TIGRE VOWEL HARMONIES

(Report on Work in Progress)

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0. Introduction.

Tigré, the northernmost Semitic language of Ethiopia, has been the object of two detailed studies couched in the framework of Prosodic Analysis[1] by Palmer (1956, 1962)[2]. Prosodic analysis is based on ideas developed by J. R. Firth and his collaborators in London during the 1940's. Firth's departure from classical phonemic analysis resulted from a discontentment with the paradigmatic limitations of then current theories. He introduced a syntagmatic axis in the representation of sound structure and suggested that some phonological aspects of the signal should be extracted from their instantiations in phonemes and held to range over strings of sounds. Such abstract properties were called "prosodies", and their concrete phonetic manifestations "exponents". Prosodies could be properties exhibited by several contiguous segments, such as tonal and harmonic spans, or they could be properties characteristic of the particular position a segment occupies in a string, such as the aspiration of English voiceless obstruents at the beginning of syllables. In practice, any predictable property could be extracted from a string of sounds.

Palmer (1956) is primarily concerned with the characterization of the prosody "openness", i.e. the distribution of the vowel [ä][3] with respect to its allophone [a][4]. To express Palmer's generalizations in contemporary terms, he identified two types of harmonies whereby a vowel /ä/ changes to [a]. The first, vowel-vowel harmony, causes an /ä/ to lower to [a] when it is followed by an [a], under conditions to be specified below[5]. The second, consonant-vowel harmony, lowers /ä /, but, this time, when it is preceded or followed by a member of a

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[1] Cf. Firth's analysis of Cairene colloquial Arabic (1948). Some of these ideas were being developed at about the same time by Z. Harris under the term of "long component". As has been observed by Anderson (1985:192), the insights behind the notion of prosody clearly anticipate the considerations which led to Autosegmental Theory, Metrical Theory and the notion of skeletal tier.

[2] Other descriptive studies include Leslau (1945a,b, 1948) and Raz (1983). See also Raz (1983) for a thorough analysis of the source materials.

[3] The use of this symbol is customary in Ethiopian linguistics to represent a vowel very close to that of English "cut".

[4] Palmer (1956) also discusses a low level fronting/backing harmony which will not concern us here.

[5] This first type of harmony is briefly discussed in McCarthy (1979), and several of his insights are incorporated in our analysis.

certain set of consonants, under conditions rather different from vowel-vowel harmony, and which will, too, be discussed in detail below. While Palmer quite clearly saw the role of the syllable in the delimitation of these harmony domains, he did not attempt to rest a unified analysis of the two types of harmonies on a syllabic rationale.

One of our objectives in this paper is to provide an account of the domain of harmony. We will show that the paths along which harmony proceeds are amenable to a unified characterization when their domains are viewed as projections of the category Nucleus (thus confirming Anderson's (1982) view of the syllable): if N^x is the minimal domain containing the harmonic trigger, harmony operates on N^x-projections in an unbounded manner.

In his review of Langendoen's (1968), discussion of Prosodic Analysis, Robins (1969) claimed that a condition on the identification of prosodies resides in the fact that their exponents, or phonetic manifestations, "should either characterize or demarcate a definite structure". This condition could not always observed in practice by prosodic analysts, as noted by Anderson (1985:191-2), in the absence of a theory of metrical representations. In this sense, our analysis will be seen to reconcile Palmer's analysis with Robins' constraint under the strictest possible interpretation: there is only one harmony process and it operates on projections of one element, viz. the head of the syllable.

Our second objective will be to provide an account of the nature of harmony. It will be shown that one single parameter is responsible for the entire harmonic behavior of the language. To the extent that such an account is successful, it constitutes evidence for the theory of the internal structure of vocalic elements put forth in Kaye, Lowenstamm & Vergnaud (1985)(henceforth KLV), which underlies this second part of our analysis.

1. The vowel system of Tigré.

1.1. Presentation.

The vowel system of Tigré displayed in (1) is typically Ethio-Semitic in its inventory and organization. The surface system is quite a bit richer than that of (1). As mentioned above, one of the aims of this paper is to show that the differences between the basic and the surface systems are entirely derivable from our analysis. Most of the arguments used to determine the systemic status of the elements of such an inventory are valid for the entire family. Accordingly, our analysis of the vowel system can be viewed as a claim having the whole of Ethio-Semitic as its scope.

(1)

i		u
	ɨ	
e		o
	ä	
	a	

An area of controversy in the phonology of ethio-semitic is that of vowel length. There is very good historical and comparative evidence that length was associated with the pronunciation of peripheral vowels in proto ethio-semitic, and, probably, Ge'ez[6]. On the other hand, there is considerable disagreement on the current synchronic status of vowel length. Since this issue is crucial to our analysis - indeed, we argue that peripheral vowels are long and that central vowels are short in lexical representations - we will devote some time to the assessment of this question based on phonological arguments[7].

1.2. Contrastive length.

Ullendorff (1955) notes:

> "Vowel-length is non-distinctive in Ethiopic - in contrast to consonant-length (i.e. gemination) which is distinctive. In Ethiopian languages I know of no pair of words which is distinguished by vowel quantity only; in other words: vowel-length is non-phonemic in Ethiopic."

While Ullendorff is certainly correct **in a certain sense** in saying that vowel-length is generally non-distinctive in Ethiopic, as it is in Classical Arabic, with "true" length contrasts such as e.g. **qutila** "he

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[6] Cf. Voigt (   ) for an insightful discussion of the structure of the vowel system of Ge'ez.

[7] As regards auditory evidence, opinions are evenly distributed: Mittwoch (1926), quite categorically, states that:"Der Unterschied zwischen den einzelnen Vokalen is nicht sowohl, wie man das gewohnlich darstellt, ein quantitativer, als vielmehr ein qualitativer. Nicht die Lange oder Kurze ist fur ein Vokal charakteristisch...sondern es kommt vor allem darauf an, ob ein Vokal eng oder weit gesprochen wird."His position is unambiguously endorsed by Ullendorff (1955):"This is, indeed, the unanimous evidence produced by the traditional pronunciation of Ge'ez as well as by the modern languages." On the other hand, Raz (1983), with specific reference to Tigré, recognizes a measure of variability in the duration of vowels, which he relates to accentuation: "Usually vowels may be long or short according to the incidence of stress or syllable structure, though...[ä]...and also [ɨ] are predominantly short." Of interest to us is not the fact that stressed vowels are pronounced with longer duration than stressless vowels, but that central vowels remain short, even in stressed syllables. Finally, Palmer (1962) explicitly recognizes a phonetic length distinction: "The vowels fall into two classes - short and long - This phonological classification is based not only on the greater phonetic duration of long vowels, but also on the difference of the functions of the two types of vowels in the syllabic structure of the word."

was killed", vs. qutila "war has been waged", it does not follow, as we will see, that Ethiopic, in general, and Tigré, in particular, makes no length distinction. Indeed, our conception of length has undergone rather fundamental changes since it was proposed that the length of a segmental item be represented in terms of the number of timing units to which that item is associated (McCarthy, 1979, Leben, 1980). If the notion length is purely prosodic, and melody independent, a la nguage can be said to maintain, perhaps more weakly, a length contrast for vowels if it merely distinguishes between branching and non-branching nuclei. Consider the configurations in (2). CF. Hyman...and Hayes...

