Initial Consonant Mutation in Fulfulde: An Optimality Theoretic Account

Abstract

This paper examines initial consonant mutation in the Sokoto dialect of Fulfulde within the tradition of Optimality Theory. Initial consonant mutation in this dialect is seen to follow the stop – continuant pattern rather than the stop – continuant – nasal pattern found in other Fulfulde dialects. Loss of prenasalisation in word-initial position in the Sokoto dialect is responsible for this difference. Based on data collected from fieldwork, it is found that Sokoto Fulfulde mutation pairs are, except for the nasal grade,exactly as those found in other dialects. The data for this research come from 53 native Fulfulde speakers. Out of these, only one was female (aged 60). The informants were mainly elderly people aged between 45 and 80: there were 35 informants in this group, out of which 7 had formal education and 28 never. Younger subjects under the age of 45 were 18, with 8 educated and 10 uneducated speakers. Altogether, the data comprise 9, 251 lexical items; a lot of which are repetitions of regularly occurring words, particularly those referring to flora and fauna. Findings reveal that since the mutation feature in this dialect is [+continuant], and the feature docks on the left edge of stems, Alignment Constraint [ALIGN] is crucial and undominated. The study uncovers other constraints, thus providing an explanation for the occurrence of some unexpected mutation pairs such as k/h, ʧ/s and d/r. The study concludes that mutation in variform stems in the Sokoto dialect of Fulfulde can be accounted for by seven constraints; six of which must be undominated.

Keywords: Initial Consonant Mutation, Optimality Theory, Constraints, Sokoto Dialect

1. **Introduction**

Fulfulde isa member of the Northern Atlantic genus of the Niger-Congo family (Segerer, 2002; Segerer, 2010 in Fisher, 2015; Harrison, et al. 2012; Dryer &Haspelmath, 2013; Segerer&Pozdniakov, 2016). This language is spoken in most countries of West Africa with a sizeable number of speakers. In Nigeria, the language is spoken in most of the northern states, particularly Adamawa, Gombe, Bauchi, Sokoto, Kebbi, Zamfara, Kano, Jigawa, and Kaduna. Fulfulde speakers are mainly migratory; always moving in search of pasture for their livestock. The consequence of such continuous movement is the growth of dialects as a result of different factors, particularly language contact (see Shehu, 2019; Hussaini, 2019; Ahmed, 2019; Abdullahi, 2024).

The growth of dialects as a result of the movement makes it difficult to say with certainty, the exact number of Fulfulde dialects. Girei (2009, p.18) for example, questions the identification and demarcation of the dialect areas by scholars on Fulfulde. Girei (ibid) buttresses his argument by citing Wolfram (1991), who enumerates the factors responsible for dialect formation which include “settlement, migration routes, physical factors and language contact”. Girei (ibid) thus observes that “it is apparent that the development of Fulfulde dialects will be a continuous process” explaining that “to determine the number of dialects of the language in the near future is going to be an odious task, since all factors listed are still in active play”.It is for this reason that this paper limits its focus to the Sokoto dialect of Fulfulde and describes the initial consonant mutation found in the dialect within the framework of Optimality Theory (Prince &Smolensky, 1993). The motivation for this research stems from the observed peculiarity of the Sokoto dialect of Fulfulde with respect to consonant mutation. It is observed that mutation in other dialects of Fulfulde follow a continuant – stop – nasal pattern as shown in (List 1) from Anderson (1976) whereas the Sokoto Fulfulde mutation

pattern is argued to be restricted to the stop – continuant pattern because the nasal grade reported in other dialects does not occur in the Sokoto dialect.

List 1: Fulfulde Consonant Mutation Pattern

'Continuant'	r	w	w	y	y	f	s	h	b	d	j	g
	|	||||||||||									
'Stop'	d	b	g	g	j	p	c (sh)	k	b	d	j	g
	|	||||||||||									
'Nasal'	nd	mb	ŋgŋgnj		p	c (sh)	k	mb	ndnjŋg			

In the above scheme presented by Anderson (1976) for the Adamawa dialect of Fulfulde, continuant-initial stems take the stop grade in their plural forms and the nasal grade in diminutive and augmentative forms. This alternation is argued to be absent in the Sokoto dialect as shown in (List 2).

