NOMINAL TONE IN NAWURI

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This article deals with the tone patterns of nouns in Nawuri, a Kwa language of Ghana. At first glance, the tone of a noun-class prefix does not appear to be predictable from the tone of the stem. Snider (1990) has shown, however, that prefix tones can in fact be predicted from underlying stem tones, given appropriate and independently motivated assumptions about the latter.

Despite the overall success of Snider's analysis, a few generalizations remain unexplained, for example the fact that an underlying low stem tone posited for one group of nouns surfaces overtly only with stems that are minimally bimoraic. This article extends and modifies Snider's analysis to account for these generalizations. Central to my analysis is the claim that low tones are underlyingly unspecified in Nawuri, being supplied later by default.

Cet article se concentre sur le système tonal des noms en nawuri, une langue de la famille kwa du Ghana. A première vue, les tons qui se mettent au début d'un nom semblent s'affixer au hasard. Snider (1990) a affirmé, cependant, que les tons de préfixes peuvent au fait être prévu des tons sous-jacents de la base, pourvu qu'on soit donné des suppositions appropriées et motivées indépendamment.

Malgré le succès qu'a connu cette analyse, quelques généralisations restent à l'ombre. Par exemple, le fait que un ton bas sous-jacent de la base posé pour un groupe de noms se révèlent seulement avec les bases qui sont composées d'au moins deux mores. Cet article étend et modifie l'analyse de Snider pour tenir compte de ces généralisations. Capital à cette analyse est la revendication que les tons bas ne sont pas specifiés au niveau sous-jacent en cette langue, n'étant fournis que plus tard par défaut.

0. INTRODUCTION

The aim of this article is to account for the surface tonal patterns of nouns in Nawuri[1] (a Kwa language of Ghana), focusing in particular on the large number of nouns which take noun class prefixes.[2] These exhibit a variety of surface tonal patterns, some of which are shown in (1) (monosyllabic stems) and (2) (disyllabic stems). **/gI/**, **/ga/**, and **/O/** are three different singular noun class prefixes.[3]

	with **gI-**:	with **ga-**:	with **O-**:
(1)	**gí-ɲí**	**gá-dí**	**ó-bí**
	tooth	village	person
	gɷ̀-sɷ́	**gà-bwí**	**ò-bú**
	ear	goat	room
	gì-bɛ́ɛ̀	**gà-bɔ́ɔ̀**	**ò-fɛ́ŋ̀**
	butterfly	messenger	scent
	gí-káà	**gá-bîì**	**ɔ́-kíŋ̀**
	headpad	child	fish
	gì-dɛ́ɛ́	**gà-báá**	**ɔ̀-dɔ́ɔ́**
	half	tree (type)	fiber (type)
(2)	**gí-bɷ́lî**	**gá-pínî**	**ó-búnî**
	gourd plant	ring	corpse

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[2] While almost all noun stems in Nawuri take noun class prefixes in the plural, there are a considerable number of nouns which lack singular noun class prefixes. As far as I am aware, no additional complications are presented by the stems which lack these prefixes.

[3] Certain phonetic details are systematically ignored in these phonetic transcriptions. In pre-pausal position, for example, long vowels are consistently realized with final glottal stops.

gì-jágáà	**gà-pálî**	**ò-fúlî**
surplus	fufu	space
gì-bìté	**gà-gbìní**	**ò-lìbí**
girl	okra	bad one

At first glance, it does not appear that the tones of the prefixes in these examples[4] are in any way predictable from the tone of the stem. The tonal patterns of **[gá-dí]** 'village' and **[gà-bwí]** 'goat', for example, are identical in their stem portions (which are high-toned) and differ only in that the prefix of the former bears a high tone while the prefix of the latter is realized with a low tone.[5] Despite the apparently idiosyncratic tonal behavior of these prefixes, Snider (1990) convincingly shows that, given independently justified assumptions about the underlying tonal melodies of noun stems, it is indeed possible to predict the tone of the prefix in the overwhelming majority of cases.

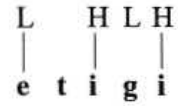
While Snider's basic approach has a great deal of merit, we shall see that two significant problems remain. First, the generalization he arrives at for predicting the prefix tones is not readily formalizable within most current theoretical frameworks, since it apparently requires that the rule be triggered by a tone which is in some cases not strictly adjacent to the tone undergoing the rule. Second, one striking generalization regarding the distribution of contour tones remains unexplained.

The goal of this article is to formalize an extended and somewhat modified version of Snider's proposal which will overcome these difficulties without however abandoning the fundamental insights of his analysis. A crucial component of This analysis, which makes use of proposals outlined in Pulleyblank (1986), is the assumption that low tones in Nawuri are lexically unspecified, being supplied by a later default rule.

1. BACKGROUND

Nawuri has two contrastive tones, high (H) and low (L). Like many African tonal languages, the language displays the phenomenon of downdrift, in which the second of two H tones separated by an intervening L is pronounced at a slightly lower pitch than the first H. Cases of downstep, in which the second of two H's is pronounced at a lower pitch level even when no L-toned syllable intervenes, are also not uncommon. In keeping with most recent work on the subject, it is assumed that downstep is due to the presence of a floating L tone (Clements and Ford 1979). Thus the surface representation of a form like **[ètí ꜜgí]**[6] 'he is opening (it)', in which the third syllable is downstepped relative to the second, will be as in (3).

(3)



Contour rising and falling tones also occur in Nawuri; as in most West African tonal languages, these may be analyzed as arising from sequences of level (H and L) tones. Rising contours are much less common than falling contours, being restricted almost entirely to certain bimoraic, monosyllabic verbs in the imperative.

[4]The Nawuri data in this article are drawn primarily from the author's own fieldwork, although some Nawuri data in Snider (1990) is also used. In any case, these data are in very close agreement as far as Nawuri tonal patterns are concerned.

[5] It should be emphasized that there is no evidence whatsoever for treating the prefixes in these two words as different morphemes.

[6] A raised exclamation point is used throughout this paper to indicate the downstepping of a following H tone.

