

THE MORPHOPHONOLOGY OF NOUN CLASSES IN DAGAARE AND AKAN

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1. Introduction

Noun classification has been the subject of much discussion in linguistics. From works such as Ourso (1989), Breedveld (1995), Ikoru (1996), Creissels (2000) and Dimmendaal (2000), it may be seen that noun classification has been variously discussed among scholars of African linguistics as well as among scholars of Australian languages (e.g., Leeding 1989; Harvey & Reid *et al.* 1997) and beyond. These are all in an attempt to evolve an appropriate system of noun categorization suitable for a particular language. In this paper, we endeavour to provide a morphophonological account of the noun class systems of Dagaare (Gur, Niger Congo) and Akan (Kwa, Niger Congo).

A language may be said to have a noun class system if that language has grammatical gender or if the nouns of the language can be categorized according to a system of concord or affixal markings on the nouns. Sometimes the term is used without considering gender languages. As noted by Heine *et al.* (1981), two out of every three African languages have a system of noun classification, but not in the same way between languages or groups of languages.

Our proposal for the classification of nouns in Dagaare and Akan, a follow up of Bodomo (1994 & 1997), stems from the build up of the various noun forms and also, the subsequent phonological processes that emerge in the composition. This will be in contrast to a *solely* semantic-dependent criterion, a position adopted in works like Mohamadou (1994) and Delplanque (1995), among others. The formal aspects of our analysis are therefore mainly within general generative phonology, but some aspects are particularly related to lexical phonology. It is important to note that this paper is not intended to contest the validity of a semantic approach. Rather, we explain that a *solely* semantic-dependent criterion could hardly evolve a comprehensive noun class system in the languages.

2. The Classification System

An overview of Dagaare and Akan nominal morphology shows that the most appropriate criterion that can be used to set up noun classes is number – i.e. singular and plural – categorization, which is marked in Dagaare mainly by suffixes and in Akan by prefixes.¹ Concord marking as could be used in languages like Farefare (Gurene) (Nsoh 2002), a language closely related to Dagaare, is not a very sufficient criterion as

¹ This difference in affixation constitutes the main motivation for using, and for that matter, comparing these two languages. What is more, as will become evident, the languages have other phenomena in common, e.g. vowel harmony (with regards to advance tongue root (ATR)).

the phenomenon is rather too degenerate in Dagaare. Concord particles (distinct from affixes indicating number) are hardly present in the language. We are thus left with only the affixal markings on the nouns and, as shown in table (3) below, the function of the affixes as class markers is underscored by the distinctive noun classes based on these affixes. In the case of Akan, Osam (1993) identifies several criteria of noun classification, but finally takes the position that, synchronically, the noun class system in the language is lost. As will be observed in this paper, we have a different opinion. We explain that distinctive noun classes based on number affixes are established in the language, as shown in table (4).

Based on number affixation, there are, at least, two ways by which Dagaare and Akan nouns can be set up into classes. One is to group nouns based on the similarity, first, of their singular affixes and then their plural affixes. This means that nouns with common ways of forming their singular affixes and are, therefore, in the same group may not necessarily occur together in another group, when we consider their plural formation. The other is to put nouns into classes based on the similarity of both the singular and plural affixes. With this criterion, nouns are always in the same class, whether in the singular or plural. In one of the earliest comprehensive suggestions as to how noun classes can be set up in Dagaare, Angkaaraba (1980) adopted the first option. That study, as

shown in (1), establishes nine noun classes based on singular suffixes and eleven noun classes based on plural suffixes.

(1)	Class	Singular	Plural
	1	zero (∅)	-rɪ / -ri
	2 a.	-ɛ / -e	-rɪ / -ri
	b.	-o	(+vowel lengthening)
	3	-ɪ / -i	-ba
	4	-rɪ / -ri	-mɪ / -mi
	5	-ri (+ vowel lengthening)	-bɔ / -bo
	6 a.	-a	-ɛ / -e
	b.	-a (replacement suffix)	
	7	-ba	-mɛ
	8	-u- / -ɔ- (infix)	-a
	9	-mɔ	-nɪ / -ni
	10	–	-nɛ / -ne
	11	–	-o

In what seems to be true for only Fante, one of the major dialects of Akan, Osam (1993: 85) also opts for the first approach on morphological evidence and comes up with six classes (specifically, four in the singular

and two in the plural) for Akan, as shown in (2). Dolphyne (1988: 82ff.) has also exemplified some nominal affixations, but without any clear classification.

(2)

Singular
Class 1: o- / ɔ-
Class 2: a- / e-
Class 3: i- / ɪ-
Class 4: ε-

Plural
Class 5: n-
Class 6: a- / e-

One advantage with this approach (i.e., singular-then-plural) is the straightforwardness with which we can categorize nouns sharing the same singular affixes on the one hand and on the other, the same plural affixes. However, the main disadvantage is that some important phonological (and semantic) generalizations are lost when nouns with the same natural phonological phenomena are put in different classes at one point, but not in another. As will be shown in both Dagaare and Akan, one consistent natural observation is that all nouns with nasal singular affixes also have nasal plural affixes. In other words, they belong to the same natural class and, therefore, putting them in different classes by any other criterion

conceals this generalization in the morphophonemics of the languages. In Akan, such nasal affixed nouns are discussed as underlyingly plural.

3. The Present Proposals

Our approach of classifying the nouns in Dagaare and Akan is based on the second alternative, where particular noun forms are always found in one and the same class. Nouns in the same class must have similar singular affixes and similar plural affixes. Another difference is that we rely heavily on phonological processes to refine our classification. Therefore, one needs to pay particular attention to these phonological processes in order to understand the ten noun classes shown in (3) and the nine in (4) we now propose as constituting the noun class systems of Dagaare and Akan respectively.