2. **Literature Review**

Consonant mutation, reported to occur in many languages of the world, is said to be accounted for by several factors which include phonological, morphological, etc. It is however noted by scholars such as Grijzenhout (2011, p.1537) that phonological processes such as assimilation, dissimilation and contextual neutralisation are not counted as instances of consonant mutation. As indicated above, consonant mutation is said to occur in many languages including many Atlantic languages such as Pajade (Wilson 1965), Basari and Bedik (Ferry 1968), Wolof (Magel 1970), Päri (Andersen 1988), Biafada (Wilson 1993), Seerer-Siin (McLaughlin 1994; 2000), Mayak (Andersen 1999), Tanda, Kasanga, Kobiana, and Banyun (Wilson 2007). Apart from these Atlantic languages, consonant mutation has equally been noted in the South-Western languages particularly Mende (Conteh, Cowper & Rice 1985) the Bantu languages (Doke 1954) and in a Cushitic language, Blin (Fallon 2006). This morphophonological process is also found in Celtic languages like Irish, Scottish, Manx, Welsh, Breton and Cornish (Iosad 2010). Similarly, consonant mutation occurs in Iwaidja, an

Australian language (Evans 1998) and Nivkh, a language spoken further east of Russia (Shiraishi 2006). These are in addition to Fulfulde which is the focus of this paper.

The domain of consonant mutation in Fulfulde is word-initial consonants. This position is supported byIosad(2010). Consonant mutation involves the attachment of floating feature morphemes. Reference to floating feature morphemes suggests that mutation features are floating features which are analysable as "grammatical morphemes" (Akinlabi, 1996; 2011). Thefloating feature morphemes are found in both mutation and non-mutation contexts, forexample in Chaha, a Gurage language of Ethiopia (McCarthy, 1983, p.179; Archangeli&Pulleyblank 1994, p.314-316) in which the third person masculine singular object is indicated by means of an iterative labialisation. It is also found in Zoque, (Wonderly, 1951; Akinlabi, 1996), in which palatalization is used to mark the third person singular. Labial, alveolar, velar and laryngeal consonants take the feature as a prefix. Meanwhile, mutation in Seereer-Siin, a language "closely related to Fula" (McLaughlin, 1994, p.279) results from "the prefixation of a class marker that contains a floating autosegment which associates to an underspecified stem-initial consonant" (McLaughlin, 1994, p.279).

Seminal works on Fulfulde such as Arnott (1970), Anderson (1976), Lieber (1984), etc. agree that noun classes in the language consist of the features [continuant] and [nasal]. This paper agrees with this line of argument except for the feature [nasal] because Sokoto Fulfulde is argued to exhibit only continuancy mutation; hence, only the feature [continuant] is relevant for mutation in this dialect.

To recapitulate, initial consonant mutation in Fulfulde is largely reported as following the continuant – stop – nasal pattern; described as grade I, grade II and grade III respectively in Fulfulde literature. These grades parallel continuant, stop and nasal. In the Sokoto dialect however, it is argued that the mutation pattern is continuant – stop as schematised in (List 2) following the non-occurrence of the nasal grade (prenasalised stops are not found in word-initial positions according to Miyamoto, 1989). Anumber of processes are reportedly responsible for consonant mutation in Fulfulde; however, the most obvious trigger is argued to be morphological – as part of the morphological markers for singular, plural, diminutive and augmentative.

Materials and method

List 2: Sokoto Fulfulde Mutation Schema

	1	2	3	4	5	6	7	8	9	10	11	12
'Continuant'				r	w	wjj	f	s	h	b	d	ʤg
			|	||||||||||								
'Stop'				d	b	gʤg	p	ʧ	k	b	d	ʤg

Arnott (1970, p.92) explains initial consonant mutation in Fulfulde by identifying three stem types: *uniform, variform* and *unchanging* stems as defined below:

a. *Uniform stems*: "the initial consonant of which is the same in all circumstances". Consonants belonging to this class are "(t, l; m, n, ny; ɓ, ɗ, 'y, ')[1]" and the "N-category consonants (mb, nd, nj, ŋg, p, sh, k)" in respect of the Gombe dialect of Fulfulde. With the exception of the "N-category consonants" which do not occur, these consonants are also *uniform* in the Sokoto dialect as represented in columns 9-11 in (List 2) above.