A third type of contour tone, in which the pitch starts high and falls by an amount equivalent to a single downstep, occurs on some monosyllabic verbs in the imperfective aspect. This type of contour tone is not relevant to the topic of this article.

With the exception of some falling contours derived through a postlexical H tone spreading process (see the examples in (7) below), falling tones are almost entirely restricted to word-final position.[7] These word-final falling tones occur both on heavy syllables, as in (4a), and light syllables, as in (4b). (The regular syllable structures in Nawuri are CV, CVN, and CVV where VV is a long vowel. Onsetless V(N) syllables also occur, but are restricted to word-initial position. Heavy syllables are those with a long vowel or nasal coda.)

(4) a. **ì-pîì** tails
b. **ḿ-pínî** rings

In both cases, the final syllables are realized with falls only in pre-pausal position. Elsewhere, they surface with a level H tone, and if the initial tone of the following word is also H, this word-initial H tone is downstepped as in (5).

(5) **ì-píí ꜜgúdú** ten tails
ḿ-píní ꜜgúdú ten rings

When a word ending in a H tone directly precedes a word whose initial syllable is underlyingly L-toned, the H tone spreads rightward, causing the initial syllable to appear with a H tone on the surface as in (6).

(6) a. **à-ɲàŋ̀-bí gì-lìfá** → **àɲàŋ̀bí gílìfá** one hundred nails
b. **ǹ-sɔ́ fɔ̀lɔ̀ŋ̀** → **ǹsɔ́ fɔ́lɔ̀ŋ̀** I have fire
c. **ɔ̀-číí gì-báá** → **ɔ̀číí gí ꜜbáá** woman's hand

Notice that in (6c), the L tone of the prefix /**gɪ**/ manifests itself on the surface by causing the final H tone of the stem /**baa**/ 'hand' to be downstepped.

In all of the examples in (6), the syllable onto which the H tone spreads is light. When this word-initial syllable is heavy, as in (7), it surfaces with a falling one rather than a level H tone.

(7) a. **/ǹ-sɔ́ čèèčéé/** → **ǹsɔ́ céèčéé** I have a bicycle
b. **/náátí lèmbìrì/** → **náátí lémbìrì** black cow

There is reason to believe that H tone spreading applies lexically in Nawuri as well. This will be discussed in more in §3 and §5 below.

Nawuri has a fairly extensive noun class system. (See Snider 1988 for discussion of noun classes in Nawuri and other Guang languages.) The attested correspondences between singular and plural noun class prefixes are shown in (8).

(8)

SINGULAR	PLURAL
gI-	**a-**
O-	**I-**
ga-	**N-**
gI-	**I-**
O-	**a-**
Ø	**a-**
Ø	**I-**

(**N** represents a syllabic nasal prefix which is always homorganic with the initial consonant of the stem. **I** is realized as either [**i**] or [**ɪ**], depending on the [ATR]

[7] The author's lexical file of about 1700 different Nawuri words contains only twelve with falling contours in non-final position. Four of these are compounds in which the falling contours are readily derived by independently motivated rules. No explanation comes to mind for the contours in the remaining eight words (which are not common), although the length of these words makes it likely that at least some of them are compounds as well.

category of the first stem vowel. Similarly, **O** is realized as either [o] or [ɔ], depending on the [ATR] category of the first stem vowel.)

Noun class prefixes do not have inherent tone; rather the tone of a prefix is determined by the tone of the stem by mechanisms to be discussed in §3 and §5 below A noun which takes both singular and plural prefixes will always manifest the same tone on both prefixes.

2. COMMON SURFACE TONAL PATTERNS

In this section the stage continues to be set for an analytical treatment of nominaltone in Nawuri by describing the commonly attested surface tonal patterns found in prefixed nouns with mono- or bimoraic stems. (Some additional, less common, tonal patterns occurring with stems of this type will be taken up in §6.) All such stems have one of the forms listed in (9).

(9)

Monomoraic stem:	CV
Monosyllabic, bimoraic stem:	CVN or CVV
Disyllabic, bimoraic stem:	CVCV

Nouns with simple stems of this type constitute a sizable percentage of all nouns in Nawuri. While nouns with longer (heavier) stems are not uncommon, many of them are probably compounds, at least historically.[8] Since the longer stems exhibit a much greater variety of surface tonal patterns, it will be simpler to limit the analysis to stems with a maximum of two moras. The tonal behavior of longer stems will be taken up briefly in §7.

2.1 MONOMORAIC STEMS

Nouns consisting of a noun class prefix plus a monomoraic stem display the two common surface tonal patterns in (10).

(10)

a.	H prefix, H stem:	
	gá-dí	village
b.	L prefix, H stem:	
	gà-bwí	goat

Conspicuous for its absence is a pattern in which the prefix is H and the stem is L. This fact is indicative of a more general property of all nouns in Nawuri: a H-toned prefix is never directly followed by a L-toned mora in the initial syllable of the stem.

Also absent in (10) is a pattern in which both prefix and stem are L. As we shall see in §6, this latter pattern does actually occur in a few nouns, though it is not common.

2.2 MONOSYLLABIC, BIMORAIC STEMS

There are three common surface tonal patterns for nouns whose stems are monosyllabic and bimoraic as shown in (11).

(11)

a.	H prefix, HL stem:	
	á-fúù	wind
b.	L prefix, H stem:	
	ɔ̀-číí	woman
c.	L prefix, HL stem:	
	ɔ̀-pîì	tail

[8] The noun-root shapes reconstructed by Snider for Proto-Guang are limited to CV, CVN, CVʔ, CVCV, and CVNCV.

Note that once again there is no pattern in which the prefix is H and the stem is L. Also somewhat surprising is the lack of a common pattern in which both prefix and stem are H. While such a pattern does in fact occur with a few nouns, it is relatively rare. This is rather unexpected, in view of the fact that MONOMORAIC stems with this pattern (as in (10a)) are extremely common. Finally, we may note once again the absence of a common pattern (although it does occur more rarely) in which both prefix and stem are L.

