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# VERBAL INFLECTION IN KWAWU AKAN*

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Morphological processes in Kwawu are argued to be governed by a condition which states that words are morphologically analyzable only in terms of properties of the head of the word. The head of an affixed word is the most external affix. Certain rules apply only to bare stems and not to words with affixes. A verb formed by reanalyzing adjacent verbs as a single morphological word is accessible to these rules if its head is a stem; non-head roots in the reanalyzed verb are inaccessible to all morphological rules, as predicted.

## 0. Introduction

In this paper I discuss some aspects of the verb inflection system of Kwawu (Akan), a Kwa language of Ghana. I shall be particularly concerned with the conditions under which a given rule may apply to a word to attach an affix to it. I believe that the correct analysis of much of these phenomena can shed light on the theory of morphology, especially regarding constraints on morphological rules.

In section 1, the theoretical assumptions that will serve as the starting point of the discussion are set forth; in section 2, most of the inflectional categories, and the rules that derive them, are discussed; section 3 discusses a set of inflectional phenomena which arise in serial verb constructions; and section 4 discusses some aspects of the derivational morphology of nouns, adjectives, and verbs in Kwawu.

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*Akan is a Kwa language spoken in Ghana. The current work is based on the speech of Mr. Yaw Agyakwa of Los Angeles. I am especially indebted to Paul Schachter and my fellow students in his Field Methods course given at UCLA in Winter and Spring, 1987, which gave rise to the work reported on here.

## 1. Theoretical Background

1.1. Word-headedness. I assume a particular theory of morphology that relies crucially on the notion "head of a word" in the following sense: the head of a morphologically complex word is the morpheme, or formative, that carries all of the information about that word that is accessible to rules. In other words, at any point in the derivation, a word is a pair consisting of its phonological form and its head. The statement of a rule can make reference only to features of heads of words, never to features contained exclusively in formatives that are not heads. We refer to this constraint as the Head Convention (HC):

> *Head Convention (HC)*: Morphological analysis refers only to properties of words [Grimshaw 1986:747], and properties of a word are just the properties of the head of that word.

It is necessary to have an explicit way of determing what the head of the word is. I assume, following Williams [1981] and Grimshaw [1986], that the head of a word at a given point in the derivation is the affix or formative which was most recently applied to the word.

For example, the morphological properties of the Kwawu word nkyére[1] 'not catch' are just those of its head, which in this case is the negative prefix N- . If a subsequent rule attaches another prefix to this word, that prefix will become the head. For example, the progressive prefix ré- is the head of rényére 'isn't catching'.

Of course, properties of stems or affixes can be inherited from previous heads by affixes applied subsequently. In the preceding example, the word n-kyére is still a verb, for example, with all of the lexical properties of kyére 'catch'.

However, as will be seen below, reference to certain aspects of the

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[1]Kwawu data is given in standard (Akan) orthography. Where necessary, they are accompanied by a broad phonetic transcription. In addition, tones are transcribed as follows: ´ = high, ` = low; sentence initial syllables that have no mark are low; otherwise unmarked syllables indicate no change from the immediately preceding syllable; downstep is marked as a high tone following a high tone.

structure of words is excluded in principle from morphological analysis. These fall into two basic types: first, properties of parts of a word which are never heads, and could never be inherited, since they are never properties of the word. This will be relevant to a rule that combines whole words to make a complex word.

The second type of property that cannot be inherited by affixes are merely stipulated as such. The analysis of Kwawu verb inflection, for example, requires us to postulate that "*stemhood*" is such a property: a word that contains an affix is never a stem.[2]

In fact, the notion "stem" is an interesting one in this light. In this paper, it is suggested (although not thoroughly argued) that the property of being a stem is relevant only for inflectional morphology and not for derivational operations. This is proposed as a solution to a paradox concerning reduplication.

It is worth noting how the HC differs from similar theories, e.g. Lieber's [1980] theory of feature percolation. In that theory, features of affixes take precedence over features of roots when determining which features percolate to the combined form. In most cases, the HC has the same result, since we are assuming that affixes are the head of affix + root combinations. However, by separating the notion "head" from that of "affix", we are able to make predictions for cases where a complex word contains no affixes, e.g. where it consists of two roots. Indeed, this is crucial to our analysis of adjacent verb series in section 3.

1.2. Rule ordering. Two other theoretical assumptions should be mentioned. The first is that morphological rules are explicitly ordered. It may be the case that certain rules are disjunctively ordered, following work such as Anderson [1982]. This will turn out to be of little consequence for the analysis proposed here, in part because much of the work that might have been done by disjunctively ordering rules has been taken up by the HC.

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[2]Ideally, this should follow from the definition of stem; however, this goes beyond the scope of this paper.

The second assumption concerns the distinction between derivational and inflectional processes. Following Anderson [1982], I assume that derivational processes operate in the lexicon and are not sensitive to syntactic information. Inflectional processes are post-lexical and are (or at least can be) sensitive to syntactic environment. This distinction will be crucial in the discussion of the relation between stemhood and reduplication, which I take to be a derivational process in Kwawu.

## 2. Verbal Affixation in Kwawu

In this section I will present the basic facts about verbal inflection in Kwawu, along with their analysis in terms of the word-headedness theory.

2.1. Basic tone. Verbs in Kwawu all have a basic lexical tone pattern which is predictable from the phonological structure of the word. The tone pattern that we refer to as basic is the pattern that shows up in the present (habitual) tense in non-negative sentences. This is one of the forms that have no (apparent) affixes; the others are the imperative and the stative. As we shall see, however, these (which have low tone) are best described as deriving from an underlying form with high tone.