b. *Variform stems*: "the initial consonant of which varies in accordance with the consonant alternation system". These are represented by columns 1-8 I (List 2) above.

c. *Unchangingstems*: "which have in initial position one of the consonants normally subject to alternation (i.e. columns 1-8 in (List 2) above), but which nevertheless remain unchanged in all circumstances".

2.1 **Sokoto Fulfulde Phoneme Inventory**

The phonemic inventory of the Sokoto Fulfulde dialect comprises 24 consonant sounds as shown in Table 1 (Alkali, 2019).

[1]Arnott's ny, 'y and ' are equivalent to [ɲ, ʧ', ʔ]. Note also that [ʧ'] is orthographic y.

Table 1: Sokoto Fulfulde Consonant Phonemes

	Bilabial	Labio-dental	Alveolar	Post-Alveolar	Palatal	Velar	Labial-velar	Glottal
Stops	p b		t d			k g		ʔ
Affricatives				ʧ ʤ				
Fricatives		f	s					h
Implosives	ɓ		ɗ					
Ejectives				ʧ’		k’		
Nasals	m		n		ɲ	ŋ		
Approximants			ɾ		j		w	
Lateral			l					

3. **Initial Consonant Mutation**

The examination of initial consonant mutation in the Sokoto dialect of Fulfulde nouns follows Arnott’s classification of noun stems as *uniform, variform* and *unchanging* as explained above. This discussion centres on nouns with*variform* initial segments. The phenomenon of initial consonant mutation from the purview of Optimality Theory can be explained by evoking the concept of *Generalized Alignment* (McCarthy & Prince, 1994). This is because the consistent docking of the mutation feature at the left edge of stems requires a constraint that aligns the feature at the appropriate site. For stems whose initial segments are not subject to mutation (uniform stems), the theory provides for constraints that ban the mutation feature from docking on such segments which have not been addressed in this paper.

3.1 **Initial Consonant Mutation inVariform initial segments**

Variform initial segments are examined, using the four (4) simple mutation correspondences, f/p, h/k, s/c and r/d to see how these constraints preserve the attested mutation pairings.

3.1.1 **f/p mutation**

Examples of some nouns and verbs exhibiting f/p mutation are provided in (3.) In (3a) are examples from nouns, while (3b) are from verbs.

(1) List 3: Examples of f/p mutation in nouns and verbs.

a. Examples from nouns:

few-re	[few-ɾe]	*pew-e*	[pɐw-e]	'lie'
faan-du	[fɑːn-dʊ]	*paa-li*	[pɑː-lɪ]	'gourd'
faɗ-o	[fɑɗ-o]	*paɗ-e*	[pɑɗ-e]	'shoe'
faaw-ru	[fɑːw-ɾʊ]	*paaɓ-i*	[pɑːɓ-ɪ]	'frog'
finor-du	[fɪnoɾ-dʊ]	*pinor-dĩ*	[pɪnoɾ-dɪ]	'antimony stick'

b. Examples from verbs:

Singular		Plural		Gloss
o-few-i	[ʔo-few-ɪ]	*ɓe-pew-i*	[ɓe-pew-ɪ]	lied
o-faan-dii	[ʔo-fɑːn-dɪː]	*ɓe-paan-dii*	[ɓe-pɑːn-dɪː]	approached
o-faɗ-ii	[ʔo-fɑɗ-ɪː]	*ɓe-paɗ-ii*	[ɓe-pɑɗ-ɪː]	put on shoes
o-folw-ii	[ʔo-folw-ɪː]	*ɓe-polw-ii*	[ɓe-polw-ɪː]	woke up
o-fiɗ-i	[ʔo-fɪɗ-ɪ]	*ɓe-piɗ-i*	[ɓe-pɪɗ-ɪ]	shot (something)

Note that the trigger of mutation in verbs is the subject: singular subjects occur with continuant-initial stems and plural subjects with stop-initial ones. Recall however, that the mutation pattern for verbs holds only when the subject of the verb is pre-posed as shown in (4a-b). When the subject is postposed, the verb stem remains in the stop grade irrespective of number as the examples in (4c-d) show.