(3) Noun class system in Dagaare

Classes	Singular Form	Stem	Plural Form
1 : -V/ -bV (+human)	<i>póyó</i> ‘woman’	p̀̀g-	<i>pógbó</i> ‘women’
	<i>dóó</i> ‘man’	d̀̀-	<i>dóbó</i> ‘men’
	<i>níè</i> ‘person’	níŋ-	<i>núbà</i> ‘people’
	<i>kúóráà</i> ‘farmer’	kú̀r-	<i>kóribó</i> ‘farmers’
2 :	-V		-rI
a. -E /-rI	<i>bíé</i> ‘child’	bĩ-	<i>bĩrí</i> ‘children’
	<i>gbíé</i> ‘forehead’	gbè-	<i>gbèrí</i> ‘foreheads’

	<i>tîé</i>	‘tree’	tî-	<i>tîrî</i>	‘trees’
	<i>pîé</i>	‘basket’	pè-	<i>pèrî</i>	‘baskets’
b. -O/-rI	<i>dùó</i>	‘pig’	dò-	<i>dòrî</i>	‘pigs’
	<i>dùó</i>	‘dawadawa’	dò-	<i>dòrî</i>	‘dawadawas’
	<i>kúó</i>	‘rat’	kù-	<i>kúúrî</i>	‘rats’
	<i>bógó</i>	‘shoulder’	bòg-	<i>bóggrî</i>	‘shoulders’
c. -I/-rI	<i>sígí</i>	‘hut’	sìg-	<i>sígrî</i>	‘huts’
	<i>pégí</i>	‘shell’	pèg-	<i>pégrî</i>	‘shells’
3 :		-I			-V
a. -I/-E	<i>gyĩli</i>	‘xylophone’	gyĩl-	<i>gyĩlé</i>	‘xylophones’
	<i>filí</i>	‘sore’	fil-	<i>filé</i>	‘sores’
	<i>pélí</i>	‘sheet’	pél-	<i>pélè</i>	‘sheets’
	<i>íílí</i>	‘horn’	ííl-	<i>íílé</i>	‘horns’
b. -I/-O	<i>pòlí</i>	‘path (of rats)’	pòl-	<i>pòlò</i>	‘paths (of rats)’
	<i>dólí</i>	‘path’	dól-	<i>dólò</i>	‘paths’
	<i>dólí</i>	‘try spot’	dól-	<i>dólò</i>	‘dry spots’
	<i>kpòlúú</i>	‘termite’	kpòl-	<i>kpòlò</i>	‘termites’
c. -I/-a	<i>gbáálí</i>	‘large pot’	gbààl-	<i>gbáálá</i>	‘large pots’
	<i>váálí</i>	‘rubbish’	vààl-	<i>váálá</i>	‘rubbish’
4 : -rU/-rI	<i>pírúú</i>	‘sheep’	pí-	<i>pírrì</i>	‘sheep’
	<i>kpárú</i>	‘shirt’	kpār-	<i>kpárrì</i>	‘shirts’
	<i>wááú</i>	‘snake’	wá-	<i>wírrì</i>	‘snakes’

5	: -Ø/-rI	<i>zú</i>	‘head’	<i>zú-</i>	<i>zúrí</i>	‘heads’
		<i>túú</i>	‘forest’	<i>tùù-</i>	<i>túúrí</i>	‘forest’
		<i>kyúú</i>	‘month’	<i>kyúú-</i>	<i>kyúúrí</i>	‘months’
		<i>nú</i>	‘hand’	<i>nú-</i>	<i>núúrí</i>	‘hands’

6	:	-rI		-V		
a.	-rI/-E	<i>bírì</i>	‘seed’	<i>bí-</i>	<i>bìè</i>	‘seeds’
		<i>mírì</i>	‘rope’	<i>mí-</i>	<i>mìè</i>	‘ropes’
		<i>nímírì</i>	‘eye’	<i>nímí-</i>	<i>nímìè</i>	‘eyes’
		<i>nyóórí</i>	‘nose’	<i>nyò-</i>	<i>nyóóréé</i>	‘noses’
b.	-rI/-O	<i>lúgrí</i>	‘log’	<i>lùg-</i>	<i>lúgó</i>	‘logs’
		<i>tòòrí</i>	‘ear’	<i>tòò-</i>	<i>tòóbó</i>	‘ears’
		<i>kóórí</i>	‘bone’	<i>kòò-</i>	<i>kóóbó</i>	‘bones’
		<i>tòòrì</i>	‘tobacco’	<i>tòò-</i>	<i>tòóbò</i>	‘tobacco’
c.	-rI/-a	<i>nyágrí</i>	‘root’	<i>nyàg-</i>	<i>nyágá</i>	‘roots’
		<i>yàgrí</i>	‘cheek’	<i>yàg-</i>	<i>yágá</i>	‘cheeks’
		<i>gbágrí</i>	‘container’	<i>gbàg-</i>	<i>gbágá</i>	‘containers’

7	:	<i>Nasalised -NV</i>		<i>Nasalised -NV</i>		
a.	-nI/-ma	<i>gánì</i>	‘hide/book’	<i>gán-</i>	<i>gámà</i>	‘hides/books’
		<i>sánì</i>	‘debt’	<i>sán-</i>	<i>sámà</i>	‘debts’
		<i>ηmání</i>	‘calabash’	<i>ηmàn-</i>	<i>ηmámá</i>	‘calabashes’
b.	-nI/-mε	<i>líéní</i>	‘fruit kind’	<i>lìèn-</i>	<i>líémé</i>	‘fruits’
		<i>kyííní</i>	‘instrument’	<i>kyìì-</i>	<i>kyíímé</i>	‘instruments’
		<i>néní</i>	‘meat’	<i>néη-</i>	<i>némé</i>	‘meats’

