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## Syllable weight in the phonology of Pulaar

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### 1. Introduction

This chapter examines the role of syllable weight in the phonology of Fuutankooore Pulaar, a Senegalese dialect of Fula. Cross-linguistically, the weight distinction between light and heavy syllables plays a role in a number of phonological processes including stress and tone assignment, compensatory lengthening, minimal word effects, and reduplication. Taken as a whole, claims about syllable weight in Fula dialects have been somewhat inconclusive, but in a work that has served as the basis for a number of subsequent discussions and analyses (Downing 2004, 2010; Wiltshire 2006), Niang (1997) proposes that syllable weight is crucial to stress assignment in a Mauritanian dialect of Fuutankooore Pulaar, and identifies a four-way weight distinction: CVVC > CVV > CVC > CV. Mc Laughlin (2005) describes the role that syllable weight plays in constraints on patronymic reduplication in the closely related Senegalese Fuutankooore Pulaar, but finds no evidence for a weight distinction between CVV and CVC syllables.

In this chapter we first examine the role of syllable weight in stress assignment. Phonetic evidence indicates that the Senegalese dialect under discussion does not show the robust patterns of weight-sensitive prominence attested in Niang (1997); in fact it is questionable whether weight plays any role at all in syllable prominence. Second, we look at the role of syllable weight in other phonological processes including reduplication, compensatory lengthening, and minimal word requirements, where its effects are quite robust.

Fula is a non-tonal Atlantic language spoken across the West African Sahel from Mauritania and Senegal in the west to Sudan and Central African Republic in the east. There is significant dialectal diversity among Fula speakers, and although the morphological, syntactic, and phonological basis of the language is more or less consistent across dialects, many details are quite different. In particular, accounts of syllable prominence suggest that there are striking prosodic differences between dialects. Fula speakers are often fluent speakers of other languages as well, and language contact may turn out to play a role in these prosodic differences between dialects.

## 2. Syllable weight and syllable prominence in Fula

Pulaar allows the following syllable types: CV, CVC, CVV, and CVVC. Onsets are obligatory. Vowel-initial loanwords, for example, undergo epenthesis in the form of a glottal stop or glide insertion in order to satisfy this requirement. The language does not have tautosyllabic consonant clusters, i.e., complex onsets and codas consisting of more than one segment. Although they are transcribed with digraphs, e.g., *ʰd/*, prenasalized stops are single segments and do not violate the prohibition against clusters. Word internal sequences of three consonants are broken up by an epenthetic vowel, normally [u]. These facts are illustrated in (1)– (3). The symbols  $\epsilon$  and  $\text{ɔ}$  denote mid vowels that have the value [–ATR] (Advanced Tongue Root).

- |     |          |                  |           |
|-----|----------|------------------|-----------|
| (1) | CVC.CV   | <i>dɛf.tɛ</i>    | “books”   |
|     | CVC.CV   | <i>cɛw.ʲgu</i>   | “panther” |
|     | CV.CVC   | <i>ʰdi.jam</i>   | “water”   |
|     | CVVC.CVV | <i>ʲjaaw.nii</i> | “hurried” |
- (2) *uɓle* (Fr. “ourler”) → *ɹurlude* “to hem”
- (3) /mawn/+/dɛ/ → *mawnude* “to grow up”

Two patterns of stress assignment that are independent of syllable weight, namely initial and penultimate stress, occur in a number of descriptions of Fula phonology. Accounts of syllable prominence in the literature include those of Arnott (1970) for the Gombe dialect spoken in Gombe and Bauchi State in Nigeria, McIntosh (1984) on the Kacecereere dialect spoken in southern Zaria in Nigeria, Breedveld (1995) on the Maasinankoore dialect spoken in the Maasina region of Mali’s Inner Niger Delta, Niang (1997) on the dialect spoken in Boghe in the Brakna region of Mauritania, and Diallo (2000) on the Labé dialect spoken in the Fuuta Jaloo in northern Guinea. Their findings are presented in turn.

### 2.1 Arnott’s account of Gombe Fulfulde

Arnott (1970:63) gives a very brief account of stress, or what he terms “salience”, in the Gombe dialect of Fula, spoken in Gombe and Bauchi State, Nigeria. “In the case of disyllabic and polysyllabic nominals and adverbials, the first syllable is the salient syllable in nearly all cases.” He adds that in the verbal complex the default position is the first syllable of the radical. Syllable weight plays no role in salience in Arnott’s description.

