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TONE IN ABIDJI VERB MORPHOLOGY*

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This article is a description of the morphology of the regular verbs in Abidji. It shows how segmental and tonal rules interact to produce the realization of 14 tense-aspect combinations in 2 different classes of verbs. Each tense or aspect is represented by a specific tone pattern on the verb root and causes the occurrence of a certain tone on the prefix. I start with the description of the verbal structure and the presentation of the various tense-aspect combinations and of the 3 classes of verbs. Then I describe the tonal realization of each tense-aspect combination on the stems of Class 1 and Class 2 verbs (leaving out the third class of irregular verbs). Finally, I describe the phonological rules that create the tone-pattern found on the prefix.

0. Introduction

Abidji[1] has a straightforward two-tone system which plays a very important role in the language mainly because of its use in tense-aspect derivations of verbs.

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[1] The Abidji language is spoken by about 30,000 people in the southeast part of Côte d'Ivoire in a region situated 80 kms north of Abidjan. Abidji, under the name of Ari, was classified by Westermann and Bryan in the Lagoon Group of the Kwa languages. In Greenberg's classification, Abidji is called Ari and belongs to the Congo-Kordofanian group, Niger-Congo

The goal of this article is to describe how the two tonemes (H and L)[2] interact within the verbal word to produce the various forms of a verb. The approach chosen for this description is that of Autosegmental Phonology, where tone is considered as a tier independent from the segmental one and behaving according to its own set of rules before it is associated with the next tier, which is that of the segments. This approach suits perfectly the description of the tonal facts existing in Abidji since the analysis revealed the following:

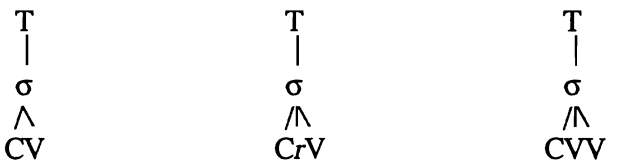
(1) In Abidji, the process of tone mapping conforms to the Tone Mapping Rule described by Williams[3] (and referred to in this paper by the term "Association Convention").

However, the following stipulations need to be added:

(2) The Tone Bearing Unit (TBU) is the syllable, i.e. a unit of *timing* made up of one of the following segmental combinations: V, CV, CrV,[4] and CVV. In the last combination, the vowel sequence is always of the type:

C	V_1	V_2
	[+high]	[-high]

(3) A TBU which is immediately followed by a word boundary or by a TBU carrying its own intrinsic tone is allowed to carry 2 tones but not more. If such a TBU has only one vowel, that single vowel will carry the tone glide, but if it has two, the tone glide will be distributed over the two vowels:



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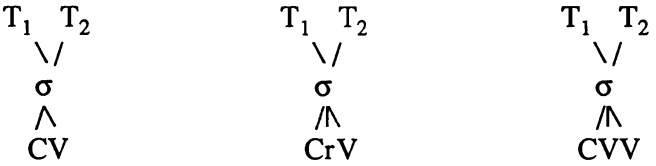
family, sub-family Kwa, sub-group b: Lagoon Languages (I.A.4.b). The Abidji themselves do not use this word "Abidji", which is the term used by the Administration and by the other ethnic groups. They themselves use only the names of the 2 dialects, Enyembe, spoken in the southern and western parts of the area, and Ogbru in the east.

[2] In order to avoid possible confusion, I have always used capitals H, L to refer to tones and features within square brackets, e.g. [+high], to refer to segmental vowel height.

[3] I have referred to a 1971 prepublication version of Williams [1976]. Williams' Tone Mapping Rule is as follows:

(1) It maps from left to right a sequence of tones onto a sequence of syllables.
(2) It assigns one tone per syllable until it runs out of tones,
(3) then it assigns the last tone that was specified to the remaining untoned syllables on the right
(4) until it encounters the next syllable to the right belonging to a morpheme with specified tone.

[4] The symbol *r* stands for the 2 phonemes /r/ and /l/, which are the only two consonants that can appear as C_2 in a syllable initial consonant cluster.



There is a language specific restriction that no TBU can carry three tones. Thus, it is never possible for the final V in a CVV syllable to carry a tone glide.

(4) In the verbs, the domain of association of a tone pattern starts with the first Tone Bearing Unit of the stem. Thus the prefixes that are inherently toneless (the pronoun and the Aspect Vowel) are outside this domain of association and will require special phonological rules to determine the tone that they will bear in each environment.

1. Generalities

In order to describe the different realizations of tone on the verbs, we need to divide the verbs into three classes on the basis of their tonal behaviour, but before we do this, we must state the properties that all three classes have in common, i.e. the structure of a verb form, and the different tenses and aspects.

1.1. The structure of the verb.

1.1.1. Roots and reduplicated stems. The obligatory element of a verb is the *root*. A root is always monomorphemic, but it can be either monosyllabic or disyllabic:[5]

(5)

MONOSYLLABIC		DISYLLABIC	
ye	'to show'	*tɔpɷ*	'to send someone'
fɷɛ	'to laugh'	*kɷatɷ*	'to remind'
kpra	'to look'	*bɷka*	'to help'

A root can be expanded by the addition of a reduplication prefix which is made up of the first consonant of the root, but since consonant clusters C_1C_2 in which C_2 is not /r/ or /l/ are forbidden in the language, a vowel epenthesis rule is necessary. This rule inserts a [+high] vowel in the C_1C_2 sequence when a

[5] Abidji has the following phonemes: 21 consonants */p, b, f, w, m, t, d, s, l, r, n, c, j, y, ɲ, kp, gb, k, g, ʔ, h /*; 9 vowels, divided into 2 series [+ATR] *i, e, u, o* and [-ATR] *ɪ, ɛ, ɷ, ɔ, a.*

reduplicative prefix is added to a verb root. The epenthetic vowel agrees in backness and ATR with the first vowel of the root.

(6) VOWEL EPENTHESIS

$$\emptyset \rightarrow \begin{matrix} V \\ [+high \\ \alpha F] \end{matrix} \; / \; \begin{matrix} C_1 \\ PFX \end{matrix} \; \_\_ \; C_2 \; \begin{matrix} V \\ [\alpha F] \end{matrix} \; X$$

The presence of the reduplicative prefix means that the action is performed by several agents or has several objects. In the case of the reduplicated form of a verb, we will no longer talk about the verb *root*, but about the verb *stem*.