Monosyllabic verb stems have as their basic pattern a high (H) tone, and most disyllabic stems have LH. For ease of exposition, I will refer to these two classes of verbs as Class 1 and Class 2, respectively. I will assume that the basic tone is assigned to verbs in the lexicon, according to the following rule:

(1) $\emptyset \rightarrow$ H (|) / $[_{V}(\sigma)\ \sigma\ \ldots]$

That is, H is associated with the second syllable of the stem, if there are more than one, otherwise with the first. This rule applies in the lexicon to all verbs,[3] whether active or stative. Furthermore, assume that L is

[3]Possible exceptions are irregular verbs, especially verbs that never inflect, e.g. de (usually glossed as 'take'), which always has low tone, except in certain embedded environments, in which case all verbs get high tone on the first syllable.

assigned (in the lexicon) to syllables that are not specified as H. Thus, Class 2 verb stems are LH, and monosyllabic stems are H.

There is, however, a class of disyllabic verb stems which have a basic tone pattern of HH, which I will call Class 3 verbs. Clearly, rule (1) is not sufficient. These verbs can be accommodated by (1) with some additional assumptions. First of all, it is significant that all such verbs are of the form $CV_irV_i$ or $CV_inV_i$ :[4] the vowel of the second syllable is always identical to the vowel of the first, and the second consonant is always [+sonorant,+coronal]. Therefore, we can assume that rule (2) applies in the lexicon after (1), with the result that (1) correctly assigns H to the first syllable of Class 3 verbs:

(2) $\emptyset \rightarrow V \; / \; \begin{bmatrix} +son \\ +cor \end{bmatrix} \_\_\_ \; \#$

For this analysis, it is also necessary to assume that the (high) tone of the syllable copied by (2) is copied along with the vowel. A sample derivation of the Class 3 verb stem hóro 'wash' is given in (3):

(3)

| | | | |
|---|---|---|---|
| | | H | |
| | | \| | by rule (1) |
| /hor/ | → | hor | |
| H | | H | |
| \| | | /\ | by rule (2) |
| hor | → | horo | |

The basic tone of a verb is assigned in the lexicon completely independent of any lexical features (such as active or stative), based only on syllable count. Morphological rules that change the tone of verbs (discussed in section 2.2) do just that: they alter the previously existing tone pattern, usually by deleting tones. The alternative would be for these rules to assign tones to unspecified forms and then to assign the basic pattern to the remaining unspecified forms at the end of the derivation. This alterna-

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[4]Stems of the form CVN may also be in this class. For discussion of the disyllabic status of CVN forms in Kwawu, see Dolphyne [1987] and Bat-El [1988].

tive is unworkable, as will be shown at the end of section 2.

2.2. Verb inflection. I will assume, following Anderson [1982], that inflectional formatives, or morphemes, are introduced by rule rather than being drawn from the lexicon and inserted in a phrase-marker. Nothing crucial in this analysis depends on this assumption, but I believe it makes it easier to describe the distribution of certain formatives.

2.2.1. Affixes. *Negative*: All verbs, whether active or stative, inflect for negation in the same way, with a low tone nasal prefix. The rule for this is given in (4):

(4) [+V,+negative] → Ǹ + V

*Optative*: The rule that introduces the optative prefix is given in (5). Optative is taken to be [-indicative,-imperative].

(5) [+V,-indicative,-imperative,-negative] → Ń + V

The optative rule cannot apply to verbs that are inflected for negation; negative optative verbs in Kwawu have only one nasal prefix, which has low tone, indicating that it is the negative prefix.

*Future and Progressive*: In non-negative simple sentences, future tense is marked by a verbal prefix bɛ́- , and progressive aspect by the prefix re- . In negative contexts, this distinction is neutralized. This is illustrated in (6):

(6) kofí re- ǹ- kɔ́ kùmáse 'Kofi will not go to Kumase' or
K. FUT/PR-NEG-go Kumase 'Kofi is not going to Kumase'

In non-negative serial constructions, the prefixes bɛ́- and re- show up only on the main (first)[5] verb of the construction. The following verb(s) have a different prefix a- , called the consecutive prefix. We can write a set of disjunctively ordered rules to introduce these formatives as in (7),[6]

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[5]These prefixes appear on the first verb of a verb series unless that verb is uninflectable de 'take', in which case they appear on the second verb.

[6]This is only for the sake of exposition. I do not wish to rule out a syntactic analysis for the distribution of these affixes, for example.

where [+FUT/PR] is the feature shared by future and progressive forms:

(7) i. [+V,+FUT/PR,-NEG,-PROG] → bɛ́ + V / main verb
ii. [+V,+FUT/PR,-NEG] → re + V / main verb
iii. [+V,+FUT/PR] → ré + V / main verb
iv. [+V,+FUT/PR,-NEG] → a + V

In negative contexts, the consecutive prefix does not show up, either, as (8) demonstrates:

(8) a. kofí bɛ- yɛ àdwúma a- má yàw
K. FUT-do work CONS-give Y.
'Kofi will work for Yaw'

b. kofí re- ǹ- yɛ́ àdwúma (*a-) m̀- má yàw
K. FUT/PR-NEG-do work (CONS-) NEG-give Y.
'Kofi will not work for Yaw'

Thus the consecutive prefix, like the optative prefix, cannot cooccur with the negative prefix.

Note that other inflectional affixes (such as the negative prefix in (8b)) usually show up on all verbs in a serial construction. Indeed, it is a property of serial constructions in Kwawu that the verbs in a construction share all features for tense/aspect, mood, and negation.