## 2.2 McIntosh's account of Kaceccereere Fulfulde

In her description of Kaceccereere Fulfulde spoken to the southeast of Kaduna in northern Nigeria, McIntosh (1984: 20) considers pitch to be the correlate of stress. She states that in nominals the last non-final CVC or CVV syllable, i.e., heavy syllable, is stressed. If there is no such syllable, then the initial syllable is stressed. In the examples presented, stress invariably falls on the penultimate syllable (which in two syllable words is also the initial syllable). She provides further examples of stress being “pushed back” from penultimate position to a preceding CVC or CVV syllable, as in <sup>ʎ</sup>*jaw.di.ri* “ram” and *hoc.ce.re* “mountain”, which consequently receive stress on the initial syllable.<sup>1</sup> The two remaining examples are derived proper nouns which include the associative plural suffix /-ʔen/, which is extrametrical (Hayes 1995) and therefore plays no role in stress assignment. The two forms are: *wun.ʔan.ko.ʔen* “those of the Wuntanko lineage”, where the heavy antepenult is stressed, and *ka.cec.ce.re.ʔen* “those of the Kaceccere clan”, where the second syllable, i.e., the only heavy syllable in the word, is stressed. These two examples are unusual in that neither the initial nor the penultimate syllable are stressed. McIntosh herself remarks on the exceptional nature of the forms and says that “nominals with more than three syllables, but without a CVV or CVC syllable in penultimate position are very rare” (1984: 21).

McIntosh is less sure of the correlation between stress and pitch in her discussion of verbs and refers to syllable prominence in verbal complexes as “high pitch”. Verbal complexes consist of a verb stem and its inflectional suffixes which synthetically express voice, aspect and polarity through cumulative exponence (Mc Laughlin 2015). High pitch falls on “the penultimate syllable, or the verbal root, whichever is the later” (McIntosh 1984: 82) i.e., rightmost. The only examples of high pitch falling on the verbal root in non-penultimate position are forms in which there is no suffix, such as *o-war-Ø* “he came”, where the final syllable *war* “come” receives high pitch (1984: 83). Interestingly, however, McIntosh reports that “(w)hen the penultimate syllable has CV structure, then the preceding CV syllable can also take high pitch” (1984: 83). She formulates the pattern in the following way: “Two penultimate light syllables, or one penultimate heavy syllable, may receive high pitch in the verbal complex” (1984: 84). By way of example she gives the form *mo-jaaf-oto-ʔen* “he’ll forgive us”, which is syllabified as follows: *mo.jaa.fó.tó.ʔen*. Both the penult and the antepenult receive high pitch, suggesting

1. With the exception of Breedveld (1995), authors whose data is cited do not transcribe the [+/- ATR] distinction.

that the domain of high pitch is a bimoraic span whose right edge correlates with the penultimate syllable, rather than the syllable itself. While this is a natural behavior for pitch, the spread of high pitch over a two syllable span suggests that pitch is not the primary correlate of stress here, as stress does not “spread” to an adjacent mora but rather avoids the highly marked structure of stress clashing on two adjacent syllables.<sup>2</sup>

What we can retain from McIntosh’s description of Kaceccereere Fulfulde prosody is the prominence of the penultimate and initial positions. A heavy syllable in penultimate position is stressed; otherwise initial prominence is the default. There appears to be no weight distinction between CVC and CVV syllables.

### 2.3 Breedveld’s account of Maasinankooore Fulfulde

Breedveld (1995) describes in some detail the stress system of Maasinankooore Fulfulde, a dialect of Fula spoken in Maasina in Mali’s Inner Niger Delta. In Maasinankooore Fulfulde stress is marked by an increase in amplitude and a change in pitch, which more often than not manifests as a *lowering* of pitch (p. 131). In addition, she provides phonetic evidence to show that “vowels are relatively longer in stressed syllables” (p. 133). She critiques previous analyses by scholars including Arnott (1970), Noye (1974), and to a lesser extent McIntosh (1984), whom she says were misled by focusing on high pitch as a correlate of stress. Breedveld (1995: 133) proposes that “stress is assigned to the last heavy syllable in a word. If there are no heavy syllables, the stress falls on the first syllable of the word. The last syllable in nouns is extrametrical.” She gives the examples in (4) to illustrate her analysis. Adjectives pattern like nominals with regard to stress, so the final syllable in *pamarol* “small” is extrametrical, whereas the final, heavy syllable in the verbal form *calminanaa* “you should greet for” is stressed.