(2) a. b.

```
"true" length contrast          "weak" length contrast

     N       N                       N          N
     |      / \                      |         / \
     x     x   x                     x        x   x
     |      \ /
     α       α
```

In 2.a., the same segment α can be associated to branching or non-branching nuclei. This corresponds to the state of affairs prevailaing in Classical Arabic where short u can be opposed to long u, short i to long i, etc. On the other hand, 2.b. represents the case of a language displaying branching and non-branching nuclei. Such a language certainly has short <u>and</u> long vowels (as opposed to a language tolerating non-branching nuclei only) but no mention is made of whether the same vowel(s) can or must be associated to both kinds of nuclei. In a framework formally segregating prosodic weight and segment quality, 2.b. represents the general case, of which 2.a. is but a special case. Consequently, a measure of specialization may be expected, whereby a class of vowels would show an affinity for a certain type of nuclei, and an another class for the other type.

We now turn to positive evidence in support of our claim that peripheral vowels are long.

1.3. Distributional evidence.

One of the most firmly established generalizations throughout Semitic is the absence of long vowels from non-word final closed syllables[8]. As it turns out, peripheral vowels are subject to exactly the same restriction, as explicitly stated in Palmer (1962:3):

"The long vowels are: i...e...a...o...u...The long vowels appear

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[8] See Brockelmann (1908) for a variety of examples from different languages, and Leslau (1961) who makes a very convincing case for Ethiopic.