*Other affixes*: The perfect prefix is a- , which is homophonous with the consecutive prefix. However, it is clearly a distinct affix, since it does cooccur with the negative prefix, as shown in (9):

(9) a. kofí a- ǹ- kɔ́ kùmáse
K. PERF-NEG-go Kumase
'Kofi didn't go to Kumase'[7]

[7]The negative perfect in Kwawu is semantically simple past, whereas the negative past is semantically perfective. I have no explanation for this "switching" effect, but I do not think that it is a morphological effect per se. In other words, the forms given in (9) are *formally* perfect rather than past, and since we are concerned with the formal properties of inflection, we will ignore the strange semantic effect.

b. kofí a- ǹ- yɛ́ àdwúma *(a-) m̀- má yàw
K. PERF-NEG-do work (PERF-) NEG-give Y.
'Kofi didn't work for Yaw'

*Past tense*: The simple past tense in Kwawu is marked by three different things, only two of which will concern us here. When a verb in the past tense is S-final, it has an extra suffix, -ɛ , in addition to the other affixes, which are described below. This suffix will be of no concern to us here, although it will show up in some examples.

Of the two that will be discussed, one is a tone-changing rule and will be discussed in section 2.2.2. The other is a suffix consisting of a lengthening of the final segment of the verb stem, e.g. kɔ́ 'go' becomes kɔɔ 'went', furá 'put on' becomes furáà 'put on (past)', hóro 'wash' becomes horoo 'washed', etc. The added segment has low tone. We can write a rule for this as in (10):

(10) [+V,+past] → V + x̀ where x is a slot on the CV tier

This suffix is crucial to the discussion in section 3.

2.2.2. Tone changing rules. There are three morphological rules in Kwawu whose sole effect is to make the tone of the verb stem low. These apply to stative, imperative, and past tense forms. Since we are assuming that the basic tone of a verb is assigned in the lexicon, these rules must delete high tones associated with verb stems.

The past tense tone rule applies only to Class 1 and 3 verbs, i.e. to verbs whose initial tone is H . This rule is given in (11):

(11) H → Ø / [+V,+past]
|
[$_{V}$σ ...]

Rule (11) deletes H only if it is linked to the first syllable of the verb. This provision correctly excludes Class 2 (basic disyllabic) verb stems from undergoing this rule. The correct past tense form of bisá 'ask' is bisáà , not *bisaa .

The tone-changing rules for stative and imperative verbs are given in

(12):

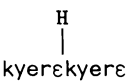
(12) a. H → Ø / [+V,+imperative]

b. H → Ø / [+V,-active]

In each case, any H linked to the verb stem is deleted regardless of which syllable it is linked to. These rules differ in this respect from the past tense tone changing rule (11). It is necessary to state the rules in this way because the stative and imperative forms of all verbs are all low, whereas the past tense tone change does not apply to Class 2 verbs.

Nor can it be the case that the rules in (12) delete highs that are linked to final syllables. The reduplicated form of a Class 2 verb such as kyerɛ́ 'show' has a basic tone pattern of LHLL, i.e. kyerɛ́kyèrɛ 'teach'. This follows from rule (1), which assigns basic tone to all verbs, along with one additional assumption, viz. that reduplication applies before (1). The reduplicated verb, kyerɛkyerɛ , is assigned H linked to the second syllable, as in (13):

(13)




by rule (1)

All remaining unspecified syllables get linked to L . This must occur in the lexicon and before the application of (2) (since (2) was assumed to copy tones). This derives the correct tone pattern:

(14)


This class of verbs (reduplicated dissyllabic verbs) is not exempt from (12a), as demonstrated in (15):

(15) a. bɪsabɪsa 'ask around!'
ask:around-IMP

b. *bɪsábɪ̀sa

c. kyerɛkyerɛ no 'teach him!'
teach-IMP him

d. *kyerékyèrɛ no

Thus it appears that rule (12a), and probably (12b) as well, are correct as given.

The interesting thing about rules (11) and (12a,b) is that they do not apply to verbs which have the negative prefix. Example (16) shows this for the past tense, (17) for the stative, and (18) for the imperative:

(16) a. yaw hu -u no 'Yaw saw him'
Y. see-PAST him

b. yaw n- hú -ù no 'Yaw hasn't seen him' (see fn. 7)
Y. NEG-see-PAST him

(17) a. kofí hyè atadéɛ 'Kofi is wearing an *atade*'
K. wear-STAT

b. kofí ǹ- hyé àtadéɛ 'Kofi is not wearing an *atade*'
K. NEG-wear-STAT

(18) a. twa dúa no 'cut the wood!'
cut-IMP wood DEF

b. n- twá dúa no 'don't cut the wood!'
NEG-cut-IMP wood DEF

c. kyekyere no 'tie him up!'
tie:up-IMP him

d. n- kyekyérè no 'don't tie him up!'
NEG-tie:up-IMP him

These "affixes" join the consecutive and prefixes in the class of formatives that cannot cooccur with the negative prefix. However, unlike the consecutive and optative prefixation rules, the inability of the tone changing rules to cooccur with the negative affix will be attributed to the HC.

2.3. Stemhood.

2.3.1. The analysis. As indicated above, the analysis of rules which cannot cooccur with the negative prefix involves the HC. In order to appeal to the HC to derive these facts, it must be the case either that the words these rules cannot apply to lack some property which is necessary for the application of the rules or that they have some property which is incompatible with

the application of these rules. In order for a word to have or lack a property, its head must have or lack that property by the HC. Since the rules in question do apply to bare stems, but not to verbs which have the negative prefix, the problem must be with the prefix, which is the head of the words at the point in the derivation where the rule tries to apply.

It could be, for example, that these rules all have the property of not being able to apply to words that are [+negative]. As it turns out, however, the solution has nothing to do with negation *per se*. It so happens that the negative affix is usually the one that prevents these rules from applying because it is one of the few affixes that is attached before these rules apply. But other affixes also block the application of these rules.