c. -mũ/-ma	támmŭ	‘bow’	tàn-	támá	‘bows’
	zàmmŭ	‘onion’	zàn-	zámá	‘onions’
d. -ɲE/-nI	bìyɛ	‘pen’	bìɲ-	bìnní	‘pens’
	yèyɛ	‘outside’	yèɲ-	yènní	‘outsides’
	sèyɛ	‘bed’	sèɲ-	sènní	‘beds’
	kpĩĩmɛ̃	‘dead person’	kpĩĩ-	kpĩĩnnì	‘dead people’
e. -ɲO/-nI	bòɲó	‘donkey’	bòɲ-	bònní	‘donkeys’
	wòɲó	‘deaf person’	wòɲ-	wònní	‘deaf people’
	kòɲó	‘leper’	kòɲ-	kònní	‘lepers’
	lòɲó	‘frog’	lòɲ-	lònní	‘frogs’
f. - Ø /-nĕĕ (-count) Plural	dáá	‘pito’	dáá-	dáánĕĕ	‘types of pito’
	káá	‘oil/butter’	káá-	káánĕĕ	‘types of oil’
	tĩĩ	‘medicine’	tĩĩ-	tĩĩnĕĕ	‘medicines’
	zĩĩ	‘blood’	zĩĩ-	zĩĩnĕĕ	‘types of blood’
8 : -aa/-I	píráá	‘button’	pĩr-	pírrí	‘buttons’
	ɲmáràà	‘moon’	ɲmár-	ɲmárrì	‘moons’
	lúóráá	‘lion’	lùòr-	lùòrí	‘lions’
9 : -U/ (derived) No plural	kúòò	‘farming’	kó-		
	yíéú	‘horrible thing’	yíé-		
	gúóú	‘sleep’	góɲ-		
	múóú	‘wrestling’	mó-		

10 : /- <i>ɔŋ</i> (-count) no sing.		bùùl-	<i>búúílúŋ</i>	‘porridge’
		ḍírúŋ-	<i>ḍírúŋ</i>	‘food’
		bìrúŋ-	<i>bìrúŋ</i>	‘milk’
		kḍḍlòŋ-	<i>kḍḍólóŋ</i>	‘hair’

(4) Noun Class System in Akan

Classes	Singular Form	Stem	Plural Form
1 :	V-		N-
a. O-/N-	<i>ḍbáá</i> ‘female’ <i>ḍkwádúó</i> ‘antelope’ <i>òdwáń</i> ‘sheep’	-báá -kwádúó -dwáń	<i>ńmáá</i> ‘females’ <i>ńkwádúó</i> ‘antelopes’ <i>ńnwáń</i> ‘flock of sheep’
b. A-/N-	<i>àtààdé</i> ‘cloth’ <i>àbḍfrá</i> ‘child’ <i>àkù má</i> ‘axe’ <i>àdwú má</i> ‘work’	-tààdé -bḍfrá -kù má -dwú má	<i>ńtààdé</i> ‘clothes’ <i>ńmḍfrá</i> ‘children’ <i>ńkù má</i> ‘axes’ <i>ńnwú má</i> ‘works’
c. (V)-/N-	<i>ḍkrámáń</i> ‘dog’ <i>èdù á</i> ‘tree’ <i>àfidíé</i> ‘trap’ <i>èbré</i> ‘time’	-krámáń -dù á -fidíé -bré	<i>ńkrámáń</i> ‘dogs’ <i>ńnù á</i> ‘trees’ <i>ńḍfidíé</i> ‘traps’ <i>ńmbré</i> ‘times’
2 : Ø-/N-	<i>bé p ó</i> ‘mountain’	-bé p ó	<i>mmé p ó</i> ‘mountains’

	<i>kàsèé</i>	‘bone’	-kàsèé	<i>̀̀kàsèé</i>	‘bones’
	<i>sàfòá</i>	‘key’	-sàfòá	<i>̀̀sàfòá</i>	‘keys’
	<i>fütúó</i>	‘saving’	-fütúó	<i>̀̀fütúó</i>	‘savings’

3 :	V-			A-	
a. <i>O-</i> / <i>A-</i>	<i>̀̀súnú</i>	‘elephant’	-súnú	<i>̀̀súnú</i>	‘elephants’
	<i>̀̀híní</i>	‘king’	-híní	<i>̀̀híní</i>	‘kings’
	<i>̀̀yúó</i>	‘antelope’	-yúó	<i>̀̀yúó</i>	‘antelopes’
	<i>̀̀púró</i>	‘squirrel’	-púró	<i>̀̀púró</i>	‘squirrels’
b. (<i>V-</i>) / <i>A-</i>	<i>̀̀pé!té</i>	‘vulture’	-pé!té	<i>̀̀pé!té</i>	‘vultures’
	<i>̀̀fíé</i>	‘house’	-fíé	<i>̀̀fíé</i>	‘houses’
	<i>̀̀kóó</i>	‘rhino’	-kóó	<i>̀̀kóó</i>	‘rhinos’
	<i>̀̀kúó</i>	‘group’	-kúó	<i>̀̀kúó</i>	‘groups’

4 : \emptyset - / <i>A-</i>					
	<i>bámá</i>	‘veranda’	-bámá	<i>̀̀bámá</i>	‘verandas’
	<i>kú!dúó</i>	‘canoe’	-kú!dúó	<i>̀̀kú!dúó</i>	‘canoes’
	<i>dè̀̀nsù</i>	‘whale’	-dè̀̀nsù	<i>̀̀dè̀̀nsù</i>	‘whales’
	<i>dúkù</i>	‘headgear’	-dúkù	<i>̀̀dúkù</i>	‘headgears’

5 : +kinship	V- / \emptyset-			A- / \emptyset- _ -<i>num</i>	
a. <i>V-</i> / <i>A-</i>	<i>̀̀nùá</i>	‘sibling’	-nùá-	<i>̀̀nùánúmí</i>	‘siblings’
	<i>̀̀gyá</i>	‘father’	-gyá-	<i>̀̀gyánúmí</i>	‘fathers’
	<i>̀̀yírí</i>	‘wife’	-yírí-	<i>̀̀yírínúmí</i>	‘wives’
	<i>̀̀ená</i>	‘mother’	-ná-	<i>̀̀nánúmí</i>	‘mothers’
b. \emptyset - / \emptyset -	<i>nàná</i>	‘grand...’	-nàná-	<i>̀̀nánánúmí</i>	‘grand...s’
	<i>wàfà</i>	‘uncle’	-wàfà-	<i>̀̀wàfánúmí</i>	‘uncles’

	sèwáá ‘aunt’	-sèwáá-	sèwáánómí ‘aunts’
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6 :	(O)- _ -ni		A- _ -fúó
a. O- / A- Identity/ occupational	òsìkàní ‘rich person’	-sìká-	àsìkàfúó ‘rich people’
	òkřístòní ‘christian’	-křístò-	àkřístòfúó ‘christians’
	òhìání ‘poor person’	-hìá-	àhìáfúó ‘poor people’
	òkyíní ‘an akyem’	-kyé-	àkyímífúó ‘akyem people’
b. Ø- / A- Identity/ occupational	tíkyàní ‘teacher’	-tíkyà-	atíkyàfúó ‘teachers’
	sógyàní ‘soldier’	-sógyà-	asógyàfúó ‘soldiers’
	ðróbàní ‘driver’	-ðróbà-	adróbàfúó ‘drivers’
	pòlísìní ‘police’	-pòlísì-	apòlísìfúó ‘policemen’