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(2) a. b.

```
     "true" length contrast            "weak" length contrast

          N          N                      N              N
          |        /   \                    |            /   \
          x      x       x                  x          x       x
          |        \   /
          α          α
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rarely in CVC syllables, except where these are word final."[9]

1.4. Shortening.

The conjugation of regular triradical verbs gives rise to CäCCä forms such as **qänsä** "he got up" (qäns+ä, from √qns) in the Perfect, 3rd masc. Verbs from glide medial (or "hollow") roots display coalescence in lieu of an initial closed syllable: **dorä** "he went around" (<däwr+ä from √dwr), **gedä** "he hurried" (<gäyd+ä from √gyd)[10]. Now, as noted by Leslau (1945) and Raz (1983), when the root syllable is closed, for instance upon suffixation of a CV(C) pronominal marker, these mid vowels can no longer maintain themselves, as one would expect under Brockelmann's and Palmer's generalizations, and are replaced by a short epenthetic high central vowel: **dɨrka** / *dorkä, "you went around", **gɨdko**/*gedko "I hurried". In order to give the reader an idea of the generality of the phenomenon, we give below the full paradigms of the three verbs mentioned for the Perfect (from Raz, 1983).

(3)

	√qns	√dwr	√gyd
3ms	qänsä	dorä	gedä
3fs	qänsät	dorät	gedät
2ms	qänäska	dɨrka	gɨdka
2fs	qänäski	dɨrki	gɨdki
1cs	qänäsko	dɨrko	gɨdko
3mp	qänsäw	doräw	gedäw
3fp	qänsäya	doräya	gedäya
2mp	qänäskum	dɨrkum	gɨdkum
2fp	qänäskɨn	dɨrkɨn	gɨdkɨn
1cp	qänäsna	dɨrna	gɨdna

Long vowels are distributed exactly as expected: they are strictly limited to open syllables, and a short vowel appears elsewhere.

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[9] Of course, for Palmer peripheral vowels **are** long, precisely what we are trying to establish. Since we want to demonstrate, as opposed to simply agreeing with him, that per. vowels are long, we emphasize that the meaningful part of his statement, from our point of view, is the distributional observation, not the assertion of length.

[10] The root medial glide absent in the Perfect appears in the Imperfect: **tɨdawɨr** "he is going around", **tɨgayɨd** "he is hurrying".

1.5. Broken plurals.

Tigré displays a very rich system of broken plurals studied in considerable detail in Palmer (1962). Palmer notes an interesting equivalence between two surface realizations of the class of broken plurals corresponding to singulars of the form CɨCCɨC, viz. CäCaCɨC/CäCäCCC.

> "The geminated consonants, are, moreover, always preceded by the vowel ä, whereas in plurals of very similar structures, but without gemination, the corresponding consonant is preceded by a. There is alternation of ä with gemination and a with absence of gemination...An example is CäCaCɨC and CäCäCCɨC."

Palmer illustrates this equivalence by means of the forms we reproduce in (4).

(4)	sing.	pl.	
	mɨsgɨd	mäsagɨd	"mosque"
	qɨlcɨm	qäläccɨm	"wrist"

Quite clearly, the medial syllable of this broken plural pattern must be heavy. The fact that Ca has the same weight as CäC constitutes additional evidence for the claim that peripherality correlates with length, and centrality, with absence thereof. The fact that nouns such as those of (5) will select a geminating or non-geminating plural pattern is unpredictable. Yet, in a few cases, the same noun will select both types. An example is given in (5).

(5)	sing.	pl.	
	dɨngɨl	dänagɨl/dänäggɨl	"virgin"

Examples such as (5) further strengthen our claim for, in this case, the same noun tolerates both plural forms which, here too, differ only in the mode of realization of medial rime heaviness[11].

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[11] Such wavering in the expression of medial rime heaviness for plurals of one and the same noun is more common in Eritrean Tigrinya than in Tigré. Thus, because of the formal similarity between this type of broken plurals in Asmara Tigrinya and Tigré, Palmer (1962:18) refers to Palmer (1955) where Tigrinya examples such as the following are given: tɨrmuz "bottle": täramuz/tärämmuz, bärmil "barrel": bäramil/bärämmil, känfär "lip": känafɨr/känäffɨr, etc.

1.6. Quadriliterals.

Leslau (1945) discussing verbs such as **mezänä** or **gorätä** considers two plausible possibilities regarding the analysis of their roots:

i. either these verbs stem from triradical roots, √mzn, √grt, and they, moreover, display a peculiarity in the vocalism of their initial syllable[12], OR

ii. they stem from quadriradical roots, √myzn, √gwrt.

Leslau points out that under the triradical hypothesis, one would expect medial gemination in the Imperfect (i.e. *lɨmäzzɨn, or, perhaps *lɨmezzɨn), as is the case with true triradical verbs, to wit lɨfäggɨr, the Imperfect corresponding to fägärä. On the other hand, no such gemination would be expected of Imperfects from quadriliteral roots. He concludes:

"The non-gemination of z [in mezänä, or r in gorätä, JL&JFP] (penult radical) proves that this consonant is not the 2nd radical of the verb but the 3rd one, and the syllabic structure of lɨmezɨn is the same as that of the quadriliteral lɨdängɨs..."

Of course, Leslau's analysis incorporates the insight that the first syllable of **mezänä**, or **gorätä** counts as just as heavy as that of **dängäsä**

Another argument could be added to Leslau's contention: the class of verbs he analyzes as crypto-quadriradicals includes a number of verbs mentioned in Fleisch (1944), and called by this author "verbes à allongement vocalique interne", such as **qeqärä** "to press", **qeqämä** "to tell on somebody", **qoqälä** "to unearth", **'antotälä**[13] "to swing in the air", etc. Should these verbs be analyzed as stemming from triradical roots, the roots would be √qqr, √qqm, √qql, and √ttl, which constitute massive violations of the Obligatory Contour Principle. If the language systematically disregarded the OCP - which it does not - one would expect to find such violations evenly distributed throughout the lexicon. In particular, triradical verbs with regular vocalism such as hypothetical **rärädä** (from *√rrd) would be expected. The fact that such verbs do not exist would mean that putative OCP violations such as √qqm and the like, are in systematic correspondance with the peculiar vocalism - e and o instead of ä - of the forms quoted by Fleisch,

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[12] The question arises because such peculiar vocalisms are encountered throughout Ethio-Semitic. The verbs of which they are characteristic are known as Type C, D, etc. Cf. Leslau (1957) and Lowenstamm (1986) for discussion.

[13] 'an is a prefix in this form.

surely a suspicious result. If, on the other hand, one recognizes these verbs for what they are, a quadriliteral analysis of the roots is provided (√qyqr, √qyqm, √qwql, √twtl), a result consistant with the fact that Tigré faithfully abides by the OCP.

We have presented a series of arguments in support of our claim that peripheral vowels are long and that central vowels are short. We now turn to the description of Tigré harmonies.

2. Tigré Facts.

In this section, we outline the basic facts of Tigré harmonies as they were noted and insightfully described by Palmer (1962). Tigré has both vowel-vowel harmony, described in II.A., and consonant-vowel harmony, which will be treated in II.B. In these largely descriptive sections, we first outline the relevant generalizations in a manner very similar to Palmer's and then paraphrase them in more current terminology.

A. Vowel-Vowel Harmony:

Palmer's (1956:561) initial observation is that "there are sequences of open front vowels, and that within those sequences there are no half open central vowels." In other words, there are sequences of short [a] vowels but there are no intervening [ä] vowels within these sequences.

The following generalizations describe the restrictions on vowel sequences in Tigré.

(1) A. a [a] is always followed, within the same word, by a long [aa], with no long vowel of any other quality between them.

B. a [ä] is either
1. followed, within the same word, by a long vowel other than [aa], with no long [aa] between them,
2. or not followed, within the same word, by any long vowel.

C. neither short [a] nor [ä] are found word-finally.

It will become clear as we proceed that these static generalizations summarize a harmony process in which /ä/ lowers to [a] only when /ä/ is followed by [aa] with no intervening long vowel. Before we turn to the illustration of (1.A.-B.), let us simply not that the absence of word-final [a] word-finally, noted in (1.C.) follows from the absence of underlying /a/ and that the absence of word-final [ä] is due to a general constraint against CV syllables. These generalizations can be illustrated with the following examples.

(2) a. /sälsälätaa/ [salsalataa] "her bracelet"
b. /mänkaahuu/ [mankaahuu] "his spoon"
c. /näbiit/ [näbiit] "wine"
d. /sämbuukaa/ [sämbuukaa] "her boat"
e. /däbeelaa/ [däbeelaa] "he-goat"
f. /sälsälät/ [sälsälät] "bracelet"
g. /baaldängät/ [baaldängät] "bean"
h. /täkoobätaa/ [täkoobataa] "her mat"

(3)		b	t	d			k	g			'
			t, s		c		q				
	f		s	z	s	j			h	9	h
		m		n							
				l							
				r							
		w				y					

Examples (2.a.) and (2.b.) show that a sequence of /ä/ vowels lowers to a sequence of [a] vowels when it is followed by a long [aa], as stated in (1.A.). Examples (2.c-e) exemplify one of the two possible contexts in which [ä] is found, viz., as stated in (1.B.1.), when it is followed by a long vowel other than [aa]. Note that the final [aa] of (2.d-e.) fails to lower preceding /ä/ vowels because a non-low long vowel intervenes. Examples (2.f-g.) show that [ä] may also appear, as stated in (1.B.2.) when no long vowel follows it. It should be clear that (1.B.) expresses the two contexts when /ä/ remains central because it is not followed by the harmony trigger, i.e. the vowel /aa/. Finally, (2.h.) is a word which contains two separate instances of /ä/, or in Palmer's terms two prosodic pieces. The rightmost /ä/ lowers to [a] because it is followed by [aa] (cf. 1.A.) while the leftmost /ä/ remains central because it is separated from the harmony trigger /aa/ by a non-low long vowel.

B. Consonant-Vowel Harmony:

The consonants of Tigré are as given below.

For the purposes of harmony, one must distinguish the set consisting of {t, s, c, q, h, 9}, i.e. ejectives and pharyngeals, and all other consonants. Only the first set of consonants triggers harmony i.e. the consonants of this set lower /ä/ to [a]. Neither set of consonants undergoes harmony. We will refer to the harmony triggering consonants as h-consonants and suggest, in line with the theory of internal structure assumed here, that they include a vocalic element A.[14] We

[14] In a feature-based theory, h-consonants could be said to hav [+back, +low], or simply [+low], specified under their secondary plac node in an Archangeli & Pulleyblank (1986) type model or under a dorsa articulator in a Sagey (1986) type model. In attributing an A element t

will, consequently, view the harmony triggered by h-consonants as the spreading of an A element. A more detailed position concerning the nature of the harmony will be given in .....

Consonant-vowel harmony is identical to vowel-vowel harmony in its phonetic lowering effect but the former differs from the latter in its domains of application. Consider these generalizations on the distribution of [ä] with respect to that of h-consonants.

(4) A. A short [a] is always followed within the same word, or immediately preceded, by an h-consonant.

B. A [ä] is never followed within the same word, or immediately preceded, by an h-consonant.

The following examples illustrate these generalizations.

(5)	a. /sînät/	[sînat]	"haversack"
	b. /fälîc/	[falîc]	"wood"
	c. /rämäc/	[ramac]	"embers"
	d. /wärîq/	[warîq]	"gold"
	e. /färä9/	[fara9]	"clan"
	f. /wärîh/	[warîh]	"month
	g. /säriit/	[sariit]	"line"
	h. /sänduuq/	[sanduuq]	"box, case""
	i. /cäbäl/	[cabäl]	"ashes"
	j. /9ästär/	[9astär]	"sky"
	k. /hächîc/	[hachîc]	"pebbles"
	l. /färäs/	[färäs]	"horse"
	m. /färîd/	[färîd]	"revolver"
	n. /jähät/	[jähät]	"direction"

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h-consonants, our reasoning is identical to that of Chomsky & Halle (1968:305-306), from whom the following quotation is drawn. "These subsidiary articulations consist in the super-imposition of vowel-like articulations on the basic consonantal articulation. In palatalization, the super-imposed subsidiary articulation is [i]-like; in velarization [î]-like; and in pharyngealization, [a]-like. The most straightforward procedure is, therefore, to express these super-imposed vowel-like articulations with the help of the features "high", "low", and "back" which are used to characterize the same articulations when they appear in the vowels. We shall say that (...) the pharyngealized consonants (e.g. the Arabic "emphatic consonants") are low and back." The Ethiopian Semitic ejectives are phonetically distinct from Arabic emphatics but, in the absence of any phonological contrast between these two consonant types, we may attribute to ejectives the phonological structure of emphatics and assume that the difference between them pertains to the realm of phonetic implementation, or in any case has no direct crucial bearing on the problem at hand.
CHECK GREENBERG ON EMPHATICS AND EJECTIVES.

Examples (5.a-g) show that a sequence of /ä/ is lowered to [a] when an h-consonant follows somewhere within the word. These examples demonstrate harmony even over an epenthetic vowel. The fact that the intervening vowel is irrelevant to harmony because, as (5.g-h.) show, harmony triggered by an h-consonant spreads over any vowel, including long non-low vowel such as /ii/ and /uu/. Examples (5.i-k.) illustrate the second case covered by generalization (4.A.), viz. harmony triggered by an h-consonant in an onset position lowers a tautosyllabic /ä/ but fails to spread any further to the right. Finally, examples (5.l-n.) are already familiar; like (2.f-g.) they are words in which /ä/ or a sequence of /ä/ vowels remains central in the absence of any harmony trigger.

C. Conclusion

As we have just seen, the domains of application of harmony triggered by h-consonants are radically different from that triggered by /aa/. For one thing, consonant-vowel harmony ignores any intervening vowels, while vowel-vowel harmony is always blocked by any intervening long vowel.[15] For another thing, consonant-vowel harmony can be seen to spread rightward when the triggering h-consonant and the target /ä/ are tautosyllabic. Both regular consonant-vowel and vowel-vowel harmonies are strictly leftward processes. The properties of these three harmonies are summarized below.

(6)

HARMONY	DIRECTION	DOMAIN	BLOCKED BY
vowel-vowel	leftward	unlimited	blocked by an intervening long non-low vowel.
consonant-vowel	leftward	unlimited	not blocked by anything.
consonant-vowel	rightward	syllable	N/A

As all three harmonies affect the same vowel and have the same phonetic effect, concluding that the grammar of Tigré contains three distinct harmony processes appears to put a heavy burden on the language learner. We will assume that refering to three distinct processes with three distinct sets of properties is an undesirable theoretical position. We will, consequently, attempt to demonstrate, in the rest

[15] Palmer's statements (p. 565) specifies that vowel-vowel harmony blocked by an intervening <u>long</u> non-low vowel. One cannot generalize include the short non-low vowel [î], i.e. the epenthetic vowel, as harmony blocker because but his data does not include any relevai examples with an intervening [î].

of this paper, that Tigré only has one leftward harmony process, and that the apparent distinction between the harmony types described in (6) follow from the identification of the proper harmony domain in an X-bar representation of the syllable.

3. Syllable structure.

Syllable structure has been the subject of much scrutiny in the frameworks of autosegmental and metrical phonology and we will restrict this section to the essential points of an X-bar theory of syllable structure, i.e. a view of syllabic constituents as projections of the nucleus.

The essential insight which an X-bar representation of the syllable attempts to capture is the fact that every syllable has a head, viz. the nucleus, and that other syllabic constituents, viz. the rhyme node and the syllable node, are projections of the head. Such a proposal is made by Anderson (1982:549?) who suggests that the syllable is identical in categorial specification with the nucleus. In other words, the syllable is the maximal projection of the nucleus and may be noted N''. The rime, being the intermediate constituent between the nucleus and the syllable, is the first order projection of the nucleus and will be noted N'. Under Anderson's proposal, then, the structure of a CVC syllable would be as follows.