(2) List 4: Examples of pre-posed and postposed constructions in Sokoto Fulfulde verbs.

a. Pre-posed subject

o-war-ii	[ʔo-wɑɾ-ɪː]	's/he (3SG.) has come'
mi-war-ii	[mɪ-wɑɾ-ɪː]	'I (1SG.) have come'
a-war-ii	[ʔɑ-wɑɾ-ɪː]	'you (2SG.) have come'

b. Postposed subject

on-gar-ii [ʔoŋ-gɑɾ-ɪː] ‘you (2PL.) have come’

min-gar-ii [mɪŋ-gɑɾ-ɪː] ‘we (1PL. excl.) have come’

en-gar-ii [ʔeŋ-gɑɾ-ɪː] ‘we (1PL. incl.) have come’

ɓe-gar-ii [ɓe-gɑɾ-ɪː] ‘they (3PL.) have come’

c. Postposed subject

gar-mi [gɑɾ-mɪ] ‘I (1SG.) came’

gar-ɗaa[gɑɾ-dɑː] ‘you (2SG.) came’

d. Postposed subject

gar-ɗon[gɑɾ-dɔn] ‘you (2PL.) came’

gar-ɗen[gɑɾ-dɛn] ‘we (1PL. incl.) came’

e. Unattested

**gar-o* ‘s/he (3SG.) came’

**gar-min* ‘we (1PL. excl.) came’

**gar-ɓe*‘they (3PL.) came’

The examples in (4a) are those in which the subject of the verb is singular and thus, the verb stems are all in the continuant grade. In (4b) are plural subjects, making the stems to occur in the stop grade. The examples in (4c–d) are those in which the subjects of the verb are postposed: the subjects in (4c) are singular while those in (4d) are plural but the verb stems are all in the stop grade – a confirmation that there is no mutation when the subjects occur after the verb stem. The examples in (4e) are cases where the postposed subject reading is not available, although the last example, *gar-ɓe,* in a different context, means ‘those that came’.

With the foregoing explanation, representative tableaux are constructed for each mutation type in what follows, beginning with the noun pairs *few-re/pew-e* ‘lie(s)’. Recall that

Alignment is relevant for mutation. To discuss initial consonant mutation therefore, the Alignment constraint, stated in (5) is necessary. The proposal in this paper is that the stop grade is the underlying representation. In addition, since the mutation pairs have labial-initial segments, the constraint in (6) which militates against the continuancy of bilabial sounds is needed. Moreover, since the stop grade is the underlying representation and mutation adds [+continuant] feature, a *faithfulness* constraint that requires identity to the [–continuant] feature is needed. The constraint is stated in (Table 2). There is equally the need for a constraint that will penalise voiced labio-dentals as stated in (8). The constraints in (5), (6), (Table 2) and (8) are represented as ALIGN, *BLB, IDENT-IO and *LABin all tableaux. Recall that since the underlying representation is argued to be the stop grade, all plurals are not subject to mutation since they occur with that grade. Consequently, only their singular counterparts are addressed in the discussion of mutation.

(3) ALIGN ([+CONT], L, STEM, L).

The feature [+continuant] must be aligned at the left edge of the stem.

(4) *BLB-CONT

If Bilabial, then not continuant.

(5) IDENT-IO [–CONT]

Correspondent input and output form share identical [–continuant] features.

(6) *LAB-DENTAL [VOI]

Avoid voiced labio-dentals

(7) Tableau for [few-re] ‘lie’.

Table 2: Different Mutation types ([few-re] ‘lie’)

	/pew + -ɾe [+CONT]/	ALIGN	*BLB	*LAB	IDENT-IO
	a. [pew-ɾe]	*!			