(4)	CVC.CV.CV	<i>’kor.su.do</i>	“cherished one”	(Breedveld
	CV.CVV.CV	<i>ra. ’waa. ’du</i>	“dog”	1995: 135–136)
	CV.CV.CVC	<i>’pa.ma.rol</i>	“small”	
	CVC.CV.CV.CVV	<i>cal.mi.na. ’naa</i>	“you should greet for”	

The parameters of her metrical analysis are as follows (p. 134): the last syllable is extrametrical in nominals (and adjectives); feet are left-headed, unbounded, and quantity sensitive; and the word level structure is right-headed, so that the last foot

2. We examine pitch in Pulaar in §3, although it may not be a correlate of stress at all (Beckman 1986; Sluijter 1995).

in the word receives stress. She makes a distinction between light (CV) and heavy (CVV, CVC, CVVC) syllables, and notes that CVVC syllables are “considered to be slightly overweight,” and are sometimes subject to vowel shortening (p. 105). She gives no indication of a weight distinction between CVC and CVV syllables.

#### 2.4 Diallo’s account of Fuuta Jaloo Pular

In describing his native Labé dialect of Guinean Pular, Diallo (2000:62) characterizes syllable prominence, or what he calls accent, as simply “une articulation plus énergique d’un constituant segmental (vocalique pour le cas du pular)” [a more energetic articulation of a segmental constituent (vocalic in the case of Pular)]. He describes primary and secondary accent at the word level as well as within larger syntactic constituents such as the NP, VP and clause. Fuuta Jaloo Pular, according to Diallo, shows a regular pattern of word-initial primary stress, and penultimate secondary stress in words over three syllables in length. Although there are not quite enough examples of different syllable types to make any definitive conclusions, this pattern appears to be unaffected by syllable weight, as the examples in (5) illustrate. Exceptions to this pattern include negative particles, negative verbs, disyllabic ideophones, and a handful of other particles, all of which receive stress on the final syllable. A more extensive treatment of clause level prominence (pitch) in the same dialect is provided in Anyanwu & Diallo (2007:67), who state that “[s]yllable structure (e.g. light V, CV; heavy VC or CVC) does not play any predominant role in the distribution of stress”.

- |     |                 |                          |           |                  |
|-----|-----------------|--------------------------|-----------|------------------|
| (5) | CV.CVV.CV       | <i>'dō.too.ri</i>        | “cock”    | (Diallo 2000:63) |
|     | CVC.CV.CVV.CV   | <i>'sal.li.ˌtaa.re</i>   | “revolt”  |                  |
|     | CV.CV.CV.CVV.CV | <i>'sa.ga.ta.ˌlaa.ku</i> | “bravery” |                  |

Although their approaches and parameters are quite different, McIntosh and Diallo both describe a system in which the initial and penultimate syllables are positions of prominence. Diallo gives no indication, however, of quantity sensitivity in the dialect he describes. His examples in (5) in fact show that the CVs and CVCs in initial position are favored for stress over later CVVs, an indication that position is more important than syllable weight.

## 2.5 Niang's account of Mauritanian Fuutankooré Pulaar

Most typologies of quantity-sensitive stress, including both moraic (e.g., McCarthy & Prince 1986; Broselow et al. 1997) and syllabic (Blevins 1995) do not admit four levels of weight. But in his description of stress in Mauritanian Fuutankooré Pulaar, Niang (1997) claims that four values are required to determine primary stress (CVVC > CVV > CVC > CV), and two are required to determine secondary stress (CVVC, CVV, CVC vs. CV). The generalizations, summarized in Wiltshire (2006), are as follows:

## (6) Primary stress in Mauritanian Pulaar (Niang 1997; Wiltshire 2006)

- a. If all syllables are CV, stress the first:  
*'ba.la.be* "shoulders"  
*'za.du.na* "world"
- b. The heaviest syllable (CVVV > CVV > CVC > CV) gets primary stress; a heavier syllable pulls stress away from the first syllable:
- |                |                         |                       |
|----------------|-------------------------|-----------------------|
| CVC leftmost   | <i>'hal.ku.de</i>       | "to kill"             |
|                | <i>ʃol.nu.de</i>        | "to put in"           |
| CVC beats CV   | <i>bo.'nan.de</i>       | "harm"                |
|                | <i>he.'lir.de</i>       | "to break with"       |
| CVV leftmost   | <i>'pii.la.gol</i>      | "tying of scarf"      |
|                | <i>'baa.bal.,naa.ʃo</i> | "person from Baabal"  |
| CVV beats CV   | <i>da.'raa.de</i>       | "to stand"            |
|                | <i>he.'daa.de</i>       | "to listen"           |
| CVV beats CVC  | <i>hal.'kaa.de</i>      | "to perish"           |
|                | <i>fer.'laa.de</i>      | "to squat"            |
|                | <i>ʃal.'too.wo</i>      | "person going out"    |
| CVVC leftmost  | <i>'ʃoof.nu.de</i>      | "to complete"         |
|                | <i>'daan.ki.,naa.de</i> | "to pretend to sleep" |
| CVVC beats CVV | <i>naa.'naal.de</i>     | "salted area"         |
|                | <i>ʃaa.'taar.naa.ʃo</i> | "person from Jaataar" |
- c. If two syllables are equally heavy, stress the leftmost:
- |               |                           |                      |
|---------------|---------------------------|----------------------|
| leftmost CVC  | <i>'tak.kor.di</i>        | "glue"               |
|               | <i>'tal.lor.de</i>        | "place for rolling"  |
|               | <i>'gol.lor.de</i>        | "work place"         |
|               | <i>'jam.min.de</i>        | "give directions"    |
| leftmost CVV  | <i>'poo.laa.do</i>        | "defeated person"    |
|               | <i>'daa.gaa.de</i>        | "to walk slowly"     |
| leftmost CVVC | <i>'haal.pu.,laar.zen</i> | "speakers of Pulaar" |
- d. Final syllables are not stressed, regardless of weight:
- |           |                  |          |
|-----------|------------------|----------|
| non-final | <i>'deb.buus</i> | "stick"  |
|           | <i>'noo.gaas</i> | "twenty" |

## 2.6 Summary

Despite their general incompatibility, the stress patterns described for the Fula dialects presented above converge in identifying the initial syllable as the default position for primary stress. They differ on whether syllable weight plays a role in stress assignment. Niang's dialect does, and robustly and systematically so according to his description. Maasinankooore Fulfulde also does, according to Breedveld. It is possible that syllable weight plays a role in stress assignment in Kaceccereere Fulfulde described by McIntosh, but it plays no role in Arnott or Diallo's descriptions.

## 3. Syllable prominence in Senegalese Fuutankooore Pulaar

Of the dialects described above, Niang's Mauritanian Fuutankooore Pulaar is the closest to the dialect that is the subject of this chapter. Although it is spoken on the Mauritanian side of the Senegal River, it is nonetheless part of the Fuuta Tooro dialect area identified by Arnott (1970). Our preliminary investigation of syllable prominence in Senegalese Fuutankooore Pulaar did not reveal any consistent patterns of stress assignment based on syllable weight, nor did the two native speakers we worked with have any intuitions about syllable prominence; we therefore turned to acoustic data. Given that the dialect we investigated is very close to the one investigated by Niang (1997), the goal of our phonetic investigation was to attempt to corroborate Niang's (1997) account of four degrees of syllable weight with phonetic evidence.

### 3.1 Methodology

In attempting to evaluate Niang's analysis we constructed two data sets. The first consisted of 34 trisyllabic or longer words containing the different syllable types, each of which was pronounced twice in the two separate carrier phrases below in (7) by a native speaker, making for a total of four recorded tokens of each word. In the carrier phrases, the target word is focused.

- (7) (a) *Mbii mi kɔ* \_\_\_\_\_. "I said \_\_\_\_\_"  
 (b) *Kɔ* \_\_\_\_ *mbii mi*. "It's \_\_\_\_\_ I said."

Because the intrinsic pitch of vowels varies by vowel quality, in the second data set we controlled for vowel quality by using twelve trisyllabic words in which the relevant syllables contained only the vowel [a], in both short and long versions. The same carrier phrases were used, also resulting in four recorded tokens of each of these words. All words in both data sets are listed in the Appendix.