```
(7)                     N'' (o-)
                      / |
                    /   N'  (R)
                  /     |\
                /       N  \
              /         |    \
             X          X     X
```

As evidence for the existence of projections, consider, for instance, the fact that stress system are sensitive to the projections of nuclei, or of rhymes and, perhaps, in some cases of the syllable as a whole. This typology does not exhaust all the logically conceivable possibilities whereby a syllabic constituent could be projected. Thus, there seems to be no attested case of processes operating on projections consisting solely of onsets, or solely of codas. Clearly, what distinguishes the attested from the unattested projections is that all the attested ones include the nucleus as a constituent. Now, the requirement that the projection of any syllabic constituent must include the nucleus, although it expresses an apparently valid generalization, remains stipulatory unless it is assumed that the nucleus occupies a special position within the syllable. If nuclei are syllable heads and only syllable heads may be projected, along, optionally, with their structurally peripheral constituents, it will follow that any projection of a syllabic constituent must include the nucleus. Futher discussion on the implications of (7) for stress placement can be found in Levin (1985:273ff.).

A number of studies have adopted a view of syllable structure such as that given in (7). Levin (1985), for instance, adopts the syllable template shown in (7) and provides arguments in its favor. Mohanan (1985:152) also mentions structure (7), with a specifier position in place of the traditional onset node and a complement position in place of the coda node, but does not argue for it. Other proponents of (7), or of a variant of it, include ....
In the following sections, we adopt Anderson's proposal and argue that Tigré harmonies provide strong arguments in favor of an X-bar organization of the syllable. Presenting this evidence and its implications for syllabic theory is the purpose of the present paper. In the next section we introduce some basic elements of the framework of Prosodic Analysis. For more detailed discussions, the reader may consult the introduction to Palmer (1970), Robins (1970, 188-200), Lass (1984, chap. 10) and Anderson (1985, chap. 7).

4. Prosodies.

5. Formal representation.

In this sub section, we assume the framework of KLV, which we now briefly present[16].

5.1. Elements

Universal Grammar provides three elements which form the basis of all vowel systems in languages of the world: A, I, and U. These elements are fully specified feature matrices, which we give below in (6).

(6)	A	I	U
	-ROUND	-ROUND	+ROUND
	+BACK	-BACK	+BACK
	-HIGH	+HIGH	+HIGH
	+low	-low	-low

While the features in (6) provide a phonetic interpretation for the elements, the elements themselves, alone or in combination with other elements, not the features, are the ultimate constituents of phonological analysis. The set of elements { A, I, U } is defined, in terms of a theory of markedness such as Kean's (1975), as the set of matrices marked for one and only one feature. We have underscored in (6) the "hot" feature of each element, the feature whose value is marked. Each element is represented at its own autosegmental level, labeled according to the hot feature of the element. Thus, U rests on the Round line, I on the Back line, etc. From this point of view, a

[16] The reader is invited to consult KLV for more detailed discussion.

phonological representation is a two-dimensional grid consisting of 1) a set of n horizontal lines, where n is the number of features whose marked value characterizes an element of the system, (but see 2.2.3. below) 2) a set of vertical lines linking elements to timing units, although elements may "float" autosegmental fashion. Thus, in (7), I and A are linked to skeletal positions, whereas U floats.

(7)

