The Phonology-Syntax interface in Avikam

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Abstract

Very often African languages have been claimed to have tones but no intonation which may be understood as some organization of complex prosodic or breath grouping, beyond the segment. However, recent studies have shown that these languages may have complex prosodic structures. Avikam, an isolate lagoon language of the Kwa cluster spoken in the Ivory Coast, is investigated. The paper argues that Tone Lowering is a well established phonological rule that is constrained both by syntactic and prosodic domains, in a quite intricate way. This interaction points to an interface level between syntax and phonology, which may differ from a mere post-lexical component. Based on the Tone Lowering rule, prosodic domains such as the phonological word, the phonological phrase and the tonal foot are identified. The paper provides evidence that recursion of the prosodic word is a common process similar to that attested in Leben and Ahoua (1997). The paper has implications for the strong version of the Strict layer Hypothesis (Selkirk 1978), for which some weakening may be required.

1. Introduction

The goal of the paper is to describe Avikam complex tonal rules in nominal and verbal constructions and examine their interactions with the prosodic, syntactic and segmental domains and constraints. The interactions between syntactic constituents and phonological constraints provide interface structures that current theories call "the prosodic domains". The latter presumably affect phonological rules and "readjust" the syntactic structures before the phonetic implementation applies (cf. Truckenbrodt (1995, 1999), Leben and Ahoua (1997), Inkelas and Zec (1990), Nespor and Vogel (1986) and Selkirk (1978)).

The paper argues that Tone Lowering is a widely attested phonological constraint in Avikam that may contribute to motivate the distinction between the prosodic word and the phonological phrase with respect to syntactic domains. The prosodic word is argued to be required for the analysis of prefix apheresis and unbounded Low tone spreading. The paper accounts for some exceptions

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to the Tone Lowering Rule generalization by adducing independent evidence from sequences of monosyllabic words. The prosodic word is claimed to have recursive properties. The prosodic phrase on the other hand generally correlates with clauses, and sometimes violate for instance Noun and Adjective and Noun and numeral phrases. The prosodic phrase helps to account for some tonal asymetries between double object constructions and possessive constructions. I then provide evidence that the unbounded Low Tone spreading in disyllabic words is constrained by the tonal foot (cf. Akin and Urua, and Urua 2007 for motivations of the foot). At the syllable level, the Tone Lowering Rule helps to decide whether the surface [**CGV**] syllables are to be analysed as diphthongs or as a sequence of vowels (disyllabic words) (cf. Ahoua and Leben 1999). The paper thus attempts to contribute to the typology of the prosodic domains and hierachy and their interaction with syntax in Kwa languages, using the recursive approach by Leben and Ahoua (1997).

The paper is organised as follows: Firstly, I provide an overview of the location and classification of the language; secondly, I survey the vowel and consonantal system as the latter is involved in the tonal rule conspiracies of the language. The last sections discuss the interaction between tonal rules and domains.

2. Location and classification of Avikam

Avikam is a Kwa language of Côte d'Ivoire located between 5° N. and 6° N. Latitude and 4° and 6° W. Longitude. Genetically the language belongs to the Volta-Congo, a subgroup of Niger Congo languages. Stewart (1989) classified the language as an isolated lagoon language under the Nyo cluster, together with Alladian to which it is closely related. The number of speakers is estimated at about 30,000 speakers spread in thirty villages. The language is spoken along the coastal plain of Grand Lahou and Toukouzou and is bordered in the North by Didas, in the West by Godies, in the East by Ahizis and Alladians and in the South by the Atlantic ocean. A careful investigation of the language together with a group of native speakers who have requested us to prepare a literacy primer for them has revealed at least two different dialects. Apart from the mutual intelligibillity, the phonological differences are minor and seem to be limited to segmental correspondences between labial obstruents and labial glides (cf. The word for 'tree' [**eziba**] vs [**ezuwa**]), alveolar fricatives with palatal ones (cf. [**besi**] 'plantain bananas'vs [**beʃi**]) in some dialects. I also noted the replacement of final high front vowels with high rounded vowels, as well as a few lexical variations.

The language has been little described. Only few major linguistic works have been published on aspects of its phonology and grammar (Kadio-

Morokro (1978), Duponchel (1971), Herault (1982), Rongier (2002)). None of the preceding works has motivated the Tonal Lowering rule in the nominal system, and its complex interactions with other prosodic domains has not been noticed, though valuable work by Herault (1982) provides some brief remarks on some tonal effects in the verbal system.