For example, the aspectual prefixes bɛ- (not to be confused with the future tense prefix bɛ́- ) and kɔ- , referred to by Christaller [1875] as the "ingressive" prefixes, also block the application of the imperative rule, as (19) demonstrates:

(19) a. tɔ ɔkráman 'buy a dog!'
buy-IMP dog

b. bɛ-tɔ́ ɔkráman 'come buy a dog!'
BE-buy dog

c. tɔn ɔkráman 'sell a dog!'
sell-IMP dog

d. kɔ-tɔ̀n̄ ɔkráman 'go sell a dog!'
KO-sell dog

We have already seen (in (15) and the accompanying discussion) that the rule that changes the tone of the imperative does not care what syllable the H that it deletes is linked to. Therefore, there must be something morphological that blocks the application of rule (12a) in (19).

The ingressive affixes look a great deal like the verbs bá 'come' and kɔ́ 'go' and are translated into English as these, but these cannot be analyzed as independent stems, since verbs with an ingressive prefix behave morphologically like one verb, taking only one affix between them. Observe the contrast in (20), where (a) has a verb with the prefix kɔ- and one nega-

tive prefix, and (b) has a true serial construction and two negative prefixes:

(20) a. kofí n- kɔ̀- dá
K. NEG-KO-sleep-STAT
'Kofi should[8] not go to sleep'

b. yaw n- ká ǹ- kyerɛ́ kòfí sɛ̀ɛ̀ afúa ho yɛ fɛ̀
Y. NEG-say NEG-show K. that A. body do beauty
'Yaw doesn't tell Kofi that Afua is beautiful'

Moreover, as Paul Schachter [p.c.] has pointed out, there are genuine serial constructions with ingressive meaning using bá and kɔ́ as the first verb. These often cooccur with verbs with ingressive prefixes, as in (21):

(21) kofí kɔ kɔ̀- dá 'Kofi goes to sleep'
K. go KO-sleep

Therefore, these must be genuine affixes. I conclude that in (19) the imperative tone change is blocked because of the affix on the verb.

Similarly, the tone change of the stative is blocked if there are any other affixes on the verb. Consider, for example, the sentences in (22), which contain examples of stative verbs which are inflected for future tense or optative mood:

(22) a. kwasí yɛ̀ tíkyà 'Kwasi is a teacher'
K. be-STAT teacher

b. *kwasí yɛ tikyà
K. do teacher

c. kwasí bɛ- yɛ tikyà 'Kwasi will be a teacher'
K. FUT-be teacher

d. *kwasí bɛ-yɛ̀ tíkyà

e. kwasí n- yɛ tikyà 'Kwasi should be a teacher'
K. OPT-be teacher

f. *kwasí n-yɛ̀ tíkyà

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[8]This sentence was actually elicited as negative optative, but as noted above, this form is syncretic with the simple present negative.

Examples (22a) and (22b) show that only the stative form of the verb is acceptable in this configuration. Nevertheless, in (22c) and (22e), the verb stem has high tone rather than the low tone usually associated with the stative. Apparently this rule, too, is blocked by the presence of an affix.

Why should the presence of an affix prevent these rules from applying? It seems that they can only apply to bare stems, i.e. verbs that have no affixes. I assume, then, that this is indeed the case: the rules must be stated so as to apply only if the (head of the) word is a stem.[9] We can rewrite (11) as (11'), and (12) as (12'):

(11') $\overset{|}{H} \rightarrow \emptyset$ / $[_{V}{}^{\sigma}$ ...] [+V,+past. +stem]

(12') a. H → Ø / [+V,+imperative,+stem]

b. H → Ø / [+V,-active,+stem]

If the word has an affix at the point in the derivation when these rules apply, then the affix, rather than the stem, is the head of the word, and the rules cannot apply. This follows from the HC. It is no doubt not a coincidence that all of the rules in Kwawu that have this property are rules that delete tones rather than add an affix. I have no explanation as to why that should be the case, however.

2.3.2. A remark on basic tone insertion. This analysis also provides an argument for the assumption made at the beginning of section 2, viz. that the basic tone pattern of verbs is assigned in the lexicon and the tone-changing rules alter the existing tone pattern. The alternative would be for these rules to insert L in the appropriate place on a stem which is unspecified for tone. At the end of the derivation, the basic tone is assigned (by inserting H and linking it to the appropriate syllable) to stems that have not yet been specified for tone. It turns out that the domain of this rule would be (a) the verbs which have remained bare stems, i.e. present habitual forms, and (b) just those verb stems which are *not* heads of words. (a) and

[9]But see note 2.

(b) form a rather unnatural class, I think.

In contrast, the assumption that basic tone is inserted lexically and then changed in some environments allows us to state all the rules affecting the tones of verbs in uniform ways, so that they apply to natural classes, as it were.

## 3. Adjacent Verb Series (AVS)

In this section I will discuss a problem in the inflectional system of Kwawu and propose a solution which makes use of the HC. I believe that the theory of word-headedness provides an elegant solution to the problem, whereas other analyses seem ad hoc and unsatisfying. I will discuss what I think is the best alternative analysis at the end of this section and demonstrate its shortcomings.

3.1. The problem. In most cases, except where noted, serialization does not directly affect verbal inflection. Verbs in a series apparently always share all tense/aspect and mood features, with a few alternations specific to main verbs (usually the first member of the series), and they always agree in polarity. This is true, for example, in (23):

(23) kofí kà- a asém kyèré-è yaw
K. say-PAST thing show-PAST Y.
'Kofi told Yaw something'

Each verb shows the expected past tense marking. Ká 'say' is a Class 1 verb, so it has a lengthened final segment and low tone throughout the stem in this tense; kyeré 'show' is a Class 2 verb, so it gets only the final lengthening.

However, if the two verbs in (23) were adjacent, as in (24), then only the second one would get past tense marking. The first one gets neither the final lengthening nor the low tone on the stem. This I will refer to as the Adjacency effect.

(24) kofí ka kyèré-è yaw sɛ̀ɛ̀ ...
K. say-Ø show-PAST Y. that ...
'Kofi told Yaw that ...'