7 :	(O)- _ -ni / -Ø		N- _ -fúó
a. -ni / N-	òkřèmòní ‘moslem’	-křèmó-	nkřèmòfúó ‘moslems’
	òdèdùàní ‘prisoner’	-dèdùà-	nnèdùàfúó ‘prisoners’
b. -Ø / N-	òsámání ‘ghost’	-sámání-	òsámànfúó ‘ghosts’
	òpàníní ‘elder’	-pàníní-	m̀pànyìnfúó ‘elders’

8 : A- / - (derived) no plural			
	àdó ‘farming’	-dó	
	àgúró ‘game’	-gúró	
	àyíé ‘funeral’	-yíé	

9 : Mass	No singular		N-/V-
a. / N-		-frámá	ñfrámá ‘air’
		-bógyá	nmógyá ‘blood’
		-kwání	ìkwání ‘soup’
		-sórómá	òsúrómá ‘stars’

b. - / V-	-gyá	ègyá	‘fire’
	-wúó	èwúó	‘honey’
	-sîkyîré	àsîkyîré	‘sugar’

Returning to our central proposal in this paper - that the noun class systems of Dagaare and Akan are based mainly on an interface between the morphological and phonological components of the grammar - one may note that the basic assumption here is mainly morphophonological. Thus, we first establish the stem of the noun by comparing its singular and plural forms to identify the affixes. For example, stem forms for the Class (2a) nouns of Dagaare, ‘child’ and ‘tree’, are *bí-* and *tî-* respectively. We know this by their occurrence in the plural forms too. We then insert the singular affixes *-e* and *-ε* to realize the full word forms: *bíé* and *tîé*. The same is the case in Akan, such that the stems for the Class (3b) nouns ‘rhino’ and ‘group’ are *-kúó* and *-kúó* respectively. The full forms, *èkúó* and *èkúó*, are then realized by prefixing the stems with *ε-* and *e-* respectively.

Due to the preference involved in the selection of a particular affix, we realize that only the morphological facts cannot satisfactorily explain our criterion. Accordingly, we also appeal to phonological information. The most prominent of the phonological information is the

advanced tongue root (ATR) vowel harmony principle. By the vowel harmony principle, the assumption is that the nine and ten vowels in Dagaare and Akan respectively fall into two phonetically distinctive classes; i.e., a vowel is either produced with an advanced tongue root ([+ATR]; /i, e, o, u, (a)/) or with a retracted tongue root ([-ATR]; /ɪ, ɛ, ɔ, ʊ, a/). Following the distinction, all stem vowels are required to be of a common ATR feature specification. The ATR specification in the stem then dictates that of the vowels in the affixes. In this case, stem vowels that are [+ATR] select the same vowel specification in the affix and likewise [-ATR] stem vowels. This explains the differences between the suffix in *bî-é* and *tî-é* in Dagaare. In Akan, the phenomenon explains the differences between the prefix in *è-kúó* and *è-kúó*. There are a few exceptional cases in Akan though, where both specifications occur in a word.

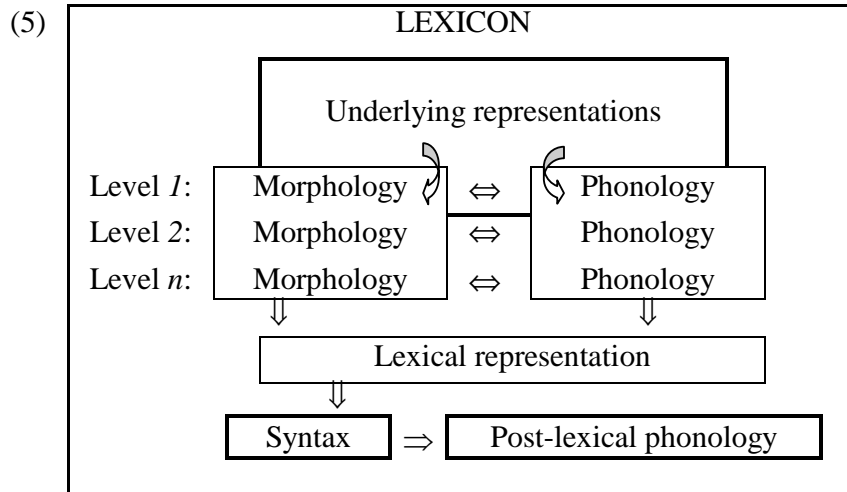
Further, Dagaare needs rules such as vowel lengthening to explain some of the nominal forms, for instance, in Class (2). In Akan, the vowel harmony principle is blocked in the rare classes with suffixes, and this can only be explained phonologically. These underline our working hypothesis that the noun class systems of Dagaare and Akan are a product of the interface between phonology and morphology. As such, in setting up the noun class systems, both morphological and phonological information are needed.

4. Formalization of the analysis

Formalizing the analysis described above, our sketch in (5) is done in the theoretical machinery of Lexical Phonology (LP).² LP, as developed in works such as Kiparsky (1985) and Mohanan (1986), involves both phonological and morphological theories. It recognizes the fact that phonological representation is very much word-bound, and so word formation consists of phonological rules applying on underlying morphological units supplied by the lexicon. Among these phonological rules, those that apply within word boundaries are defined as lexical, while the inter-boundary sensitive ones are referred to as post-lexical rules. This model of grammar then is one that provides an interface between phonology, morphology, and syntax.³ As sketched in (5) below, therefore, LP adequately addresses our morphophonological concerns.