The present work is the result of several field works in the area of Grand Lahou on the Kpanda dialect throughout the year 1999. The data has been checked together with many informants to ensure the maximum of consistency. It reflects the present stage of the tonal system of the Kpanda dialect. Here is the opportunity of calling the attention of researchers on the risks of working with only one informant because we encountered variations that were often rejected by other native speakers. We also often met disagreements on some details of pronunciation. Tone is the most sensitive area where individual variations may occur. In that respect, only contrastive pairs taken from the lexical inventory of the language and which have been proved to be stable and documented in various distributions were used as reliable heuristic tools.

3. The segmental system of Avikam

3.1 The Consonants

The language has voiced and voiceless series of sonorants and obstruents including lateral and labial approximants. [ʒ] is a contextual variant of /**s**/ when followed by a front high vowel. Avikam has only one labial implosive that Hérault (1982) classifies as a sonorant along with the approximants [**l**],[**j**] and [**w**], an analysis that we adopt in our Figure 1. Its pronunciation is auditively close to that of [**m**] (cf. Ladefoged, 1969: 6) for a similar observation on Ebrie). There is, however, no synchronic alternation between the nasals and the sonorants. Following Herault (1982) who has set up a full class of sonorants by including the series of glides, the present classification is represented as in Figure 1 and is motivated later on the basis of the tonal phonology, an argumentation that is not based on the need to satisfy the principle of pattern congruity and symmetry.

	Labials	alveolars	palatals	velars	labiovelars
stops: voiceless	p	t	C	k	kp
stops: voiced	b	d	ɟ	g	gb
Sonorants	ɓ	l	J	ɣ	w
Nasals	[m]	[n]	[ɲ]	[ŋ]	
Fric: voiceless	f	s			
Fric: voiced	v	z	[ʒ]		

FIGURE 1: The consonant system of Avikam

The segments represented in Figure 1 are all contrastive except the ones in brackets. According to Hérault (1982) all the nasal consonants are distributional variants of the approximants. A similar case has been postulated for Potou languages. The status of [**m**] is less obvious as it may be analysed as a variant of its stop /**b**/ or sonorant /**ɓ**/counterpart. Synchronically, there exist environments where the implosive is realised as nasal [**m**]. However, there exists also a true underlying /m/ as the tonal alternations will show. The latter is opaque to tonal spreading while the surface [**m**] that is derived from /**ɓ**/ is transparent to the same tonal process. Regarding the consonant /**ɓ**/, it should be noted that Avikam belongs to the few Kwa languages that have maintained some older phonological forms of proto-Kwa (cf. Ahoua (2006) for similar data in Tano, a Kwa subgroup).

3. 2. The vowels

According to Hérault (1982:283), Avikam seems to belong to the conservative types of languages of the Kwa group that has the full set of advanced tongue root (**ATR**) and non advanced tongue root (**-ATR**) patterning in lexical items. However, it is crucial to point out that Hérault (1982:262) admits having found no contrast of words containing the (**ATR**) vowels. Lexically, Hérault (1982) observed that retracted High vowels were attested only in some twenty words and in borrowings:

> *"...la langue n'offre pas d'exemples d'opposition des rétractées* [*I*] *et* [ʊ] *ni entre elles ni aux autres. L'antérieure [I] est attestée dans une vingtaine de mots où elle n'est jamais initiale : emprunts parfois (le plus souvent à l'anglais :* bàgɪ, *sac), mots autochtones le plus souvent*

*(*bɔlɪ,*rosée,* asɪsɛ, *joue,*kɪka, *où?, etc...). [ʊ] n'a été relevé que dans une dizaine de mots (...)"*

Following Herault (1982) and Duponchel (1971), we represent the vowel system as follows:

	+ATR		-ATR				+ATR		-ATR	
	oral	nas.	Oral	nas.	Oral	nas.	Oral	nas.	Oral	Nas.
High	i	i̱	ɪ				u	u̱	ʊ	
Mid	e		ɛ	ɛ̱			o		ɔ	ɔ̱
Low					a	a̱				

FIGURE 2 : The vowel system of Avikam

In general, the **ATR** alternations of the type that is attested in most Tano languages are quite limited in Avikam to the domain of Noun phrases (determiners and nouns), and verbal syntagmas (verbs and their clitic pronouns). In addition to Hérault's observation, Avikam uses only some odd thirty archaic words with the **-ATR** high vowels. Regarding nasality, the language has nasal vowels that contrast with oral vowels. The vowels **[e]** and **[o]** never occur following a nasal consonant.

