngu class)  
<table>
<thead>
<tr>
<th>III</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg.</td>
<td>pl.</td>
</tr>
<tr>
<td>P</td>
<td>pucc-u</td>
</tr>
<tr>
<td>MB</td>
<td>mbaal-u</td>
</tr>
<tr>
<td>P</td>
<td>ñook</td>
</tr>
<tr>
<td>M</td>
<td>mol-u</td>
</tr>
</tbody>
</table>

‘horse’

‘sheep’

‘mosquito’

‘foal’

Figure 37: Cognate animal nouns in singular and plural

For cognate animals in the ne and 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. This is indeed what we find in both languages.

4.5 Explaining these sound changes

With the mutation sound changes in Figure 34 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.

4.5.1 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 elsewhere 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 mutation systems of many other Northwest Atlantic languages (see Figure 41).

The only difficulty is the development of M+B. 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 *M+B > ñ change. Instead, this change is likely due to an intermediate stage of gemination (*MB > ññ > ñ). 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), as has taken place in Fula, where /b/ alternates 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 boos ‘massage,’ Sereer fab, 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. Clements and Osu (2002) propose that implosives, like nasals, are non-obstruent stops, and thus share a number of phonological and phonetic similarities. 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.

4.5.2 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. Of course 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 4.8 that the identity of this set of consonants “X” is 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.

Historical processes which devoice geminates are well-attested (e.g. in the Ethiopian languages Endegeń and Chaha (Rose 2003: 845)), and can easily explain Sereer devoicing in fortition grade. Of especial importance, the typological tendency to devoice geminates provides an explanation for the appearance of the voiceless implosives in fortition grade 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.

11 This same process may also have operated in Fula, but as geminates do not devoice, but do degeminate word-initially in Fula, we would be left with no evidence to prefer a development *MB > BB > B over a simple nasal deletion process, *MB > B.
Synchronic processes of geminate hardening are common cross-linguistically, and can even be found in modern Fula.

\[
\begin{align*}
\text{nof-ru} & \quad \text{‘ear’} & \text{nopp-i} & \quad \text{‘ears’} \\
\text{rew-be} & \quad \text{‘women’} & \text{debb-o} & \quad \text{‘woman’}
\end{align*}
\]

*Figure 38: Synchronic geminate hardening in Fula*

When an underlyingly \( \delta \)-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 must not be due to the same sound changes responsible for initial mutation (see section 6). Keer (1998: 157) further cites Faroese and Tûmpisa Shoshone as languages with synchronic geminate hardening processes. A particularly striking example is found in the Bantu language Luganda (Kawahara 2007: 7).

\[
\begin{align*}
\text{noun root} & \quad \text{augmentative} \\
\text{-kubo} & \quad \text{kkubo} & \text{‘path’} \\
\text{-tabi} & \quad \text{ttabi} & \text{‘branch’} \\
\text{-bala} & \quad \text{bbala} & \text{‘spot’} \\
\text{-sajja} & \quad \text{ssajja} & \text{‘man’} \\
\text{-fumu} & \quad \text{ffumu} & \text{‘spear’} \\
\text{-langa} & \quad \text{ddanga} & \text{‘lily’} \\
\text{-yinga} & \quad \text{jjjinga} & \text{‘stone’} \\
\text{-wanga} & \quad \text{ggwanga} & \text{‘nation’}
\end{align*}
\]

*Figure 39: Geminate hardening in Luganda*

Here, the augmentative noun class (Bantu class 5) 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 \( *i̯ \) (likely realized as a palatal glide at the time of the change) to the root-initial consonant.

Despite the well-attestedness of these synchronic patterns of geminate hardening, I am not aware of any case in which the avoidance of geminate continuants is necessarily due to a historical process of the type \( FF > PP \) (pathway 1 below). In all of the synchronic cases cited, it is possible that the avoidance of geminate continuants arose by a two-step process in which the continuant was first hardened next to some other consonant, which then assimilated to the now-hardened continuant (pathway 2 below).

\[
\begin{align*}
\text{Pathway 1 : assimilation then hardening} & \quad *XF > FF > PP \\
\text{Pathway 2 : hardening then assimilation} & \quad *XF > XP > PP
\end{align*}
\]

*Figure 40: 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. However, in Sereer, 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 Serer, 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.

Finally, evidence for Fula and Serer fortition being the outcome of gemination can potentially be found in other Northwest Atlantic languages. In these 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).

Earlier Wolof (some is reconstructed, most attested from earlier material; Sapir 1971)
I f t s *h₁² b d j g l r x m
II pp ? cc kk bb t jj ? ll tt dd ? mm
III mp nt nc nk mb nd nj ng ? nr nx ?

Kobiana (Sapir 1971)
I f h s h b l ð g r m n ñ ñ w y
II p t c k bb dd jj gg d(d) m n ñ ñ w y
III mp nt nc nk mb nd nj ng (?) m n ñ ñ w y

Konyagi/Wamey (adapted from Santos 1996)
I f r s x x w l y *y₁² w v ry y w l ñ *y₁² w
II p t c k k w b d j g g w b ð y m n ñ ñ ñ w
III p t c k k w mp nt nc nk nk w mb nd nj m n ñ ñ ñ w

Bedik (Ferry 1968b)
I f s h h w r y ý b l ý ý
II p t c k b d j g b ð ý ý
III p t c k mb nd nj ng m n ñ ñ

Biafada/Gonjoola (Wilson 1965)
I f r s h l b w b d j g m n ñ ñ w y
II p t c k r bb w bb dd jj gg mm mn ñ ñ ñ ñ ww yy
III mp nt nc nk nr,nd mb w mb nd nj ng mm mn ñ ñ ñ ñ ww yy

Pajade/Badjaranké/Jaad (reconstructed Wilson 1965)
I f s s Ø r Ø w b d j m n ñ ñ w y
II pp tt cc kk p t c k ð b b ð v mm mn ñ ñ ñ ñ
III pp tt cc kk mp nt nc nk mb nd nj mm mn ñ ñ ñ ñ

Figure 41: Mutation systems in other Northwest Atlantic languages

12 In Wolof *h > w, y, Ø, in Konyagi *y > w, y, Ø, *y > w, ý, depending on the vocalic environment.
It must be stressed that these mutation systems are not “cognate” with the mutation systems of Sereer and Fula, as they developed independently. Indeed, the historical processes which gave rise to these similar systems may have been different in individual languages. For example, the Konyagi and Bedik systems appear impressionistically to have resulted from the lenition of the grade II consonants into the grade I consonants, whereas the system of earlier Wolof appears to involve the gemination of the grade I consonants into the grade II consonants (as in Fula and Sereer). Nonetheless, the typological similarities of the resulting systems are striking. Crucially, in many of these languages (e.g. Wolof, Biafada, Pajade, Kobiana), grade II contains geminates. While this evidence is purely typological, it shows a strong areal tendency for the existence of a mutation grade consisting of geminate stops.

4.6 Why lenition doesn’t work

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 (Skousen 1972, McLaughlin 1994, and Elzinga 1996) assume that the continuants are non-basic, and derived from their corresponding stops. 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 9 and Figure 10) and Sereer (Figure 18), if continuants are never taken to be underlying, it is impossible to predict when a stop will alternate with a continual, and when it will not. This is the result of the fact that the proto-language contained roots which were continual initial, as well as stop initial (at least for voiced consonants), as shown in Figure 42.

<table>
<thead>
<tr>
<th>Fula</th>
<th>Sereer</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>bon</td>
<td>bon</td>
<td>*bon</td>
</tr>
<tr>
<td>dad’</td>
<td>dad’</td>
<td>*dad’</td>
</tr>
<tr>
<td>jaɓ</td>
<td>jaɓ</td>
<td>*jaɓ</td>
</tr>
<tr>
<td>gew</td>
<td>gef</td>
<td>*gef/w</td>
</tr>
<tr>
<td>war</td>
<td>war</td>
<td>*war</td>
</tr>
<tr>
<td>rim</td>
<td>rim</td>
<td>*rim</td>
</tr>
<tr>
<td>yaaj</td>
<td>yaaj</td>
<td>*yaaj</td>
</tr>
<tr>
<td>yim</td>
<td>gim</td>
<td>*yim</td>
</tr>
</tbody>
</table>

*Figure 42: Stop- and continual-initial roots in Proto-Fula-Sereer*

These facts were the motivation for including stops in grade I along with the 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 33), and does not support the idea that lenition played any role in the development of the ICM system of either language.

4.7 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 34 for each language. As these same processes must have operated in each language, it would at first seem
natural to propose that these processes 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:

<table>
<thead>
<tr>
<th>Nasalization</th>
<th>Fortition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sereer</strong></td>
<td><strong>Fula</strong></td>
</tr>
<tr>
<td>*M+F &gt; MB</td>
<td>*M+F &gt; P</td>
</tr>
<tr>
<td>*M+B &gt; P</td>
<td>*M+B &gt; B</td>
</tr>
</tbody>
</table>

*Figure 43: 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 4.5.2 (below Figure 40) 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 *Il cannot have taken place in PFS, as this class triggers fortition in Fula, but no mutation in Sereer.