² As rightly remarked by a reviewer, there are more recent theoretical formalisms in phonology such as Optimality Theory (e.g. Prince and Smolensky 1993). We believe, however, that LP still remains a good and valid theoretical framework for expressing the hypothesis of noun class formation we adopt in the paper.

³ Within the general theory of LP, various issues and morphophonological methodologies such as underspecification, cyclicity, levels of representation and structure preservation are prominent, but we shall not take them up in this paper.



In word formation, LP projects the view that the morphological component supplies the various affixed and compounded forms of the language, upon which the required lexical rules of the language apply to modify and produce the phonetic forms. Therefore, with LP, any natural language lexicon has in stock an inventory of stems, affixes, as well as word forms whose meaning are not predictable from their constituent parts. Word formation rules (*WFRs*), which describe the potential words of the language in question, are then defined. The rules in (6) below are some of them that apply in Akan and Dagaare nouns.

(6) Some word formation (morphological) rules

<i>WFR</i>	Dagaare		Form
i,	Noun _{Stem} -Sfx	: <i>bí-é</i>	‘child’ → N
ii,	Verb _{Stem} -Sfx	: <i>zòó-ú</i>	‘act of running’ → N
iii,	Noun _{Stem} -Noun _{Stem}	: <i>bí-dóó</i>	‘a baby boy’ → N

<i>WFR</i>	Akan		Form
i,	Pfx-Noun _{Stem}	: <i>ò-dwáń</i>	‘sheep’ → N
ii,	Pfx-Verb _{Stem}	: <i>à-dó</i>	‘farming’ → N
iii,	Noun _{Stem} -Noun _{Stem}	: <i>dàdè-séń</i>	‘a metal bowl’ → N

The processes in (6) explain the construction of (new) words. Thus, if our lexicon contains the stems *-dwáń* and *bí-* and the affixes *ò-* and *-é*, *WFR*_i predicts *òdwáń* and *bíé* as possible words of Akan and Dagaare respectively. Also, following *WFR*_{ii} we could predict a noun like *àdó* and *zòóú* in Akan and Dagaare respectively, if our lexicons contain the verb stems *-dó/zòó-* and affixes *a-/ú*.

As noted earlier, the above demonstrations are only morphological (i.e. constituent concatenation), which are then altered to realize the phonetic forms of the lexical items by phonological explanations to

of our LP model, with a simple Dagaare lexicon, *zò-* (stem) and *-U* (suffix), and Akan lexicon, *-kúɔ* (stem) and *E-* (prefix).

(8)		Dagaare	Akan
	Underlying representation	: [[zo-][-U]]	[[E-][-kɔɔ]]
<i>Step 1:</i>	<i>WFR</i> (in (6)) applies	: zo-U	<i>E-kɔɔ</i>
<i>Step 2:</i>	<i>VH</i> (in (7)) applies	: zo-u	<i>ɛ-kɔɔ</i> ‘a rhino’
<i>Step 3:</i>	<i>VL</i> (in (7)) applies	: zoo-u	— ‘running’

In (8), the morphological rule does the right stem and affix combination gives us *zo-U* and *E-kɔɔ*. The affixes are still unspecified for the ATR feature in the stem, such that we need a phonological rule, which enriches this harmony principle and converts the affixes to the right phonetic representation; hence, *zo-u* and *ɛ-kɔɔ*. In Dagaare, *VL* further applies to realize the correct surface realization of *zoo-u*. These are just illustrations of how word (and especially nominal) formation processes within LP are done. As will be observed in the following section, there are obviously many other phonological processes involved.

As shown in (8), the phonological conditions (e.g., see (7)) that trigger the local phonological rules arise in the morphological context of ‘stem-affix/affix-stem’ concatenation. However, we do not suppose that

the conditions do not arise in other morphological contexts (and, even, in some syntactic contexts) as well. Indeed, in the morphological context of ‘noun-noun/adjective’ compounding in Akan for instance, the *VH* rule may be conditioned to apply. For example, the [–ATR] vowel /ɛ/ in *ɲsɛ́ní* ‘stories’ becomes [+ATR] /e/ in the compound, *ɲsɛ́nhúní* ‘nonsense’. Also, in the analysis of phonological rules, one could present and explain in detail the morphological and phonological facts. However, as has been witnessed with the *WFRs* and the major phonological rules (i.e., *VH* and *VL*) presented in (6) and (7) respectively and illustrated in (8), we believe that so much is involved in this direction (of detailed analysis) that demands another complete paper by itself. Accordingly, we emphasize that the other local phonological rules occurring along with *VH* and *VL* in the noun classes are simply stated and exemplified in this paper.

5. Illustration of the formalization with the noun classes

Returning to our proposed noun class tables in (3) and (4), we show how the morphological and phonological rules and processes account for the various data within the ten and nine noun classes in Dagaare and Akan respectively that may not be understood at first glance. We have noted that there are two generalizations that cut across all the noun classes in Dagaare and Akan: *WFRi* (morphological) and *VH* (phonological). In other words, every noun is a product of stem-affix/affix-stem combination and every noun in Dagaare and Akan must have either only [+ATR]

vowels or only [–ATR] vowels. Having addressed the persistence of *WFR* and *VH*, we now proceed to briefly illustrate the other local rules occurring in each of the various classes in both languages, beginning with Dagaare.

5.1. Local rules in Dagaare noun class system

Class 1: –V/–bV:

This class is the central Dagaare version of the *bV* class that is so common in many Mabilia languages.⁴ Again, the fact that it is related exclusively to [+human] nouns makes it unique. In this class, as shown in (9), some of the rules that successively underlie word forms are segment softening (*SegS*), vowel shortening (*VS*), vowel assimilation (*VA*), nasal deletion (*N-dln*), rounding (+*R*) and *VL*. See *Appendix I* for the full names of all the rules mentioned in this paper. Note also that the affected segments of the various rules are emboldened and italicized.