4. The tonal system of Avikam

4.1 The syllable structure

Avikam has at the surface only words with open syllables and maximally two consonants at the onsets. The inventory of the syllables contained in words are: **V, CV, CCV, CVV** that also occur in longer words. Avikam is a language with prefixes attached to words. Monosyllabic **CV** words are thus rare in citation forms. In contexts, however, the prefixes may be dropped under certain prosodic and syntactic conditions . In our analysis, whenever **VCV** words drop their prefixes in context, they would behave as monosyllabic **CV** units . The syllables of the type **CVV** will be phonologically analyzed as vowel sequences because the tonal assimilation rule may affect only one of the two vowels in the **CVV** words. Gliding of the first vowel in such sequences is argued to be just a surface phenomenon (cf. Ahoua and Leben 1999).

4.2 Lexical contrasts

Avikam has two contrastive lexical tones, High and Low. It has also a downstepped High tone. There are no contrastive lexical Mid tones. The language has no contrastive contour tones on monosyllables, though it has, according to Hérault (1982:267), High-Low and Low-High contours on some syllables in initial, medial and final positions. In verbs, contour tones are clearly derived tones. A short glance at the lexicon (as for instance given in Hérault's (1982) Atlas, volume 2) provides minimal pairs of level tones. As mentioned above, **CV** words don't occur in isolation, so the contrastive pairs have all a prefix vowel. Consider the following examples :

(1)	Low-High		High-High	
a.	èsɛ̰	'tomorrow'	èsɛ̰	'fish'
b.	ènɔ̰	'dance'	ènɔ̰	'mouth'
c.	èɲą̰	'animal'	èɲą̰	'flesh'

It should be noted that a High in a Low High sequence as in (1) is not automatically downstepped. The Downstep can be analysed as a floating tone that lowers following High tones but its position is not predictable, though it generally occurs word internally as in (2) :

Downstepped High v. High and Low:

(2)	Downstepped High		High-Low	
a.	ázrá!ɓá	'tongue'	ézîɓà	'tree'
b.	éwą̰!ɓá	'eye'	éŋglúbà	'dance'
c.	éklɔ́!vlî	'head-luggage support'	áwólógà	'animal'
d.	ébró!bú	'coconut'	étrą̀dà	'field'

As we can see in (2) a sequence of H H!H contrasts with a sequence of H H L, where the last High is respectively realized as a Mid in the left row and as a Low in the right row. Across lexical words, tones distinguish sentences such as in (3) and (4):

(3) a. èflúɓà 'a book'
b. è:flùbà 'his book'

(4) a. mà nạ́ làvrí sɛ̀ 'I give Lavri's fish'
b. mà naạ́ làvrí èsɛ́ 'I give Lavri a fish'

One question that may now arise is whether the tones in (3)b. and (4)b. are derived tones and whether they are triggered by a Tone Lowering Rule. The issue is discussed in greater detail in the next section. Let's mention that the contrasts in (3) and (4) have been recognized by Hérault (1982:269) who however fails to generalize the rule to the whole tonal system and to other components of the language :

> *"Dans ce type de syntagme, le déterminé prend le plus souvent une tonalité syntagmatique basse : tel est ici le cas avec èfrúɓá."* Hérault (1982:269)

4.3 Tone Lowering and High tones neutralisation

The Tone Lowering Rule in Avikam is mainly, but not uniquely, motivated in possessive or associative constructions (cf. Williamson 1986) that involve either a possessor noun and a possessed object or a possessive pronoun and its object. It is significant to note that the Lowering rule *neutralizes* the phonetic contrast between a disyllabic lexical word that has respectively a Low and High Tone and a disyllabic lexical word with respectively a High and High Tone. At this point, one may be tempted to informally propose the rule as follows:

(5) **Tone Lowering:**
$H \rightarrow L / \quad X]_{possessor} \; [\_\_\_$

We intend to argue below that rule (5) will be misleading and that the hypothesis of proposing a floating tone better accounts for the associative or possessive constructions, in addition to the fact that we have observed that a floating tone independently exists word internally as in (2) above.