Technically, one could propose that in the cases in which Sereer and Fula share the same outcome (e.g. *MP > P), a categorical mutation had already taken place in the proto-language. However, 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 much more parsimonious to assume that each process applied only once in each language, and across the entire set of consonants. Under this assumption, there can have been no categorical mutation in the proto-language.

This observation is important because if true, it calls into question the idea that exhibiting a mutation system is evidence for genetic relatedness. Recall that in Segerer’s (2010) classification of Atlantic, a subgroup 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.

4.8 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 44.

Figure 44: Sound changes leading to mutation in Fula and Sereer

Of course, *x, *k, *l, and *n are singled out as the C₁ in these C₁C₂ 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 C₁ 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.

4.8.1 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.

Figure 45: 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.
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 45 and Figure 46 above, there are many roots of the form CVC₁C₂ in Fula, with a final consonant cluster. A number of these have Sereer cognates, and can be reconstructed for the protolanguage.

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 CVVC₃ 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 C₁C₂ clusters, depending mainly on the identity of C₁: 1) assimilation of C₁ to C₂, with subsequent degemination, 2) nasalization of C₂ by C₁, and 3) deletion of C₁, often with compensatory lengthening. This last process can be observed in many of the roots given in Figure 47, where C₁ 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 CVC1C2 roots which support the proposed mutation sound changes. First, there are no geminate continuants, while all other consonants can appear as a geminate in C1C2 (this includes /ll/, as /l/ does not function as a continuant 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 C1 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 C1C2 position. Of these, 315 were found in more than one of the four dialect areas surveyed. The number of times each consonant appears in C1 is given in Figure 48.

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

**Figure 48: Consonants appearing as the first member of a cluster in Fula verb roots**

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, /t/, or /h/ appearing as C1 are in most cases the result of the deletion of a vowel that is still present in other dialects (e.g. liky’ (Pulaar) = likky’ (Maasina and Nigerian dialects) = likiy’ (Adamawa dialect) ‘hiccup’), and there generally exists a variant which does not display the offending sequence in the same dialect (liiy’ and liy’ both appear as variants of liky’ in Pulaar). This phonotactic restriction against stops and voiceless continuants other than /s/ followed by 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 C1C2 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 C1 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 sections 6.2.1.5 and 0). 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 C1 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 changes. We do encounter many roots containing a nasal followed by a voiceless stop or implosive, suggesting

---

13 This count excludes voiced presnasalized stop-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.
that the loss of the nasal in MP, MF, and MB sequences occurs only word-initially, just as
degemination only applies 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.

4.8.2 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.

<table>
<thead>
<tr>
<th>Fula</th>
<th>Sereer</th>
</tr>
</thead>
<tbody>
<tr>
<td>-(i)t</td>
<td>-(i)t/d</td>
</tr>
<tr>
<td>-(i)r</td>
<td>-(i)t</td>
</tr>
<tr>
<td>-(i)n</td>
<td>-(i)n</td>
</tr>
<tr>
<td>-(i)d</td>
<td>-(i)r</td>
</tr>
<tr>
<td>-(i)d’</td>
<td>-(i)d’</td>
</tr>
<tr>
<td>reversive/repetitive/etc.</td>
<td>reversive</td>
</tr>
<tr>
<td>applicative</td>
<td>applicative</td>
</tr>
<tr>
<td>causative</td>
<td>causative</td>
</tr>
<tr>
<td>associative/comprehensive</td>
<td>reflexive</td>
</tr>
<tr>
<td>denominative</td>
<td>subject-affecting</td>
</tr>
</tbody>
</table>

Figure 49: 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 (<*-d), applicative -t, and causative -n are all found fossilized
in certain verb stems.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>dag</td>
<td>‘hang’</td>
<td>dat</td>
</tr>
<tr>
<td>‘uup’</td>
<td>‘bury’</td>
<td>‘ut’</td>
</tr>
<tr>
<td>weg</td>
<td>‘close’</td>
<td>wet</td>
</tr>
<tr>
<td>yùug</td>
<td>‘bow head’</td>
<td>yùt</td>
</tr>
<tr>
<td>ɓuuɓ</td>
<td>‘be cold’</td>
<td>but</td>
</tr>
<tr>
<td>maad</td>
<td>‘be present’</td>
<td>mat</td>
</tr>
<tr>
<td>yen</td>
<td>‘fall’</td>
<td>yet</td>
</tr>
<tr>
<td>jol</td>
<td>‘pass’</td>
<td>joot</td>
</tr>
<tr>
<td>faax</td>
<td>‘be good/well’</td>
<td>fan</td>
</tr>
<tr>
<td>jol</td>
<td>‘pass’</td>
<td>joon</td>
</tr>
</tbody>
</table>

Figure 50: 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 the preceding long vowel (if applicable). 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 retain the original voiced stop in the suffix (e.g. *xobid ‘deshell,’ wasid ‘descale,’ hurid ‘skim off,’ xobid ‘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.

In Fula, “covertly extended” stems of this sort can also be found.

<table>
<thead>
<tr>
<th>Fula word</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>dat-</td>
<td>‘road’</td>
</tr>
<tr>
<td>reg</td>
<td>‘go down’</td>
</tr>
<tr>
<td>ñak</td>
<td>‘be insufficient’</td>
</tr>
<tr>
<td>heɓ</td>
<td>‘get/obtain’</td>
</tr>
<tr>
<td>hudɗ</td>
<td>‘swear/curse’</td>
</tr>
<tr>
<td>hodɗ</td>
<td>‘live at’</td>
</tr>
<tr>
<td>tiif</td>
<td>‘heap up/pile up’</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\text{dat-} & \quad \text{‘road’} & \text{dann} & \quad < \text{dat-n} & \quad \text{‘set out on trip’} & \quad \text{Causative} \\
\text{reg} & \quad \text{‘go down’} & \text{renn} & \quad < \text{reg-n} & \quad \text{‘take down’} \\
\text{ñak} & \quad \text{‘be insufficient’} & \text{ñann} & \quad < \text{ñak-n} & \quad \text{‘shorten/lessen’} \\
\text{heɓ} & \quad \text{‘get/obtain’} & \text{hatt} & \quad < \text{heɓ-t} & \quad \text{‘regain/recover’} & \quad \text{Repetitive} \\
\text{hudɗ} & \quad \text{‘swear/curse’} & \text{hutt} & \quad < \text{hudɗ-t} & \quad \text{‘swear’} & \quad \text{Intensive} \\
\text{hodɗ} & \quad \text{‘live at’} & \text{hodd} & \quad < \text{hodɗ-r/-d} & \quad \text{‘live next to’} & \quad \text{Recip./assoc.?} \\
\text{tiif} & \quad \text{‘heap up/pile up’} & \text{tidd} & \quad < \text{tiif-d} & \quad \text{‘heap up/pile up’} & \quad \text{Comprehensive} \\
\end{align*}

\text{Figure 51: 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 there is also evidence from 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 49 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 /♯/, and group B contains voiced continuants, nasals, /d/ and /b/. 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); 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 case 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.

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  (covertly extended roots)
*CVCA-C > CVCC  (but *lr, *nr, *rr > ld, nd, rd)
*CVCB-C > CVCB-C

Figure 52: Development of roots with -(i)C extensions 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.

4.9  Analogical changes in Sereer

4.9.1  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 sec-sec-njec “sun” are retentions, whereas sal-sal-sal “branch” have been leveled (see Figure 22). 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 †njuk ne / cuk ke, †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 sec “be sunny” are formed from the noun njec/sec “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:

\[ \text{Figure 52: Development of roots with -(i)C extensions in Fula} \]

---

14 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 /jy/ 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.
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 a result of borrowing from Wolof, from which Sereer has borrowed extensively for centuries, and in which this alternation is common. The analogies in Figure 53 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.

### 4.9.2 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 20). This unexpected mutation can be explained by analogical change. Because singular nouns in the personal class are in grade II, many appear with an initial voiceless stop (e.g. o-tew ‘woman’). Because the underlying root is in fact a voiced stop or continuant (e.g. 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.

<table>
<thead>
<tr>
<th>sg. noun</th>
<th>diminutive</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-tew</td>
<td>o-ndew</td>
</tr>
<tr>
<td></td>
<td>‘woman’</td>
</tr>
<tr>
<td>o-koor</td>
<td>o-ngoor</td>
</tr>
<tr>
<td></td>
<td>‘man’</td>
</tr>
<tr>
<td>o-tocir</td>
<td>___ = o-ndocir (replacing *o-tocir)</td>
</tr>
<tr>
<td></td>
<td>‘peanut splitter’</td>
</tr>
<tr>
<td>o-kucala</td>
<td>___ = o-ngucala (replacing *o-kucala)</td>
</tr>
<tr>
<td></td>
<td>‘drawstring’</td>
</tr>
</tbody>
</table>

**Figure 54: Proportional analogy leading to prenasalization of voiceless stops**

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 54, nouns in the ole class would undergo no change at all in the diminutive were it not for the analogical introduction of mutation in these nouns. 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.
4.9.3 Agentive 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.

<table>
<thead>
<tr>
<th>singular</th>
<th>plural</th>
<th>variant pl.</th>
<th>root</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-tafax</td>
<td>tafax</td>
<td>dafax</td>
<td>*taf</td>
</tr>
<tr>
<td>o-cii-cit</td>
<td>cii-cit</td>
<td>jii-jit</td>
<td>cit</td>
</tr>
</tbody>
</table>

*Figure 55: Analogized personal plural forms of 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 ‘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 *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.