This contrast only appears in the past tense. In (25), the same two

verbs are in the perfect. In (25a) they are adjacent, in (25b) they are not:

(25) a. kofí a- ká a- kyèré yàw sɛ́ɛ̀ ...
K. PERF-say PERF-show Y. that ...
'Kofi has told Yaw that ...'

b. kofí a- ká asɛ́m a- kyèré yàw
K. PERF-say thing PERF-show Y.
'Kofi has told Yaw something'

The explanation of the Adjacency effect is the subject of section 3.2.

3.2. The analysis. The basic form of the analysis of the Adjacency effect described in the preceding section is to assume that at some level of the derivation adjacent serial verbs combine to form a single complex verb, so that affixation rules apply to the combination as a whole, rather than to each part. First, however, it will be instructive to see how a more straightforward analysis might handle these facts.

The observable differences between the past tense form in (24) and what is expected, i.e. the form in (23), are two: (i) the past tense suffix (lengthening) is missing from the first verb ká , and (ii) ká has high tone, even though it is monosyllabic and should get low tone in the past tense. The most straightforward account of this is to write rules that (i) delete the final vowel of ká , and (ii) insert a high tone. These rules would have to be stated so as to apply just to the past tense, which could be handled by assuming that suffixes are deleted or long segments shortened, and they must also apply only if the following word is a verb. Thus, it must take into account both morphological and phonologocial information.

The most unattractive aspect of this approach, however, is that it does not explain anything. If it turns out that there are other effects associated with this structure, the approach outlined above would have to say that this is a coincidence, i.e. that the two effects are independent and unrelated. In fact, it says just that about the two parts of the effect noted: the loss of the lengthened segment and the high tone on the first verb. It leaves unexplained why these two things cooccur.

Instead we will seek an explanation that ties these facts together and al-

lows for the possibility that other observable effects will follow from the same explanation. Suppose, then, there is a rule that reanalyzes members of an adjacent verb series as a single complex word, as in (26):

(26) AVS Reanalysis

$$V_1 - V_2 \rightarrow [_V V_1 + V_2]$$

This rule applies to verbs that are string adjacent without reference to, or effect on, the syntax. The output is a single verb made up of the adjacent verbs of a serial construction. Since the effect of this rule only shows up in the past tense, it is necessary to assume either that it applies only to verbs in the past tense or that it applies before the past tense inflection rules but after the other inflectional rules.

The latter is definitely preferable, since it does not require the mention of a particular feature in the statement of the rule. In fact, we can find evidence that this approach is correct. In the past negative, the effect of rule (26) is apparent, in that the past tense inflection is missing from the first verb of the combination, but each verb has a negative prefix, as in (27):

(27) yaw n- ká n- kyèré-è kofí séè ...
Y. NEG-say-Ø NEG-show-PAST K. that
'Yaw has not told Kofi that ...'

This is explained by the assumption that (26) applies after certain inflectional affixation rules, but before the past tense rules. The rule that attaches the negative prefix applies first, affecting both verbs; then AVS REANALYSIS applies, making the sequence n-ká n-kyèré a single word to which the past tense inflection rules apply just once.

In fact, (26) follows all of the inflectional rules discussed so far except for the two rules for past tense inflection (10, 11').

Since the reanalyzed verbs are a single word when the past tense rules apply, they can only apply to the whole construction once. For rule (10), which adds a segment to the end of the word, this is straightforward: a single segmental slot is added to the right edge of the complex word, as in (28):

(28) $[_{V}$ka + kyerɛ] + ɛ

For rule (11'), which deletes a high tone on the stem of a verb in the past tense, matters are slightly more complex. In AVS constructions, this happens only on the rightmost member of the series if that verb is Class 1 or 3 (initial high tone):

(29) kofí pu gù- uɛ[10] 'Kofi spat it out'
K. spit-Ø drip-PAST

The initial verb of this series, pú , not only lacks the additional segment of the past tense suffix, but it has high tone rather than low. To account for this, we need a way of referring to the rightmost verb in the reanalyzed construction.

Here is where the HC comes in. I propose (the head of) $V_2$ is the head of the reanalyzed verb in (26). Thus, in (29), the head of $[_{V}$pu gu] is gu after rule (26) has applied. This word ([pu+gu]) now has the property that its head (gu) is a stem. Consequently, rule (11), which applies only to stems, can apply to it. Rule (11') cannot apply to pu , however, since it is not the head of anything.

3.3. Another post-reanalysis rule. There is a morphological rule that applies to Class 3 verbs (the underlyingly monosyllabic verbs that become dissyllabic) and to reduplicated Class 3 verbs, but to no other class of verb. That rule is the subject of this section.

Consider the sentences in (30):

(30) a. ɔ- bɛ́- kyerè kofí 'he will catch Kofi'
3sg.-FUT-catch K.

b. ɔ-bɛ́-kyerè twúm̀ 'he will catch Twum'

c. ɔ-bɛ́-kyere da biara 'he will catch everyday'

d. ɔ-bɛ́-kyerè dá biara 'he will catch it everyday'

[10]The extra -ɛ in this case shows up on all verbs in the past tense that are clause final. It is in addition to the final segment lengthening that always shows up. See section 2.2.1.

In sentences (30a), (30b), and (30d), the final tone on the verb is low whereas in sentence (30c) the final tone is high. The verb is the same in each case and in the same tense, the only difference being that in (30a), (30b), and (30d), but not in (30c), the verb is followed by a noun phrase object, whether overt or empty. The pair (30a) and (30b) shows that the presence of the final L is not sensitive to the initial tone of the NP; pair (30b) and (30c) shows that it is sensitive to whether or not the verb has an NP object; and the pair (30c) and (30d) shows that this holds even if the object is null (inanimate, unemphatic object pronouns are almost always null in Kwawu).