1.1.1 Lowering of monosyllabic words in possessive constructions

Monosyllabic words occur only as non initial constructions and are derived from *VCV* lexical items that lose the initial vowel.The lowering of monosyllabic words is best motivated by lexical *VCV* items that have the High-High tones as the ones with Low-High tones. The examples (6) and (7) illustrate the neutralisation of the underlying High tone, making it phonetically identical to a Low tone. In the following examples '**Lavri**', a proper name, is constructed with respectively a lexical High-High possessed nouns versus a lexical Low-High possessed noun.

(6)

Low-High tones	**Possessive Construction**	
èŋu̱	làvrí ŋu̱	Lavri's hair
èbɔ̱	làvrí bɔ̱	Lavri's hand
èká	làvrí kà	Lavri's place
ègbɛ̱	làvrí gbɛ̱	Lavri's money

In (6) we may be tempted to assume that the deleted lexical Low tone of the prefix is the trigger of the lowering but , as we can see in (7) below, even words that had prefixes with lexical High tones are lowered.

(7)

VCV High-High tones in isolation	**Possessive construction with prefix deletion**	
évé	làvrí vè	Lavri's medicine
écú	làvrí cù	Lavri's sea
ésɛ̱	làvrí sɛ̱	Lavri's fish
ésɔ̱	làvrí sɔ̱	Lavri's house
édɔ̱	làvrí dɔ̱	Lavri's village
évà	làvrí và	Lavri's court
átí	làvrí tì	Lavri's buttock

Although **CCV** words may pattern differently from **CV** words as attested in Kwa languages such as Baule or Krobu, Avikam **CCV** words follow the regular process as the **CV**s. Note that Adiukru, a kwa language geographically close to Avikam, **CCV** syllables are barriers to tonal rules as opposed to **CV**s (cf. Ahoua and Leben 2006).

(8)	**VCCV High-High tones**	**Possessive construction**	
	ézrà	làvrízrà	Lavri's language
	éflé	làvrí flè	Lavri's okra
	ébrá	làvrí brà	Lavri's wooden vessel

In all these examples, the High tone of the possessed **CCV** nouns is realized as a Low tone.

1.1.2 Lowering of disyllabic and trisyllabic words

Within words containing two or three syllables, Tone lowering applies only on the first syllable starting from the left edge.

(9)	**VCV High-High tones**	**Possessive construction**	
	lówú	làvrí lòwú	Lavri's bone
	sáká	làvrí sàká	Lavri's rice
	dámą̀	làvrí dàmą̀	Lavri's cigarette
	ɓásą̀bá	làvrí ɓàsą̀bá	Lavri's boy
	nąɟóbá	làvrí nàɟóbá	Lavri's bird
	ɓásálé	làvrí ɓásálé	Lavri's wife
	císálé	làvrí císálé	Lavri's cloth
	ɓɔ́kùmą̀	làvrí ɓɔ́kùmą̀	Lavri's navel

The rule is straightforward. It applies if a High tone or a sequence of High tones follows a lexical phrase. In an associative or possessive construction, the first High tones become Low, depending on the prosodic structure of the word. Now, we are in a better position to choose to postulate a floating Low tone, let us call it, the *associative tonal morpheme* that may represent a morpheme of the associative marker, a solution that has been often proved useful in Niger-Congo languages (cf. Welmers 1963). The Low tone can be interpreted as 'docking' on the first syllable to its right. In the following section we intend to show that a possessive pronoun

may exist between the possessor and the possessed that is not phonetically realized. At this point, Avikam resembles many other Kwa languages in which a floating low tone occurs in associative constructions and in predicate (subject-verb) constructions, as has been noted in Anyi, Nzema and Akan (Dolphyne 1986).

4.3.3. Lowering of words in possessive or associative pronouns and compound nouns

The regularity of the Tone lowering process extends to the constructions with a proclitic associative pronoun and a noun . Consider examples with **'sáká'**"rice'with only High tones:

(10)			
	m̀	m̀ sàká	'my rice'
	À	à sàká	'your rice'
	è or è:	è: sàká	'his rice'
	ò or ɔ̀	ɔ̀ sàká	'our rice'
	o̲ or w̲	o̲ sàká	'your rice'
	ɲɔ̲	ɲɔ̲ sàkà	'their rice'

In (10) the first column represents the citation variants of the pronouns depending on the vowel features of the following noun. Notice that the first High tone of the noun **'sáká'** has changed to Low. Following Ahoua (1986), one may not exclude that the associative pronoun may be the one that is inserted between the proper nouns and the associated nouns, but which is deleted segmentally at the surface phonetic level. Some exceptions to the regular process of High tone lowering are given in (11) :