<table>
<thead>
<tr>
<th>singular</th>
<th>plural</th>
<th>variant pl.</th>
<th>root</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-teefanke</td>
<td>reefanke</td>
<td>deefanke</td>
<td>reef</td>
</tr>
<tr>
<td>o-baa-bar</td>
<td>baa-bar</td>
<td>waa-war</td>
<td>war</td>
</tr>
</tbody>
</table>

*Figure 56: Analogized personal plural forms of 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 more common.

4.10 Analogical changes in Fula
4.10.1 Voiceless stop 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.

---

15 No longer exists as a verb root in Sereer; c.f. Fula taf ‘forge.’
While the Firdu dialect of Pulaar 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 commencer. Presumably, some roots that appear as voiceless-continuant-initial in all dialects were once voiceless-stop initial, though I have unfortunately 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, and thus no naturally-occurring mutation series in which /t/ alternates with another consonant.

In fact, there are a number of historically p-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 fortition grade. For this reason, historically voiceless stop- and continuant-initial roots in these noun 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 overt mutation is introduced.

**4.10.2 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 12, 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 *ya-initial roots (e.g. Pulaar, see section 2.2.5), all *ʔa-initial roots were reanalyzed as undergoing this mutation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>‘and</td>
<td>‘and</td>
<td>‘and</td>
<td>ngand</td>
</tr>
<tr>
<td>‘adoox</td>
<td>‘adoox</td>
<td>‘adaa</td>
<td>ngadaa</td>
</tr>
<tr>
<td>‘at</td>
<td>‘at</td>
<td>‘add</td>
<td>ngadd</td>
</tr>
</tbody>
</table>

**Figure 58: Reanalysis of *ʔa-initial roots in Fula**
In analogy with a-initial roots that had developed naturally from *ya-initial roots (e.g. ‘as ‘dig,’ ‘ar ‘come’), these historically *a-initial roots are now treated as *ya-initial, showing /ng/ in the plural form of the verb. Of course, in dialects where *ya developed to /wa/, this reanalysis did not occur, e.g. Niger ‘and/’and ‘know’, ‘andal ‘knowledge’ vs. Pulaar ‘and/ngand, gandal (from the root *?and).

4.11 The Proto-Fula-Sereer consonant inventory

The consonant inventory of Proto-Fula-Sereer can be reconstructed as follows:

<table>
<thead>
<tr>
<th>stop</th>
<th>labial</th>
<th>coronal</th>
<th>palatal</th>
<th>velar</th>
<th>uvular</th>
<th>glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>egressive</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>voiceless</td>
<td>b</td>
<td>d</td>
<td>j</td>
<td>g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>continuant</td>
<td>f</td>
<td>s</td>
<td>h</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>w</td>
<td>r</td>
<td>y</td>
<td>y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>implosive stop</td>
<td>ɓ</td>
<td>d’</td>
<td>y’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nasal</td>
<td>m</td>
<td>n</td>
<td>ŋ</td>
<td>ŋ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lateral continuant</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 due to nasalization. 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 common in the area, as found in earlier Wolof (Sapir 1971) and the Mande language Susu (Houis 1963).

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 [ŋ]. However, these would not be surprising as the outcome of prenasalized [ʒ] (with [ŋ] > [ʒ] > [y] paralleling [ŋʃ] > [ʃ] > [s] in Sereer). Furthermore, the fortition changes [ʃʃ] > [ʃʃ] and [ʃʃ] > [ʃ] seem much more plausible than [ʃʃ] > [ʃʃ] and [ʃʃ] > [ʃ]. Dialectal variants in Fula such as lesdi ~ leydi ‘earth’ and kosngal ~ koñgal ‘leg’ are much more easily explained as voicing of [ʃʃ] to [ʃ] (generally before a voiced sound, though note also ngaska ~ ngayka ‘hole in ground,’ from the root *ŋas ‘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 norfru vs. nowru ‘ear’ and defere 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 4.10.1), it may very well be that voiceless stops were underrepresented in the proto-language, despite being typologically most “basic.”

5 Morphemes inducing verbal mutation

We must now determine 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.

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st sg. mi</td>
<td>1st sg. mi</td>
</tr>
<tr>
<td>1st pl. in</td>
<td>1st pl. en, min</td>
</tr>
<tr>
<td>2nd sg. wo</td>
<td>2nd sg. ’a</td>
</tr>
<tr>
<td>2nd pl. nuun</td>
<td>2nd pl. on</td>
</tr>
<tr>
<td>3rd sg. den, *a</td>
<td>3rd sg. ‘o, mbo, dumbo, ...</td>
</tr>
<tr>
<td>3rd pl. ɗum, ɓe, ɗumen, ...</td>
<td>3rd pl. be, dumen, ...</td>
</tr>
</tbody>
</table>

Figure 60: 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 proclitics lack a final nasal, while the corresponding free pronouns (which appear in object or focus position) retain the nasal.

<table>
<thead>
<tr>
<th>Strong agr. paradigm</th>
<th>Free pronouns</th>
<th>Historical source</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg.</td>
<td>pl.</td>
<td>sg.</td>
</tr>
<tr>
<td>1st m ret</td>
<td>i ndet</td>
<td>mi</td>
</tr>
<tr>
<td>2nd o ret</td>
<td>nu ndet</td>
<td>wo</td>
</tr>
<tr>
<td>3rd te ret</td>
<td>de ndet</td>
<td>(o-)ten</td>
</tr>
</tbody>
</table>

Figure 61: Sereer “strong” agreement paradigm for ret ‘go,’ and its possible historical source

Note that Figure 61 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 proclitic 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 proclitic a= developed must have been *a and not †*an, as evidenced by the copular forms a-xe (sg.) and a-we (pl.) (importantly not †an-we or †a-mbe in

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This “strong” paradigm is found primarily 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 Sii 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’.

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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 ret “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 ngaru 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’), and a preverbal particle naa in the case of subject relatives with a progressive participle (e.g. o-koor ox-e naa gar-aa ‘the man that is coming’). 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 markers are in fact historically bimorphemic (-n-a and n-aa), with the original relative marker simply being *n.

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. We must identify the historical form of these noun class markers, and importantly the identity of their final segments, in order to examine their effect on following consonants.

6.1 How to reconstruct the noun classes

We can begin with the observations 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 an /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.

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 15 are from the Saalum and Siin dialects. The noun class markers of the Ņominka dialect (adapted from Renaudier (2012:31)) are markedly different, and of clear importance for historical reconstruction.

<table>
<thead>
<tr>
<th>Ņominka</th>
<th>det. prefix</th>
<th>grade</th>
<th>Siin/Saalum equivalent</th>
<th>sg. n. prefix</th>
<th>det. prefix</th>
<th>grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-</td>
<td>ox-</td>
<td>II</td>
<td>o-</td>
<td>ox-</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>fa-</td>
<td>fan-</td>
<td>III</td>
<td>fa-</td>
<td>f-</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>gi-</td>
<td>l-</td>
<td>I</td>
<td>Ø-</td>
<td>l-</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>gi-</td>
<td>n-</td>
<td>III</td>
<td>Ø-</td>
<td>n-</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>go-</td>
<td>ol-</td>
<td>I</td>
<td>o-</td>
<td>ol-</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>fo-</td>
<td>ol-</td>
<td>I</td>
<td>fo-</td>
<td>ol-</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>ga-</td>
<td>al-</td>
<td>II</td>
<td>a-</td>
<td>al-</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>ga-</td>
<td>n-</td>
<td>III</td>
<td>a-</td>
<td>al-</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>o-</td>
<td>ong-</td>
<td>III</td>
<td>o-</td>
<td>ong-/onq-</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>pl. n. prefix</td>
<td></td>
<td></td>
<td>Ø-</td>
<td>w-</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>fi-</td>
<td>w-</td>
<td>I</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Ø-</td>
<td>k-</td>
<td>II</td>
<td>Ø-</td>
<td>k-</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>a-</td>
<td>ak-</td>
<td>II</td>
<td>a-</td>
<td>ak-</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>xa-</td>
<td>ax-</td>
<td>II</td>
<td>xa-</td>
<td>ax-</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>fi-</td>
<td>n-</td>
<td>III</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 62: Noun class markers of Sereer Ņominka.*

Where other dialects have singular o- and a-, Ņominka 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). Finally, it has two augmentative plural classes (one for people, one for everything else), not present in other dialects.

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

<table>
<thead>
<tr>
<th>Njagañanaaw</th>
<th>Other dialects</th>
</tr>
</thead>
<tbody>
<tr>
<td>g-</td>
<td>k-</td>
</tr>
<tr>
<td>ag-</td>
<td>ak-</td>
</tr>
<tr>
<td>r-</td>
<td>l-</td>
</tr>
<tr>
<td>an-</td>
<td>f(an)-</td>
</tr>
</tbody>
</table>

*Figure 63: Divergent noun class prefixes on determiners in Njagañanaaw*
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- for the diminutive plural fo-.

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 in different dialects. The only cross-dialectal phonological discrepancy is for the mba class (see section 4.10.2).