```
BACK-----I---------------
         |
ROUND----|-------------U---
         |
HIGH-----|------A---------
         |      |
         x      x
```

5.2. The cold vowel.

To the three elements of (6), we add a fourth object corresponding to the absence of an element at the intersection of a horizontal and a vertical line. The cold vowel, noted v, is defined as having no hot feature. Accordingly, its matrix must be:

(8)

```
    v

-ROUND
+BACK
+HIGH
-low
```

5.3. Line fusion.

While the BACK, ROUND and HIGH lines are, in principle independent of each other, it is not unusual, in vowel systems of the world to observe the effects of what we interpret as line fusion. Consider, for instance, a vowel system, comprising two mid vowels, say [e] and [o], of which a partial representation appears in (9).

(9)

```
Line α     ---I--     Line τ     ---U--
              |                     |
Line β     ---A--     Line β     ---A--
              |                     |
              x                     x
             [e]                   [o]
```

For the time being, we remain non-commital about the labeling of the lines involved in the representations of (9). We simply note that [e] and [o] result from the combination of I with A, and U with A, respectively. Since elements seem to combine freely, one would expect, everything being equal, that I and U, will combine as well, yielding a series of front rounded vowels, as in e.g. French, German or Hungarian. The full representations of such combinations are given in (10).

(10)

```
ROUND----U----U----
         |    |
BACK-----I----I----
         |    |
HIGH-----v----A ----
         |    |
         |    |
         x    x
        [ü]  [ö]
```

Since many languages display mid vowels, while at the same time disallowing front rounded vowels, we conclude that combination of elements per se is not ruled out. What is ruled out is the combination of I and U. Formally, we interpret the incompatibility of I and U as a fusion of their respective lines. I and U being represented on the same line, they cannot combine paradigmatically to yield [ü] and [ö]. On the other hand, they can combine syntagmatically to yield light diphthongs in the sense of Kaye (1985). This is represented in (11).

(11)

```
BACK/ROUND   ---I-----U-----U-----I---
                |     |     |     |
HIGH         ---A-----A-----v-----v---
                |     |      \   /
                x     x        x
               [e]   [o]     [wi]
```

5.4. Combination and calculus.

Combination is an asymetric operation relying on a distinction between **head** and **operator** in a sense close to that of Bach & Wheeler (1980) and Wheeler (1981). We adopt a convention whereby, if element α combines with element β, the head appears to the right of the operator in the expression. Thus, in $\boldsymbol{\alpha.\beta}$, β is the head, whereas in $\boldsymbol{\beta.\alpha}$, α is the head. Moreover the calculus consists in assigning the value of the hot feature of the operator to the same feature in the matrix of the head. Thus, consider the two combinations involving I and A.

(12)

a. A.I

```
-ROUND     -ROUND             -ROUND
+BACK      -BACK     ----->   -BACK
-HIGH      +HIGH              -HIGH
+low       -low               -low
  A          I                 [e]
```

b. I.A

```
-ROUND     -ROUND             -ROUND
-BACK      +BACK     ----->   -BACK
+HIGH      -HIGH              -HIGH
-low       +low               +low
  I          A                 [æ]
```

In (2.a.) A being the operator of the expression contributes its hot feature to the matrix of the head, I, and a mid front vowel is derived. In (12.b.), I is the operator, and the low vowel [a] is fronted into [æ].

6. Fighting the facts... (N Projections).

6.1. The nature of the phenomenon..

In order to gain insight into the nature of the process which lowers the vowel ä to a, consider first the case given in (7).

(7)

a.	sälsälät		"bracelet"
b.	sälsälät + u	---> sälsälätu	"his bracelet"
c.	sälsälät + a	---> salsalata	"her bracelet"

It can be seen in (7) that a final a, the 3rd person feminine marker, in this case, lowers a series of preceding central vowels to a. The u of the 3rd person masculine marker has no such effect on the preceding vowels. The framework we have adopted for the representation of vowels gives us a straightforward interpretation of this lowering. Consider the full representation of the vocalic system of /sälsälät + a/ in (8.a) and the representation of the phonetic output [salsalata] in (8.b.).

(8)

```
           a.                                  b.