(11)			
	édá	làvrí dá	Lavri's bundle of twigs
	égbó	làvrí gbó	Lavri's shell
	égbó	kébé gbó	crab's shell
	éɲa̲	ésɛɲa̲	fish meat
	édí	ètìé dí	dog's excrements (Hérault 269)
	ékla̲	làvrí kla̲	Lavri's hedge
	ékpó	làvrí kpó	Lavri's half part
	ékrwé	làvrí krwé	Lavri is not mature

A question that emerges now is whether a floating tone occurs between these words or whether it is part of these items that blocks the Low tone docking. Indeed, an example such as the last one may be interpreted as a predicate phrase because

High tones in adjectives are never lowered after verbs (in contrast they lower if they are part of the noun in a noun phrase). However, the remaining examples in (11) would resist this analysis. A solution towards the alienable or inalienable seems straightforward to maintain for the very first example: 'bundle of twigs'as well as for 'hedge'. This would also suggest that it's not accidental that all the other exceptions are to be interpreted as inalienable cases. Another alternative would be to suggest a morphophonological analysis that requires a less abstract mechanism and involves phonological effects triggered by domain *-edges* or the labelling of syntactic categories. At this point, neither a morphophonological or morphological approach can handle the cases in (11) unless we assume a prosodic phrase that is independently motivated in other parts of the grammar (see Section 5).

4.3.4. Lowering of monosyllabic words in postpositional phrases

In constructions involving nouns and postpositiona phrases, Tone Lowering also applies. Here again, a morphological analysis that would require an associative tonal morpheme would never surface in such constructions.

(12)

VCV High-High tones	**Noun+postposition construction**	
énám̀	làvrí nàm̀	behind Lavri
ávázù	làvrí vàzù	before Lavri
énɛ̀sɛ̀	làvrí nɛ̀sɛ̀	near Lavri
égbá	làvrí gbà	below Lavri
ézúvì	làvrí zùvì	above Lavri

We conclude that the postpositional phrases clearly add up to the prosodic domains of the Tone Lowering Rule.

4.3.5. Explaining some exceptions: èfluúɓá and énàgá

In the above sections a wide range of empirical motivations for the Tone Lowering process have been provided. There exist, however, some problematic cases in which the Tone Lowering extends over two following High tones as in (13) while it is limited to only one as in (14). (Remember at this place that so far disyllabic words lower only the first syllable to the left as in (9)). This case is well transcribed in Hérault's paper. Consider the following patterns:

(13)	**High-High tones**	**Possessive construction**	
	a. èflúɓá	làvrí flùɓà) (Hérault 269)	Lavri's book
	b. èbwa̱bá	làvrí bwa̱bà	Lavri's finger
	c. èʒéɓà	làvrí ʒèɓà	lavri's ear
	d. èŋùo̱ɓá	làvrí ŋùo̱ɓà	Lavri's eye
	e. léɓá	làvrí lèɓà	Lavri's eye brow
	f. èwlɔɓá	làvrí wlɔɓà	Lavri's egg
	g. èsómą̱	làvrí sòmą̱	Lavri's sickness
	h. àfruu̱mú	làvrí fru̱mù	lavri's donkey
	i. ájɔ́lɛ́	làvrí jɔ̀lɛ̀	Lavri's story
(14)	a. kéwé	làvrí kèwé	lavri's crab
	b. lɔ́wɔ́	làvrí lɔ̀wɔ́	Lavri's piece of wood
	c. tává	làvrí tàvá	Lavri's bat

The examples (13) and (14) contrast because in the first set all the High tones of the second item are lowered, while in the second set only the first tone of the syllable is lowered. Since there is no apparent explanation, I shall explore some possible analyses and provide independent evidence for one type of solution.
The cases we are going to deal with are the words **'èflúɓá'** 'book' and **'èŋúo̱ɓá'** 'eye'.We explain the contrast by assuming that **ɓá** is a dimunitive prefix that has lexicalized, though there are no synchronic cases where these words can be used without that prefix. One possible additional explanation is that the consonant '6' is a transparent consonant as has been documented in most lagoon languages, as opposed to depressor consonant. An additional motivation for this hypothesis is the impossibility of analyzing the lowered third syllable of the word **èflúɓá** as a suffix because it is a borrowing from other Kwa languages where the same word shows up as **fluwa** or **fluwa** in most languages (cf. Ahoua 2007 for discussion of the sources of alternating **b** and **w** in Kwa). In **èsómą̱** the same explanation holds, provided we agree with Hérault (1982) that the implosive **ɓ** is realized [**m**] before a nasal vowel. Thus, **èsómą̱** and **àfru̱mu̱** are to be interpreted phonologically as /**èsóɓą̱**/ and /**àfru̱ɓu̱**/. In (14) our class of approximants are opaque to Low Tone spreading. In the examples (15) Tone Lowering spreads on all the disyllabic words although there are no apparent synchronic suffixes:

(15)

a. ès̩bé̩	làvrí sɔ̀bɛ̩̀	Lavri's river
b. énán̩á̩	làvrí nàn̩à̩	Lavri's snake
c. èn̩ɔ̀bá	làvrí n̩ɔ̀bà	Lavri's eye
d. èkáwrú	làvrí kàwrù	Lavri's sweat
e. kpùkpùn̩à̩n̩à̩	làvrí kpùkpùn̩à̩n̩à̩	Lavri's fish (sp.)
f. àcùfù̩à̩	làvrí cùfù̩à̩	Lavri's nail
g. adìrà	làvrí dìrà	Lavri's bean

One can further observe that Low tone spreads across the consonant '**b**' as the other consonants '**w**', '**j**'and '**l**' that were grouped together under the same class with the feature 'sonorant' by Hérault (1982:266). The latter group is motivated by the nasalization rule. Nonetheless it is still unclear why the examples (15) b. to f. are subject to Tone Lowering unless we hypothesize different diachronic sources for these words[1].

One further question that may arise at this junction is whether it makes sense to postulate that a Low tone is inserted by morphology to mark the compounding, and then to stipulate that the tone is displaced to the right-standing syllable by a phonological constraint. As I've argued here, tonal spreading beyong a transparent consonant is a phonological rule. This leads us to admit that the morphology is governed by morphological conditions, and the phonology by phonological constraints. Such a structure is similar to the type of model that is exemplified in Kiparsky's (1982) and Mohanan's (1986) versions of the theory of Lexical phonology.

5. Across-the-board Tonal Spreading: Recursive prosodic words

èflúbá is particularly revealing, because it shows that a Low tone can spread beyond more than a single syllable. What is apparently a significant observation is that there is a transparency of the medial consonant that doesn't block the spreading. This may suggest that Avikam interprets some types of sonorants as non opaque. However, it's hard to see why the spreading rule would affect also those words that use all the other regular types of obstruents as in (16) :

(16)

làvrí [cù]	Lavri's sea
làvrí [cù][sɛ̩̀]	Lavri's sea fish
làvrí [cù][sɛ̩̀][sɔ̩̀]	Lavri's home sea fish
làvrí [cù][sɛ̩̀][sɔ̩̀][và]	Sea fish from Lavri's home compound

d.	ávázù	má	énám	→	ávázù ménám
	'before'	Conj	'behind'		'ahead and behind'
e.	èfŕ̩	má	èdjá	→	èfŕ̩ mêdjá
	'left'	Conj	'right'		'left and right'

As we see, the prosodic pattern is [NP [ma NP]]. It is also crucial to note again the similarities with most Tano languages such as Anyi, Nzema and Akan.

7. Tonal foot as a constraint on Tone Lowering and the account of CVV vs. CGV words

Avikam has a class of words that may be interpreted either as **CVV** or **CGV**. Hérault (1982) has chosen to transcribe them as **CGV**. The challenging question related to these syllables is to explain why complex syllables with High tones occurring as the second of a disyllabic word are realized with a rising tone (Low-High) as in (30) when we expect an across-the-board tone lowering:

(30)	dɔ́víé	làvrí dɔ́víé lɛ́	Lavri's evening
	lézíé	làvrí lèzìé lé	Lavri's tail

Note that by contrast the complex syllables **CVV** carrying High tones are entirely lowered in (31) :

(31)	ébíé	làvrí bìè	Lavri's pot
	ébúré	làvrí bùrè	Lavri's heart
	édíá	làvrí dìà	Lavri's tooth stick
	ásúá	làvrí sùà	Lavri's mouse

Observe first of all that the significant similarity between (30) and (35) is the fact that the prefix drops and that (30) and (31) are disyllabic, though in (30) the Low tone doesn't spread to the last High tone as we can read off the right-hand columns. The proposed explanation is that two tones represent a tonal foot that constitute a domain of Tone Lowering.