(9) <u>Stem</u>	<u>WFRi</u>	<u>SegS</u>	<u>VS</u>	<u>VA</u>	
pɔg-	: pɔg-ɔ	» pɔɣ			‘a woman’
dɔɔ-	: dɔɔ-ba		» dɔba	» dɔbb	‘men’

⁴ The term, Mabilia, is the cover name for the central Gur languages of West Africa, including Dagaare, Dagbane, Gurenne and Kusaal. These languages are, thus, often referred to as Mabilia languages.

<u>Stem</u>	<u>WFRi</u>	<u>N-dln</u>	<u>+R</u>	<u>VL</u>	
nɪŋ-	: nɪŋ-ba	» nɪba	» nɔba		‘people’
kʊɔɾ-	:kʊɔɾ-aa			» kʊɔɾaa	‘farmer’

Class 2: -V/-rI

In addition to the general rules, *WFRi* and *VH*, a further *VL* rule similar to the one formulated in (iii) of (7) is quite frequent in this class of Dagaare. This *VL* rule formulated in (10a) causes the stem-final high vowel (i.e. *U* or *I*) to be lengthened before the suffix, *-rI*, as illuminated in (10b).

(10) a. *VL*: V → VV / C___ -rI
 [+High]

b. bi- + -rI → biiri ‘children’
 ti- + -rI → tuuri ‘tress’
 ku- + -rI → kuuri ‘rats’

Class 3: -I/-V

This class of Dagaare is very regular, because we only need *WFRi* and *VH* to account for almost all the data here. However, as shown in (3), this class is modified and subdivided into three broad classes based on the

vowel of the plural suffix (i.e. *E*, *O* or /a/). In a few other cases further phonological processes, such as final vowel rounding (+*R*), as in *kpoli* → *kpolu* and *VL*, as in *kpolu* → *kpoluu* ‘termites’, are invoked to explain some surface representation.

Class 4: -rU/-rI

This constitutes a small class. Apart from the regular rules of *WFRi* and *VH*, regressive vowel assimilation (*RVA*), consonant elision (*C-eln.*) and *C-dln* also commonly occur in this class, as exemplified in (11). Also observed in this class is *VL*, which also applies in other classes.

(11)	<u>Stem</u>	<u>WFRi</u>	<u>RVA</u>	<u>C-dln</u>	<u>C-eln</u>	<u>VL</u>	
	wa-	: wa-ri	» wiri			» wiri	‘snakes’
	kpar-	: kpar-ru		» kparu		» kparuu	‘shirt’
	wa-	: wa-ru			» wau	» waaU	‘snake’

Class 5: -∅ /-rI

We have a case in this class where the singular forms of the nouns are exactly the same as the stems, for there seems to be no morphophonological alterations. Following our *WFRs*, however, we suppose that these singular forms are more than stems. In other words, in order to establish the universality of *WFRi* and its application, we posit

the concept of zero-affix for Dagaare, as in Akan Class 4 singular noun forms. Thus, in such ‘affix-less’ situations, a zero affix is assumed. With this explanation, applying our general rules, *WFRi* and *VH*, accounts for all but *nuuri* (from *nu+ri*), which needs an extra rule of stem *VL*, *nu-* → *nuu-*, to complete.

Class 6: -rI/-V

This is another morphologically very regular class where stems combine with *-rI* in the singular forms and with either *E*, *O* or */a/* to form plurals. As in (3), with this variation in the plurals, three subclasses are distinguished. Besides *WFRi* and *VH*, we need the rules, *VS* and diphthongization (*Diph*) to account for some of the data, as showed in (12a & b) respectively.

(12)	<u>Stem</u>	<u>WFRi</u>	<u>VS</u>	<u>Diph</u>	
a.	too-	: too-bo	» tɔbo		‘ears’
b.	nyɔ-	: nyɔ-rɪ		» nyɔɔrɪ	‘nose’

Class 7: The nasal class

Dubbed the nasal class (due to its all nasal-final or nasalized stems and affixes) and divided into six subgroups, this is a very large class. This nasal property is a vital generalization within the noun class system of Dagaare that can only be captured by our morphophonological criterion,

which stresses the fact that nasal-final nouns form a natural class in the system. Analyses that insist solely on a semantic categorization would most likely miss this generalization or find it difficult to state. As shown in (13), nasal assimilation (*NA*), nasal shortening (*NS*), nasal change (*NC*), *VA* and *VL* are some of the local phonological rules that apply.

(13)	Stem	<u>WFRi</u>	<u>NA</u>	<u>NS</u>	<u>VA</u>	<u>NC</u>	<u>VL</u>
	gan-	: ganni		» gani			
	gan-	: ganma	» gamma	» gama			
	biŋ-	: biŋni	» binni				
	liɛn-	: liɛnma	» liɛmma	» liɛma	» liɛmɛ		
	kpin-	: kpinŋɛ	» kpinɛ	» kpinɛ		» kpinɛ	» kpinɛ

Class 8: -aa/-I

This is another class with an interesting phonological generalization. In the plural forms of the nouns an occurrence of doubling a stem-final consonant, generally referred to as consonant gemination (*ConsG*), is a quite regular phenomenon. Together with our universal rules of *WFRi* and *VH*, *ConsG* partly distinguishes this class in the plural forms, as shown in (14).

- (14) pir- + -I → pirI (*WFRi*) → piri (*VH*) → pirri (*ConsG*)

Class 9: -U/-

The nouns in this class are derived from verbs to form various types of concepts. We first show how this syntactico-semantic phenomenon is done in (15), after which we outline the morphophonological rules observed here.

(15)	<i>kɔ</i>	‘to farm’	→ <i>kuɔɔ</i>	‘the act or concept of farming’
	<i>gaŋ</i>	‘to lie down, sleep’	→ <i>guɔɔ</i>	‘sleep’
	<i>mɔ</i>	‘to wrestle’	→ <i>muɔɔ</i>	‘the act of wrestling’
	<i>yie</i>	‘to faint’	→ <i>yieu</i>	‘abomination, i.e. a thing that can make us faint’

As can be realized, most, if not all, of the nouns in this class are lexicalized from abstract concepts. As a result they do not have plural counterparts (except when talking about types of these concepts), just as it is with Akan Class 8 nouns. From the stems of these derived nouns we observe significant morphophonological realizations, some of which result before *WFRi*, as shown in (16).