B/R---v---v---v---v---            B/R---v---v---v---v---
      |   |   |   |                     |   |   |   |
      |   |   |   |                     |   |   |   |
H-----A---A---A---A---            H-----A---A---A---A---
      ¦   ¦   ¦  / \                    ¦   ¦   ¦  / \
      x   x   x  x x                    x   x   x  x x
      ä   ä   ä   a                     a   a   a   a
```

All the vowels of (8.a.) have the same elementary composition: v, and A. The only difference lies in the head/operator relationship obtaining between these elements within each vocalic expression: (A.v) for ä, and (v.A) for a. REWRITE AND EMPHASIZE. (1979).In a sense, then, the harmony represented in (8.b.) is a "head" harmony since all vocalic segments now "agree" in terms of what their head is. This example is of the simplest possible kind since the harmonic domain encompasses the whole word. In the next section, we address the question of the domain itself.

6.2. The domain of the phenomenon.QUOTE MCCARTHY (1979).....

We propose the following algorithm for the definition of the domain of harmony in Tigré.

(11)

i. Identify the minimal projection of N containing the harmonic trigger.
ii. Build a right-headed tree over all adjacent projections[17].
iii. Harmonize.

We now turn to a case of vowel-vowel harmony, slightly more complex than (8), one in which the lowering of a low central vowel is blocked by an intervening long vowel. When the feminine possessive 3rd person feminine marker a is suffixed to **[täkobät]** the first ä from the right lowers to a, but not the initial ä: thus, **[täkobata]**, not ***[takobata]**.

As the harmony originates, in this case from a nucleus, the minimal projection containing the harmonic trigger is N. A right headed tree is erected on all such projections

(12)

```
                       /|
                      / |
                     /  |
                    /   |
          N    N    N   N

B/R-----v----U----v----v----
        |    |    |    |
        |    |    |    |
        |    |    |    |
    H-----A----A----A----A----

          x   x x   x   x x
```

The tree in (12) cannot incorporate the third syllable from the right, the one containing o, for it would, then, include a branching terminal node in non-head position, a node corresponding to a long vowel. Within the domain just defined, harmony proceeds as described above.

[17] We assume, following Hayes (1980) that no recessive position in a tree may branch.

7. N'-Projections

In this section, we turn to one case of consonant-vowel harmony, that in which the triggering h-consonant is in coda position. Section VII will be dedicated to those instances of consonant-vowel harmony in which the triggering h-consonant is in onset position. We have just seen, in the preceding section, that a word may contain several distinct domains when the harmony is vowel-vowel, even when to the left of the triggering vowel, all the vowels of each of these harmonic domains having their head on the same line (i.e. High when there is harmony and Back/Round when there is no harmony). In section VI and VII we will show why a word can contain only one harmonic domain to the left of an h-consonant and that this distinction between several/one harmonic domain to the left of the triggering segment corresponds to the N/N'-N'' dichotomy.

The first question to address in the case of consonant-vowel harmony is: what is the status of the A element in h-consonants? Definition (..) requires one to identify all A elements in head position for vowel-vowel harmony. An analysis which wishes to unify both harmony types must consequently answer that A is the head of h-consonants lest definition (..) be judged inadequate for the identification of consonantal triggers. We will therefore assume that A is the head of h-consonants, just as it is the head of /aa/, and furthermore that no other consonant has an A element. Note that this conclusion cannot be simply dismissed on grounds of phonetic plausibility, for instance by objecting that A is a vocalic element while h-consonants have all the properties of true consonantal segments. Notions such as heads and operators are theoretical notions which can only be decided on theory-internal grounds. There is, in other words, no more reason to believe that the knowledge of which element is the head of a segment is any more accessible to intuition than is the knowledge that the suffix <u>-al</u> is the morphological head of the word <u>constitutional</u>.[18] In the following sections, we will simply represent the A element of h-consonants in our examples because, for one thing, a detailed study of the structure of Tigre consonants is beyond the scope of this study and, for another thing, only one property of consonants is relevant to the analysis of harmony: whether they have a harmony trigger or not.

Let us now turn to an example such as /f@r@9/ "clan", whose realization is [fara9]. The underlying representation of this word is shown in (9a.) while its phonetic realization is given in (9b).

(8) .. <u>v</u> .... <u>v</u> .... v ..... v ......

a... A ...... A .... <u>A</u>   b. ...... <u>A</u> ..... <u>A</u> ..... <u>A</u>

/ @....... @ .... 9 /   [a .... a .... 9]

---

[18] JF: find quotation in Anderson (1979) on intuitions and analysis.

The harmony mechanism at work in this example is the same as that discussed in vowel-vowel harmony: all the vocalic elements in a (head-final) domain must agree in terms of the head-operator relation. The difference with vowel-vowel harmony stem from the difference in harmony domain. Recall our assumption that, for any word, all nuclear projections are available. This means that any word will be dominated by a N-projection, a N'-projection and a N''-projection, as shown below for /f@r@/.

```
(9)            N''  N''
               N'   N'  <----
               N    N

          / f  @ r  @  9 /
```

The projection which is available to harmony is the minimal projection which contains an A element in head position. In the case of an h-consonant in a "coda" position, such as the /9/ of /f@r@9/, the minimal projecion which contains the h-consonant, and hence the A element, is the N'-projection. Once the relevant level of projection has been determined, our definition of harmony requires that all segments containing an A element within this projection change their head-operator relation such that A be the head of every vocalic expression contained within the relevant projection, in this case N'. The two /@/ vowels of /f@r@9/ are contained within the N-projection which is itself part of the N'-projection. Consequently, every A element which is part of a vowel will be contained within any level of nuclear projection and affected by harmony on that level. Let us now consider cases in which the empirical results are not identical with vowel-vowel harmony.

Vowel-vowel harmony is blocked by any non-low peripheral vowel because, we suggested above, prosodic weight is visible from the immediately dominating projection, viz. the N-projection. We assume that a language-specific constraint in Tigre constrains the sensitivity of nuclear projections to the N-projections, which entails that neither the N'-projection nor the N''-projection are sensitive to whether they dominate one or more X-slots. Our explanation for why peripheral vowels block harmony on the N-projection, i.e. for vowel-vowel harmony, relies on the fact that a vocalic head dominates more than one X-slot and is visible on the N-projection (since N-projections are weight-sensitive). As no harmonic domain may contain more than one head, it followed that a peripheral vowel to the left of an /aa/, which is the head of the domain, must be construed as external to the harmony domain. Now, higher nuclear projections are not weight-sensitive and, hence, a N'/N'' projection cannot discriminate between a long and a short vowel. It follows that no long vowel will block a harmony on a projection level superior to N. Such a case is shown below.