2.3 DISYLLABIC, BIMORAIC STEMS

For disyllabic, bimoraic stems there are four well-attested surface tonal patterns in (12).

(12) a. H prefix, HL stem:
gá-pínî ring

b. L prefix, H stem:
ɔ̀-wɔ́lí book

c. L prefix, HL stem
à-súnɔ̂ seven

d. L prefix, LH stem:
ò-lìbí bad one

Two other patterns, L prefix plus L stem and H prefix plus H stem, are also attested but are extremely rare. A pattern in which an H prefix precedes an L stem is completely absent, just as it is in the case of the monomoraic and monosyllabic, bimoraic stems.

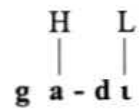
3. SNIDER'S ANALYSIS

Snider accounts for the tonal patterns of nouns in Nawuri and other Guang languages by positing that the tones of the prefixes are in some sense 'polarized' with respect to the stem tone. The principle of tone polarization is expressed in the following quote from Snider (1990:92):[9]

> if the underlying melody of a noun root includes H, the prefix tone is ` [i.e. L]. If the underlying melody of the noun root does not include H, i.e., is L, the prefix tone is ´ [i.e. H].

He further proposes a lexical rule of H-Spread by which a H tone spreads rightward one or more syllables (the exact extent of spreading varying among the different Guang languages).

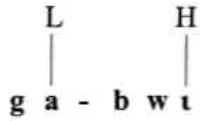
As an example of how this analysis works, consider the surface tonal contrast between [**gá-dí**] 'village', in which the prefix takes a H tone, and [**gà-bwí**] 'goat', in which it takes a L tone. The surface difference between these two forms is assumed to be due to an underlying difference in the tone of the stem: /**dɪ**/ is underlyingly L-toned, while /**bwɪ**/ is underlyingly H-toned.[10] The principle of prefix tone polarization will then entail that the prefix attached to /**dɪ**/ will be H, while the prefix of /**bwɪ**/ will be L as seen in (13).

(13) a.


[9] In its context, this quote is applied specifically to Chumburung, but Snider gives evidence that the principle holds true of several other Guang languages, and of Nawuri in particular.

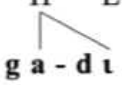
[10] The assumption that stems like /**dɪ**/ 'sleep' which surface with H prefixes are underlyingly L-toned (not only in Nawuri but in other Guang languages as well) is supported by several pieces of synchronic and diachronic evidence. For detailed discussion, see Snider (1990).

b.



In the case of /**ga-dɪ**/, H-Spread will then apply to delink the L tone of the stem, deriving the correct surface form in (14).

(14)

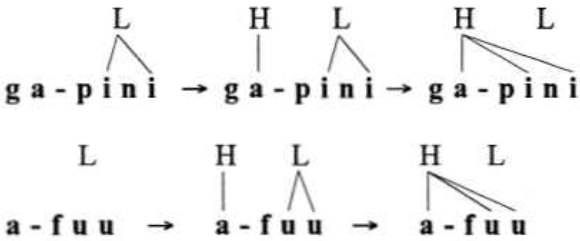


As Snider clearly states, the underlying L tone which is displaced in cases of this type (i.e., cases involving monomoraic stems) does not cause a following H tone to be downstepped, nor does it ever manifest itself in any othr way. It is therefore necessary to assume that iut is somehow deleted. (Recall that floating L tones regularly trigger downstep elsewhere in Nawuri.)

Interestingly, longer stems which are underlyingly L-toned in Snider's analysis behave somewhat differently, in that the underlying L tone is not deleted. This may be illustrated by examining a disyllabic stem like /**pini**/ 'ring' and a monosyllabic, bimoraic, stem like /**fuu**/ 'air'.

These are subject to the derivations in (15).

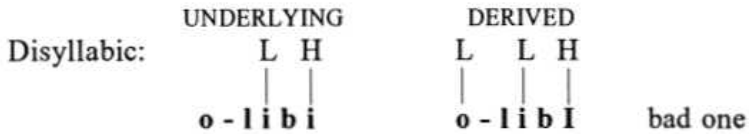
(15)



The middle representation for each word results from prefix tone polarization, while the rightmost is due to the additional application of H-Spread (which must spread a H tone all the way to the rightmost syllable of a word, presumably by iterative application). In contrast to the case with monomoraic-stemmed words like /**ga-dɪ**/, however, the final L does not simply disappear; rather, it causes a following H-toned word to be downstepped. Thus, for example, /**m-pini gu-du**/ 'ten rings' is pronounced as [**m̀píní ꜜgúdú**]. (/**m**/ is the plural noun class prefix corresponding to the singular prefix /**ga**/.[11]) Moreover, these final L tones are pronounced overtly in pre-pausal position, in that the L tone shows up as part of a falling tone on the final syllable. Thus, if Snider's approach is to be maintained, it is necessary to ensure that the displaced L tone of the stem is deleted just in case the stem is monomoraic.

In addition to stems with the underlying melodies L and H, Snider posits two additional stem types, with LH and HL melodies. An example of the LH pattern is given in (16).

(16)



The derivation of this form is straightforward, involving only the assignment, due to the principle of prefix tone polarization, of a L tone to the prefix. (Recall that, as

11 This plural prefix is always realized as a syllabic nasal consonant homorganic to the initial consonant of the stem. It may therefore be treated as underlyingly unspecified for place features; to avoid a proliferation of symbols, however, its underlying form will consistently be represented as equivalent to its (assimilated) surface form, i.e., /**m**/ with labial-initial stems, /**ŋ**/ with velar-initial stems, etc.

this principle is expressed informally in the quotation from Snider given above, a prefix will receive a L tone if a H tone appears anywhere in the tonal melody of the stem.)