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, section 5). When grade II is triggered, this pre-root morpheme must have ended in some other “mystery” consonant, 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.

In these examples, by assuming that the prefixes on the noun, adjective, and determiner were once identical, and attached 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 6.6. 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. 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
the PFS prefix became a suffix in Fula, there is no reason to believe that any of these alternations
existed in PFS. The nasal suffix grade was induced by a nasal-final stem, and certain other stem-
final consonants (e.g. /l/) caused the deletion of the suffix-initial consonant. 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 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 the following reconstructions, the Fula suffix-initial
continuant, as opposed to the stop, is assumed to be original in 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 38). An original continuant may also be more consistent with 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 are much more likely.

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
phonological cognacy 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 will 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 N, X, or Ø depending on what
mutation grade they trigger (III, II, I 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

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<tbody>
<tr>
<td>faN-</td>
<td>f(an)-</td>
<td>N- -wa</td>
<td>N- -ba</td>
<td>*fan- (or *wan-)</td>
</tr>
</tbody>
</table>

**Sereer**
- fa-mbe: ‘goat’
- fa-ñiig/-ñiik: ‘elephant’
- fa-noox: ‘crocodile’
- fa-ngoool: ‘snake’

**Fula**
- mbee-wa: ‘goat’
- ñii-wa: ‘elephant’
- nood-a: ‘crocodile’
- ngowl-a: ‘snake species’

**PFS**
- *fan-Be
- *fan-ñiiɣ
- *fan-nooX
- *fan-Gowl

*Figure 65: Cognates in the *fan- class*

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 only seven nouns which display the overt prefix fa-. Four are animals, and three are
the deverbal nouns fa-lay ‘speech,’ fa-nqon ‘death,’ and fa-ŋas ‘game.’ However, in all but falay
(plural lay), the prefix has been reanalyzed as part of the stem, 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 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/ word-initially (see

---

17 Found in the Volta dialect of Burkina Faso

18 Crétois (1972: 91) give plurals qon ke, ñiik ke, and noox ke for ‘death,’ ‘elephant,’ and ‘crocodile,’ in the Siin
dialect, which must be original. These are not found by McLaughlin for Siin, nor are they found in Saalum.
Figure 30), 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.

6.2.1.2 *ɣun

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<tbody>
<tr>
<td>N-</td>
<td>n-</td>
<td>N- -wu</td>
<td>N- -gu</td>
<td>*ɣun-</td>
</tr>
</tbody>
</table>

**Sereer**
- mol ‘foal’
- pis ‘horse’
- ɓook ‘mosquito’
- mbaal ‘sheep’
- liŋ ‘fish’

**Fula**
- mol-u ‘foal’
- pucc-u ‘horse’
- ɓo-ngu ‘mosquito’
- mbaal-u ‘sheep’
- li-nngu ‘fish’

**PFS**
- *ɣun-mol
- *ɣun-pVs
- *ɣun-book
- *ɣun-ɓook
- *ɣun-liX6

**Figure 66: Cognates in the *ɣun class**

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.

6.2.1.3 *rin

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<tbody>
<tr>
<td>N-</td>
<td>n-</td>
<td>N- -ri</td>
<td>N- -di</td>
<td>*rin</td>
</tr>
</tbody>
</table>

**Sereer**
- ndaw ‘ashes’
- ɓuj ‘bullock’
- ngand ‘brain’
- ngaaf ‘millet’

**Fula**
- ndoo-ndi ‘ashes’
- ɓuj-iri ‘bullock’
- ngaa-ndi ‘brain’
- ngaw-ri19 ‘millet’

**PFS**
- *rin-Daw
- *rin-ɓuj
- *rin-Gaand
- *rin-Gaaf

**Figure 67: Cognates in the rin- class**

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-intial) in Fula, often accompanied by an epenthetic /i/ (-iri), solidify the reconstruction of *rin.

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.

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19 Form from Fuuta Jaloo dialect. Other dialects have gaw-ri, inexplicably.
6.2.1.4 *ox

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<tr>
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</thead>
<tbody>
<tr>
<td>oX-</td>
<td>ox-</td>
<td>X- jo/wo</td>
<td>X- -do/ko</td>
<td><em>(?)</em>-ox-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-koor</td>
<td>‘man’</td>
<td>*ox-yoor</td>
</tr>
<tr>
<td>o-tew (pl. rew)</td>
<td>‘woman’</td>
<td>*ox-rew</td>
</tr>
<tr>
<td>o-kay naak</td>
<td>‘cowherd’</td>
<td>*ox-yay naak</td>
</tr>
<tr>
<td>o-siiday</td>
<td>‘twin’</td>
<td>*ox-siwd</td>
</tr>
</tbody>
</table>

Figure 68: Cognates in the *ox class

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 used in this class.

Phonologically, both contain the vowel /o/, and trigger mutation grade II. The Sereer determiner tells us that the final consonant which triggered fortition is /x/. 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 †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 co-opted in many cases, perhaps due to its being the suffix-initial consonant with the highest token frequency, as it appeared 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, a /k/ was inserted. The origin of this /k/ is particularly interesting— it seems that it occurred originally in only one word, gaynaako ‘cow herder,’ where it was the final consonant of the word *naak ‘cow.’ For cultural reasons (most Fula are migrant 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 the final /k/ assimilated to the suffix, and the vowel shortened before the resulting 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 < *yay (c.f. Sereer gay). This reanalyzed -ko was then extended to 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

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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>(g)aX-</td>
<td>al-</td>
<td>X- -wal</td>
<td>X- -gal</td>
<td>*ɣal-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-saaw ‘guinea fowl’</td>
<td>jaaw-ngal ‘guinea fowl’</td>
<td>*ɣal-saaw/-yaaw</td>
</tr>
<tr>
<td>a-tud ‘vulture’</td>
<td>dut-al ‘vulture’</td>
<td>*ɣal-Dud</td>
</tr>
<tr>
<td>a-soocoor ‘toothpick’</td>
<td>coccor-gal ‘toothpick’</td>
<td>*ɣal-soXc-oor</td>
</tr>
<tr>
<td>a-‘un ‘pestle’</td>
<td>‘unu-gal ‘pestle’</td>
<td>*ɣal-‘un</td>
</tr>
<tr>
<td>a-fat ‘road/way’</td>
<td>dat-al ‘road/way’</td>
<td>*ɣal-dat</td>
</tr>
<tr>
<td>a-kaaфаar ‘jaw’</td>
<td>gabбу-gal ‘jaw’</td>
<td>*ɣal-GaXɓ-</td>
</tr>
<tr>
<td>a-qoos ‘shin’</td>
<td>kos-ngal ‘leg/foot’</td>
<td>*ɣal-xoos</td>
</tr>
</tbody>
</table>

Figure 69: Cognates in the *ɣal class

Most Sereer cognates of Fula words in the *ngal class appear in the *ɣal class. Sereer *ɣal 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. It is a very large class in both languages, containing a variety of nouns that do not fall into the above semantic categories.

Phonologically, both languages independently suggest a reconstruction *ɣal or *gal. As *ɣ regularly develops to /g/ in Sereer, the Nominka prefix ga- confirms the initial voiced velar, but provides no clues as to its continuancy. Both languages attest the final /l/, which triggers fortition. Recall that the final /l/ remains in the Fula class marker after triggering fortition, unlike in Sereer where it is preserved only pre-vocally. 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. 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

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<tbody>
<tr>
<td>(g)o-</td>
<td>ol-</td>
<td>X- -wol</td>
<td>X- -gol</td>
<td>*ɣol-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-ñaay 'forest fire'</td>
<td>jay-ngol 'fire'</td>
<td>*ɣol-ñaay</td>
</tr>
<tr>
<td>o-gef 'crack'</td>
<td>gew-ol 'crack'</td>
<td>*ɣol-Gef</td>
</tr>
<tr>
<td>o-ɓaak* 'rope'</td>
<td>ɓogg-ol 'rope'</td>
<td>*ɣol-ɓVK</td>
</tr>
<tr>
<td>o-goon 'sap'</td>
<td>gon-gol 'torn'</td>
<td>*ɣol-Goon</td>
</tr>
<tr>
<td>o-goon-iit 'tear'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o-maar 'braid'</td>
<td>mor-gol 'braid'</td>
<td>*ɣol-mVr</td>
</tr>
</tbody>
</table>

Figure 70: Cognates in the *ɣol class

*The exceptional voiceless implosive is presumably in analogy with ɓaak ‘baobab,’ the bark of which is used to make rope.

Most Sereer cognates of Fula words in the ngol class appear in the ole class. Fula ngol contains many long objects, and any verb can be nominalized by putting it in the ngol class. It serves as the infinitive marker in the Gambian, Liptakko-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 many other 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 50), 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 highly doubtful due to the rarity of *ɣo nouns and the frequency of *ɣol nouns.