☞	b. [few-ɾe]				*
	c. [ɸew-ɾe]		*!		*
	d. [βew-ɾe]		*!		*
	e. [vew-ɾe]		*!	*!	*

In (Table 3), the constraints are not ranked but the outcome suggests that ALIGN should be ranked to dominate IDENT-IO otherwise the sub-optimal candidate (a) will emerge as the winner. The ranking of ALIGN relative to *BLB-CONT is inconsequential as either way, the same result will emerge. The two are therefore unranked with respect to each other. Taking the sequencing of the constraints in (Table 3) as the established and crucial ranking clearly selects the attested candidate (b) as the winner, with a non-fatal violation of IDENT-IO. Candidate (a) suffers a fatal violation of ALIGN and the sub-optimal candidates (c and d) are removed by*BLB-CONT while *LAB-DENTAL [VOI], is violated by the last sub-optimal candidate (e). The ranking in (List 5) in which ALIGN dominates IDENT-IO [–CONT], is the correct and crucial ranking.

(8) ALIGN ([+CONT], L, STEM, L), *BLB-CONT, *LAB-DENTAL [VOI}>> IDENT-IO [–CONT]

In (11) below, the same p/f mutation in verbs is examined taking as representative examples, two minimal complexes *o-few-i/βe-pew-i*'s/he (3SG.)/they (3PL.) lied'. Recall from (36) that all singular subjects, irrespective of number, trigger the continuant grade whereas all plural subjects trigger the stop grade.

(9) Tableau for [ʔo-few-ɪ] 's/he (3SG.) lied'.

Table 3: Different mutation types ([ʔo-few-ɪ] 's/he (3SG.) lied'):

	/pew + ɪ (SG.) [+CONT]/	ALIGN	*BLB	*LAB	IDENT-IO
	a. [ʔo-pew-ɪ]	*!			
☞	b. [ʔo-few-ɪ]				*

	c. [ʔo-vew-ɪ]			*!	*
	d. [ʔo-βew-ɪ]		*!		*
	e. [ʔo-ɸew-ɪ]		*!		*

In (11), the constraints as ranked, are effective as they select the attested candidate (b) as the optimal candidate. The most faithful candidate (a) fails on ALIGN as it has a stop-initial stem. Candidate (c) is eliminated by *LAB-DENTAL [VOI] whereas candidates (d) and (e) are eliminated by *BLB-CONT. Candidate (b), with a non-fatal violation of IDENT-IO, is selected as optimal. The plural occurs with a stop grade and as has no mutation.

The tableau in (11) serves as representative of all instances of mutation involving verbs. This is because as noted earlier, only the subject of the verb determines the initial consonant of the stem. Consistently therefore, every singular subject will occur with a continuant-initial stem and every plural subject, with a stop-initial stem. Consequently, although examples will be provided from both nouns and verbs for every mutation type, subsequent tableaux will focus on nouns only.

3.1.2 **h/k mutation**

This section presents nouns and verbs stems, the initial segments of which are in k/h mutation correspondence. Nouns are in (12a) while verbs are in (12b).

(10) List 5: Examples of h/k mutation in Sokoto Fulfulde nouns and verbs

a. Examples from nouns:

koyŷû-du	[hoʧ ʔʧ ʔʊ-dʊ]	*koyŷû-li*	[koʧ ʔːʊ-lɪ]	‘occiput’
hine-re	[hɪne-ɾe]	*kin-e*	[kɪn-e]	‘nose’
hoo-re	[ho:ɾ-e]	*ko-e*	[ko-e]	‘head’
haw-re	[hɑw-ɾe]	*kaɓ-e*	[kɑɓ-e]	‘fight’
hoon-du	[ho:n-dʊ]	*koo-li*	[ko:-lɪ]	‘finger’

b. Examples from verbs:

Singular		Plural		Gloss
o-hoyi	[ʔo-hoj-ɪ]	*ɓe-koy-i*	[ɓe-koj-ɪ]	recuperated
o-hul-i	[ʔo-hʊl-ɪ]	*ɓe-kul-i*	[ɓe-kʊl-ɪ]	got frightened
o-heewn-i	[ʔo-heːwn-ɪ]	*ɓe-keewn-i*	[ɓe-keːwn-ɪ]	filled up
o-hocc-i	[ʔo-hoʧʧ-ɪ]	*ɓe-kocc-i*	[ɓe-koʧʧ-ɪ]	took
o-haang-aa	[ʔo-hɑːŋg-ɑː]	*ɓe-kaang-aa*	[ɓe-kɑːŋg-ɑː]	became mad