We recorded the first data set from a male native speaker of Pulaar in his forties from the town of Podor. The second set of data was also obtained from a male native speaker of Pulaar in his forties, but from the town of Thilogne. Both speakers also speak Wolof, Senegal's lingua franca, and French. Podor and Thilogne are on the Senegalese side of the Senegal River, while Niang's data are from Boghé, on the Mauritanian side of the Senegal River, approximately midway between Podor and Thilogne.

Cross-linguistically, the acoustic correlates of stress are length, pitch and intensity. In Pulaar, vowel length is phonemically contrastive, as illustrated in (8), so we concentrated on pitch and intensity in order to evaluate syllable prominence.

(8)	<i>jeh-i</i>	“went.sg” (in clauses with a focused argument)	<i>jeh-ii</i>	“went.sg”
	<i>ˈde</i>	“the” (noun class <i>ˈde</i> )	<i>ˈdeɛ</i>	“this” (noun class <i>ˈde</i> )
	<i>harde</i>	“to snore”	<i>haarde</i>	“to be full”

### 3.2 Results

Using Praat 5.4.02 (Boersma & Weenink 2014), we measured the maximum intensity and pitch of the first two syllables in each token considered here. The overall results are shown in Table 1. We first compared potential stress correlates on the first two syllables without taking syllable size/weight into consideration, in order to test whether syllable position determines stress. A two-tailed t-test comparing pitch of the first syllable vs. the second revealed no significant differences in either set of data (set 1  $p = .88$ , set 2  $p = .27$ ) or in the sets combined ( $p = .44$ ). However, a two-tailed t-test on maximum intensity did find a small but significant difference, with the first syllable louder than the second. This held true in both sets of data (Set 1  $p = .02$ , Set 2  $p = .002$ ), and in the sets combined ( $p = .0002$ ). This suggests that intensity is the primary correlate of stress, and when syllable weight is disregarded, the first syllable is consistently louder than the second.

**Table 1.** Measures of pitch and intensity in the first two syllables of each word

	Set 1 (various Vs)	Set 2 (controlled Vs)	Combined sets
Syl 1 avg max pitch	135.2 Hz	121.1 Hz	124.6 Hz
Syl 2 avg max pitch	135.7 Hz	120.1 Hz	124.0 Hz
Syl 1 avg max intensity	81.6 dB	72.8 dB	74.8 dB
Syl 2 avg max intensity	80.2 dB	71.5 dB	73.5 dB

Although the magnitude of the difference is small, the Just Noticeable Difference (JND) for intensity in the 70–80 dB range is approximately .5 dB (e.g., Miller 1947; Hellman et al. 1987), while the difference between intensity of the first and second syllables is more than twice that.

Our results did not provide any evidence in support of Niang’s four level classification of weight as the determinant of the location of stress. Under Niang’s account, a heavier second syllable should draw stress away from initial position. However in a comparison of a CVC first syllable vs. a CVV second syllable (which in Niang’s system is supposed to be heavier), or a CV first syllable vs. a CVC second syllable, the first syllable was still significantly louder than the second. Pitch differences were also insignificant as to whether a heavier syllable appeared in first or second position. While our data set is admittedly quite limited, the results suggest that stress is realized as intensity, that initial position is the primary determiner for stress in this variety of Pulaar, and that syllable weight is irrelevant to stress location.

#### 4. Syllable weight in other phonological processes

Although the phonetic evidence casts doubt on the idea that syllable weight plays a role in stress assignment, it does play a role in other morphophonological processes. This section provides evidence for the role of syllable weight in compensatory lengthening, reduplication, and minimal word effects. It does not, however, support the proposed weight distinction between CVV and CVC syllables.

##### 4.1 Reduplication

In Senegalese Fuutankooré Pulaar reduplication is not a very productive process. Besides a handful of lexicalized forms that have no transparent base, such as *timtim-ol* ‘rainbow’, and *wilwil-<sup>n</sup>du* ‘bat’, there are two attested reduplicative patterns. The first of these involves a small number of idiosyncratic reduplicated lexical items that involve noun-to-noun or verb-to-noun derivation, examples of which are given in (9). In these examples the entire stem, whether CVC or CVVC, is reduplicated. The initial consonant of the newly formed word undergoes consonant alternation in accordance with its noun class.