Snider also posits LH stems in which the H is floating. In contrast to the 'fully-linked' LH pattern in (16), which occurs only with minimally disyllabic stems, the LH pattern in which the H is floating occurs with stems of all sizes as in (17).[12]

(17)

	UNDERLYING	DERIVED	
Monosyllabic, Monomoraic:	L H ɔ - tɔ	L L H ɔ - tɔ	stomach
Monosyllabic, Bimoraic:	L H gɪ - jaŋ	L L H gɪ - jaŋ	shed
Disyllabic:	L H gɪ - pɪrɪ	L L H gɪ - pɪrɪ	desire

The analysis of these forms is a bit more abstract, in that the posited H tone in the stem melody never shows up on the surface. This tone must be assumed to be present underlyingly, however, since in Snider's analysis (which relies on prefix tone polarization) there is no way to generate a L prefix tone without positing a H tone somewhere in the stem melody. Since there is no evidence that floating H tones ever play a role in the language, we may assume that a final unassociated H is simply deleted at some point. The resulting all-L pattern is rare, as noted previously.

It remains to consider the final underlying stem melody posited by Snider, HL. Examples of stems belonging to this class are given in (18).

(18)

	UNDERLYING	DERIVED	
Disyllabic:	H L a - sunɔ	L H L a - sunɔ	seven
Monosyllabic, Bimoraic:	HL ɔ - pɪɪ	L HL ɔ - pɪɪ	tail
Monosyllabic, Monomoraic:	?	?	

The derivations of these examples are once again straightforward, involving only assignment of L tone to the prefix by polarization, and a single application of H-Spread. The final floating L tones are not deleted, but cause a following H tone to be downstepped. In pre-pausal position, these L tones result in a falling contour on the final syllable. (Snider does not discuss the actual mechanism by which these pre-pausal falling contours are created; presumably this would be accomplished by a late rule which docks a floating L tone that occurs at the end of a phonological phrase to a preceding H-toned mora.

The absence of monosyllabic, monomoraic stems with an underlying HL melody is expected, since the result of applying Snider's rules to such a form would be indistinguishable from the surface pattern of a monomoraic stem with a simple H

12 Snider does not actually discuss any cases where the LH melody occurs with CV stems, and it is not clear whether he would wish to analyze a stem like /tɔ/ 'stomach' as having an underlying LH melody, as in this article. The author has taken the liberty of doing so because it leads to the correct surface result and seems consistent with his overall framework. Disyllabic forms with this melody, e.g., /pɪrɪ/ 'desire', are also not directly analyzed by Snider, although he mentions them briefly in a footnote and suggests that they have "a floating H somewhere in the melody that triggers the realization of L on the prefix".

melody. Thus a hypothetical stem /**ta**/ with a HL melody would be subject to the derivation in (19), using /**ga**/ as the noun class prefix.

(19)
```
        H L        L   H L
        |          |   |
g a - t a   →   g a - t a
```

Since there is reason to believe that floating L's are deleted following monomoraic stems (cf. the derivation of [**gádí**] 'village' in (14)), this must presumably be converted to the derivation in (20).

(20)
```
      L   H
      |   |
g a - t a
```

But the tonal pattern of this form is exactly identical to the pattern derived for the monomoraic H-toned stem /**bwu**/ 'goat' in (13b). Hence the absence of a distinctive underling HL pattern on monomoraic stems does not by itself constitute a serious problem for Snider's analysis.

This section concludes with a table summarizing the underlying stem melodies which Snider's analysis posits for each of the commonly attested surface patterns given previously in (10)–(12) (H_f represents a floating H tone):

(21) Monomoraic Stems:

	SURFACE	UNDERLYING STEM	EXAMPLE	
a.	H prefix, H stem	L	**gá-dí**	village
b.	L prefix, H stem	H	**gà-bwí**	goat

(22) Monosyllabic, Bimoraic Stems:

	SURFACE	UNDERLYING STEM	EXAMPLE	
a.	H prefix, HL stem	L	**á-fúù**	wind
b.	L prefix, H stem	H	**ɔ̀-číí**	woman
c.	L prefix, HL stem	HL	**ɔ̀-pîì**	tail

(23) Disyllabic, Bimoraic Stems:

	SURFACE	UNDERLYING STEM	EXAMPLE	
a.	H prefix, HL stem	L	**gá-pínî**	ring
b.	L prefix, H stem	H	**ɔ̀-wólí**	book
c.	L prefix, HL stem	HL	**à-súnɔ̂**	seven
d.	L prefix, LH stem	LH	**ò-lìbí**	bad one

4. SOME PROBLEMS WITH SNIDER'S ANALYSIS

It will be apparent from the preceding discussion that Snider's analysis accounts for a great deal. In particular, it offers a solution to the seemingly intractable problem of accounting for the surface tones of the noun class prefixes. As presented thus far, however, the analysis has been largely informal. Since Snider was primarily concerned with reconstructing the tonal system of Proto-Guang nouns rather than giving detailed synchronic analyses of individual Guang languages, it is entirely natural that he did not concern himself with the detailed formal mechanisms by which the processes he posited were to be carried out. In order to achieve the present aim of providing a rigorous analysis of present-day nominal tone in Nawuri, however, an explicit formal statement of the relevant tonal processes must be given.

In attempting to incorporate Snider's insights into a formal account, two questions immediately arise. First, there is the question of how to formalize the prefix tone polarization process. This is an issue because current theoretical frameworks generally do not allow polarization processes to be formalized using an α variable mechanism. While early frameworks such as Chomsky and Halle (1968) freely employed this

device, it is generally rejected by current theories in the interest of restrictiveness, since the additional generative power which it makes available does not seem to be required.

Attempting to formalize the rule so as to assign the prefix a L tone before a H, HL, or LH stem melody without using the α device is also problematic. Consider for example the possible formulation in (24).

(24) Ø → L (L) H
μ
noun

Clear cases of long-distance rules of this sort, in which a rule must be able to apply to a target that is separated from its trigger by an intervening segment on the same tier are not widely attested. Consequently, there has been a growing tendency in more recent theoretical work (cf. Steriade 1987) to restrict the power of phonological rules by requiring that triggers and targets be adjacent in some well-defined sense.

As an alternative to (24), another possibility would be to suppose that all prefixes are lexically listed with a L tone preceded by a floating H tone, as in (25).