So, assuming that the complex syllable is to be interpreted as a **CGV** syllable, we would incorrectly predict a Low tone rather than a rising tone in (30) because only vowels are tone bearing units. However, as just argued, if we choose to interpret the complex syllables as a sequence of moras **CVV**, it becomes straightforward to assume that each mora can carry its own tone, and therefore that each tone can

undergo its own process. Support for this analysis is provided by words such as those in (32) where sequence vowels co-exist with the adjunction of a nominal suffix marker **ɛ̰**:

(32) **kɔ́ 'to fight'** **kʊ̰ɛ̰ vs * kʷɛ̰ battle'**
ácɔ́'to dart' **ácúɛ́ vs * kwɛ̰'dart'**

Avikam verbs that have the structure **CVV** or **CCV** bear Low- High tones while monosyllabic verbs carry unambiguously only High tones, and monosyllabic words generally do not carry contour tones. To my view, this points to the disyllabic nature of these words. A similar fact has been widely attested in most Kwa languages, especially with verbs in isolation and in their morphophonological behavior at the tonal and segmental levels (cf. Ahoua and Leben 1999). So, assuming that **CVV** and **CCV** words are to be analyzed as disyllabic raises the question of how to represent the fact that these syllable types attract Tone Lowering. One natural candidate solution is to suggest that the **CVV** are phonologically to be interpreted as disyllabic words just as **CVCV** words and that their tones constitutes a tonal foot, a term independently motivated in some other African languages (cf. Leben 1997). If this analysis is correct, it is possible to generalize and to propose a Tonal Foot Formation algorithm as in (33):

(33) **Tonal foot formation**

a. Every High tone of a disyllabic word is a tonal foot.
b. Tone Lowering applies on the first two High tones.

As we see, this domain is purely phonological. Notice however that the just formulated Tonal foot contrasts with the disyllabic prosodic words in (13) and (14) above which we repeat below.

(34)

a. **kéwé**	**làvrí kèwé**	lavri's crab
b. **tává**	**làvrí tàvá**	Lavri's bat
c. **lɔ́wɔ́**	**làvrí lɔ̀wɔ́**	Lavri's piece of wood
d. **lɛ́ɓá**	**làvrí lɛ̀ɓá**	Lavri's eye brow

Let's note that patterns such as (14) apply in High tones of adjectives adjoined to nouns as qualifiers (**ebhipa** "small", **eson bhìpa** "small river").
If we analyze (30), (31) as **CVV**, the solution is straightforward because we have

independently motivated tonal foot in Avikam that behave the same way, allowing to account for a simpler generalization.
To sum up, the present section has provided empirical evidence for the significant role that the Lowering plays in the phonology of the language. Assuming the Strict Layer Hypothesis, the tonal foot is projected below the prosodic word and therefore can be licensed to undergo partial Tone Lowering. The empiral consequences for this approach is the emergence of the constraint that disyllabic words are maximal prosodic domains that contrast with monosyllabic words.

8. Leftward docking and further evidence of (segmental) phonological conditioning

This section considers segmental influence on tonal rules and attempts to account for the data collected by Herault (1982). The reason for this section is to show that motivation for floating tones as a morphosyntatic morpheme are rather weak in other domains, and that a domain construction or domain alignment might be a necessary algorithm to account for the facts in Avikam. The prosodic domains in Avikam cannot be always directly read off the syntactic constituents, and do not rely on a morphosyntactic trace such as the floating tone generally documented in Niger-Congo languages. Notice in the examples (35) that the Tonal lowering on the right is not applied.

(35) m̀ ɲɔ̀ àlábá — I caught a pearl
m̀ ɲɔ́ ásúá — I caught a mouse

On the contrary, tones on the right tend to dock on the syllables on the left, contradicting the directionality of the docking hypothesis found in possessive constructions. This corresponds to Hérault's (1982 :273) "Alpha Rule" that reads :

> "*la dernière (ou unique) syllabe du verbe adopte le ton inverse de celui qui lui fait suite si elle n'en est séparée par une consonne(ou plusieurs).* "

According to this rule, the last syllable of the verb copies the tone of the following item unless that item has one or more consonants that block the copy process. The copying rule is exemplified by the following examples from Hérault (1982:273).