In (14), a representative tableau for k/h mutation is provided taking *hoýʊ-du* from the singular and plural pair *hoýʊ-du/koýʊ-li* [hoʧ’ʧ’ʊ-dʊ/koʧ’ʧ’ʊ-lɪ] ‘occiput(s)’. An additional constraint to remove continuant velars is needed; hence, it is stated in (List 6). This is necessary because the stop grade mutation in the pair /k/ is a velar sound. The constraint is represented as *VELAR on the tableau.

(11) *VELAR-CONT

Avoid Continuant velars

(12) Tableau for [hoʧ’ʧ’ʊ-dʊ] ‘occiput (SG.)’.

Table 4: Different Mutation types(hoʧ’ʧ’ʊ-dʊ] ‘occiput (SG) :

	/koʧ’:ʊ + dʊ [+CONT]/	ALIGN	*VELAR	IDENT-IO
	a. [koʧ’ʧ’ʊ-dʊ]	*!		
☞	b. [hoʧ’ʧ’ʊ-dʊ]			*
	c. [ɣoʧ’ʧ’ʊ-dʊ]		*!	*
	d. [xoʧ’ʧ’ʊ-dʊ]		*!	*

In (14), the stop-initial candidate (a) suffers a fatal violation of ALIGN and is ruled out. The other sub-optimal candidates (c) and (d) violate *VELAR-CONT thus, paving the way for the selection of the optimal candidate (b).

3.1.3 **s/c mutation**

In this section, c/s mutation is considered. Examples are provided from both nouns in (15a) and verbs in (15b).

(13) List 6: Examples of s/c mutation in Sokoto Fula nouns and verbs

a. Examples from nouns

sekk-o	[sekk-o]	*cekk-e*	[ʧekk-e]	'fencing mat'
sagg-o	[sɑgg-o]	*cagg-e*	[ʧɑgg-e]	'hide of sheep'
son-du	[son-dʊ]	*col-li*	[ʧol-lɪ]	'bird'
saw-ru	[sɑw-rʊ]	*cabb-i*	[ʧɑbb-ɪ]	'stick'
sapp-o	[sɑpp-o]	*cappan-ɗe*	[ʧɑppɑn-ɗe]	'ten'

b. Examples from verbs

Singular		Plural		Gloss
o-sel-i	[ʔo-sel-ɪ]	*ɓe-cel-i*	[ɓe-ʧel-ɪ]	branched off
o-sapp-ii	[ʔo-sɑpp-ɪː]	*ɓe-capp-ii*	[ɓe-ʧɑpp-ɪː]	pointed at
o-sipp-i	[ʔo-sɪpp-ɪ]	*ɓe-cipp-i*	[ɓe-ʧɪpp-ɪ]	sold
o-suuɗ-i	[ʔo-suːɗ-ɪ]	*ɓe-cuuɗ-i*	[ɓe-ʧuːɗ-ɪ]	hid (sth.)
o-suuɗ-ii	[ʔo-suːɗ-ɪː]	*ɓe-cuuɗ-ii*	[ɓe-ʧuːɗ-ɪː]	hid (self)

In (18), a representative c/s mutation tableau is provided with *sekk-o* [sekk-o] the singular of the pair *sekk-o/cekk-e* [sekk-o/ʧekk-e] 'fencing mat' as an example. Two additional constraints are introduced in (Table 5) and (List 7) to aid the analysis.

(14) *COR ([+CONT], [–SON], [–STRID])

Avoid coronals specified for the features ([+continuant], [–sonorant], [–strident]).

(15) *COR ([+CONT], [–ANT])

Avoid coronals specified for the feature [+continuant], [-anterior].

Both constraints are represented as *COR [STR] and *COR {ANT} on the tableau respectively.

(16) Tableau for [sekk-o] ‘fencing mat (SG.)’.