(25) H L
g a

In cases where the stem melody is L, the floating H will spread rightward onto the prefix vowel by a rule which might be formalized as in (26).

(26) H L L
μ μ
noun

Before any stem with a melody other than L, the structural description of this rule will not be met, with the result that the prefix surfaces with L tone. This is essentially the approach proposed by Snider for Chumburung.[13]

While this analysis correctly derives the principle of prefix tone polarization, it does so at a cost. The rule it employs is rather complex and unnatural, in that it crucially refers to the presence of exactly two L tones. The final word boundary, moreover, is included solely to prevent the rule from applying in cases where the stem melody is LH, i.e., it is a means of allowing the rule to make use of information which is not strictly local. Hence, this analysis is actually open to the same theoretical objections against "long-distance rules" which apply to the analysis using (24).

A second problem encountered in giving formal expression to Snider's approach concerns the asymmetry in the behavior of stems with underlying L melodies, in that the displaced L surfaces only if the stem contains more than one mora. While it might be possible to formulate a rule to delete a floating L just in case the stem consists of a single mora only, a stipulative solution of this sort does not explain anything.

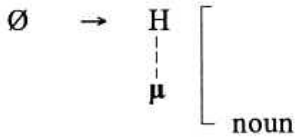
In the following section, a modified version of Snider's analysis will be proposed that makes crucial use of the assumption that L tones are underlyingly unspecified (cf. Pulleyblank 1986). By making this assumption, it will be possible to overcome the problem in formalizing prefix tone assignment and at the same time provide a simple explanation for the correlation between the presence of a final floating L tone and the number of moras in the stem.

13 Snider implies that the rule which spreads a floating H onto a prefix may be combined with the same H-Spread rule that spreads a H tone from a prefix onto a stem (as in (14)). It does not seem to me that this is actually possible, however, since the conditions which govern spreading of the floating H onto the prefix, as expressed in (26), are much more restrictive.

5. AN ALTERNATIVE ANALYSIS

First the task of accounting for the surface tones of the noun class prefixes must be dealt with, adopting as a point of departure Snider's insight that the prefix tone is L if and only if a H tone appears in the stem melody. The problem will be to formalize this 'tone polarization' process in a way that is consistent both with the empirical data and with recent theoretical developments. In place of a single polarization rule, an analysis will be adopted in which the polarization effect is actually the consequence of several different mechanisms. To begin with, a general rule inserting a H tone on a noun class prefix is posited as shown in (27).

(27) Prefix Tone Assignment (lexical)



This rule will correctly account for the appearance of a H-toned prefix before stems with the underlying melody L, as in (14) and (15). Prefix Tone Assignment must not be allowed to apply before stems with Snider's H, LH, or HL melodies, however, since the prefixes which precede these stems do not surface with H tones. It is suggested that the failure of Prefix Tone Assignment to apply to stems with the simple melody H is due to the Obligatory Contour Principle (OCP) (Goldsmith 1976, McCarthy 1986), which prohibits the occurrence of adjacent identical tones within the same word. The OCP will block the application of Prefix Tone Assignment to stems like **/bwu/** 'goat' (cf. (13b)) which have an underlying H melody, as well as those for which Snider posits an underlying HL melody, as in (18). It is assumed that the L tones which eventually surface on the prefixes attached to these stems are assigned by default as in (28).

(28) Default L-Assignment
Assign L tone to a toneless mora.

Taking this a step further (following for example Pulleyblank's (1986) treatment of Tonga), it is proposed that all L tones are underlyingly unspecified in Nawuri and are filled in by Default L-Assignment. For now, we may assume that this takes place at the beginning of the postlexical component, although it will be necessary to modify this assumption later.

It is assumed that, rather than inserting a new L tone for each toneless mora, Default L-Assignment will only insert a new L when there is no existing L to which a toneless mora could be linked. Thus the result of applying Default L-Assignment to a representation like (29) will be (30) rather than (31).

(29) **a t a**

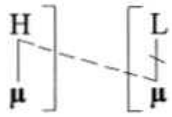
(30)


(31)


This interpretation of Default L-Assignment will yield representations which are consistent with the OCP.

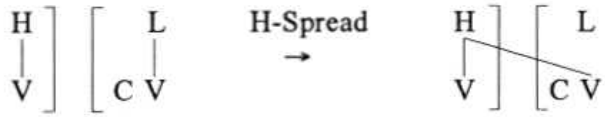
Following Snider, a rule of H-Spread is posited which applies across a word or morpheme boundary. This rule is formalized in (32).

(32) H-Spread (lexical and postlexical)

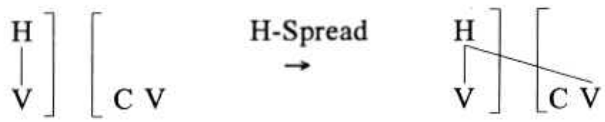


In accordance with the interpretation of spreading and delinking rules proposed in Kiparsky (1985:98), it is assumed that the spreading and delinking operations are independent, in the sense that spreading will still apply even where delinking is inapplicable. Thus H-Spread will apply both when a H-toned mora is followed by a L-toned mora, as in (33a), and when a H-toned mora is followed by a toneless mora, as in (33b).

(33) a.



b.



The situation in (33a) is the one which may arise postlexically, after Default L-Assignment, as in (34).

(34)

black cow (cf. (7b))

The situation in (33b), on the other hand, arises before Default L-Assignment has had a chance to apply.

In place of Snider's distinction between underlying L, H, LH, and HL melodies, the present analysis predicts the possible classes of underlying stem melodies in (35)–(37), assuming that only H tones are present underlyingly and that these must be linked.

(35) Monomoraic stems:

a. C V (= L)

b.

(= H)

(36) Monosyllabic, Bimoraic stems:

a. C V V (= L)

b.

(= H)

c.

(= LH)

d.

(= HL)

(37) Disyllabic, Bimoraic stems:

a. C V C V (= L)

b.

(= H)

c. 

(= LH)

d. 