(36)	Underlying	Surface	
	é ɲǫ̀ èsǫ́	**é ɲǫ̀ sǫ̀**	Let him drink water!
	lè èká	**lè ká**	go (somewhere) for a trip!

The examples (36) are injunctive constructions. The subject pronoun and the verbs are assigned a High tone and floating tones are not allowed to dock neither to the right nor to the left (Hérault 1982:275). Notice also that the floating Low tone downsteps the High tone of the object nouns, and this is explicitly transcribed by Hérault (1982:275)

On the other hand, Avikam shows other rules sensitive to segmental quality, the effect of which is to trigger tonal polarity after apocope. If the object noun has an initial prefix vowel, the tone of that vowel copies onto the lefthand verb. However, if an initial vowel is not available, and that the object noun starts with a consonant, that consonant triggers the change of the tone of the verb into an opposite level. I refer to this total change of level as tonal polarity. Such a rule has been found to apply in other Kwa languages such as Ega, in the imperative mode.

(37)		
	m̀ ɲǫ́ grìgbé	I caught a grass cutter
	m̀ ɲǫ̀ dábù	I caught a duck
	m̀ ɲǫ́ ásúá	I caught a mouse
	m̀ ɲǫ̀ àlábá	I caught a pearl

When we add to this evidence the fact that downstepped High exists morpheme internally, and that there again the floating low tone does not dock, the morphological solution of an associative marker may seem *ad hoc*.

9. Conclusion

We have attempted to argue that Tone Lowering in Avikam plays a significant role in understanding the prosody of Avikam, because it helps to identify the tonal foot (true bisyllabic words), the recursivity of prosodic words (sequences of monosyllabic words) and the existence of the prosodic phrase (adjective, numeral consitutents) and a disyllabic word constraint. The present results, while they clearly provide evidence for a hierarchical prosodic structure, do diverge to some extent from the strong version of Selkirk's (1990:180) Strict Layer Hypothesis. According to this model every category must be immediately included into a higher category. We argued however that recursivity should be licenced in Avikam, similarly to Baule (Leben and Ahoua 1997). At the tonal level, the tonal foot made up of two High tones in a non-prefixed disyllabic word undergoes Tone Lowering of the first High tone. The prosodic word composed of a prefixed monosyllabic

word lowers all sequences of High tones across-the-board and iteratively. The phonological phrase is opaque to Tone Lowering while the phonological word is transparent to that rule. Phonological phrases generally correlate with clauses of noun phrases (whereby every coordination conjunction starts a new phonological phrase), determiner phrases, adjective phrases, prepositional phrases. In verbal constructions, all verbal complements (adverbs, objects and double objects) are phonological phrases, a phenomenon that is quite common in Kwa languages, especially in Tano.

Phonologically Tone Lowering makes it possible to distinguish morphosyntactic domains from phonological domains. Phonologically Tone Lowering helps to distinguish between a **CjV** (consonant palatal glide and vowel) and a **CiV** (consonant vowel vowel) analysis of the syllable structure. The evidence has been shown to be widely attested in a great number of Kwa languages (cf. Ahoua and Leben 1999). The phonology of Avikam shows the conspiracies between segments and tones that make the language comparable to Adiukru, a geographically and genetically closely related language. Avikam also presents a rare case of tonal inversion triggered by voiced consonants and suggests floating tones in the verbal constructions.

From a comparative and typological perspective, we can suggest that Avikam and Baule, both Kwa languages, have in common that they tend to distinguish between monosyllabic word and polysyllabic ones, and most crucially that the former are generally incorporated into recursive prosodic words. The cases considered here point to the relevance of prosody in modelling the intonation and the tonal system of a language. I conclude by pointing out that for literacy purposes most of the present results can be easily incorporated into a proposal for a straightforward orthography, for instance in the notation of compound nouns and the default tones. Noun compounds should be marked with hyphens. Finally since Low tones are triggers for tonal changes, they should be written, whereas High tones being default tones should be left unspecified, in accordance with Rongier (2002).

NOTES

1. According to our informant, Diecket Moise, **ɛ́ɲą́ŋą́**"snake" may be a compound of **ɛ́ɲą́** "animal" **ŋą́** "looking for quarrels" and **èsɔ̨bɛ́** as a lexicalized compound of **èsɔ̨** " water " and **bɛ́** "sweet" (meaning sweet water or river). **èkáwrú** "sweat" may be composed of **èká**"time" and **wrú** "heat".

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