(7)

ROOT		REDUPLICATED STEM	
ye	'to show'	*yi-ye*	'to teach'
kpra	'to look'	*kpɪ-kpra*	'to inspect'
fie	'to wash'	*fi-fie*	'to wash many clothes'
tɔpʊ	'to send someone'	*tʊ-tɔpʊ*	'to send many people'

In addition to the reduplicative prefix, some verb roots need an intensive suffix -U.[6] This suffix is also counted as part of the stem in the mapping of the different tone patterns.

(8)

ROOT		REDUPLICATED STEMS WITH INTENSIVE SUFFIX	
pa	'to buy'	*pɪ-pa-ʊ*	'to buy many things'
fʊɔ	'to give'	*fʊ-fʊɔ-ʊ*	'to give many presents'

Then to the stem (or root when non-reduplicated) can be added several prefixes and suffixes.

1.1.2. Prefixes. (a) *Aspect Vowel (AV)*: This vowel, which is [+high] for some tense-aspect combinations and [-high] for others (as shown in (31), (32), (33), and (34) of §1.2), comes immediately to the left of the stem. It is inherently toneless and so derives its tone from the Tone Mapping Rules that will be described in §3.

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[6] Since the phonetic realization of a vowel depends on the vowel harmony specifications of the word it belongs to, *U* represents the two [+high,+back] vowels [*u*] and [*ʊ*]. *I* represents the two [+high,-back] vowels [*i*] and [*ɪ*].

(9) a. *ɔ́-tɑ̀tɔ̀pɑ́*[7] 'to send several people' (INFINITIVE)
AV-STEM

b. *n-ɔ́-bùtú* 'he has asked' (ACCOMPLISHED)
S-AV-STEM

c. *f-ì-yê* 'you show' (HABITUAL)
S-AV-STEM

(In 9b and 9c, S- represents the subject pronoun.)

(b) *Aspect Morpheme (AM)*: In addition to the AV, some aspects also require an Aspect Morpheme, which comes directly to the left of the AV in the verb structure. Unlike the AV, the AM carries its own inherent tone. However, when the segmental representation of this AM is a phoneme carrying the feature [-syll], the tone that is associated with it will have to dock onto the nearest element on the segmental tier carrying the [+syll] feature. This element is always the AV, and the rule that accomplishes this is called the Aspect Morpheme Tone Docking Rule (AMTD).

There are four Aspect Morphemes. Three of them are sonorant consonants, and one is an obstruent. The sonorants may undergo certain phonological changes when another consonant (the subject pronoun) is also present in the prefix.

The PROGRESSIVE aspect morpheme is attached to the PROGRESSIVE and the PROGRESSIVE NEGATIVE. It takes the following form:

tonal tier	L
	|
segmental tier	*n*
	[-syll +son +alv]

Its segmental representation is the nasal alveolar sonorant /*n*/. On the segmental tier, it undergoes a deletion rule when a subject pronoun is present:

[7] In all the examples given in this section, the surface tone pattern of each tense or aspect is indicated because it is part of this particular form, but for a full justification of its realization, see §2 and §3.

(10) SONORANT ASPECT MORPHEME DELETION RULE (SAMDR)

$$C \rightarrow \emptyset \;/\; C \_\_ V$$

$$\begin{bmatrix} \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \qquad \begin{bmatrix} \text{-syll} \\ \text{PRN} \end{bmatrix}$$

(11) PROGRESSIVE without subject pronoun

Underlying	*Kìrî*	*n`-é-sí*	
	Subject	AM-AV-stem	
AMTD	*Kìrî*	*n-ě-sí*	'Kere is bringing'

(12) PROGRESSIVE with subject pronoun

Underlying	*f-n`-è-sí*		
	PRN-AM-AV-stem		
SAMDR	*f`-è-sí*	[*fèsí*]	'you are bringing'
	PRN-AV-stem		

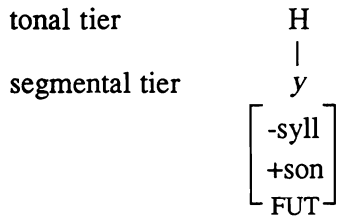
(13) PROG NEG without subject pronoun

Underlying	*Kìrî*	*n`-é-sì*	
	Subject	AM-AV-stem	
AMTD	*Kìrî*	*n-ě-sì*	'Kere is not bringing'

(14) PROG NEG with subject pronoun

Underlying	*f-n`-é-sì*	
	PRN-AM-AV-stem	
SAMDR	*f`-é-sì*	
	PRN-AV-stem	
AMTD	*f-ě-sì*	'you are not bringing'

The FUTURE aspect morpheme takes the following form:



Its segmental representation is the palatal semi-vowel /*y*/. On the segmental tier, it also undergoes the deletion rule (10) when a subject pronoun is present:

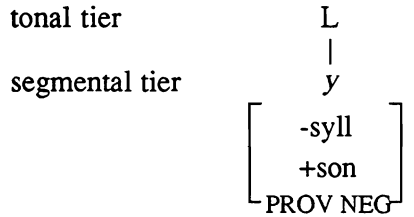
(15) FUTURE without subject pronoun

Kìrî	*y´-í-sí*	'Kere will bring'
Subject	AM-AV-stem	

(16) FUTURE with subject pronoun

Underlying	*f-y´-ì-sí* PRN-AM-AV-stem	
FUT AM Deletion	*f´-ì-sí* PRN-AV-stem	
AMTD	*f-î-sí*	'you will bring'

The PROVISIONAL NEGATIVE aspect morpheme takes the following form:



Its segmental representation is again the palatal semi-vowel /*y*/, but its tonal and segmental behaviour when the subject is a pronoun is different from that of the preceding aspect morphemes in that it must undergo the Syllabification Rule (17) rather than the deletion rule (10), which must thus be revised as (10').