```
(10)      N''  N''
          N'   N'   <----
          N    N

    / s  @ r ii  t /  "line"   --->  [sariit]
```

In this example, the weight of the long vowel /ii/ is invisible on the projection which is relevant to harmony, viz. N'. It follows that nothing prevents the last N' position on the N'-projection from being the sole head of the entire N'-projection of the word. The harmony definition given in (..) still requires all segments containing an A element within the relevant domain, here the entire word, to agree in terms of head-operator position. The vowel /ii/ contains no A element, so that the prediction has no positive effect here, but the prediction is that /oo/ and /ee/ will be lowered in a consonant-vowel harmony while they remain unaffected in a vowel-vowel harmony. Palmer's data (CHECK) do not contain any word with /oo/ or /ee/ in a consonant-vowel harmony triggered by an h-consonant in a coda position but they do contain such vowels in words which contain an h-consonant in onset position. Our prediction concerning the lowering of mid vowels holds for N'' as well as for N' and, as we will see in the next section, the predictions turn out to be correct.

NB. l'article de Palmer ne contient pas de bons examples avec une h-consonne en position d'attaque suivie d'une voyelle tauto-morphemique et precedant une sequence de /@/. En existe t-il ailleurs? Les examples utilises ci-dessous sont douteux car la h-consonne en position d'attaque est finale de mot et on pourrait dire que l'harmonie s'applique avant la suffixation.

8. N''-Projection

Harmony triggered by an h-consonant in onset position differs, the reader will recall from (6), from other harmonies in that it spreads left-to-right in one syllable only (as well as spreading right-to-left unboundedly), whereas harmony triggered by an h-consonant in coda position only spreads right-to-left unboundedly. This difference falls out naturally from our analysis, as we will now see.

Let us first consider a word containing a /@/ followed somewhere within the word by an h-consonant in onset position.

```
(11)      ....  v  ....  U  ...              ...  v  ....  U  ...

          ....  A  ....  v  ...  A           ...  A  ....  v  ...  A

          /     @        uu      q   aa  /   /    a        uu        q
                                             aa/