(= HL)

Given the assumption that Nawuri tonal representations are subject to the OCP, these representations exhaust the logical possibilities for mono- and bimoraic stems.

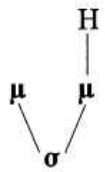
Since, in this analysis, the H, LH, and HL stem classes all have the same simple melody H (differing only in where this melody is attached), we correctly predict that prefixes attached to all four of these classes, including the formerly problematic LH class, will fail to undergo Prefix Tone Assignment (due to the blocking effect of the OCP) and will therefore surface with L tones by default.

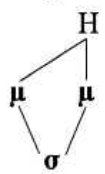
Of the ten possible underlying configurations in (35)–(37), only nine lead to well-formed surface representations. The problematic underlying pattern is (36c). After Default L-Assignment to the first stem mora, this would surface as in (38).

(38) 

This is ill-formed because, as noted previously, rising contours do not occur on nouns in Nawuri. In order to rule out underlying representations like (36e), therefore, the constraint in (39) is posited.

(39)

if: 

then: 

The nine remaining possible configurations in (35)–(37) yield exactly the nine commonly attested surface tonal patterns illustrated previously in §2. Specifically, derivations are given to show that the correspondence of underlying to surface representations is as follows (using X to represent an arbitrary noun class prefix) in (40)–(42).

(40) Monosyllabic, Monomoraic stems:

	UNDERLYING	SURFACE, UTT. FINAL	SURFACE, NON-FINAL	EXAMPLe
		H	(same)	**gá-dí** (10a)
a.	X-CV	 X-CV		
	H	L H	(same)	**gà-bwí** (10b)
b.	 X-CV	 X-CV		

(41) Monosyllabic, Bimoraic stems:

	UNDERLYING	SURFACE, UTT. FINAL	SURFACE, NON-FINAL	EXAMPLE
		H L	H L	**á-fúù** (11a)
a.	X-CVV	X-CVV	X-CVV	
	H	L H	(same)	**ɔ̀-číí** (11b)
b.	X-CVV	X-CVV		
	H	L H L	L HL	**ɔ̀-pîî** (11c)
c.	X-CVV	X-CVV	X-CVV	

(42) Disyllabic, Bimoraic stems:

	UNDERLYING	SURFACE, UTT. FINAL	SURFACE, NON-FINAL	EXAMPLE
		H L	H L	**gá-pínî** (12a)
a.	X-CVCV	X-CVCV	X-CVCV	
	H	L H	(same)	**ɔ̀-wɷ́lí** (12b)
b.	X-CVCV	X-CVCV		
	H	L H L	L H L	**à-súnɔ̂** (12c)
c.	X-CVCV	X-CVCV	X-CVCV	
	H	L H	(same)	**ò-lìbí** (12d)
d.	X-CVCV	X-CVCV		

Consider first the case of nouns which surface with a H prefix, as in the (a) examples in (40)–(42). In Snider's analysis the stem melody was underlyingly L; in the present approach, these stems are simply entered in the lexicon with no tonal melodies at all. Prefix Tone Assignment will first apply to assign a H tone to the prefixes of these forms, giving the representations in (43).

(43)

a. H
X - C V

b. H
X - C V V

c. H
X - C V C V

The lexical application of H-Spread will convert these to the representations in (44).

(44)

a. H
X - C V

b. H
X - C V V

c.

At the beginning of the postlexical component, Default L-Assignment will apply to the forms in (44b) and (44c), deriving the representations in (45).

(45) a.

(from 44b)

b.

(from 44c)

It will not, however, be able apply to (44a), since every mora of this form is already associated to a H tone. No other rules are applicable to (44a), which is in fact the correct surface output.

There is an obvious problem here with the disyllabic form in (45b), which does not correspond to the desired output for this pattern, which should be (in non-final position) as in (46) (cf. 42a).

(46)

Note that, as formulated in (32), H-Spread applies only across word or morpheme boundaries; the postlexical application of H-Spread will therefore be unable to affect (45b). This might seem to suggest that H-Spread should be reformulated so as to apply within as well as across morpheme or word boundaries, in which case the postlexical application of this rule would succeed in converting (45b) to (46).

While this approach would work in the case of forms like (45b), however, there are several reasons why it is not tenable in general. First, consider toneless stems which consist of more than two moras, for example **/lembiri/** 'black', which surfaces with all L tones in its isolation (adjectival) form. When this stem takes the singular noun class prefix **/gi/**, forming a noun meaning 'black object', the H tone of the prefix (which arises from Prefix Tone Assignment) spreads all the way to the rightmost mora of the word, yielding **[gílémbírî]**. A single postlexical application of H-Spread (revised to apply within as well as across boundaries) could not derive this form, but would spread only as far as the second stem mora, yielding ***[gílémbìrì]** as shown in (47).

(47) **g i - l e m b i r i** Underlying Form

by Prefix Tone Assoc.

by lexical H-Spread

by Default L-Assignment

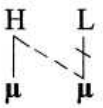
by postlexical H-Spread

Note moreover that we could not get around this problem simply by making the postlexical application of H-Spread iterative, since its application across word boundaries clearly is not iterative (cf. (6)).

There is a further reason for not allowing H-Spread to apply where the trigger and target are not separated by a boundary. Under most current theories, postlexical rules are not allowed to have lexically conditioned exceptions, e.g. particular words to which they idiosyncratically fail to apply. There are however a number of Nawuri words in which a L-toned syllable immediately follows a H-toned syllable within the stem. Some of these are loans, e.g. **[kúlàà]** 'jug' (from English 'cooler'), **[péénì]** 'pen', although quite a few appear to be native, e.g. **[gì-ɲìŋírìbòtoo]** 'millipede'. If postlexical H-Spread were allowed to apply within words, we would be unable to explain why these particular lexical items failed to undergo it.[14]

An obvious alternative solution is to posit a second, iterative H-spreading rule that applies lexically at the word-level (cf. Kiparsky 1985) as in (48).