(17) PROVISIONAL NEG. ASPECT MORPHEME SYLLABIFICATION

$$\begin{bmatrix} y \\ \text{-syll} \\ \text{PROV NEG} \end{bmatrix} \rightarrow \begin{matrix} \text{I} \\ \text{[+syll]} \end{matrix} \; / \; \begin{matrix} \text{C} \\ \begin{bmatrix} \text{-syll} \\ \text{PRN} \end{bmatrix} \end{matrix} \; \_\_\text{V}$$

(10') SONORANT ASPECT MORPHEME DELETION

$$\begin{bmatrix} \text{C} \\ \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \rightarrow \text{Ø} \; / \; \begin{matrix} \text{C} \\ \begin{bmatrix} \text{-syll} \\ \text{PRN} \end{bmatrix} \end{matrix} \; \_\_\text{V}$$

Condition: $\begin{bmatrix} \text{C} \\ \text{-syll} \\ \text{+son} \\ \text{AM} \end{bmatrix} \neq \begin{bmatrix} y \\ \text{-syll} \\ \text{+son} \\ \text{PROV NEG} \end{bmatrix}$

Rule (17) changes the semi-vowel /*y*/ into the vowel /I/ (cf. fn. 6) when a pronoun is added. By changing its feature from [-syll] to [+syll], this rule allows the PROV NEG AM to act as the segmental support for its own low tone, but it also obliges it to conform to the Vowel Harmony Rule (18).

(18) VOWEL HARMONY RULE

$$\begin{matrix} \text{V} \\ \text{PRF} \end{matrix} \rightarrow [\alpha\text{ATR}] \,/\, \text{C}\_\_\text{C} \quad \begin{matrix} \text{V} \\ \begin{bmatrix} \alpha\text{ATR} \\ \text{ROOT} \end{bmatrix} \end{matrix}$$

(A vowel occurring in an affix has ATR harmony with the vowel(s) of the root.)

Thus, the syllabified PROV NEG AM will be realized as the vowel /*i*/ in verbs carrying the feature [+ATR], and as the vowel /*ɪ*/ in verbs carrying the feature [-ATR], as shown in the following examples:

(19) PROVISIONAL NEGATIVE without subject pronoun

	a. [+ATR] root		b. [-ATR] root	
Underlying	*Kìrî*	*y`-é-sí*	*Kìrî*	*y`-ɛ́-lí*
	Subject	AM-AV-stem	Subject	AM-AV-stem
AMTD	*Kìrî*	*y-ě-sí*	*Kìrî*	*y-ɛ̌-lí*
	'Kere has not brought yet'		'Kere has not done yet'	

(20) PROVISIONAL NEGATIVE with subject pronoun

	a. [+ATR] root	b. [-ATR] root
Underlying	*f-y`-é-sí*	*f-y`-ɛ́-lí*
	S-AM-AV-stem	S-AM-AV-stem
AM Syllabification & Vowel Harmony	*f-ì-é-sí*	*f-ì-ɛ́-lí*
	S-AM-AV-stem	S-AM-AV-stem
	'you have not brought yet'	'you have not done yet'

The PROHIBITIVE aspect morpheme consists of the alveolar voiced plosive /*d*/ on the segmental tier and a low tone on the tonal tier. This tone will of course dock onto the AV, but unlike the other AM, the consonant, probably because it is an obstruent and not a sonorant, will not delete in the presence of a pronoun. Instead, it will cause the insertion of an epenthetic vowel according to rule (6), just like the reduplicative prefix.

(21) PROHIBITIVE with pronoun subject

Underlying	*n-d`-è-sí*	
	PRN-AM-AV-stem	
Epenthesis	*nì-d-è-sí*	'don't let him bring'

This epenthetic vowel has no tone of its own, and since in the PROHIBITIVE the pronoun does not cause any specific tone to appear, this syllable always copies the tone of the next one, as will be shown in (74).

(c) *Subject Pronoun (S)*: It occurs as the very first element of the verb when the subject is not a Noun Phrase or in the DIRECT IMPERATIVE and PROHIBITIVE when the subject is not in the second person. This pronoun is an inherently toneless consonant with the following forms:

			S-AV-STEM	
(22)	*m-*	for 1st p. sg.	*m-ù-túrù*	'I think'
(23)	*f-*	for 2nd p.	*f-ù-túrù*	'you think'
(24)	*n-*	for 3rd p.	*n-ù-túrù*	'he/she thinks'
(25)	*r-*	for 1st p. pl.	*r-ù-túrù*	'we think'

1.1.3. Suffixes. Now, to the right of the stem one may add the following suffixes:

(a) plural *-n*I. This suffix carries its own H tone:

(26)	*nîyê*	'he will show'	*nîyê-ní*	'they will show'
	fìpá	'you (sg) buy'	*fìpá-ní*	'you (pl) buy'

(b) Object Pronouns (O):

(27)	*-m*U	for 1st p. sg.	*nùbútù-mù*	'he asks me'
(28)	*-f*U	for 2nd p. sg.	*nùbútù-fù*	'he asks you'
(29)	*n*I	for 3rd p. sg.	*nùbútù-nì*	'he asks him'

The 3rd person pronoun carries its own L tone, but the 1st and 2nd person pronouns change their tone according to the class of the verb they are attached to. Plural object pronouns are independent words, not suffixes.

(c) Negative Morpheme *-m*U with a H tone appears in the negative group (see 32):

(30) *n-é-yê-mú* 'he doesn't show'
S-AV-ROOT-NEG

The only verbal suffix we will talk about in this article is the negative morpheme *-m*Ú.

We can sum up the position of the different elements of the verb in the following formula:

$$\pm\text{Subj. pron. } \pm\text{AM } \pm\text{AV } + \frac{|\pm\text{redupl. } +\text{ROOT } \pm\text{Intensive}|}{\text{STEM}} \pm \begin{Bmatrix}\text{negative}\\ \text{plural}\\ \text{object}\end{Bmatrix}$$

1.2. Tenses and aspects. All verbs share the same combinations of tenses and aspects. These tense-aspect combinations all have an Aspect Vowel in their surface realizations apart from three exceptions: (31b), (33a) and (33b), in which the stem is found in isolation when the subject is not a pronoun. For some combinations, the Aspect Vowel is [+high], for others, it is [-high], as shown in (31-34) below.

The different tense-aspect combinations can be divided into four different groups according to the Tone Mapping Rules (TMR) that operate within them. I give the combinations belonging to the four groups here. By establishing these groups, the derivations of sections 2 and 3 will lead to the correct surface forms.