6.2.1.7 *re

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<tbody>
<tr>
<td>Ø-</td>
<td>l- (r-)</td>
<td>Ø- -re</td>
<td>Ø- -de</td>
<td>*re-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>saax 'town/land'</td>
<td>saa-re 'town'</td>
<td>*re-saax</td>
</tr>
<tr>
<td>xoox 'head'</td>
<td>hoo-re 'head'</td>
<td>*re-xoox</td>
</tr>
<tr>
<td>ŋiŋ 'tooth'</td>
<td>ŋiŋ-nde 'tooth'</td>
<td>*re-ŋiŋ</td>
</tr>
<tr>
<td>xeeŋ 'heart/lung/liver'</td>
<td>heeŋ-ere 'liver'</td>
<td>*re-xeeŋ</td>
</tr>
<tr>
<td>ɓaak 'baobab fruit'</td>
<td>ɓoḥ-re 'baobab fruit'</td>
<td>*re-ɓVK</td>
</tr>
</tbody>
</table>

Figure 71: Cognates in the *re class
Sereer cognates of Fula words in the nde class appear in the le class. Fula nde contains most fruits, but otherwise has no clear semantic properties, nor does the le class in Sereer.

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 xuul, 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 63). 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.

6.2.1.8 *ɓe

Ø- w- Ø- -ɓe/-‘en 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 the 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 6.7.1). 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. 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 should not be particularly troubling. The origin of the alternate Fula suffix - ‘en is unclear.

6.2.1.9 *ɗik and *ɗak

X- k- X- -ji X- -ɗi *ɗik-

aX- ak- X- -je X- -ɗe *ɗak-

The two basic non-personal plural classes in Fula are ɗa and de. 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.

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<tbody>
<tr>
<td>*ye</td>
<td>nge</td>
<td>ði</td>
<td>le</td>
<td>ke</td>
</tr>
<tr>
<td>*yun</td>
<td>ngu</td>
<td>ði</td>
<td>ne</td>
<td>ke</td>
</tr>
<tr>
<td>*rin</td>
<td>ndi</td>
<td>ði</td>
<td>ne</td>
<td>ke</td>
</tr>
<tr>
<td>*fan</td>
<td>mba</td>
<td>ði</td>
<td>fane</td>
<td>ke</td>
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<td>ðe</td>
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</tr>
<tr>
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<td>axe</td>
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<td>ðe</td>
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<td>axe</td>
</tr>
<tr>
<td>*han</td>
<td>ka</td>
<td>ðe</td>
<td>aN- ale</td>
<td>ke</td>
</tr>
</tbody>
</table>

*Figure 72: Cognate 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 *ði*, and wherever Sereer has *ake*, Fula has *de*. 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 *ði* and *ke*, and of *de* and *ake*.

Phonologically, the *ði = 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 idiosyncratic lenition, c.f. *be- > w- above). The initial consonant and vowel have been eroded in Sereer, but Fula attests to initial *ði*-*, so that the full form of the PFS prefix would be *ðik*. Unlike in the case of *ox*, the initial /ð/ seen in Fula can be taken as original, as it does not idiosyncratically alternate with other consonants like /k/ and /w/20. The fact that this prefix is identical in form to the PFS word *ðik* ‘two’ cannot be coincidence. It suggests that this marker was grammaticalized from the numeral21.

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

21 This account also explains the form of the Fula word for two *ðið*, which is conspicuously reduplicated, and lacks the final /k/ of the Sereer *ðik/ðik*.

<table>
<thead>
<tr>
<th><em>ðik ðik</em> &gt;</th>
<th>gemination</th>
<th>prefix&gt;suffix</th>
<th>cluster simplification</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>ðik ðik</em> &gt;</td>
<td>di ðik</td>
<td>ððik</td>
<td>Fula di di</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><em>ðik ðik</em> &gt;</th>
<th>gemination</th>
<th>erosion</th>
<th>geminate devoicing</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>ðik ðik</em> &gt;</td>
<td>di ðik</td>
<td>ððik</td>
<td>Sereer fik</td>
</tr>
</tbody>
</table>

Being an adjective, *ðik* ‘two’ would have taken the plural noun class prefix *ðik*- when agreeing with most plurals. This proto-form *ðik ðik* evolved by regular processes in each language, yielding Fula *ðið* and Sereer *fik*.
The reconstruction of the class marker for the $de = ake$ 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.

<table>
<thead>
<tr>
<th>we class</th>
<th>ke class</th>
<th>ake class</th>
<th>axe class</th>
</tr>
</thead>
<tbody>
<tr>
<td>dik</td>
<td>fik</td>
<td>a fak</td>
<td>xa fak</td>
</tr>
<tr>
<td>daduk</td>
<td>tadik</td>
<td>a tadak</td>
<td>xa tadak</td>
</tr>
<tr>
<td>naxuk</td>
<td>naxik</td>
<td>a naxak</td>
<td>xa naxak</td>
</tr>
<tr>
<td>ñetuk</td>
<td>ñetik</td>
<td>a ñetak</td>
<td>xa ñetak</td>
</tr>
</tbody>
</table>

‘two’

‘three’

‘four’

‘five’

*Figure 73: 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 ñik–ñak 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-. 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 6.4). Second, if *ɗek- were original, it would mean that all of the vowels in the final syllables of the Sereer numerals in Figure 73 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 *ɗek- and *ɗak- were collapsed to *ɗek- in Fula, and *ɗak- in Sereer.

6.2.1.10 *ɣin and ɣan

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>giN-</td>
<td>al-</td>
<td>N- -yii</td>
<td>N- -gii</td>
<td>*ɣin-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(g)aN-</td>
<td>al-</td>
<td>N- -wa</td>
<td>N- -ga</td>
<td>*ɣan-</td>
</tr>
</tbody>
</table>

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 final 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 *yal 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.
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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>aN-</td>
<td>al-</td>
<td>N- -ha</td>
<td>N- -ka</td>
<td>*han-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-ngas ‘well’</td>
<td>ngas-ka ‘hole in ground’</td>
<td>*han-yas</td>
</tr>
</tbody>
</table>

Figure 74: A possible cognate in the *han class

The aN- 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- in prefixes is maintained in Sereer (see section 6.4). 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 aN- class is in fact distinct from the augmentative (g)aN- or the ale class, as the plural of aN- 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 aN- 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 aN- noun with an ake plural (a-ngid / a-kid ‘eye(s)’), but the Fula cognate is in the nde class (yitere / gite).

6.2.2.2 *ɣo

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(g)o-</td>
<td>ol-</td>
<td>Ø- -wo</td>
<td>Ø- -go</td>
<td>*ɣo-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-maag ‘river/sea’</td>
<td>maay-o/maaw-o ‘river’</td>
<td>*ɣo-maay</td>
</tr>
</tbody>
</table>

Figure 75: A possible cognate in the *ɣo class

The Fula ngo class contains relatively few members, only one of which 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 0 on *ɣol, used in many other dialects).

Both the Sereer and Fula class marker 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. A parallel case from an unrelated language is the example 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 *ye

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø-</td>
<td>1-</td>
<td>Ø- -ye</td>
<td>Ø- -ge</td>
<td>*ye-</td>
</tr>
</tbody>
</table>

**Figure 76: A possible cognate in the *ye class**

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

The lack of mutation in Fula suggests a vowel-final class marker *ye-. Once this marker eroded in Sereer, the few nouns in the *ye 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 †a-naak ake as would be regular for a true le class noun. As the plural class for nge is dì in Fula, we can be rather confident in attributing the irregular plural form of Sereer naak to its earlier membership in the *ye class.

6.2.3 **Class reassignment**

6.2.3.1 *ru

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ngol ne</td>
<td>hon-ndu (pl. koll-i)</td>
<td>*ru-hol</td>
</tr>
<tr>
<td>nof ne</td>
<td>nof-ru</td>
<td>*ru-nof</td>
</tr>
<tr>
<td>feen ne</td>
<td>‘en-du’22</td>
<td>‘breast’</td>
</tr>
<tr>
<td>ngeñ ne</td>
<td>hen-ndu</td>
<td>‘wind’</td>
</tr>
<tr>
<td>a-keñ ale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>faaɓ le</td>
<td>fam-ru (pl. paaɓ-i)</td>
<td>*ru-faaɓ</td>
</tr>
<tr>
<td>a-mbeel ale</td>
<td>wee-ndu (pl. beel-i)</td>
<td>*ru-weel</td>
</tr>
</tbody>
</table>

**Figure 77: Cognates in the *ru class**

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.

---

22 The lack of /d/ in Fula is unexplained.
6.2.3.2 *hiX

<table>
<thead>
<tr>
<th>Sereer</th>
<th>Fula</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ḋaak ne</td>
<td>ḋok-ki</td>
<td>*hiX-ɓVK</td>
</tr>
<tr>
<td>? sooɓ ne</td>
<td>jaɓɓ-i (root yaɓɓ-)</td>
<td>*hiX-{y/s}oxɓ</td>
</tr>
<tr>
<td>? o-naapan ole</td>
<td>naaw-ki</td>
<td>*hiX-naaf</td>
</tr>
<tr>
<td>? (f)o-suun ole</td>
<td>cuur-ki</td>
<td>*hiX-suu{t/n}</td>
</tr>
<tr>
<td>? teex ne</td>
<td>lekk-i</td>
<td>*hiX-reex</td>
</tr>
</tbody>
</table>

Figure 78: Possible cognates in the *hiX class

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 none are 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- (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, but of course the possibility must be considered.