(48) Word-level H-Spread (iterative, lexical)



If we allow this rule to apply after Default L-Assignment (revising an earlier assumption that Default L-Assignment applies at the beginning of the postlexical component and requiring it to apply prior to the word-level of the lexical component), it will derive (46) from (45b). (46) is in fact the correct surface output in non-pre-pausal position. In this environment, the final L tone does not surface, although it will cause a following H tone to be downstepped. In isolation or at the end of an utterance, however, the final L tone is manifested overtly as part of a falling tone on the final syllable. To account for this, an additional rule of L-Docking is posited in (49).

(49) L-Docking

This rule will convert (46) to the surface form (50) utterance finally.

(50)

This analysis will also allow us to correctly derive **[gílémbírî]**, as seen in (51).

(51) **g i - l e m b i r i** Underlying Form

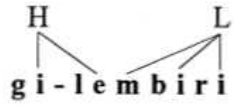
H

g i - l e m b i r i by Prefix Tone Assign.

H

g i - l e m b i r i by lexical H-Spread

14 A quick count uncovered 33 (out of a total of approximately 975) nouns in the author's lexical file which contained stem-internal HL sequences in successive syllables. At least 11 of these (and probably more) are loanwords, mostly from English.



by Default L-Assignment

by Word-level H-Spread

by L-Docking (in pre-pausal position only)

Exceptional forms like **[kúlàà]** need not present a problem for this analysis, as we may simply mark them as exceptions to Word-level H-Spread. Since this is a lexical rule, it is entirely expected that it should have exceptions.

What might detract from the appeal of this analysis is the fact that Word-level H-Spread is so similar in its effect to the original H-Spread rule, making it seem that the two should be regarded as a single process. There are however three pieces of evidence that suggest that two separate processes are actually involved. First, as already noted, there are a number of exceptions to Word-level H-Spread. Across both prefix-stem and word boundaries, on the other hand, H-Spread is always exceptionless. There are absolutely no CV-CV words, for example, in which the prefix is H and the stem is L. Second, the related North Guang languages Krachi and Gichode displayH-Spread across word and prefix-stem boundaries, just as in Nawuri, but lack Word-level H-Spread altogether. Finally, Word-level H-Spread, but not the original H-Spread, is restricted to certain categories of words, primarily nouns formed from nominal or adjective roots. Verbal nouns, formed by combining the singular noun class prefix **/gi/** with a verb root, are not subject to Word-level H-Spread for example. Thus a L-toned verb like **/fuli/** 'singe' undergoes only H-Spread when **/gi/** is prefixed to it, surfacing as **[gí-fúlì]** rather than ***[gí-fúlî]**.

The derivations of all three lengths of underlyingly toneless stems are summarized for convenience in (52).

(52)

CV stem	CVV stem	CVCV stem	
X - C V	X - C V V	X - C V C V	Underlying
H | X - C V	H | X - C V V	H | X - C V C V	by Prefix Tone Assignment
H ⌜⌟ X - C V	H ⌜⌟ X - C V V	H ⌜⌟ X - C V C V	by H-Spread
---	H L ⌜⌟ | X - C V V	H L ⌜⌟ | X - C V C V	by Default L-Assignment
---	H L ⌜⌟ X - C V V	H L ⌜⌟ X - C V C V	by Word-level H-Spread
---	H L ⌜⌟ X - C V V	H L ⌜⌟ X - C V C V	by L-Docking (in pre-pausal position only)

Note that, in contrast to Snider's analysis, the present analysis provides a ready explanation for why a final L shows up with bimoraic but not monomoraic stems of this tonal class. This asymmetric behavior is a consequence of two principles: 1) L

tones are not present underlyingly but are assigned only to free moras by default, and 2) after H-Spread has applied, only the bimoraic stems have a free mora remaining to which a default L could be assigned.

The form of the final contour which results in the middle (CVV stem) representation in (52) may appear somewhat suspicious, in that the H and L tones are not evenly distributed over the syllable, i.e., the L is linked only to the final mora, whereas the H is linked to both moras. Note moreover that this representation differs from that of falling contours derived through postlexical H-Spread across word boundaries, as in (34) (repeated here as (53)), even though there does not seem to be any discernible difference in the way these two contour representations are pronounced.

(53) 

black cow (cf. (7b))

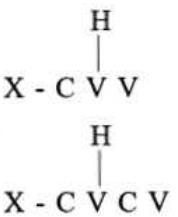
While this state of affairs may not seem entirely satisfactory, it is not clear that it should be ruled out. Hyman (1988) has argued that cases of 'phonetic overlapping', in which distinct phonological representations receive identical phonetic interpretations, must be recognized in some languages. A fuller resolution of this issue will not be attempted in this article, but it will be simply noted that, in the worst case, it might be necessary to adopt an additional rule to convert the suspicious contour representation to the more conventional one in (54).

(54) 

Consider next the (b) forms in (40)–(42), which correspond to Snider's underlying stem melody H. The derivation in each of these cases is trivial. Prefix Tone Assignment is blocked by the OCP. Since there are no toneless stem moras to which H-Spread could apply, the only process that takes place is the assignment of a default L to the prefix, yielding the correct surface forms.

The case of (42d), corresponding to Snider's underlying melody LH, is equally straightforward. Here again, Prefix Tone Assignment is blocked by the OCP, and the only rule which can apply is Default L-Assignment, which supplies a L tone to both the prefix and the first mora of the stem.

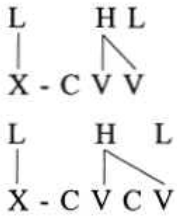
Remaining to be accounted for are the configurations in (41c) and (42c), which have the melody HL in Snider's analysis. Initially, these will be represented as in (55).

(55) 

Prefix Tone Assignment is blocked by the OCP. Lexical H-Spread is inapplicable, since it is restricted to apply across boundaries. At the beginning of the word-level, the toneless moras receive L tones by default as in (56).

(56) 

Word-level H-Spread will then apply next to yield the forms in (57).