(31) Positive Group

		AV height
a. HABITUAL	(HAB)	[+high]
b. PERFECTIVE	(PERF)	[+high] with pronoun
c. FUTURE	(FUT)	[+high] (except in 57b)
d. PROGRESSIVE	(PROG)	[-high]
e. ACCOMPLISHED	(ACC)	[-high]
f. HYPOTHETICAL	(HYP)	[-high]

(32) Negative Group

		AV height
a. ABSOLUTE NEGATIVE	(ABS NEG)	[+high]
b. SPECIFIC NEGATIVE	(SPEC NEG)	[-high]
c. PROGRESSIVE NEGATIVE	(PROG NEG)	[-high]
d. PROVISIONAL NEGATIVE	(PROV NEG)	[-high]

(33) Imperative Group

		AV height
a. DIRECT IMPERATIVE	(DIR IMP)	[+high] with pronoun
b. INDIRECT IMPERATIVE	(IND IMP)	[+high] with pronoun
c. PROHIBITIVE	(PROH)	[-high]

(34) The INFINITIVE (INF) with a [-high] AV constitutes the fourth category.

Within each of these groups, the same TMR's operate.

1.3. The three classes of verbs. The Abidji verbs are divided into three different classes according to the different tone patterns which appear on the verb stems to realize the various tense-aspect combinations.

Class 1 contains the vast majority of Abidji verbs. Stems of class 1 can consist of up to 3 TBU's on which the tense-aspect combinations can be realized by tone patterns of one or two tones. The tone pattern realized on Class 1 stems is L for some tense-aspect combinations, HL for others, and LH for yet others, as shown in (35).

Class 2 consists only of a few CV and CVV roots on which the tense-aspect combinations can be realized by tone patterns of one tone only, specifically L or H, as shown in (35).

(35) Summary chart of stem tone patterns in Classes 1 and 2

<table>
<tr><th>Tone Pattern on Class 1 stems</th><th>Tense-aspect combination</th><th>Tone Pattern on Class 2 roots</th></tr>
<tr><td>HL</td><td>HAB
PERF
FUT
PROG
HYP
SPEC NEG
PROV NEG
IND IMP</td><td rowspan="2">H</td></tr>
<tr><td>LH</td><td>PROH
ACC [NP Subj / prn Subj]
INF</td></tr>
<tr><td>L</td><td>ABS NEG
PROG NEG
DIR IMP</td><td>L</td></tr>
</table>

This table shows that for every tense-aspect combination (bar two exceptions), the single tone on Class 2 stems is identical to the first tone of the tone pattern on

Class 1 stems. The two exceptions in Class 2 are ACCOMPLISHED with a Noun Phrase Subject and PROHIBITIVE (see examples (76) and (77) of §3.4).

Note that none of the verbs belonging to Class 2 can have more than one TBU. Consequently, the reduplicated forms of all Class 2 roots will belong to Class 1.

Another characteristic of Class 2 verbs is the absence of the negative suffix *-mʊ́* in the negative group of tense-aspect combinations.[8]

(36) SPECIFIC NEGATIVE

a. Class 1	b. Class 2
n-á-kprâ-mɷ́	*n-ɔ́-tɷ́*
S-AV-ROOT-NEG	S-AV-ROOT
'he is not looking'	'he is not giving'

There is a 3rd class composed of the following 5 irregular verbs:

ʔa	'to go'
ʔɩ	'to eat'
ʔi	'to come'
ʔu	'to die'
ʔɷ	'to fight'

I will not treat them further here.

2. Tone on Verbal Stems

2.1. Class 1 verbs. In this class, the three tone patterns available are L, HL, and LH. With 14 tenses and aspects and only 3 tone patterns, several forms have to share the same tone pattern.

Class 1 is divided into 3 sub-classes, according to the CV structure of the segmental tier:

-Sub-class 1a consists of monosyllabic roots (only one TBU: CV, CVV, C*r*V).

-Sub-class 1b consists of disyllabic roots (2 TBU's).

-Sub-class 1c contains all expanded stems derived from roots of sub-classes 1a and 1b and from roots of class 2.

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[8] The negative suffix reappears in Class 2 verbs, however, when another suffix is also present, such as the object pronoun or the plural.

2.1.1. The L tone pattern.

(37) Sub-class 1a:

L	L	L
|	|	|\
CV	C*r*V	CVV
ROOT	ROOT	ROOT
DIR IMP	*yè*	*kprà*	*ɲtɛ̀*
2nd person sg	'show!'	'look!'	'hope!'

(38) Sub-class 1b:

L	L
/ \	/| \
CVCV	CVVCV
ROOT	ROOT
DIR IMP	*bùtù*	*kɷ̀àtɷ̀*
2nd person sg	'ask!'	'remind'

(39) a. Sub-class 1c: (reduplicated)

L	L	L
CV-CV	CV-CVV	CV-CVCV
rd-ROOT	rd-ROOT	rd-ROOT
DIR IMP	*gɷ̀-gɔ̀*	*bì-bì è*	*kù-kòtù*
2nd person sg	'implore!'	'scratch!'	'praise!'

b.

L	L
CV-C*r*V	CV-CVVCV
DIR IMP	*jì-jrɛ̀*	*sù-sùòpù*
2nd person sg	'shine!'	'examine!'

Some CV and CVV roots add the intensive suffix -U to their reduplicated form. This suffix is still within the domain of the root tone pattern.

c.		L	L
		CV-CV-U	CV-CVV-U
		rd-ROOT-intens.	rd-ROOT-intens.
	DIR IMP	*kì-kè-ù*	*fɷ̀-fɷ̀ɔ̀-ɷ̀*
	2nd person sg.	'shake!'	'give many presents!'

2.1.2. The HL tone pattern

(40) Sub-class 1a:

	HL	HL	HL
	|	|	| |
	CV	C*r*V	CVV
	NPS ROOT	NPS ROOT	NPS ROOT
PERF	*Áyɷ́ yê*	*Áyɷ́ kprâ*	*Áyɷ́ líɛ̀*
	'Ayo showed'	'Ayo looked'	'Ayo hoped'

(41) Sub-class 1b:

	HL
	| \
	CVCV
	NPS ROOT
PERF	*Áyɷ́ bútù*
	'Ayo asked'

Since the Tone Bearing Units are syllables, the HL pattern is mapped onto a CVVCV root in the following way (see (3) of section 0):

(42) Underlying

	H L
	| |
	σ σ
	/|\ /|
	CVVCV

Surface Form

	H L
	|\ |
	CVVCV

PERF *Áyɷ́ kɷ́átɷ̀*
NPS ROOT
'Ayo reminded'

(43) a. Sub-class 1c (reduplicated)

	H L	H L
	| |	| /\
	CV-CV	CV-CVV
	NPS rd-ROOT	NPS rd-ROOT
PERF	*Áyɷ́ gɷ́-gɔ̀*	*Áyɷ́ bí-bì è*
	'Ayo implored'	'Ayo scratched'

b.