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. ḋaak le ‘baobab fruit’ and daaf le ‘an apple-like pitted fruit’). These facts point to *re as being the PFS class for fruits, with most being reassigned to ole in Sereer for some reason. Other sporadic cases of reassignment can be identified, e.g. Fula njum-ri = Sereer yuum fe ‘honey,’ Fula ñaa-nde = Sereer ñaal ne, 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 without cognates

6.2.4.1 Fula liquid ḍam

<table>
<thead>
<tr>
<th>ḍam</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ndiy-am</td>
<td>‘water’</td>
</tr>
<tr>
<td>kos-am</td>
<td>‘sour milk’</td>
</tr>
<tr>
<td>lam-ɗam</td>
<td>‘salt’</td>
</tr>
<tr>
<td>nebb-am</td>
<td>‘oil’</td>
</tr>
<tr>
<td>yiiy-ɗam</td>
<td>‘blood’</td>
</tr>
</tbody>
</table>

Figure 79: Examples of nouns in the Fula ḍam liquid class

Many liquids appear in the Fula ḍam class (triggering grade III). While this has no cognate in Sereer, it is somewhat phonologically similar to the ma- liquid classes that appear pervasively throughout Northwest 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 †*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 0). 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 *(d)am is the fact that the only other two m-final noun class suffixes in Fula, *dim and *ngm (Fuuta Jaloo dialect), 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.

<table>
<thead>
<tr>
<th>Siin</th>
<th>Saalum</th>
</tr>
</thead>
<tbody>
<tr>
<td>fo-sis ole</td>
<td>o-sis ole</td>
</tr>
<tr>
<td>fo-soow ole</td>
<td>o-soow ole</td>
</tr>
<tr>
<td>fo-suun ole</td>
<td>o-suun ole</td>
</tr>
<tr>
<td>foo-(i) ole</td>
<td>foo(i) le</td>
</tr>
<tr>
<td>fo-’oy ole</td>
<td>fo’oy fe/le</td>
</tr>
<tr>
<td>fo-saa\varepsilon ole</td>
<td>mbasaa\varepsilon ne</td>
</tr>
</tbody>
</table>

*Figure 80: Siin words in the fo- class and their Saalum equivalents*

First, if *dam is to be reconstructed as the PFS liquid class, reconstructing something which became Siin fo- would require two liquid classes in the proto-language, which seems unlikely. Furthermore, whereas /\j/ was not eroded in the determiner of the 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 correspond in Saalum not only to words in different noun classes, but also to words with completely unpredictable “prefixes” (e.g. fo-saa\varepsilon vs. mbasaa\varepsilon ‘hibiscus drink’), even in the case of borrowings. 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 cannot be polymorphemic, both because there is no explanation for the supposed prefix fo- lengthening in this word, and more importantly because a possible cognate root foof- ‘breathe/rest’ can be found in Fula. From this noun, an initial /\j/ 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 polysyllabic stems. The form of the word fo’oy ‘blood’ in Saalum may have been borrowed from Siin.
6.2.4.3 Fula ko

hud-o  ‘grass’
kaa-ko  ‘leafage’
yaɓɓ-o  ‘tamarind tree leaves’
ɓok-ko  ‘baobab tree leaves’

Figure 81: Examples of nouns in the Fula ko class

The Fula ko class contains mainly grasses and 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-, but it could be an innovation of Fula.

6.2.4.4 Sereer axe

The Sereer axe class (nominal prefix xaX-) is the plural of the ole and most non-diminutive onge nouns. Through internal reconstruction, we can assume a proto-form *xax-. 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 *jol in PFS, and was replaced by the more frequent dî when it was eliminated in Fula.

6.2.4.5 Sereer onge

o-mbec  ‘dance’
o-mbiñ  ‘place’
o-ndaf  ‘sitting by the fire’
o-nqok  ‘grass sp.’
o-nqalax  ‘traditional beverage’
o-nqool  ‘moon’

Figure 82: Examples of nouns in the Sereer onge class

Sereer onge 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 nouns in this class were originally diminutives (e.g. o-mbote ‘baby goat/sheep’ and o-ndoɓ ‘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, it would have the form *ong-, *ony-, or *onh-, possibly with some missing initial consonant. The fact that a hypothetical *ong- causes nasalization is noteworthy. It may be that the oral consonant was deleted before noun roots to simplify the resulting CCC clusters, and then the resulting [ŋ] induced nasalization. The Siin form onge found in McLaughlin with a uvular stop is not easily explained, but could potentially be original, with all other dialects shifting /nq/ to /ng/ in this item due to the incipient (or complete) merger of these two phonemes in many dialects.

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- and in Ñominka augmentative plurals *fi- and *fiN-. 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 cannot be original in the form *kon seen in many other dialects. An identification with Serer 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:

<table>
<thead>
<tr>
<th>Italian</th>
<th>French</th>
<th>Spanish</th>
<th>Portuguese</th>
</tr>
</thead>
<tbody>
<tr>
<td>-etto</td>
<td>-et(te)</td>
<td>-ito</td>
<td>-inho</td>
</tr>
<tr>
<td>-otto</td>
<td>-ot</td>
<td>-cito</td>
<td>-zinho</td>
</tr>
<tr>
<td>-ino</td>
<td>-on</td>
<td>-in</td>
<td></td>
</tr>
<tr>
<td>-ello</td>
<td>-ou</td>
<td>-zuelo</td>
<td></td>
</tr>
<tr>
<td>-uccio</td>
<td></td>
<td>-itito</td>
<td></td>
</tr>
<tr>
<td>-icchio</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 83: 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.

6.3 The Serer Ñominka prefixes

The highly variant prefix shapes of the Ñominka dialect of Sereer (see Figure 62) can be explained in some cases as retentions where other dialects have eroded the original prefix, and in other cases as innovative extensions of prefixes from elsewhere in the noun class system. The initial /g/ of the nominal prefixes of the *ole* and *ale* classes (go- and ga-) are retentions from earlier *ɣal- and *ɣol-. So too is the shape of the determiner *fan-* (*fe* in other dialects), from *fan-*. The prefix *gi-* on *ne* class words is not original. One possible explanation is that it is a “compromise” between the two original markers of the class that fell together to form the *ne* class: *rin-* and *ɣun-*. The *gi-* present on *le* class words is also not original. It was perhaps extended from the *ne* class by a sort of cross-dialectal analogy; where other dialects have *O*-Ñominka has *gi-* (in the *ne* class), and so where other dialects have *O-* elsewhere (in the *le* class), Ñominka inserts a *gi-* as a sort of marker of dialect identity. Perhaps a more likely explanation is that 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). In this scenario, it is still possible that dialect awareness was at play. 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.
6.4 The regularity of phonological erosion in Sereer

For many noun classes examined in section 6.2, we concluded that the prefixes had been eroded to some degree in Sereer. It must be noted that there is some 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 *d 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 is Siin, but in Saalum the augmentative ga- and gi- are exceptionally preserved. This is presumably due to the fact that they had identifiable semantics, and so did not become bleached of meaning like most other class prefixes. 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 (*yal, *ɣol, *ɣo), which was regularly lost. However, this does not resolve the issue of why the vowel in gi- is retained, and only serves to complicate matters for Fula, and thus is likely not the right explanation.

6.5 Overview of noun class cognates and markers

<table>
<thead>
<tr>
<th>semantics</th>
<th>Fula</th>
<th>Sereer</th>
<th>semantics</th>
<th>reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>person</td>
<td>X-</td>
<td>xA- axe</td>
<td>oX- oxe</td>
<td>person</td>
</tr>
<tr>
<td>people</td>
<td>-be</td>
<td>-nde</td>
<td>we le</td>
<td>*be-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-nge ?</td>
<td></td>
<td>*re-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N- -n̩u</td>
<td>N- ne</td>
<td>*ye-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N- -ndi</td>
<td></td>
<td>*γun-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-ndu</td>
<td></td>
<td>*rin-</td>
</tr>
<tr>
<td>trees</td>
<td>X-</td>
<td>-ki</td>
<td></td>
<td>(*riX-)</td>
</tr>
<tr>
<td></td>
<td>X-</td>
<td>X- ngol</td>
<td>o- ole</td>
<td>(*γol-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-n̩o ?</td>
<td></td>
<td>*γo-</td>
</tr>
<tr>
<td></td>
<td>X-</td>
<td>X- n̩gal</td>
<td>aX- ale</td>
<td>includes deverbal nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-ka ?</td>
<td>aN- ale</td>
<td>*γγal-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N- -n̩mba</td>
<td>faN- fe/fe/n̩e</td>
<td>*fan-</td>
</tr>
<tr>
<td>augment.</td>
<td>N-</td>
<td>Nγi</td>
<td>giN- ale</td>
<td>augmentative</td>
</tr>
<tr>
<td>augment.</td>
<td>N-</td>
<td>-n̩ga</td>
<td>(g)aγN- ale</td>
<td>augmentative</td>
</tr>
<tr>
<td>pl.</td>
<td>X-</td>
<td>X- d̩i</td>
<td>X- ke</td>
<td>*γγi-</td>
</tr>
<tr>
<td>pl.</td>
<td>X-</td>
<td>X- d̩e</td>
<td>aX- ake</td>
<td>*γγak-</td>
</tr>
<tr>
<td>liquids</td>
<td>N-</td>
<td>-d̩am</td>
<td>fo- ole</td>
<td>(*d̩am-)</td>
</tr>
<tr>
<td>leaves</td>
<td>ko</td>
<td></td>
<td></td>
<td>(*ho-)</td>
</tr>
<tr>
<td>dimin.</td>
<td>X-</td>
<td>-n̩gel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dimin.</td>
<td>X-</td>
<td>-kal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dimin. pl.</td>
<td>N-</td>
<td>-ko̩n</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 84: Cognate noun classes in Fula and Sereer, with potential PFS reconstructions.