(16)	<i>gaŋ</i>	‘to sleep’	(verb: parent stem)	
	<i>gaŋ</i> :	Vowel raising (<i>VR</i>) and + <i>R</i>	→ <i>gɔŋ</i> -	(stem)

- ɣɔŋ-ɔ (WFRi)
- ɣɔɔ (N-eln.)
- ɣɔɔɔ (Diph)

Class 10: –UN

Like the noun forms in Class 9, the nouns here are also derived from verbs and other word classes. In addition, however, they seem to involve more concrete nouns. They are non-countable or mass nouns. Conceptually therefore, they fit more on the plural side of the number grid. As was done in the previous class, we indicate their origin in (17) before we analyze them morphophonologically in (18).

- | | | | | |
|------|-------------|--------------|-----------------|--|
| (17) | <i>buul</i> | ‘to stir’ | → <i>buuluŋ</i> | ‘liquid resulting from this act
– i.e. porridge’ |
| | <i>di</i> | ‘to eat’ | → <i>diruŋ</i> | ‘plenty stuff of all sorts to eat
– i.e. food’ |
| | <i>kɔgl</i> | ‘to protect’ | → <i>kɔɔluŋ</i> | ‘some mass that protects or
supports an animal – i.e. hair’ |

(18) *kɔgl* ‘to protect, support, cover’

- *kɔɔl* (syllable weakening (SW))
- *kɔɔlluŋ* (WFRi; i.e., *kɔɔl* + *luŋ*)
- *kɔɔluŋ* (consonant shortening (CS)).

5.2. Local rules in Akan noun class system

Class 1: V-N-

This class constitutes the most regular and common in Akan, such that a learner would easily over-generalize the processes here to the other classes. Beside *WFRi* and *VH* (in the singular), two other phonological processes are realized in the plural forms in this class. These are homorganic nasal assimilation (*HA*), with which a nasal prefix adopts the place of articulation of the stem-initial consonant, and voiced-to-nasal assimilation (*Vd-NA*), which also causes a voiced stem-initial consonant to become nasal after a nasal prefix. These two processes are formulated in (19a & b) and exemplified in (19c). The rules are also frequent in the class 2 nouns.

- (19) a. *HA*: N- → N- / ___ C
 [∞Place] [∞Place]
- b. *Vd-NA*: C → N / N ___
 [+Vd]

c.

<u>Stem</u>	<u>WFRi</u>	<u>HA</u>	<u>V-NA</u>	
-baa	: Nbaa	» <i>m</i> baa	» <i>m</i> maa	‘females’
-duani	: Nduani	» <i>n</i> duani	» <i>n</i> nuani	‘foods’

-fidie	: Nfidie	» <i>ɲ</i> fidie	‘traps’
-kraman	: Nkraman	» <i>ŋ</i> kraman	‘dogs’

Class 2: Ø–N–

We observed from (4) that, this class has a null prefix in the singular, but shares the same processes in the plural with the Class 1 nouns. However, as realized in Dagaare Class 5 nouns, we propose a zero prefix value in the singular without which the universality of our *WFRi* cannot be enforced. This is also the case in singular forms of Akan Class 4 nouns.

Class 3: V–A–

This class of Akan nouns, sub-classified into two obligatory or optional singular prefix marking in the singular, is also very regular, both morphologically and phonologically. With no other phonological rules, our *WFRi* and *VH* (in the prefixes) are consistently realized.

Class 4: Ø–A–

This class consists of nouns just like those in Class 3. However, like Class 2 nouns, the singular forms here do not inflect for a prefix. In the plural forms, *VH* applies and it is consistent.

Class 5: V-/A- -num

This class, involving kinship nouns, is one of the noun classes in Akan with ‘double-edge’ affix positioning in the plural. With these nouns, much as *VH* applies between the prefix and the stem, the rule fails to hold between the stem and the suffix. As noted by Dolphyne (1988), *VH* is a regressive rule (not a progressive one) and this explains why the ATR specification in the stem is blocked from spreading into the suffix. Therefore, just as the suffix, *-ni*, in Class 6 (indicating occupation or identity) is underspecified for [+ATR], the suffixes, *-num* and the one in Class 6, *-fuo*, always assume the default value of [-ATR], as in (20).

(20) A-nua -nUm → ànùánómí ‘siblings’
 └───┬───┘ |
 [+ATR] [-ATR]

Class 6: -ni/A- -fuo

This class is the other ‘double-edge’ affixed in the plural. Semantically, we could refer to nouns here as ‘identity’ or ‘occupational’ class of nouns. In this class also, our basic rules of *WFRi* and *VH* systematically take place but, again, *VH* does not apply between the stems and the suffixes, as observed in Class 5. This is only different from the Class 7 nouns in the plural, where a nasal prefix occurs, instead of /A/ in this class.

Class 7: -ni/N-__ -fɔɔ

As noted earlier, except for the homorganic nasal prefixes in the plural forms in this class, it is the same as the noun forms in Class 6. Further, following the ensuing homorganism through the application of *HA*, the stem-initial consonant, if voiced, is assimilated to nasal by *Vd-NA*. Otherwise, this consonant is maintained, as illustrated in (21). *Vd-NA* could also be described as the stem-initial consonant replacement with prefix nasal gemination.

(21) <u>Stem</u>	<u>WFRi</u>	<u>HA</u>	<u>VdN-A</u>	
-dedua-	: Ndeduafɔɔ	» ndeduafɔɔ	» nneduafɔɔ	‘prisoners’
-panyin-	: Npanyinfɔɔ	» mpanyinfɔɔ	–	‘elders’

Class 8: A-/-

This class of Akan noun forms is without the singular-plural distinction; i.e., a ‘single-sided’ class. Based on the fact that nouns here are derived from a parent verb, this class is conceptually viewed as consisting of only singular forms. For instance, *àdɔ́* ‘farming’ and *àsá* ‘dancing’ originate from the verbs *dɔ́* ‘to weed/farm’ and *sá* ‘to dance’ respectively. With regards to our morphophonological analysis, the universal rules, *WFRi* and *VH*, are manifested.