	H L	H L	H L
	| |	| /| \	| /| \
	CV-C*r*V	CV-CVVCV	CV-CVCV
	NPS rd-ROOT	NPS rd-ROOT	NPS rd-ROOT
PERF	*gbê jí-jrɛ̀*	*Áyɷ́ sú-sùòpù*	*Áyɷ́ kú-kòtù*
	'the sun shone'	'Ayo examined'	'Ayo praised'

c.

	H L	H L
	| /\	| /\\
	CV-CV-U	CV-CVV-U
	NPS rd-ROOT-intens.	NPS rd-ROOT-intens.
PERF	*Áyɷ́ kí-kè-ù*	*Áyɷ́ fɷ́-fɷ̀ɔ́-ɷ̀*
	'Ayo shook'	'Ayo gave many presents'

2.1.3. The LH tone pattern. In sub-classes 1a and 1b, the LH tone pattern is mapped onto the number of TBU's available according to the association convention. Note that in the following examples (44) to (47c), the tone on the Aspect Vowel is H because of the Initial Stem Tone Polarization Rule formulated in (59) of §3.1.2.

(44) Sub-class 1a in the INFINITIVE ([-high] AV):

Underlying	LH	LH	LH
	e-ye	*a-kpra*	*ɛ-lɪɛ*
	AV-ROOT	AV-ROOT	AV-ROOT
Association Convention	LH |/ *e-ye*	LH \/ *a-kpra*	LH | | *ɛ-lɪɛ*
Surface Form	*éyĕ*	*ákpră*	*élɪ̂é*
	'to show'	'to look'	'to hope'

(45) a. Sub-Class 1b in the INFINITIVE ([-high] AV):

Underlying	L H
	o-butu
	AV-ROOT
Association Convention	L H | |
	o-butu
Surface Form	*ó-bùtú*
	'to ask'

Again, as with example (42), a root initial CVV syllable carries the first tone of the tone pattern in (45b).

(45) b. Sub-class 1b in the INFINITIVE ([-high] AV):

Underlying Form and initial associations	L H | | σ σ /|\ /|
	a-kɷatɷ
	AV-ROOT
Surface form	*á-kɷàtɷ́*
	'to remind'

But in sub-class 1c (the subclass of reduplicated stems in class 1), the LH tone pattern is not mapped onto the TBU's according to the association convention. In order to describe its behaviour, we need to state a rule for these reduplicated stems which links the first tone of the LH tone pattern to the first syllable of the verb root before reduplication.

(46) Linking Rule

$$\begin{array}{cc} {}^{*} & \\ L & H \\ | & \\ {}^{*} & \\ \sigma_{r1} & \sigma_{r2} \end{array}$$

(σ_r represents the syllables of the root)

Next the association convention puts the rest of the tones of the root pattern on the remaining syllables of the root.

	monosyllabic root	disyllabic root
Association Convention	L H | / σ1	L H | | σ1 σ2

Then the reduplicative prefix copies the first tone of the root tone pattern.

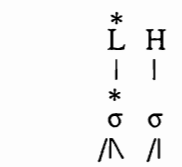
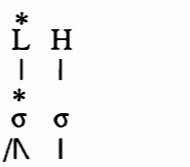
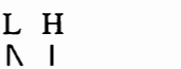
(47) a. Sub-class 1c in the INFINITIVE ([-high] AV):

Underlying	LH	LH	L H
	gɔ	*bie*	*kotu*
	ROOT	ROOT	ROOT
Linking Rule	LH | *gɔ*	L H | *b i e*	L H | *kotu*
Association Convention	LH |/ *gɔ*	L H | | *b i e*	L H | | *kotu*
Prefix Addition and Tone Copying	L LH | |/ *ɔ-gɷ-gɔ* AV-rd-ROOT	L L H | | | *e-bi-b i e* AV-rd-ROOT	L L H | | | *o-ku-kotu* AV-rd-ROOT
Surface Form	*ɔ́gɷ̀gɔ̌* 'to implore'	*ébìbìé* 'to scratch'	*ókùkòtú* 'to praise'

(47) b. Sub-class 1c with -U suffix in the INFINITIVE:

Underlying	L H
	e-ki-ke-u
	AV-rd-ROOT-intens.
Surface Form	*é-kì-kè-ú*
	'to shake'

(47) c. Sub-class 1c in the INFINITIVE: Once again, in the case of a CVV root-initial syllable, the L tone is carried by the CVV syllable, as in (42) and (45b).

Initial Associations		
	o-su-suopu	*ɔ-fɷ-fɷɔ-ɷ*
	AV-rd-ROOT	AV-rd-ROOT-intens.
Tone Copying on the Prefix		
	o-su-suopu	*ɔ-fɷ-fɷɔ-ɷ*
Surface Form	*ósùsùòpú*	*ɔ́fɷ̀fɷ̀ɔ̀ɷ́*
	'to examine'	'to give many presents'

2.2. Class 2 verbs. In this class, the only tone patterns available are H or L, each consisting of just one tone.

Class 2 has a H tone on	HAB	(where Class 1 had HL)
	PERF	"
	FUT	"
	PROG	"
	HYP	"
	SPEC NEG	"
	PROV NEG	"
	IND IMP	"
	PROH	(where Class 1 had LH)

Class 2 has a L tone on	INF	(where Class 1 had LH)
	PROG NEG	(where Class 1 had L)
	DIR IMP	"
	ABS NEG	"

The tense-aspect combination ACCOMPLISHED is not in the list above because the tone on the root of Class 2 verbs conjugated in the ACCOMPLISHED when the subject is a pronoun is different from what it is when the subject is a Noun Phrase. Specifically, Class 2 has a H tone on ACC with a NP subject and it has L tone on ACC with a pronoun subject.

(48) The H tone pattern in Class 2 roots

	CV root	CVV root
Underlying Form	H	H
PERF	*Áyɷ́ pa* NPS ROOT	*Áyɷ́ fɷ́ɛ* NPS ROOT
Association Convention	H | *Áyɷ́ pá*	H Λ *Áyɷ́ fɷ́ɛ*
Surface Form	*Áyɷ́ pá* 'Ayo bought'	*Áyɷ́ fɷ́ɛ́* 'Ayo laughed'

(49) The L tone pattern in Class 2 roots

	CV root	CVV root
Underlying	L	L
DIR IMP	*pa* ROOT	*fɷ́ɛ* ROOT
Association Convention	L | *pa*	L Λ *fɷ́ɛ*
Surface Form	*pà* 'buy!'	fɷ̀è 'laugh!'