Figure 84 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.

<table>
<thead>
<tr>
<th>sg.</th>
<th>pl.</th>
<th>semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>*(ʔ)ox</td>
<td>*ɓe</td>
<td>people</td>
</tr>
<tr>
<td>*fan/wan</td>
<td>*ɗik</td>
<td>(large) animals</td>
</tr>
<tr>
<td>*ɣun</td>
<td></td>
<td>animals</td>
</tr>
<tr>
<td>*ɣin</td>
<td></td>
<td>(round things)</td>
</tr>
<tr>
<td>(*ru)</td>
<td></td>
<td>(grasses/leaves)</td>
</tr>
<tr>
<td>(*ɣe)</td>
<td></td>
<td>(fruits)</td>
</tr>
<tr>
<td>*ɣo</td>
<td></td>
<td>(trees)</td>
</tr>
<tr>
<td>*ɣre</td>
<td>*ɗak</td>
<td>(birds, long things)</td>
</tr>
<tr>
<td>*ɣol</td>
<td></td>
<td>(long things)</td>
</tr>
<tr>
<td>*(ɣ)am/*man</td>
<td></td>
<td>liquids</td>
</tr>
<tr>
<td>*(ɣ)in</td>
<td>?</td>
<td>augmentative</td>
</tr>
<tr>
<td>*(ɣ)an</td>
<td>?</td>
<td>augmentative</td>
</tr>
<tr>
<td>*(ɣ)ol</td>
<td></td>
<td>diminutives</td>
</tr>
<tr>
<td>*(ɣ)al</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 85: Reconstructed noun class system of Proto-Fula-Sereer*

Figure 85 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.

### 6.6 The position of the Proto-Fula-Sereer noun class marker

#### 6.6.1 Prefixes or clitics?

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 odd and perhaps unattested change in a language. 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, Sir 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 does not truly involve affixes, but rather particles
that might best be analyzed as clitics. Furthermore, they were not exclusively proclitics; rather,
at the earlier period, some of these clitics could in fact appear either before or after the verb,
depending on syntactic factors (as is the case in the cited German and Dutch parallels), though
by far the most common position was indeed pre-verbal. Due to other syntactic changes in
English, the less common post-verbal position eventually became more prevalent. For an
overview of the facts and historical analyses, see Fischer et al. (2000) Chapter 7. Two important
facts of this English example must be stressed if a parallel to Fula is to be drawn: first, the
relevant morphemes are not truly affixes but clitics, and second, the later construction could only
arise due to the (albeit marginal) existence of the later pattern (or something like it) at the earlier
stage of the language.

We must then seriously entertain the hypothesis that the class markers of PFS were not
truly prefixes, but clitics 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 preverbally, and others that
require them to appear postverbally (only the 1st and 2nd singular markers in Sereer).

Sereer:
\[
\begin{align*}
\text{o} & \quad \text{ga’} & \text{a} & \quad \text{bug-u} & \quad \text{muus ne} & \quad \text{ga’o} \\
2s & \text{go} & 3s & \text{want-FOC} & \text{VS.} & \text{cat} & \text{DET} & \text{see-2s} \\
\text{‘he wants you to see’} & \text{‘you see the cat’}
\end{align*}
\]

\[
\begin{align*}
\text{um} & \quad \text{ga’} & \quad \text{a} & \quad \text{bug-u} & \quad \text{muus ne} & \quad \text{ga’um} \\
1s & \text{go} & 3s & \text{want-FOC} & \text{VS.} & \text{cat} & \text{DET} & \text{see-1s} \\
\text{‘he wants me to see’} & \text{‘I see the cat’}
\end{align*}
\]

Fula (from De Wolf 1995: xl; Gombe dialect):
\[
\begin{align*}
\text{mi} & \quad \text{war-ii} & \quad \text{nde} & \quad \text{ngaru} & \quad \text{=mi} \\
1s & \text{come-PERF} & \text{VS.} & \text{when} & \text{come 1s} \\
\text{‘I have come’} & \text{‘when I came’}
\end{align*}
\]

Figure 86: Sereer and Fula constructions with preverbal and postverbal subject markers

Might it not also have been the case that in some constructions, the usually proclitic noun class
markers could appear as enclitics? 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.

A final important piece of evidence is the status of the noun class markers in modern
Sereer. While they are generally analyzed as prefixes, they do exhibit some more clitic-like
properties. Stress assignment in Sereer, which basically assigns moraic trochees (where only
vowels are moraic) from right to left, takes as its domain the root plus any affixes, be they verbal
extensions, person marking suffixes, deverbal nominalizing suffixes or prefixes\textsuperscript{23}, etc. Subject agreement proclitics are excluded from this stress assignment domain. So too are the class markers, so that \textit{xa-póx} ‘dogs’ has final stress, while the disyllabic noun root \textit{dímbul} ‘chair’ receives penultimate stress. In this way, the noun class markers are not part of the phonological word in the same way that true suffixes and prefixes are. Further evidence (though admittedly somewhat anecdotal) is that Mr. Loum often provides words without their noun class marker when citing them in isolation. In languages with true noun class prefixes or suffixes, I do not believe that this is possible (no Swahili speaker would cite the word \textit{ki-tabu} ‘book’ as †\textit{tabu}, nor would any Spanish speaker cite \textit{manzan-a} ‘apple’ as †\textit{manzán}). Further (albeit weak) evidence that Sereer speakers think of the noun class markers as more loosely tied to the noun than a true prefix is that the language’s official orthography writes them with a space between the marker and the noun, e.g. \textit{o-koor} = <\textit{o koor}> ‘man.’

While our preconceptions about Niger-Congo noun class systems lead us to assume that the PFS markers were prefixes, the evidence that they were more loosely-bound clitics historically or even synchronically (in Sereer) is quite compelling. We may even go so far as to draw a connection between these noun class clitics and true classifiers such as those found in the languages of East and Southeast Asia, which may very well be the ultimate historical source of the PFS noun class markers. In Bangla, Bhattacharya (1999) reports that under certain conditions, the classifier can either precede or follow the noun. This provides an intriguing typological parallel to the possibly variable position of the noun class marker in PFS.

However, if the shift from proclitic 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.

\begin{center}
\begin{tabular}{l}
\textbf{Stage 1:} Marker is generally proclitic, very rarely enclitic \\
\quad \texttt{rin gaaf} \sim \texttt{gaaf rin} (much rarer) \quad ‘millet’ \\
\textbf{Stage 2:} Mutation sound changes take place \\
\quad \texttt{ri ngaaf} \sim \texttt{gaaf rin} (still much rarer) \\
\textbf{Stage 3:} Allomorphs are leveled to the much more common forms \\
\quad \texttt{ri ngaaf} \sim \texttt{ngaaf ri} (still much rarer) \\
\textbf{Stage 4:} The post-nominal marker becomes preferred \\
\quad \texttt{ngaaf ri} > \texttt{ngaw-ri} \quad ‘millet’
\end{tabular}
\end{center}

\textit{Figure 87: A possible pathway for Fula developing suffixes from proclitics}

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. The alternative to this four-stage process is that the proclitics truly did become suffixes, moving from the left to the right side of the noun. This sort of development is in itself somewhat odd, but requires only two steps: mutation, and then movement of the noun class marker. 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.

\textsuperscript{23} There is in fact only one true prefix in Sereer, the prefixed reduplicant of agentive nouns, e.g. \textit{faa-fay} ‘healers,’ which notably has stress on the prefix.
6.6.2 Alternate analyses

There are a number of possible alternatives to the above analysis. 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 29), 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. There do indeed exist languages in which noun class is marked by both suffixes and prefixes, some in Northwest Atlantic (e.g. Mbulungish and Baga Mboteni (Sapir 1971: 96)). However, in these languages 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 these 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. Perhaps more importantly, at least some of the Sereer determiners are in fact cognate with Fula determiners, suggesting that the proto-language did indeed have post-nominal determiners, but that they continue in this role in the modern languages, rather than having become grammaticalized as the Fula suffixes.

None of these alternate analyses can account for the modern facts. Only by assuming that a single pre-nominal class marker moved to the right of the noun (or that the noun moved to the left of the class marker) in Fula can we account for the fact that a) no residue of suffixes exists in Sereer, yet residue of a prefix consistent with movement (and not erosion) exists in Fula, and b) the very consonants that were “swallowed up” by nasalization and fortition in Fula fail to appear at the right edge of the modern suffixes.
6.7 The bigger picture: Northwest Atlantic and Niger-Congo

6.7.1 Looking for cognate noun classes

As Fula and Sereer are claimed in the literature to be most closely related to the Northwest Atlantic or Senegambian languages, it is natural to examine the noun class systems of these languages to see what similarities they share with the PFS noun class system.

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.