This alternation only appears in Class 3 verbs (and their reduplicated forms) in non-suffixed tenses where the basic tone is preserved, i.e. present, future, progressive, and perfect tenses of active verbs. In all other tenses, Class 3 verbs end in low tone anyway.

Now suppose, for concreteness, that this alternation is triggered by a morphological feature related to the verb's ability to assign Case to an NP.[11] Let us call this feature [+Case]. The rule accounting for the alternation is given in (31):

(31) [+V,+Case] → V + L (low tone)

Class 3 verbs (and their reduplicated forms) have the unique property that their basic tone pattern consists of H linked to two syllables. We can assume, then, that the floating L inserted by (31) is allowed to link up to the syllable to its left only if that syllable is linked to an H that is also linked to another syllable. In this way, the fact that this alternation shows up only on Class 3 verbs is accounted for in terms of the phonological representation of the verb.

Recall that in section 3.2, AVS Reanalysis was claimed to apply to adjacent verbs in all tenses, even though the overt alternation usually only showed up in the past tense. If this is the case, then it ought to apply to

[11]In fact, nothing depends on this assumption. I choose this feature merely because it relates the rule to the presence of NP.

the adjacent verbs in (32a), where the verbs are in the present tense. Furthermore, the first verb in the sequence is a (reduplicated form of a) Class 3 verb and hence should show the alternation described by (31). The expected final low tone is present in (32b) and (32c) but absent in (32a), where the verbs are adjacent:

(32) a. yaw kyekyére bɔ duá ho
Y. tie:up hit tree outside
'Yaw ties it up to a tree'

b. yaw kyekyérè no bɔ́ duá ho
Y. tie:up him hit tree outside
'Yaw ties him up to a tree'

c. yaw kyekyérè
Y. tie:up
'Yaw ties it up'

The absence of the expected low tone on the final syllable of kyekyére in (32a) is explained by the Head Convention under the analysis proposed here, assuming that rule (31) applies after AVS Reanalysis. Since kyekyere and bɔ are adjacent, they are subject to AVS Reanalysis and are a single complex verb at the point where rule (31) applies. But only properties of heads of words are visible to morphological rules, and kyekyere is not the head of this construction, bɔ is. Hence, the feature [+Case] is not visible to the rule, since they are not features of the head, therefore the rule cannot apply.

Since this rule also seems to be sensitive to whether serial verbs are adjacent or not and can be explained in terms of the analysis proposed in section 3.2, it provides independent evidence in favor of that analysis and hence in favor of the theory of word-headedness adopted here.

3.4. An alternative analysis. In this section I will discuss a plausible alternative analysis of the Adjacency effect, and then present arguments against it.

3.4.1. The analysis. In section 3.2, we tried to account for the fact, among others, that when serial verbs in the past tense are adjacent, only the right-

most member of the sequence gets inflected, while all the other members showed their basic tone pattern, e.g. the pattern associated with the present tense. But it is conceivable that the unexpected high tone on ka in (24), repeated below, is due not to a lack of inflection, but rather to a high tone inserted between the verbs:

(24) kofí ka kyèré-è yaw sέè ...
K. say-Ø show-PAST Y. that ...
'Kofi told Yaw that ...'

If this is the case, then all that needs to be accounted for in (24) is the absence of the final lengthening on ka . Suppose, then, that this is also triggered by the inserted floating H in the following manner: assume that the added segment (the past tense suffix), which is always associated with low tone, deletes when followed by a floating H , allowing the H to associate with the preceding syllable, i.e. the final syllable of the stem.

Where does the floating high tone come from? Suppose that in any serial construction, no matter whether the verbs are adjacent or what the tense is, a floating H is inserted before the second verb as a sort of connective morpheme. Some independent evidence for this position is taken from sentences like (33):

(33) a. yaw de nó kyèré kòfí 'Yaw shows him to Kofi'
Y. take him show K.

b. me- tɔ- ɔé tòn- nɛ 'I bought and sold it'
1sg-buy-PAST sell-PAST

In (33a), the object pronoun nó has high tone whereas object pronouns in general have low tone, as in (34):

(34) yaw fá nò 'Yaw takes him'
Y. take him

Similarly, in (33b), the final -ɛ of tɔɔé 'bought' is high, though this form is usually low, as it is in tɔnnɛ 'sold'. This hypothesis proposes that since pronouns have no lexical tone ( L being a default tone), a floating H before kyeré associates with the pronoun, making it high. The reason it does not happen in (34) is because this is not a serial construc-

tion, and hence there is no connective floating H . The presence of this floating H could also be used to account for the lack of final syllable lowering illustrated in (32a) above.

In summary, the presence of a floating high tone before any non-initial member of a verb series is responsible for (i) the deletion of the past tense suffix and (ii) the presence of a high tone on the final syllable of a preceding adjacent verb. These phenomena are handled, it is claimed, without recourse to a rule that combines adjacent verbs into a complex verb.

3.4.2. Problems with the analysis. The problems with this analysis are basically two: (i) when a broader range of data is considered, the analysis of the association of the floating H needs to be complicated; (ii) it is unable to account for exceptional cases.

First, consider the case of Class 3 verbs in non-final position in a sequence of adjacent verbs, illustrated in (32a), repeated here:

(32) a. yaw kyekyére bɔ duá ho
Y. tie:up-Ø hit tree outside
'Yaw ties it up to a tree'

In this case, the last two syllables of the first verb have high tone, not just the last one. Hence, there is a single high tone linked to two syllables. There is now a problem, and that concerns the tone lowering rule discussed in section 3.3. If this rule applies to any tense in which these verbs normally end in high tone, as suggested above, then what prevents it from applying in (32a)? On the other hand, if the rule of final syllable lowering specifies that it cannot apply in the past tense, then that would entail a complication of that rule.