The ACCOMPLISHED aspect in Class 2 verbs: The tone on the [-high] AV is L in (50) and H in (51) because of the Initial Stem Tone Polarization Rule formulated in (59).

(50) ACC without pronoun subject

	CV root	CVV root
Underlying	H	H
	Áyɷ́ a-pa NPS AV-ROOT	*Áyɷ́ ɛ-fɷɛ* NPS AV-ROOT
Association Convention	H |	H Λ
	Áyɷ́ a-pa	*Áyɷ́ ɛ-fɷɛ*
Surface Form	*Áyɷ́ àpá* 'Ayo has bought'	*Áyɷ́ èfɷ́ɛ́* 'Ayo has laughed'

(51) ACC with pronoun subject

Underlying	L	L
	n-a-pa S-AV-ROOT	*n-ɛ-fɷɛ* S-AV-ROOT
Association Convention	L |	L Λ
	n-a-pa	*n-ɛ-fɷɛ*
Surface Form	*nápà* 'he has bought'	*néfɷ̀è* 'he has laughed'

3. Tone on the Aspect Vowel

As was already mentioned (see 1.1.2.a and b), both the Aspect Vowel and the subject pronoun are inherently toneless, and so the tone of the syllable they form needs to be determined by the application of a rule which is different for each group of tense-aspect combinations. That is why we defined in §1.2 four

different groups of tense-aspect combinations: the positives, the negatives, the imperatives and the infinitive.

The negatives are the only aspects that do not take into account the initial stem tone for the determination of the prefix tone. The other three groups cause the prefix to either copy or polarize the first tone of the stem.

Since the first tone of the stem is the same for both classes of verbs apart from two exceptions (see chart (35)), the following rules, which determine the tone of the AV, are valid for Classes 1 and 2, and I will only use a Class 1 CVCV root to illustrate them.

The 2 exceptions in Class 2 (ACC with NP subject and PROH) will be treated separately in (76) and (77).

3.1. The positive group. This is the only group of tense-aspect combinations where two different rules are at work, because it is the only group in which the addition of the pronoun causes a tone polarization rule (59) to apply, while in the absence of the pronoun, the Aspect Vowel simply copies the first tone of the stem.

3.1.1. Initial Stem Tone Copying. The rule which applies in the positive group when there is no pronoun is called Initial Stem Tone Copying (ISTC), and can be formulated as follows:

(T_1 T_2 represent the root tone pattern and σ_s the syllables of the stem.)

Underlying	T_1	T_2	Tonal tier
	AV- σ_s	σ_s	Segmental tier
Association Convention	T_1 | AV- σ_s	T_2 | σ_s	
(52) ISTC	T_1 T_1 | | AV -σ_s	T_2 | σ_s	

Here, the Aspect Vowel duplicates the tone T_1, the first tone of the stem tone pattern.

Applications of the ISTC in the POSITIVE group:

TONE PATTERN ON THE ROOT: LH

(53) ACC with NP subject [-high] AV

Underlying		L H
	Áyɷ́	*o-butu*
	NPS	AV-ROOT
Association Convention		L H | |
	Áyɷ́	*o-butu*
ISTC		L L H | | |
	Áyɷ́	*o-butu*
Surface Form	*Áyɷ́*	*òbùtú* 'Ayo has asked'

TONE PATTERN ON THE ROOT: HL

	(54) HAB [+high] AV	(55) HYP [-high] AV
Underlying	H L	H L
	Áyɷ́ *u-butu* NPS AV-ROOT	*Áyɷ́* *o-butu* NPS AV-ROOT
Surface Form	H H L | | |	H H L | | |
	Áyɷ́ *u-butu*	*Áyɷ́* *o-butu*
	Áyɷ́ *úbútù* 'Ayo asks'	*Áyɷ́* *óbútù* 'Ayo would ask'

Two other aspects in the positive group: PROG and FUT, need an Aspect Morpheme.

(56) **PROG [-high] AV:** The PROG Aspect Morpheme is *n-* with a L tone which eventually docks onto the AV by the Aspect Morpheme Tone Docking Rule

(AMTD) first mentioned in §1.1.2b. This Tone Docking, which is the reassignment of a tone to an element of the segmental tier different from the one it was initially assigned to, comes at the very end of the derivation, when all other tones have already been assigned, either by convention or by a rule.

		L H L	
Underlying	*Áyɷ́*	*n-o-butu*	
	NPS	AM-AV-ROOT	
Association Convention		L H L | |	
	Áyɷ́	*n-o-butu*	
ISTC		L H H L | | |	
	Áyɷ́	*n-o-butu*	
AMTD		L H H L \\| | |	
	Áyɷ́	*n-o-butu*	
Surface Form	*Áyɷ́*	*nɔ̌bútù*	Ayo is asking'

(57) **FUT without subject pronoun:** The Future tense without a pronoun has three different realizations, according to the dialect of the speakers. The first two realizations (57a) and (57b) have in common the fact that the AM (*y´-*) carries a H tone (§1.1.2b) and does not undergo any modification on the segmental tier.

The difference between these first two realizations is in the height of the AV. The FUTURE was presented in (31) as having a [+high] AV but with a qualification. In actual fact, when the subject is a pronoun (65), and in two realizations out of three when the subject is a Noun Phrase (57a) and (57c), it does have a [+high] AV. But the most common realization in the dialect I studied (57b), has a [-high] Aspect Vowel.

(57)

	a. FUT [+high] AV	b. FUT [-high] AV
Underlying	H H L	H H L
	Áyɑ́ *y-u-butu*	*Áyɑ́* *y-o-butu*
	NPS AM-AV-ROOT	NPS AM-AV-ROOT
Association Convention	H H L | |	H H L | |
	Áyɑ́ *y-u-butu*	*Áyɑ́* *y-o-butu*
ISTC	H H H L | | |	H H H L | | |
	Áyɑ́ *y-u-butu*	*Áyɑ́* *y-o-butu*
AMTD	H H H L \ | | |	H H H L \ | | |
	Áyɑ́ *y-u-butu*	*Áyɑ́* *y-o-butu*
fusion of 2 H's	H H L | | |	H H L | | |
	Áyɑ́ *y-u-butu*	*Áyɑ́* *y-o-butu*
Surface Form	*Áyɑ́* *yúbútù* 'Ayo will ask'	*Áyɑ́* *yóbútù* 'Ayo will ask'

In the third realization (57c), found in 2 or 3 villages in the dialect I studied, it seems that the underlying form of the AM carried a L tone (instead of a H) and, on the segmental tier, was deleted, even though there is no consonant in the environment. The L tone of the AM docks quite normally onto the AV.