- (9) From Mc Laughlin (2005: 121)
- |                |                |                     |                                       |
|----------------|----------------|---------------------|---------------------------------------|
| <i>ɹar-de</i>  | ‘to come’      | <i>ɹgar-ɹar-di</i>  | ‘volunteer plant’                     |
| <i>waal-ɔ</i>  | ‘Waalo region’ | <i>baal-waal-ɔ</i>  | ‘person from Waalo’                   |
| <i>hul-de</i>  | ‘to fear’      | <i>kul-hul-i</i>    | ‘frightening things’                  |
| <i>sɛɛr-de</i> | ‘to separate’  | <i>cɛɛr-sɛɛr-ɔ</i>  | ‘divorcée’                            |
| <i>kal-le</i>  | ‘testicles’    | <i>kal-hal-di</i>   | ‘male animal’                         |
| <i>hin-ɛɛ</i>  | ‘nose’         | <i>kin-hin-ol</i>   | ‘thonged sandal’                      |
| <i>ceed-u</i>  | ‘dry season’   | <i>ceed-seed-lu</i> | ‘signs of approach of the dry season’ |

A second pattern of reduplication in Pulaar, and one where syllable weight plays a central role, is found in patronymic reduplication. The reduplication of a patronym results in a noun meaning “person or people of the last name X.” Examples are given in (10). Class ɔ is human singular, class 6ε is human plural.

(10) From Mc Laughlin (2005: 122)

Patronym		Class ɔ	Class 6ε
Agne	<i>ʔaŋ</i>	<i>gaŋʔaŋɔ</i>	<i>ʔaŋʔaŋ6ε</i>
Bâ	<i>bah</i>	<i>baabahɔ</i>	<i>baabaabe</i>
Dia	<i>jah</i>	<i>jaajahɔ</i>	<i>jaajaabe</i>
Athie	<i>ʔac</i>	<i>gacʔacɔ</i>	<i>ʔacʔac6ε</i>
Ka	<i>kah</i>	<i>kaahahɔ</i>	<i>haahaabe</i>
Kane	<i>kan</i>	<i>kanhanɔ</i>	<i>hanhan6ε</i>
Sall	<i>sal</i>	<i>calsalɔ</i>	<i>salsal6ε</i>
Sow	<i>sɔh</i>	<i>cɔɔsɔhɔ</i>	<i>sɔɔsɔ6ε</i>
Sy	<i>sih</i>	<i>ciisihɔ</i>	<i>siisiibe</i>
Wane	<i>wan</i>	<i>banwanɔ</i>	<i>wanwan6ε</i>
Watt	<i>wat</i>	<i>batwatɔ</i>	<i>watwat6ε</i>

Two constraints govern this pattern of reduplication. First, like the forms in (9) where the entire stem is reduplicated, the entire patronym must be reduplicated. Second, the patronymic reduplicant must be both minimally and maximally bimoraic, consisting exactly of a CVC or CVV syllable and never of a CV or CVVC syllable. Because both of these conditions must be met, patronyms that are not bimoraic are never reduplicated, as illustrated in the examples in (11):

(11)

Patronym		Class ɔ	Class 6ε	
Pam	<i>paam</i>	<i>paamɔ</i>	<i>faambe</i>	<i>*paampaamɔ/faampaambe</i>
Ndiathie	<i>ʔjaac</i>	<i>ʔjaacɔ</i>	<i>ʔjaac6ε</i>	<i>*ʔjaacʔjaacɔ/ʔjaacʔjaac6ε</i>

In distinguishing crucially between CVC and CVVC syllables, the patronymic reduplicative pattern supports a distinction between heavy and superheavy (CVVC) syllables in Pulaar. The question remains, however, whether there is a weight distinction in the language between CVC and CVV syllables as Niang claims for Mauritanian Fuutankoore Pulaar.

#### 4.2 Compensatory lengthening

There is evidence that compensatory lengthening occurs in Pulaar. In compensatory lengthening the moraic structure of the syllable remains unchanged, even when the phonemic expression is changed (Kenstowicz 1994: 295). In Pulaar, a

short vowel before a non-final coda consisting of /h/ or a glottal stop /ʔ/ becomes lengthened to compensate for the loss of the consonant, thereby maintaining the bimoraic structure of the syllable, see (12).