I think that the problem with Class 3 verbs is actually a relatively minor problem, since these verbs have been argued to derive from underlying monosyllabic forms.

Far more troublesome is the exceptional behavior of the serializing verb de , often glossed as 'take'. When this verb is the initial member of a sequence of adjacent verbs in whatever tense, it has low tone, which is its ba-

sic tone pattern.[12] This is illustrated in (35):

(35) a. yaw de ma- a kofí
Y. take give-PAST K.
'Yaw gave it to Kofi'

b. kofí dè kyekyére bɔ̀- ɔ dúa no ho
K. take tie:up-Ø hit-PAST tree DEF outside
'Kofi tied it up to the tree with it'

According to the hypothesis under consideration, de should have high tone in this environment, since it precedes a floating high tone, which precedes the following verb. One way to handle this would be to say that for whatever reason, de is an exception: verbs following de do not have a floating H connective immediately preceding them. However, it was precisely in this environment, i.e. after de , that the evidence for the high tone was claimed to have been found, as in (33). Either de is not an exception, in which case (35) is unexplained, or a high tone on an object pronoun occurring between serial verbs is not related to the tone changes associated with the Adjacency effect.

The first alternative is unacceptable: if there is independent evidence at all for the connective high tone, it comes from constructions with de (recall (33)). The second alternative, as we shall see, is arguably the correct conclusion.

The distribution of object pronouns with high tone is not entirely traceable to serialization and is quite clearly a fact about pronouns to the exclusion of lexical NP's. Consider the sentences in (36) and (37):

(36) a. yaw de nó kyèré kòfí 'Yaw shows him to Kofi'
Y. take him show K.

b. yaw de ago má kòfí 'Yaw gives velvet to Kofi'
Y. take velvet give K.

(37) a. kofí pu nò gú 'Kofi spits him out'
K. spit him drip

b. kofí pù- u nó gù- uɛ 'Kofi spat him out'
K. spit-PAST him drip-PAST

[12]The so-called secondary tone environment is an exception to this: de , like all other verbs, has high tone on the first or only syllable in certain

In (36a), an object pronoun gets high tone, but in (36b), a noun with lexical low tone retains its normal tone pattern in the same position. In (37a) the object pronoun gets low tone after pú 'spit', which has high tone, even though it is a serial construction. This contrasts with (37b), where the pronoun again gets high tone after low tone puu 'spat'. This suggests that, at the very least, whether an object pronoun gets high tone depends on the form of the verb that precedes it.

Although the precise distribution of high tone object pronouns is not clear, it is apparent that it is not part of the same phenomenon as the Adjacency effect. The presence of a floating high tone connective may ultimately be the explanation of the fugitive high tone pronouns and the high tone suffix -ɛ , but this cannot explain the behavior of adjacent verb series.

3.5. Rule order. We have argued that a rule of AVS Reanalysis is necessary to account for certain alternations in past tense inflection, as well as for other alternations. It was claimed that this rule preceded the rules of past tense inflection but followed most other inflectional rules. The order of the rules described here, insofar as this is not stated explicitly in the text, is given in (38). Rules mentioned in the same line indicate that there is no evidence to suggest that one is ordered before another.

(38) i. Ingressive prefixation
ii. Negative pref. (4); Optative pref. (5)
iii. Imperative tone change (12'a); FUT/PR rules (7); Perfect pref.
iv. Stative tone change (12'b)
v. AVS Reanalysis
vi. Past tense tone change (11')
vii. Past tense suff. (10)
viii. Class 3 transitivity rule (31)

It is assumed that all the rules mentioned in (38) are inflectional, i.e. post-lexical. Some of the consequences of this are discussed in the next section.

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subordinate clauses. It is of course an interesting question as to why de , which never shows any inflection, apparently does show this alternation. Nevertheless, this is arguably an independent issue.

## 4. Related Areas

In this section, I discuss two related areas of Kwawu morphology that are of interest to the theory adopted here. One is the status of the Head Convention with respect to derivational morphology in nominal elements, and the other concerns a particular problem posed for the analysis by reduplicated verbs, which I also take to be derivationally complex.

4.1. Nominal suffixes. Words of category [+N] can take certain prefixes, which often distinguish between singular and plural. There are four such prefixes: ɛ- , ɔ- , a- , and N- . The first two are always singular and alternate with one of the other two in the plural. The last two can be singular or plural; if a noun takes a- in the singular, it could take either a- or N- in the plural; if it takes N- in the singular, it takes N- in the plural. Which prefixes a noun takes is a lexical (and largely idiosyncratic) property of the noun.

Often, when a noun is formed by attaching the [+human] suffixes -ni (sg.) or -fo (pl.) to a noun, the resulting word takes ɔ- as its singular prefix and a- as its plural prefix, e.g. kyerɛkyerɛ 'teaching', ɔ-kyerɛkyerɛ́ni 'teacher', a-kyerɛkyerɛ́fo 'teachers'.

This holds even if the noun root that the suffix attaches to takes different prefixes. For example, a-buro (sg.) m-buro (pl.) 'corn', becomes ɔ-buro-ni (sg.) a-buro-fo (pl.), literally 'corn person(s)', but used to mean 'European(s)'. This fact follows from the Head Convention, since the suffix is the head of the word and consequently the properties of the suffix are the properties of the word. The relevant properties of -ni/-fo are that they take the prefixes ɔ- and a- . That is, whatever feature(s) of nominal elements are associated with this set of prefixes is an inherent property of the -ni/-fo suffix and therefore a property of a word that has one of these suffixes as its head.