(57) c. FUT [+high] AV

Underlying	L H L
	Áyɑ́ *y-u-butu*
	NPS AM-AV-ROOT
AM Deletion	*Áyɑ́* *u-butu*

Association Convention		L H L | |
	Áyɷ́	*u-butu*
ISTC		L H H L | | |
	Áyɷ́	*u-butu*
AMTD		L H H L \\\| | |
	Áyɷ́	*u-butu*
Surface Form	*Áyɷ́*	*ŭbútù* 'Ayo will ask'

(58) **The PERF with a NP subject** does not take any AV, but presents only the root with a HL pattern:

H L | |	
Áyɷ́ *butu*	'Ayo asked'

3.1.2. Initial Stem Tone Polarization. The second rule at work in the positive group applies when the subject is a personal pronoun prefixed to the Aspect Vowel. This rule, called Initial Stem Tone Polarization (ISTP) causes the AV to take the tone complementary to the first tone of the root. If we call $-T_1$ the complementary tone to T_1, then we have: -H=L and -L=H, and we can represent the polarization rule schematically as follows:

Underlying		T_1	T_2	Tonal tier
	AV-	σ_s	σ_s	Segmental tier
Association Convention		T_1 |	T_2 |	
	AV	σ_s	σ_s	
(59) ISTP	$-T_1$ |	T_1 |	T_2 |	Surface Form
	AV-	σ	σ	

Applications of ISTP in the POSITIVE group:

TONE PATTERN ON THE ROOT: LH

(60) ACC [-high] AV

Underlying L H

f-o-butu
prn-AV-ROOT

Association Convention L H
| |
f-o-butu

ISTP -L L H (-L=H)
| | |
f-o-butu

Surface Form *fóbùtú* 'you have asked'

TONE PATTERN ON THE ROOT: HL

	(61) HAB [+high] AV	(62) HYP [-high] AV
Underlying	H L	H L
	f-u-butu prn-AV-ROOT	*f-o-butu* prn-AV-ROOT
Surface Form	-H H L | | | *f-u-butu*	-H H L (-H=L) | | | *f-o-butu*
	fùbútù 'you ask'	*fòbútù* 'you would ask'

(63) **PERF with a subject pronoun** has a [+high] AV and behaves like all other aspects of the positive group with a pronoun subject, i.e., it is submitted to ISTP:

Underlying H L

f-u-butu
prn-AV-ROOT

Surface Form -H H L (-H=L)
| | |
f-u-butu

fùbútù 'you asked'

(64) **PROG:** In this aspect, the Aspect Vowel has the feature [-high], and the progressive AM *n* `-, being a [+son] consonant in a context where it is preceded by another consonant (the pronoun, *f-* , in the example), undergoes the Sonorant AM Deletion Rule of (10').

Underlying L H L

f-n-o-butu
prn-AM-AV-ROOT

Association Convention L H L
| |
f-n-o-butu

SAMDR L H L
| |
f-o-butu

ISTP L -H H L (-H=L)
| | |
f-o-butu

AMTD L L H L
\| | |
f-o-butu

Fusion of the 2 L's L H L
| | |
f-o-butu

Surface Form *fòbútù* 'you are asking'

(65) **FUT:** Unlike what happened when the subject was an NP, there is only one realization for the FUT when the subject is a pronoun. Segmentally, the AV is a [+high] vowel, and the rule applied to the AM *y* ´- is the Deletion Rule of (10). On the tonal tier, ISTP puts a -H on the AV, then the H tone of the AM docks onto the AV, and the net result is a HL glide on the prefix.

Underlying	H H L *f-y-u-butu* prn-AM-AV-ROOT
SAMDR	*f-u-butu*
Association Convention	H H L | | *f-u-butu*
ISTP	H -H H L (-H=L) | | | *f-u-butu*
AMTD	H L H L \ | | *f-u-butu*
Surface Form	*fûbútù* 'you will ask'

3.2. The Infinitive. The same rule ISTP (59) also applies to determine the tone on the AV in the INFINITIVE form of the verb.

(66) INF [-high] AV

Underlying	L H *o-butu* AV-ROOT

Surface Form -L L H (-L=H)
| | |
o-butu

óbùtú 'to ask'

3.3. The negative group. In the negative group, the presence or the absence of the pronoun subject makes no difference to the tone on the Aspect Vowel. In all cases, the AV bears a H tone, and the Initial Stem Tone Copying and Polarization rules do not apply. A Negative Morpheme, -*m*Ú bearing a H tone, however, is also suffixed to the root. Schematically:

Underlying H T T H
| |
AV-σ_r σ_r-*m*U

Association Convention H T T H
| | | |
AV-σ_r σ_r-*m*U

Surface Form H T T H
| | | |
AV-σ_r σ_r-*m*U

TONE PATTERN ON THE ROOT: L

(67) **ABS NEG**

	NP Subject	**Pronoun Subject**
Underlying	H L H | | *Áyɷ́ u-butu-mu* NPS AV-ROOT-Neg	H L H | | *f-u-butu-mu* prn-AV-ROOT-Neg
Association Convention	H L H | /\ | *Áyɷ́ u-butu-mu*	H L H | /\ | *f-u-butu-mu*
Surface Form	*Áyɷ́ úbùtùmú* 'Ayo doesn't ask'	*fúbùtùmú* 'you don't ask'

(68) **PROG NEG [-high] AV:** For the PROG NEG, the Sonorant AM Deletion Rule (10') is used when the subject is a pronoun. When there is no

pronoun, however, the AM does not delete. In both cases, the tone of the AM remains and docks onto the Aspect Vowel.