(12)	/jahdɛ/ →	<i>jaa.de</i>	“to go”
	/jahre/ →	<i>jaa.re</i>	“scorpion”
	/bɔhre/ →	<i>bɔɔ.re</i>	“baobab fruit”
	/ʃehre/ →	<i>ʃɛɛ.re</i>	“market”
	/jiɔde/ →	<i>jii.de</i>	“to see”

Diallo (2000: 51) describes the same phenomenon in the Fuuta Jalloo dialect. Both Diop (1999: 87) and Paradis (1992: 148) give similar examples of compensatory lengthening when [h] is lost in coda position in the Kayhaydi (Kaédi) dialect of Mauritanian Fuutankoore Pulaar. Similarly, in the Maasinankoore dialect described by Breedveld (1995: 125) compensatory lengthening takes place when [h], [ʔ], and the glide [y] are lost from coda position.

This process is apparent in the reduplicated forms of patronyms that end in [h], reproduced and syllabified in (13):

(13)	Bâ	<i>bah</i>	<i>baa.ba.hɔ</i>	<i>baa.baa.be</i>
	Dia	<i>jah</i>	<i>jaa.ja.hɔ</i>	<i>jaa.jaa.be</i>
	Ka	<i>kah</i>	<i>kaa.ha.hɔ</i>	<i>haa.haa.be</i>
	Sow	<i>sɔh</i>	<i>ɔɔ.sɔ.hɔ</i>	<i>sɔɔ.sɔɔ.be</i>
	Sy	<i>sih</i>	<i>cii.si.hɔ</i>	<i>sii.sii.be</i>

Disregarding the initial consonant alternations found in these forms, what we see here are parallel morphemes whose shape fluctuates between CVC (CVh) and CVV (CV:) depending on whether the final /h/ ends up in prevocalic position, and therefore assumes the role of onset, or preconsonantal position, where it is realized as part of the rhyme. The compensatory lengthening illustrates that Pulaar equates the weight of CVC and CVV syllables as bimoraic.

### 4.3 Minimal word constraint

There is substantial evidence that there is a minimal bimoraic word requirement in Senegalese Fuutankoore Pulaar. Independent words are never shorter than two moras. Monomoraic morphemes, such as /ɔ/ “3sg” and /a/ “2sg”, or the definite articles that show noun class such as /<sup>m</sup>dɛ/, can be analyzed as clitics. Evidence from French loanwords or nonce borrowings of the shape CV reveals that the vowel is lengthened to form a bimoraic CVV syllable, whereas short vowels are not lengthened in loanwords that consist of two monomoraic syllables.

(14)	French		Senegalese Fuutankoore Pulaar	Gloss
	thé	[te]	tɛ:	“tea”
	dés	[de]	dɛ:	“thimble, dice”
	auto	[oto]	ɔɔ	“car”

## 5. Summary and conclusions

There are a number of phonological processes in the Senegalese dialect of Fuutankoore Pulaar investigated in this study that are sensitive to syllable weight. First is the lengthening of a short vowel to compensate for the loss of a coda, as in /jah/+/dɛ/ → *jaa-dɛ*, which provides evidence that CVC and CVV syllables are both bimoraic and that there is no distinction between the two in terms of weight. Second is a bimoraic restriction on the patronymic reduplicant and the consequent failure of patronyms that consist of superheavy syllables, defined here as CVVC, to reduplicate. Third is the bimoraic minimal word constraint. Based on this phonological evidence we conclude that Senegalese Fuutankoore Pulaar has a three-way weight distinction between light (CV), heavy (CVC, CVV), and superheavy (CVVC) syllables. Our phonetic data do not provide us with any compelling phonetic evidence for a relationship between syllable weight and syllable prominence, thus we conclude that although weight plays a role in Senegalese Fuutankoore Pulaar phonology, it does not play a role in determining the location of stress.

This chapter naturally invites further research into the prosody of Fula. Based on the available descriptions, many of which are incomplete, the differences between dialects are striking, and although there are some characteristics that they all share, there is much variation, see Table 2.

In considering the differences between dialects, it may be fruitful to consider the diverse linguistic ecologies and language contact situations that Fula speakers are in. With the possible exception of Guinea, Fula is a minority language in every country where it is spoken, and speakers thus tend to know at least the regional lingua franca or vehicular language in addition to Fula. This ranges from Hausa (Chadic) in Northern Nigeria to Wolof (Atlantic) in Senegal, Hassaniyya Arabic (Semitic) in Mauritania, and Soso and Maninka (Mande) in Guinea. Whether contact plays a role in the different prosodic systems described in this chapter remains to be seen, but the question is worth pursuing. This pursuit requires more detailed descriptions of the potential role(s) of syllable weight in each language, as we have begun here for Senegalese Fuutankoore Pulaar, including both phonetic investigation, to determine its role in stress, and careful phonological analysis of phenomena such as minimal word size, compensatory lengthening, and reduplication.