(57) 

These are the correct surface representations in non-pre-pausal position. Utterance-finally, the final L of these words surfaces as part of a falling contour on the final syllable (cf. **[ìpíí ꜜgúdú]** 'ten tails', **[ìpîi]** 'tails'). This is accounted for by the application of L-Docking, which converts the representations in (57) to the ones in (58) pre-pausally.

(58) 

6. EXCEPTIONAL TONAL PATTERNS

In addition to the common surface tonal patterns described in §2, there are two other patterns that occur with prefixed nouns more rarely. The first is a pattern in which both prefix and stem are L-toned, as in (59).

(59) Monomoraic stems:

ɔ̀-tɔ̀	stomach
gì-pɔ̀	fontanel
Monosyllabic, bimoraic stems:	
ɔ̀-dɔ̀ɔ̀	trap
gì-jàŋ̀	shed
Disyllabic, bimoraic stems:	
gì-pìrì	desire
gà-yèŋà	pole

This all-L pattern is displayed by only 3 out of 45 prefixed monomoraic stems, 5 out of 96 prefixed monosyllabic, bimoraic stems, and 3 out of approximately 50 prefixed disyllabic, bimoraic stems in this data.

The all-L pattern can be readily accommodated under the present analysis simply by assuming that the stems are underlyingly toneless, and that these words are marked as exceptions to Prefix Tone Assignment. As a consequence, both prefix and stem moras will surface with L tone by default.

The second exceptional pattern, which occurs with bimoraic stems, is one in which both prefix and stem are entirely H-toned. (As stated in §2, this same pattern also occurs with monomoraic stems, with which it is quite common.) Examples are given in (60).

(60) Monosyllabic, bimoraic stems:

ɔ́-sɔ́ŋ̀	smell
gí-fúú	fear
Disyllabic, bimoraic stems:	
ɔ́-bɔ́lí	neck

This all-H pattern is limited to just 3 out of 96 prefixed monosyllabic, bimoraic stems and 1 out of approximately 50 prefixed disyllabic, bimoraic stems.

These examples might be treated either as H-stemmed nouns which exceptionally take H prefixes (either in violation of the OCP, or by lexically restricted rule that spreads the stem H leftward onto the prefix from the stem), or as L-stemmed nouns which exceptionally undergo spreading of the H prefix to both stem moras prior to Default L-Assignment (perhaps due to an additional, lexically restricted rule). A decision between these alternatives will not be attempted in this article.

7. NOUNS WITH LONGER STEMS

When we look at stems which contain more than two moras, a much greater variety of surface tonal patterns arises. While an exhaustive description of these would be beyond the scope of this paper, the examples in (61) give some idea of the kind of diversity which exists.

(61)	a.	**gì-báá-kpáŋ̀**	shoulder
	b.	**gì-bààfə̀ŋ̀**	half
	c.	**ò-jì-kìŋ̀**	mudfish
	d.	**gà-bwíí ꜜbí**	bird
	e.	**gà-pìléé-pí ꜜléé**	firefly
	f.	**gì-bàm̀-bàǹ-téè**	bird wing
	g.	**gì-bàǹsə́rə́ə̀**	multistory building
	h.	**gì-dámbírásâ**	goodness
	i.	**ɔ̀-sə́lá-pə̂**	person who carries
	j.	**gì-lìjìmá**	conversation
	k.	**gì-wɔ́rɔ́ ꜜtí**	calf (of leg)
	l.	**gí-ŋ̀ásáŋ̀**	proverb
	m.	**gí-fúfúlî**	white one
	n.	**gí-lémbírî**	black one

Many longer stems are morphologically complex, having undergone reduplication (cf. (61f)), compounding (e.g., (61c), which is apparently a compound of the roots **/ji/** 'eat' and **/kuŋ/** 'fish'), or derivational suffixation (e.g., (61i), which is derived from the verb **/sɔla/** 'carry' by the addition of an agentive suffix **/pɔ/**).

Setting aside the patterns with stem-internal downstep (which will presumably require the lexical specification of a floating L, forcing a slight retreat from the position that all L tones are lexically unspecified in Nawuri), the tonal patterns displayed in these examples can all be generated under the present analysis, given a suitable choice of underlying tonal melody. The examples with H-toned prefixes will be underlyingly toneless, as will the all-L words in (61b,c). (These latter two forms must also be marked as exceptions to Prefix Tone Assignment.) The remaining stems will all have an underlying H tone lexically associated with one or more syllables, e.g., the underlying form of (61f) will be **/gɪ-bam-ban-tɛɛ/**. Certain questions remain: in particular, the processes of reduplication and compounding require further investigation. There do not, however, seem to be any obvious obstacles to applying this analysis to longer stems.

8. CONCLUSION

I have argued for an analysis of Nawuri nominal tone in which the various surface tonal patterns are derived from underlying melodies in which only H tone is specified, L tone being supplied later by default. While some stems are underlyingly toneless, others possess a single H tone lexically linked to one or more moras of the stem. Through the operation of a number of rules and constraints, the underlying tonal

linkages interact in interesting ways with the overall segmental shape of the stems, giving rise to some striking asymmetries in the resulting surface tonal patterns.

My analysis is heavily indebted to the work of Snider, relying crucially on a number of his insights, especially with regard to the tonal behavior of prefixes. It departs most significantly from Snider's analysis in not specifying L tone underlyingly. It is argued that this analysis leads to two main advantages. First, it allows for a straightforward formalization of the mechanism for assigning tone to noun class prefixes: a single general rule assigns a H tone to a prefix. This rule will successfully apply before toneless stems, but will be blocked in the case of other stems, since its application would yield a sequence of adjacent H's within the same word, in violation of the OCP. Second, it resolves an unexplained asymmetry in Snider's account in the behavior of monomoraic L stems as compared with longer stems with the same underlying melody, in that the hypothesized L of the stem shows surface effects only in the case of the longer stems. In the analysis proposed, this asymmetry falls out as a consequence of the fact that only the longer stems (which are underlyingly toneless) ever receive a L tone by default: monomoraic toneless stems have no toneless mora remaining after the lexical application of H-Spread, and hence never receive a default L tone.

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