          /s@nduqa/ --->  [sanduqa]    "her box"
```

The first nuclear projection containing the triggering segment, viz. /q/, is N'', i.e. the syllable. The N'' level of projection is a projection of the N' level of projection, to which it has direct access, and it also has access to segments contained within N'' but outside N'. N'' is necessarily insensitive to whether a nucleus contains one or two X-slots because information about the skeletal tier is not projected beyond the N-projection. The fact that the intervening /uu/ vowel is long is consequently not accessible at the relevant harmony level, and the harmony domain on the N''-projection will include all vowels within the word. The first vowel of /s@nduqa/ is consequently within the harmony domain and changes its head-operator relation, lowering /@/ to [a]. The vowel /uu/ is unaffected because it does not contain any A element, and hence cannot ....

A Faire:

Next examples must include /oo/, /ee/ within a word with an h-consonant in onset position.

NOTES DE DISCUSSION: QUELQUES REMARQUES SUR DES ALTERNATIVES POSSIBLES DANS UN CADRE DE GEOMETRIE DES TRAITS ET SOUS-SPECIFICATION.

Mars 1988

Hypotheses:.

Les consonnes ejectives et laryngales ont une articulation secondaire soit [+back, +low], soit simplement [+low]. Cette articulation est sous le secondary place node chez Archangeli & Pulleyblank ou sous l'articulateur dorsal chez Sagey (1986).

Appelons H1 l'hypothese selon laquelle l'articulation secondaire est [+back, +low] et c'est le noeud dorsal qui se propage et H2 l'hypothese selon laquelle l'articulation secondaire est [+low] et c'est le noeud [low] qui se propage.

Admettons egalement que toutes les voyelles peripheriques ont au moins un trait sous-jacent alors qu'un schwa bas est un simple noeud dorsal vide et un schwa haut un simple X-slot vide. Admettons aussi que l'harmonie ne propage un noeud non-terminal (H1, cad dorsal) ou terminal (H2, cad [+low]) que sur un noeud dorsal vide (cad sur un schwa bas).

Prenons pour hypothese de base que le systeme vocalique sous-jacent du Tigre comprend les traits suivants. Les seuls traits auquels nous auront recours ci-dessous sont [high] et [low].

	i	u	e	o	a	@	I
high	+	+	-	-			
back		+		+			
low					+		

Ce systeme vocalique est un des systemes sous-specifies concevables. Notons qu'il admet que les deux valeurs d'un trait peuvent etre presentes dans les representations sous-jacentes (contra Archangeli & Pulleyblank, a verifier) et qu'il n'utilise pas le trait [round] parce que ce trait ne se trouve pas sous le noeud dorsal, chez Sagey/Steriade et d'autres, mais sous un autre noeud articulateur (labial). L'utilisation du trait [round] est, semble t-il, compatible avec les notes qui suivent mais elle introduit une complication inutile en ce que les voyelles sous-jacentes ne seraient pas representees uniquement sous le noeud dorsal. Finalement, le systeme postule utilise deux voyelles par defaut qui sont distinguees par le fait que l'une (/@/) possede un noeud dorsal sous-jacent et l'autre (/I/) pas. La validite de cette distinction sous-jacente devrait etre verifiee en ce sens qu'elle oblige la regle de redondance introduisant la valeur par defaut du trait [high], qui distingue les deux voyelles, a etre sensible a la presence d'un noeud dorsal lors de son application; cette valeur devra etre [-high] pour /@/ et [+high] pour /I/.

Problemes a expliquer:

1. Les voyelles longues non-hautes bloquent l'harmonie voyelle-voyelle. Pourquoi? Postulons que ces voyelles sont sous-specifiees pour le trait [low].

H1 predit que ces voyelles, qui possedent necessairement un noeud dorsal, doivent bloquer la propagation du noeud dorsal (interdiction de croiser les lignes). Cette prediction est verifiee puisque toutes les voyelles peripheriques bloquent l'harmonie voyelle-voyelle. En ce qui concerne le schwa bas, si cette voyelle est un noeud dorsal, la regle d'harmonie doit etre formulee de facon a desassocier un noeud dorsal vide a la gauche d'un noeud dorsal contenant les traits de /a/. Il y deux possibilites en ce qui concerne le schwa haut. Soit les regles de redondance vocaliques ont deja ete appliquees, et le schwa haut est devenu une voyelle a part entiere avec un noeud dorsal, auquel cas l'harmonie doit etre bloquee par un schwa haut. Soit les regles de redondance vocaliques n'ont pas encore ete appliquees et le schwa haut ne doit pas bloquer l'harmonie. L'article de Palmer ne contient pas cette donnee. Il n'est pas non plus clair s'il est possible de montrer independemment que les traits vocaliques ont ete specifies par les regles de redondance au moment de l'harmonie voyelle-voyelle.

H2 predit que les voyelles longues non-hautes, qui sont sans doute sous-specifiee pour [low], ne devraient pas bloquer l'harmonie voyelle-voyelle. Cette prediction est fausse mais on ne peut pas en deduire que H2 est fausse car il y a deux facons au moins de sauver H2. La premiere est de dire que les regles de redondances ont deja specifie les traits vocaliques. Toutes les voyelles peripheriques/centrales auraient alors une specification [-low], ce qui bloquerait la propagation de [+low]. Cette solution implique une reformulation de la regle d'harmonie puisque nous avons postule jusqu'a present que cette regle stipule que [+low] ne propage que sur un noeud dorsal vide. On pourrait par exemple dire que la cible de l'harmonie V-V est un noeud dorsal [0high]. Soit il y une condition d'adjacence (style domaine minimal, cf. l'article de A&P dans les proceedings de nels 1986) qui stipule que l'harmonie ne peut pas sauter de noeuds dorsaux. Comme la regle de propagation stipule que l'harmonie n'affecte qu'un noeud dorsal vide ou [0high], il s'ensuit que l'harmonie ne peut pas sauter de noeud dorsal ayant une specification quelconque, ce qui est le cas de toutes les voyelles peripheriques. Cette deuxieme solution predit que l'harmonie V-V ne doit pas etre bloquee par un schwa bas, puisque nous postulons que les regles de redondance vocaliques s'appliquent plus tard.

2. Pourquoi l'harmonie C-V ignore t-elle les voyelles peripheriques?

H1 ne permet pas de sauter de voyelle ayant un noeud dorsal. Comme il est clair que les voyelles peripheriques, qui ont un noeud dorsal, ne bloquent pas l'harmonie C-V, il s'ensuit que H1 n'est pas viable, au moins pour l'harmonie C-V.

H2 permet a l'harmonie C-V de sauter les voyelles peripheriques si 1) celles ci ne sont pas specifiees pour [-low], 2) les regles de redondances interviennent plus tard dans la derivation et 3) on permet a la propagation de [+low] de sauter des noeuds dorsaux. La viabilite de cette troisieme hypothese est a examiner en ce qu'elle necessite l'utilisation d'un domaine qui permet de sauter certains des noeuds cibles, cad certains des noeuds dorsaux. Notons egalement que cette difference de domaine entre V-V, qui exige l'adjacence des noeuds dorsaux, et C-V qui permet de sauter les noeuds dorsaux est une stipulation. Cette difference suit, dans une theorie X-barre de la syllable, de la position respective des segments qui declenchent l'harmonie. Examinons a present la possibilite que le trait specifie [+low] d'un /aa/ bloque la propagation du trait [+low] d'une consonne harmonique. Une suite /@...ii...aa...q/ pourrait, a prime abord, sembler interessante en ce que le manque d'abaissement de /@/, s'il etait observe, devrait etre attribue a un blockage du au trait [+low] du /aa/ intervenant entre /@/ et /q/. Par contre, l'abaissement du /@/, s'il etait observe, pourrait etre attribue a une effet OCP entre le [+low] de /aa/ et le [+low] de /q/. L'harmonie declenche par /q/ procederait alors sans que le trait [+low] du /aa/, qui aurait ete fusionne par l'OCP, puisse lui faire obstacle. En conclusion, il est possible de rendre compte des deux realisations phonetiques possibles d'une suite /@...ii... aa..q/ et une telle suite ne nous permet pas de decider de la validite de H2.

Notons, finalement, que rien n'empeche de maintenir H1 pour l'harmonie V-V et H2 pour l'harmonie C-V. On peut egalement maintenir H2 pour les deux harmonies, moyennant la discussion en 1. ci-dessus. Maintenir H2 pour les deux harmonies necessite quand meme une distinction de domaine de propagation de [+low], discutee au paragraphe precedent, qui revient a postuler deux harmonies distinctes de toutes facons.

3. Comment expliquer que, contrairement a ce que dit Palmer, les voyelles ee/oo s'abaissent par harmonie C-V mais pas par harmonie V-V?

Nous venons de voir que 1) seul H2 permet de rendre compte de l'harmonie C-V et 2) H2 pour C-V doit permettre de sauter les noeuds dorsaux des voyelles peripheriques. Si ee/oo s'abaissent par harmonie C-V, il est necessaire que le [+low] de /q/ se propage sur ces voyelles. Admettons que /ii/ est [+high] et que /uu/ est [+high, +round]. Pour exclure ii/uu, on peut modifier la description structurale de la regle de propagation et specifier que [+low] venant d'une consonne ne peut se propager que sur un noeud dorsal ne contenant pas la specification [+high]. Il faut noter que cette modification pourrait etre derivable d'une contrainte universelle voulant qu'un segment [+high] ne puisse recevoir une specification [+low] et, donc, que la description structurale, de la cible de l'harmonie C-V soit simplement specifiee ([-high]). Cette description structurale permet de ne propager [+low] que sur ee/oo qui sont tous deux [-high] et sur /@/ qui est [0high]. Pour l'harmonie V-V, on pourrait dire que la cible de l'harmonie doit etre [0high], ce qui exempte les voyelles ii/uu/ee/oo.

4. Reflechir sur le probleme suivant: comment une alternative sans domaine X-barre pourrait t-elle rendre compte du fait que les voyelles longues bloquent l'harmonie voyelle-voyelle alors qu'elle ne peuvent affecter l'harmonie consonne-voyelle ?

CONCLUSION: Avant que de tirer des conclusions de ces notes preliminaires, il est necessaire de verifier la compatibilite des idees emises ci-dessus. Il semble, cependant, qu'il soit possible de rendre compte des memes faits sans theorie X-barre de la syllabe. Prenons pour hypothese de base qu'il est plus elegant de propager le meme noeud dans les deux harmonies. Comme nous avons vu que H1 est incompatible avec l'harmonie C-V, postulons que H2 est la bonne hypothese pour les deux harmonies. Pour obtenir les differences superficielles entre les deux harmonies, il suffit d'assigner 1) des domaines distincts aux harmonies V-V et C-V (il serait interessant de voir si ces domaines coincident avec les parametres de domaines minimal/maximal de A&P, mentionnes plus haut) et 2) de specifier que l'harmonie V-V n'affecte que les noeuds dorsaux [0high], cad le /@/ puisque c'est probablement la seule voyelle ayant un noeud dorsal qui ne porte ni [+high] (ii/uu) ni [-high] (ee/oo), alors que l'harmonie C-V affecte tous les noeuds dorsaux. On peut sans doute exclure ii/uu de l'harmonie C-V en disant qu'une specification [+high] est universellement incompatible avec une specification [+low]. La difference entre la solution syllabique et la solution discutee ici se reduit a une question d'elegance universelle et specifique, dont les details demeurent a examiner.