Table 2. Cross-dialectal comparison of the role of syllable weight in Fula

	Senegalese Futankooore Pulaar	Mauritanian Futankooore Pulaar	Guinean Fuuta Jaloo Pular	Malian Maasinankooore Fulfulde	Nigerian Gombe Fulfulde	Nigerian Kacecereere Fulfulde
Default stress on initial $\sigma$	Y	Y	Y	Y	Y	Y
$\sigma$ weight plays a role in primary stress assignment	N	Y	N	Y	N	Y
$\sigma$ weight plays a role in other phonological processes	Y	Y	Y	Y	?	Y
	compensatory lengthening, minimal word, reduplicant	(Paradis 1992: 148; Diop 1999: 87) compensatory lengthening)	(Diallo 2000: 51) compensatory lengthening)	(Breedveld 1995: 125) compensatory lengthening)		(McIntosh 1984: 82) H pitch assignment)
Degrees of weight distinction	3	4	2	2(+)	2?	2
Major contact language(s)	Wolof	Hassaniyya Arabic	Maninka & Soso	Sorogo, Soninke, etc.	Hausa	Hausa

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## Appendix. Words recorded for phonetic analysis

### Word list 1

- |     |                     |                           |
|-----|---------------------|---------------------------|
| 1.  | <i>halkude</i>      | “to annihilate”           |
| 2.  | <i>ɟɔlnude</i>      | “to load”                 |
| 3.  | <i>bɔnande</i>      | “harm”                    |
| 4.  | <i>helirde</i>      | “to break (instrumental)” |
| 5.  | <i>piilagol</i>     | “turban, headscarf”       |
| 6.  | <i>baabalnaajɔ</i>  | “one from Baabal”         |
| 7.  | <i>daraade</i>      | “to stand”                |
| 8.  | <i>hedaaɗe</i>      | “to listen”               |
| 9.  | <i>halkaaɗe</i>     | “to be destroyed”         |
| 10. | <i>ferlaade</i>     | “to sit cross-legged”     |
| 11. | <i>ɟaltɔɔwɔ</i>     | “one who goes out”        |
| 12. | <i>ɟɔɟfnude</i>     | “to finish”               |
| 13. | <i>daankinaade</i>  | “to feign sleep”          |
| 14. | <i>naanaalde</i>    | “salty area”              |
| 15. | <i>jaataarnaajɔ</i> | “one from Jaataar”        |
| 16. | <i>takkordi</i>     | “sealant for cooking pot” |
| 17. | <i>tallɔrde</i>     | “animal rolling place”    |
| 18. | <i>gɔllɔrde</i>     | “work place”              |



19. *jamminde* “to become late at night”
20. *pɔɔlaadɔ* “loser”
21. *daagaade* “to walk slowly”
22. *haalpulaarʔen* “Pulaar speakers”
23. *debbuus* “stick”
24. *nɔɔgaas* “twenty”
25. *ʔar* “come”
26. *mɔɔl* “one-stringed instrument”
27. *ʔasamaan* “sky”
28. *dɛwnɔɔdɔ* “one that followed”
29. *dam<sup>m</sup>baade* “seclusion for new bride”
30. *weddiima* “threw”
31. *m<sup>b</sup>aroodi* “lion”
32. *funnaa<sup>n</sup>ge* “east”
33. *sukaabe* “children”
34. *rawaa<sup>n</sup>du* “dog”

## Word list 2

1. *halkaade* “self-destruction”
2. *gakkande* “stain”
3. *taktakɔ* “leper”
4. *faandaade* “to approach”
5. *haaca<sup>n</sup>de* “scream”
6. *baabagol* “self aggrandizement”
7. *satalla* “kettle for ablutions”
8. *hadaade* “to abstain”
9. *sagata* “virile young man”
10. *haaktaade* “to clear one’s throat”
11. *haabnaade* “to be belligerent”
12. *satallaaji* “kettles for ablutions”