Table 5: Different mutation types(sekk-o] ‘fencing mat (SG):

.	/ʧekk + o [+CONT]/	ALIGN	*COR [STR]	*COR {ANT}	IDENT-IO
	a. [ʧekk-o]	*!			
☞	b. [sekk-o]				*
	c. [θekk-o]		*!		*
	d. [ðekk-o]		*!		*
	e. [ʃekk-o]			*!	*

In (18), candidate (a) is eliminated for incurring a fatal violation of ALIGN while candidates (c) and (d) violate fatally, *COR ([+CONT], [–SON], [–STRID]). Candidate (e) violates *COR ([+CONT], [–ANT]) which disqualifies it. Candidate (b), with a non-fatal violation of IDENT-IO remains the optimal candidate.

. 3.1.4 **r/d mutation**

The last of the less complex mutation pairings is addressed in this section. Examples of nouns and verbs exhibiting this mutation type are given in (19a) and (19b).

(17) List 7: Examples of r/d mutation in Sokoto Fula nouns and verbs

a. Examples from nouns:

ree-du	[ɾe:-dʊ]	*dee-dɗi*	[de:-dɗi]	‘stomach’
riisii-re	[ɾi:si:-ɾe]	*diisii-je*	[di:si:-ɟe]	‘boar’
rood-de	[ɾo:d-de]	*doo-dɗe*	[do:-dɗe]	‘bird dropping’
ragg-e-re	[ɾagge-ɾe]	*dagg-e*	[dagg-e]	‘a knock on the head’
ruɓɓ-e-re	[ɾʊɓɓe-ɾe]	*duɓɓ-e*	[dʊɓɓ-e]	‘fan palm fruit’

b. Examples from verbs:

Singular		Plural		Gloss
o-ron-i	[ʔo-ron-ɪ]	*ɓe-don-i*	[ɓe-don-ɪ]	inherited

o-ragg-i	[ʔo-rɑgg-ɪ]	*ɓe-dagg-i*	[ɓe-dɑgg-ɪ]	knocked sb. on head
o-raar-i	[ʔo-rɑːɾ-ɪ]	*ɓe-daar-i*	[ɓe-dɑːɾ-ɪ]	looked
o-ruf-i	[ʔo-rʊf-ɪ]	*ɓe-duf-i*	[ɓe-dʊf-ɪ]	poured (sth.) away
o-res-i	[ʔo-res-ɪ]	*ɓe-des-i*	[ɓe-des-ɪ]	put (sth.) down

In (21), a typical tableau is provided for d/r mutation using the pair ree-du/dee-ɗì [ɾeː-dʊ/deː-ɗɪ] 'stomach'. As usual, only the singular is subject to mutation and hence, it is the one represented. An additional constraint is yet needed to analyse this mutation type and it is stated in 20.

(18) *COR ([+CONT], [–SON], [+VOI]).

Avoid a coronal specified for the features [+continuant], [-sonorant] and [+voice].

The constraint is represented as *COR [VOI] on the tableau.

(19) Tableau for [ɾeː-dʊ] 'stomach (SG.)'.

Table 6: Different Mutation Types([ɾeː-dʊ] 'stomach (SG):

.	/deː + dʊ [+CONT]/	ALIGN	*COR [STR]	*COR [VOI]	IDENT-IO
	a. [deː-dʊ]	*!			
☞	b. [ɾeː-dʊ]				*
	c. [zeː-dʊ]			*!	*
	d. [ðeː-dʊ]		*!		*

In (21), candidate (a) is removed for fatally violating ALIGN whereas candidate(c) fails on *COR [VOI]. Candidate (d) is eliminated for incurring fatal violations of *COR [STR]. Candidate (b) has the least violation and is thus selected as the optimal candidate.

Having considered the less intricate mutation pairs, a ranking schema is provided in (22) for all the constraints that have so far been introduced.

(20) ALIGN ([+CONT], L, STEM, L),*BLB-CONT, *VELAR-CONT, *COR ([+CONT], [–SON], [–STRID]), *COR ([+CONT], [+STRID], [–ANT]), *COR ([+CONT], [–SON], [+VOI])] >>, IDENT-IO [–CONT].