<table>
<thead>
<tr>
<th>prefix</th>
<th>grade</th>
<th>determiner</th>
<th>semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ṃ-</td>
<td>I</td>
<td>ṃlɛ̃</td>
<td>sg. person</td>
</tr>
<tr>
<td>ðʌ-</td>
<td>I</td>
<td>ðʌlɛ̃</td>
<td>pl. people</td>
</tr>
<tr>
<td>ṣà-</td>
<td>III</td>
<td>ṣàŋ</td>
<td>sg.</td>
</tr>
<tr>
<td>ðà-</td>
<td>III</td>
<td>ðàŋ</td>
<td>pl.</td>
</tr>
<tr>
<td>Ø</td>
<td>I</td>
<td>ðé̃</td>
<td>sg.</td>
</tr>
<tr>
<td>mà-</td>
<td>III</td>
<td>màŋ</td>
<td>pl., liquids</td>
</tr>
<tr>
<td>é-</td>
<td>II</td>
<td>éd</td>
<td>sg.</td>
</tr>
<tr>
<td>mà-</td>
<td>I</td>
<td>màŋ</td>
<td>pl.</td>
</tr>
<tr>
<td>g̃é-</td>
<td>III</td>
<td>g̃éŋ</td>
<td>sg.</td>
</tr>
<tr>
<td>ᶜé-</td>
<td>III</td>
<td>ᶜéŋ</td>
<td>pl.</td>
</tr>
<tr>
<td>ò-</td>
<td>I</td>
<td>òd</td>
<td>pl., sg.</td>
</tr>
<tr>
<td>ḋà-</td>
<td>III</td>
<td>ḋàŋ</td>
<td>sg.</td>
</tr>
<tr>
<td>Ḇé-</td>
<td>III</td>
<td>Ḇéŋ</td>
<td>pl.</td>
</tr>
<tr>
<td>ḡò-</td>
<td>III</td>
<td>ḡòŋ</td>
<td>sg.</td>
</tr>
<tr>
<td>ḅò-</td>
<td>III</td>
<td>ḅòŋ</td>
<td>pl.</td>
</tr>
</tbody>
</table>

I f s j h w r y y ɓ l y’ ŋ ü
II p t c k b d j ɓ d’ y’ ŋ
III p t c k mb nd nj ng m n ŋ ŋ

The Bedik noun class system appears to be on the whole rather different from that of Fula and Sereer. As in Sereer, the original CVC shape of most class markers can be determined by internal reconstruction, taking the initial consonant of the prefix, and final consonant of the post-nominal determiner. There are only two class prefixes which are similar to any PFS prefix in form and meaning. The first is the plural personal class prefix ṃ- (c.f. PFS *āe). There are in addition four other ṃ-initial plural non-personal noun class prefixes. Second is the liquid class.
prefix mā- (māŋ; c.f. PFS *(d)am). Both markers share an /a/ and /m/, but in different orders. This partial resemblance may simply be a coincidence (unless of course the PFS form was truly *man, see section 6.2.4.1). The prefix gá- (*gáŋ) is phonologically similar to the PFS augmentative *yan, but does not carry augmentative meaning.

<table>
<thead>
<tr>
<th>singular classes:</th>
<th>plural classes:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>prefix grade semantics</strong></td>
<td><strong>prefix grade semantics</strong></td>
</tr>
<tr>
<td>u- I person</td>
<td>bø- I people</td>
</tr>
<tr>
<td>Ø II/III</td>
<td>ma- III liquids</td>
</tr>
<tr>
<td>Ø I</td>
<td>bwa- I</td>
</tr>
<tr>
<td>bee- I</td>
<td>gø- I</td>
</tr>
<tr>
<td>bu- I</td>
<td>maa- I</td>
</tr>
<tr>
<td>bwa- I</td>
<td>ma- II</td>
</tr>
<tr>
<td>faa- I</td>
<td>ña- I</td>
</tr>
<tr>
<td>gø- I</td>
<td>saa- I</td>
</tr>
<tr>
<td>ga- III</td>
<td>ba- + sg. pfx.</td>
</tr>
<tr>
<td>gu- III</td>
<td></td>
</tr>
<tr>
<td>ha- II</td>
<td></td>
</tr>
<tr>
<td>jø-, ji- I</td>
<td></td>
</tr>
<tr>
<td>la- I</td>
<td></td>
</tr>
<tr>
<td>na- III</td>
<td></td>
</tr>
<tr>
<td>ña- I</td>
<td></td>
</tr>
<tr>
<td>sa- II</td>
<td></td>
</tr>
</tbody>
</table>

Figure 90: Mutation and noun class systems 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, bø-, and the liquid class marker ma-, which as in Bedik triggers the nasal grade III. We again find a gaN- (c.f. PFS *yan) and here a guN- (c.g. PFS *yun), which like PFS *yun contains many animals.

In Wolof (hypothesized by Sapir (1971) to be Fula-Sereer’s closest relative), 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 determiner as in Wolof. The f- class contains some large animals (horse, goat), suggesting a possible connection with PFS *fan/wan, and we once again find the liquid m- class, and a personal plural b- class (though this is also fossilized in many singular personal nouns, e.g. *b-o ‘person,’ *be-reɓ ‘woman’). The k- class is used for infinitive verb forms (c.f. PFS *yol), and contains the word *ke-rik ‘tree,’ which may be cognate
with Sereer *a-teex and Fula *leg-gal, suggesting the possible cognacy of Cangin *k- and PFS *ɣal and *ɣol.

Of course, a thorough historical study of these languages would be required to make any meaningful insights, but on the surface it appears that some other Northwest Atlantic languages do in fact share a few cognate noun classes with PFS, but for the majority of PFS classes, there is no compelling evidence of cognate classes in the surrounding languages.

Comparisons with languages farther afield show potential cognates for the personal plural and liquid class (e.g. Proto-Bantu *ba- and *ma-), but any further attempts at identifying cognates would be highly speculative. Looking at the modern languages, one might be tempted to equate Fula ndi (nominal suffix -di/-ri) with the Bantu class 5 (*i-, *ri-), or even Sereer oxe (nominal prefix o-) with Bantu class 1 (*mu-), but when we consider the PFS forms with the 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 Northwest Atlantic languages few clear cognates of PFS noun classes can be found.

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

We have established that Proto-Fula-Sereer had an inventory of noun class clitics of the shape CV(C) which appeared before the noun and adjective, but may have rarely appeared in postnominal position. PFS innovated at least two noun classes in the plural *ɗik and *ɗak, 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 almost no 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 possibility that the innovation and replacement of noun classes played a role in any given language or subgroup, perhaps even a major role. 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). 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 serve 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. 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:

<table>
<thead>
<tr>
<th></th>
<th>lab.</th>
<th>cor.</th>
<th>pal.</th>
<th>vel.</th>
<th>implosive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiced</td>
<td>b</td>
<td>d</td>
<td>j</td>
<td>g</td>
<td>ɓ ɗ ь y’</td>
</tr>
<tr>
<td>Voiceless</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td>ɓ f ь c’</td>
</tr>
<tr>
<td>Nasal</td>
<td>mb</td>
<td>nd</td>
<td>nj</td>
<td>ng</td>
<td>ɓ f ь c’</td>
</tr>
</tbody>
</table>

Continuant mutation:

<table>
<thead>
<tr>
<th></th>
<th>lab.</th>
<th>cor.</th>
<th>pal.</th>
<th>vel.</th>
<th>uvu.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuant</td>
<td>w</td>
<td>f</td>
<td>r</td>
<td>s</td>
<td>h</td>
</tr>
<tr>
<td>Stop</td>
<td>b</td>
<td>p</td>
<td>t</td>
<td>c</td>
<td>k</td>
</tr>
<tr>
<td>Nasal</td>
<td>mb</td>
<td>nd</td>
<td>nj</td>
<td>ng</td>
<td>nq</td>
</tr>
</tbody>
</table>

Figure 91: 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, and exist synchronically in environments where they were never mutated historically. Thus, grade I is taken to be the unmutated grade, and is underlying. Crucially, in a historically-informed analysis of both languages, 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 grades presented in Figure 33, reproduced below, can thus be taken as the synchronic mutation grades.
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 of 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 continuant, 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 underlyngly begin with /ɣ/, which surfaces in grade I as [w], [ɣ] 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’s analysis of Sereer, the analysis of 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 featural-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)\textsuperscript{24}; 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\textsuperscript{25}. Rather, we can simply make reference to the grades themselves as being abstract systems of alternation, which are memorized by all speakers and retained for their morphological usefulness, but need not be consistent with regards to 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] in all cases 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 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, and contains all consonants in the language except prenasalized stops and voiceless implosives. 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—all continuants are unmutated. The distinct development of certain consonants under the influence of fortition and nasalization indicate that categorical mutation could not have existed in the proto-language, but rather must have 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

\textsuperscript{24} McLaughlin (1994) avoids this particular problem by positing the voiceless implosives as underlying.

\textsuperscript{25} 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 motivated by synchronic and not historical evidence in Paradis’s analysis, it certainly fits in well with the historical facts. However, as McLaughlin notes, geminate continuants are in fact attested in modern Fula, so this analysis is not completely satisfying.
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 cause any mutation.

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.
Works Cited


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