Class 9: –/N–

This is the other ‘single-sided’ noun class of Akan. It is just the opposite of Class 8 nouns. However, the nouns here are without any verbal origin. They are conceptually defined as plural forms, because this class is solely constituted by mass nouns. A few of the stems here inflect for a vowel prefix, e.g. *àsíkyìré* ‘sugar’, with which our *VH* rule applies. As shown in (22), the majority however inflects for the nasal prefix, with which the rule to homorganic nasal realization, *HA*, is triggered and applies appropriately.

(22)	Stem	<i>WFRi</i>	<i>HA</i>	
	-fràmá	: <i>N</i> -fràmá	→ <i>ɲ</i> fràmá	‘air /wind’
	-bó!gyá	: <i>N</i> -bógyá	→ <i>m</i> bógyá (<i>m</i> <i>m</i> ógyá)	‘blood’
	-kwáń	: <i>N</i> -kwáń	→ <i>ɲ</i> kwáń	‘soup’
	-sórómá	: <i>N</i> -sórómá	→ <i>ɲ</i> sórómá	‘stars’

6. The role of semantics in the noun class systems

It is obvious from the analysis we have provided in this paper that the use of semantic information in setting up the noun classes of Dagaare and Akan cannot be denied. This is clearly the case with Classes 1, 9 and 10 of Dagaare and Classes 5, 6, and 9 of Akan, where we resort to some

semantic explanations as to why these nouns are naturally grouped together. The Dagaare Class 1, for instance, has been noted as exclusively human-oriented; noted in (semantic) feature terms as [+human] class. This class is systematically [+human] across the various Mabia languages. Another morpho-semantic fact that was not mentioned above is that certain nouns in only this class, such as those shown in (23), form their plurals with the affix *-mine*.

(23)	<u>Singular</u>		<u>Plural</u>	
	bá	‘friend, father’	bá- <i>mìné</i>	‘friends, fathers’
	sàá	‘father’	sàá- <i>mìné</i>	‘fathers’
	má	‘mother’	má- <i>mìné</i>	‘mothers’
	yóò	‘brother’	yóó- <i>mìné</i>	‘brothers’

Clearly, as a further evidence for a semantic analysis, the nouns in (23) refer to a set of nouns lexicalizing, mostly, relationships between individuals. This is also the case with the plural suffix *-num* in Akan, which is only used to indicate kinship and goes a long way to underlie the class 5 nouns, as noted earlier.

In Classes 9 and 10 of Dagaare, we have also witnessed cases in which we had to resort to conceptual semantic criteria to illuminate the cohesive relationship between the nouns within each class. We employed

the syntactic criterion of (nominal) derivations in Class 9 and the notion of count (i.e. [\pm count]) in Class 10 to explain the categorization. Also, in Akan Class 6/7 and 8, we appealed to the semantic notion of identity or occupation and the syntactic criterion of (nominal) derivations, respectively.

However, it is evidently clear, as we hope we have adequately shown, that in the vast majority of the classes in these systems we needed morphophonological criteria to account for ensuing word formation processes. With our proposal, it is made clear that certain classes of nouns such as 7 and 8 of Dagaare and Classes 1 and 3 of Akan form natural classes, because of the unique phonological and morphological processes manifested in them. Even in classes where a semantic criterion is unequivocally relevant, the morphological and phonological motivations to grouping these nouns into a particular class are regular and systematic.

7. Conclusion

The noun class systems of Dagaare and Akan that we have established in this paper, like that of most other African languages, provide a domain of grammatical interplay of various phonological, morphological, syntactic, semantic and conceptual processes. We have argued for and defended the position that a more principled and rigorous methodology in setting up and understanding this system is to carefully consider how phonological and morphological rules interact in the system.

We have shown that each noun in Dagaare and Akan is composed of a stem and affixes. The stems and affixes are of different types. These form the morphological basis for a broad classification of nouns into classes. This broad classification is further subcategorized depending on the phonological processes at play; some of which, like vowel harmony, are persistent and universal across the entire classes. Others such as vowel lengthening, nasalization and homorganic assimilation are more localized, but interact with the universals to thoroughly account for word formation in Dagaare and Akan.

We have identified some semantic and other conceptual factors in the systems, but this does not in any way disprove our hypothesis that the system is a product of morphological and phonological processes. This is because some of these processes were more universal, appearing constantly across the system and enabling us to attain a better and more consistent analysis of the noun class systems of Dagaare and Akan. Therefore, we hope that we have not only proposed a comprehensive noun class system for Dagaare and Akan, but that we have also been able to successfully argue for the primary roles phonology and morphology play in the noun class systems of Dagaare and Akan and, most probably, that of other languages.

Appendix I: Rules

<i>C-dln.</i> Consonant Deletion	+R Vowel Rounding
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<i>VA</i>	Voiced-to-nasal Assimilation	<i>RVA</i>	Regressive Vowel Assimilation
<i>ConsG</i>	Consonant gemination	<i>SegS.</i>	Segment Softening
<i>ConsS</i>	Consonant Shortening	<i>SW</i>	Syllable Weakening
<i>Diph</i>	Diphthongization	<i>C-eln.</i>	Total Vowel Assimilation
<i>HA</i>	Homorganic assimilation	<i>Vd-NA</i>	Consonant Elision
<i>NA</i>	Nasal Assimilation	<i>VH</i>	Vowel Harmony
<i>NC</i>	Nasal Change	<i>VL</i>	Vowel Lengthening
<i>N-dln.</i>	Nasal Deletion	<i>VR</i>	Vowel Raising
<i>N-eln.</i>	Nasal Elision	<i>VS</i>	Vowel Shortening
<i>NS</i>	Nasal Shortening	<i>WFR</i>	Word Formation Rule (<i>i, ii, iii</i>)

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