4. **Results &Discussion**

The Sokoto dialect of Fulfulde has 24 consonant phonemes in its inventory; 16 are obstruents while 8 are sonorants. Among the 16 obstruents are only 3 continuants, [f, s, h] which all participate in mutation. The remaining 13obstruents are all in the stop grade and only /t/ has no mutation partner. The implosives [ɓ, ɗ], the palato-alveolar ejective [ʧ'] and the velar ejective [K'] have also no mutation partners. Of the 8 sonorants, [m, n, ɲ, ŋ, r, l, j, w]which are all continuants except [l] – the continuancy of which is controversial, only three [r, j, w] participate in mutation. Mutation involving [l] is quite limited.

Looking at the consonants in relation to those that have mutation correspondents, it is seen that some of them are not involved. The nasals [m, n, ɲ, ŋ] and the glottal stop [ʔ] remain uniform in all contexts and that is why they are not seen in the schema provided in (1). The stops [b, d, ʤ, g] are the sounds described by Arnott (1970) as unchanging when in stem-initial positions. They participate in mutation in some situations but not in others, Examples from pairs of singulars and plurals show this clearly: [b[is in a mutation relationship with [w] in words like *baaɗi*/*waandu* 'monkeys' but remains unchanging in *baalu*/*baali* 'sheep'. The same thing happens with [d]. It undergoes mutation with [r] in words like *deeɗi*/*reedu* 'stomach' but is unchanging in words like *daande*/*daaɗe* 'neck'. [ʤ] is also in mutation with [j] in words like j*ahe*/*yaare* 'scorpion'. Similarly, [g] which is equally in mutation with [j] in words like *geece*/*yeeso* 'face' remains unchanged in words like *geelooba*/*geelooɗi* 'camel'.

The variform stems, which make the study worthwhile, show an alternation as stated in (List 3). The pairings [r/d, f/p, h/k, s/ʧ, w/b, w/g/, g/j, j/ʤ]leave more questions than answers. The pair r/d for example is found because of the absence of the alveolar voiced continuant [z]

generally in Fulfulde. It would have been the perfect mutation partner for [d]. The pair f/p is also there becausebilabial continuants are banned in the language, h/k even more so because of the prohibition against continuancy in velar sounds. s/ʃ mutation occurs only because [t], the perfect partner to [s] does not participate in mutation. The remaining mutation pairs, except g/j, are phonologically expected. [b] and [w] share labial features, [g] and [w] share dorsal features; and [ʤ] and [j] share palatal features. It is difficult to say that [g] and [j] share any phonological features. It is for these reasons that this paper embraces Optimality Theory to explain why some pairings are licit but others are not. The obvious result is that thereare constraints that favour some configurations over others. The analysis shows that seven constraints can handle initial consonant mutation in simple variform noun stems. The ranking shows 7 constraints in 2 tiers with 6 undominated constraints dominating IDENT-IO [–CONT].

5. **Conclusion**

Initial consonant mutation makes the feature [+continuant] to attach to the left edge of stems in a language like Fulfulde. Optimality Theory provides a way of explaining initial consonant mutation by providing both universal and language-specific constraints. These constraints provide an opening towards the understanding of which consonant pairs are permitted as well as the non-permitted ones. The theory accounts for the analysis of language using the constraints, while constraint ranking, with some constraints dominating others, selects the optimal out of the many candidates submitted for evaluation.

The study finds that although Fulfulde is a language spoken in most countries of West Africa, the growth of dialects necessitates a study of each of these dialects in isolation as each dialect has peculiarities which do not necessarily extend to other dialects. In the case consonant mutation for example, while the Adamawa and Gombe dialects are reported to exhibit a

pattern involving an alternation from the continuant to the stop and the nasal grades, the Sokoto dialect exhibits only the continuant and nasal mutation pattern.

The study further shows that while some stem-initial segments are involved in mutation, others are not. There are equally those that show ambivalent behaviour; showing mutation in some contexts but remaining invariant in others. These are areas for further research to address.

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript. (The paper is developed out of my Ph.D. thesis written in 2019)

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1.

2.

3.

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