	NP Subject	**Pronoun Subject**
Underlying	L H L H | | *Áyɷ́ n-o-butu-mu* NPS AM-AV-ROOT-Neg	L H L H | | *f-n-o-butu-mu* prn-AM-AV-ROOT-Neg
SAMDR		*f-o-butu-mu*
Association Convention	L H L H | /\ | *Áyɷ́ n-o-butu-mu*	L H L H | /\ | *f-o-butu-mu*
ÁMTD	L H L H \\| /\ | *Áyɷ́ n-o-butu-mu*	L H L H \\| /\ | *f-o-butu-mu*
Surface Form	*Áyɷ́ nɔ̌bùtùmú* 'Ayo isn't asking'	*fɔ̌bùtùmú* 'you are not asking'

TONE ON THE ROOT: HL

(69) **SPEC NEG**	**NP Subject**	**Pronoun Subject**
Underlying	H H L H | | *Áyɷ́ o-butu-mu* NPS AV-ROOT-Neg	H H L H | | *f-o-butu-mu* prn-AV-ROOT-Neg
Association Convention	H H L H | | | | *Áyɷ́ o-butu-mu*	H H L H | | | | *f-o-butu-mu*
Surface Form	*Áyɷ́ óbútùmú* 'Ayo hasn't asked'	*fóbútùmú* 'you haven't asked'

(70) **PROV NEG [-high] AV:** The AM *y* `- which appears in the PROV NEG is not deleted when the subject is a pronoun, but it undergoes the Syllabification and Vowel Harmony Rules of (17) and (18) to make up a CVV syllable.

	NP Subject	Pronoun Subject
Underlying	L H H L H | | | *Áyɷ́ y-o-butu-mu* NPS AM-AV-ROOT-Neg	L H H L H | | | *f-y-o-butu-mu* prn-AM-AV-ROOT-Neg
AM Syllabification		*f-i-o-butu-mu*
Association Convention	L H H L H | | | | *Áyɷ́ y-o-butu-mu*	L H H L H | | | | *f-i-o-butu-mu*
AMTD	L H H L H \\\| | | | *Áyɷ́ y-o-butu-mu*	
Surface Form	*Áyɷ́ yǒbútùmú* 'Ayo hasn't asked yet'	*fióbútùmú* 'you haven't asked yet'

3.4. The imperative group. The imperatives behave a bit differently than the positives and the negatives as regards the use of pronouns. First of all, the DIRECT IMPERATIVE with a 2nd person subject and the INDIRECT IMPERATIVE with a 3rd person Noun Phrase subject have neither a pronoun nor an Aspect Vowel, but present the stem in isolation, as was mentioned in (33).

(71) **DIR IMP**

L
|\
butu
ROOT

'ask!'

(72) **IND IMP**

H L
| |
tɷ́ Áyɷ́ butu
NPS ROOT

'make Ayo ask!'

Secondly, DIR IMP and PROH take a pronoun in all persons but the second, even when the subject is specified by a Noun Phrase, as in (73).

In the imperative group, the only tonal rule at work is the Initial Stem Tone Copying rule.

(52) ISTC

T_1	T_1	T_2	Surface
|	|	|	Form
AV-σ_s	σ_s		

This is an addition to the applicability of ISTC in the positive group without subject pronouns.

Here again, as in the negative group, the presence of the pronoun does not cause any other tone than the one copied from the stem to appear on the Aspect Vowel or on the epenthetic vowel inserted between the pronoun and the PROH AM.

Applications of ISTC in the IMPERATIVE group:

TONE PATTERN ON THE ROOT: L

(73) **DIR IMP [+high] Aspect Vowel**

Underlying L

Áyɷ́ *n-u-butu*
NPS prn-AV-ROOT

Association Convention

L
|\
Áyɷ́ *n-u-butu*

ISTC

L L
| |\
Áyɷ́ *n-u-butu*

Surface Form *Áyɷ́* *nùbùtù* 'let Ayo ask'

TONE PATTERN ON THE ROOT: LH

(74) **PROHIBITIVE [-high] AV:** In the PROHIBITIVE, the Aspect Morpheme is *d-* with a L tone. For the 2nd person PROHIBITIVE, the pronoun is zero and the derivation is straightforward (see left hand column of the example data below). For the 3rd person PROHIBITIVE, however, (shown in the right hand column), since the [-son] Aspect Morpheme cannot delete, an epenthetic vowel is inserted between the 3rd person pronoun *n-* and the Aspect Morpheme

d-, in order to avoid the initial consonant cluster *nd.* (See §1.1.1 and §1.1.2.) Since this epenthetic vowel has no tone of its own, it also copies the L tone of the Aspect Morpheme.

	2nd person	**3rd person**
Underlying	L L H | *d-o-butu* AM-AV-ROOT	L L H | *n-d-o-butu* prn-AM-AV-ROOT
Association Convention	L L H | | *d-o-butu*	L L H | | *n-d-o-butu*
ISTC	L L L H | | | *d-o-butu*	L L L H | | | *n-d-o-butu*
AMTD	L L L H \\\| | | *d-o-butu*	L L L H \\\| | | *n-d-o-butu*
Fusion of the 2 L's	L L H | | | *d-o-butu*	L L H | | | *n-d-o-butu*
Epenthesis and Tone Copying		L L L L H | | | | *nu-d-o-butu*
Surface Form	*dòbùtú* 'do not ask'	*nùdòbùtú* 'don't let him ask'

TONE PATTERN ON THE ROOT: HL

(75) **IND IMP [+high] Aspect Vowel**

	2nd person
Underlying	H L
	f-u-butu
	prn-AV-ROOT
Association Convention	H L | |
	f-u-butu
ISTC	H H L | | |
	f-u-butu
Surface Form	*fúbútù*
	'(to make) you ask'

3.5. Exceptions. As I said earlier, the preceding rules apply to all aspects of all verbs belonging to Classes 1 and 2, but there are two little exceptions, however, in Class 2: the ACC with NP subject, and the PROH. We would have expected from §3.1.1 which assigns ISTC to constructions with NP subjects in the positive group, and from §3.3 which assigns ISTC to all constructions in the imperative group, that both (76) and (77) would be subject to this Initial Stem Tone Copying rule. In fact, ISTP is what is needed to get the correct surface form.

The Aspect Vowel, of course, is [-high] from (31e) and (33c). The derivations follow:

CLASS 2	(76) **ACC with NPS.**	(77) **PROH**
Underlying	H *Áyɷ́ e-ye* NPS AV-ROOT	H *d-e-ye* AM-AV-ROOT
Association Convention	H | *Áyɷ́ e-ye*	H | *d-e-ye*
ISTP	-H H | | *Áyɷ́ e-ye*	-H H (-H=L) | | *d-e-ye*
Surface Form	*Áyɷ́ èyé* 'Ayo has vomited'	*dèyé* 'don't vomit!'

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