There are some apparent exceptions to this generalization. Specifically, many place names that take a- as their prefix in both the singular and plural forms do so also when they appear with the derivational suffixes -ni or -fo , e.g. asánte 'Asante (adj; sg. or pl.)', asante-nǐ , asante-fó 'Asan-

te person(s)'. The expected singular form ɔsante-ní also occurs, but the existence of the forms with a- poses a problem for the Head Convention.

I suggest that the form asante has become reanalyzed in these cases as a single morpheme without a prefix. One might wonder, then, why other prefixes have not become reanalyzed as well. There are two possible explanations for this. First, the prefixes ɔ- and ɛ- are always singular; any noun or adjective that takes either of these in the singular takes either a- or N- in the plural. Therefore, these are more transparently prefixes since they always show alternation for number.

The second possible explanation has to do with the morpheme structure constraints of Kwawu. Root morphemes cannot have either /ɔ/ or /ɛ/ as their first segment. Arguably, /a/ can be root-initial. There are function words in Kwawu that begin with /a/ , where it is apparently not a prefix, e.g. áà (relative clause complementizer). There are also other words where initial /a/ looks like a prefix but behaves in a way that is unexpected of prefixes, e.g. asé 'under (N)'. Although this looks like a prefix, it can occur internal to compounds, for example in kumáse (name of a city, but lit. 'under the *kum* tree'). This is unexpected if these prefixes are inflectional and therefore not attached in the lexicon. Therefore it is not surprising that /a/ has been reanalyzed in some cases, but /ɔ/ and /ɛ/ have not.

4.2. Reduplication. Verb reduplication in Kwawu is a productive process. Class 1 and 3 verbs reduplicate by copying the initial syllable to the left of the root. The vowel in the copied syllable is always [+high], but agrees in roundness with the original vowel. For example, twá 'cut' reduplicates as twitwá 'cut to pieces'; bóro [bɔrɔ] 'get drunk' becomes bobóro [bɔbɔrɔ] 'get drunk (dist.)'.

Class 2 verbs reduplicate by total reduplication, with no change in the vowels. For example, bisá 'ask' becomes bisábìsa 'ask around'; kyeré 'show' becomes kyerékyèrɛ 'teach'.

For all verbs, the reduplicated forms are subject to the tone assignment rule (1): all reduplicated verbs have low tone on the first syllable and high on the second syllable; reduplicated forms of Class 3 verbs have high on

the third syllable, as expected (see section 2.1). Since this rule was argued to apply in the lexicon and since it must follow reduplication, it follows that reduplication applies in the lexicon, as well. By the division adopted in section 1, this means that it is a derivational process.

This makes sense, since the meaning of the reduplicated form, though related, is not entirely predictable from the meaning of the root form. The most usual case, however, is for the reduplicated verb to have a distributive sense, while maintaining the basic sense of the root verb.

It is apparent that reduplication, at least in the case of Class 3 verbs (which is clearly partial reduplication), involves some sort of affixation. More specifically, it is clearly not a case of concatenating two stems.

Recall from section 2 that some rules of verb inflection are sensitive to whether or not the (head of the) word they apply to is a stem. One of these rules changes the tone on verbs in the imperative mood, making them all low. Since reduplication involves affixation, the imperative rule ought not to be applicable to reduplicated forms since reduplication (which is a lexical rule) applies before the inflectional rule of imperative.

However, this is not the case, as shown by (39):

(39) a. kyekyere no 'tie him up!'
tie:up-IMP him

b. bisabisa 'ask around!' (= 15a)
ask:around-IMP

Assuming that the analysis of the imperative rule is correct, (39) poses a serious problem for the Head Convention. Indeed, it appears to be a straightforward counterexample to it.

Notice that it cannot be the case that derivational affixes are not subject to the HC since the derivational suffixes discussed in section 4.1 were shown to act as heads of the nouns they appeared in. Therefore, something else must be at work here. Reduplication has been argued to be a derivational, i.e. lexical, process of word formation. All of the other morphological rules affecting verbs that have been discussed are of the type that are typically thought to be inflectional.

I suggest, then, that the solution to the problem illustrated in (39) is that the notion of stem is undefined for lexical processes. In other words, a derivationally complex word is still a stem so long as it has no inflectional affixes. This corresponds rather neatly with the lexical/post-lexical distinction that is assumed to underly the derivational/inflectional distinction. A stem in this conception is a form that can be inserted into a phrase marker by Lexical Insertion. Derivational rules form words before Lexical Insertion, whereas inflectional rules operate on words that have been inserted into a syntactic representation.

One apparent problem with this approach to which I have no solution to offer is that it makes the rule that accounts for stative morphology inflectional. It follows the rules that attach the negative affix, the future prefix, and the optative prefix. These rules clearly apply to forms bearing features that are taken from the syntactic environment, i.e. tense and aspect features, which are properties of sentences or of verb phrases, and are therefore post-lexical.

One would think, however, that the feature [±active] is a lexical property of verbs, and independent of syntactic configuration. It is therefore odd that the one morphological rule that makes reference to that feature is a post-lexical rule.

## 5. Conclusion

We have discussed several morphological processes in Kwawu, especially in the domain of verbs, in the light of a theory of word-headedness, in particular that of Williams [1981] and Grimshaw [1986]. Whereas a variety of theories incorporating the notion "head of a word" could be envisioned, a theory that incorporates what we have termed the Head Convention has allowed us to make sense of a range of phenomena in Kwawu morphology that would otherwise be mysterious. To the extent that the particular analyses proposed here are valid, they provide evidence in favor of such a theory.

In particular, it was seen that there is a class of inflectional rules in Kwawu that can apply only to bare verb stems or, more precisely, only to verbs whose head is a bare stem. The analysis of verb reduplication leads us to

adopt a particular conception of what a stem is, which relies on the distinction between derivational and inflectional processes being based on a lexical/post-lexical division: a stem is a formative or morpheme that is inserted in a phrase-marker, and to which inflectional rules apply.

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