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SOME PROBLEMS OF SYLLABLE STRUCTURE IN AXININCA CAMPA

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Recent studies of syllable-related phenomena such as Clements and Keyser (1981), Halle and Vergnaud (1980), Steriade (1982) have shown that CV tiers of the kind developed in McCarthy (1981) allow a deeper insight into a wide variety of phonological rules such as rules which change syllabicity, rules of epenthesis, cluster simplification, compensatory lengthening, and so on. The most usual convention governing association between the CV tier and the segmental tier is that vowels are associated with V slots and consonants with C slots. Glides have been treated in various ways, but the most interesting approach has been to assume that glides and vowels differ only in that glides are associated with C slots and vowels with V slots, and that syllabicity as a <u>feature</u> is no longer needed:

$$(1)\qquad [i] = \begin{array}{c} V \\ | \\ i \end{array} \qquad [y] = \begin{array}{c} C \\ | \\ i \end{array} \qquad [u] = \begin{array}{c} V \\ | \\ u \end{array} \qquad [w] = \begin{array}{c} C \\ | \\ u \end{array}$$

In this paper I would like to suggest that this approach is needed not only for the common high vowel-glide pairs in (1), but also for at least one low vowel, <u>a</u>. This is, of course, precisely what one would expect if the CV tier representation is taken seriously. Languages may have representations such as (2):

$$(2)\qquad \begin{array}{c} C \\ | \\ a \end{array}$$

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and these surface as a [+ low, + back] glide. In Axininca Campa (henceforth A.C.), a Peruvian Indian language worked on by David Payne (1981), only such an assumption explains the observed distribution of the "velar glide". Further, I will argue that underlyingly A.C. has unassociated C slots - phantom consonants like those postulated for French and Turkish by Clements and Keyser. In the course of this paper I will also have reason to make the claim that, in A.C. at least, only <u>associated</u> CV slots are syllabified initially, but that if an <u>unassociated</u> CV slot is syllabified by rule, it must subsequently be associated with segmental material.

The organization of the paper will be as follows. First I will show that C-final verb stems and V-final verb stems behave differently with respect to suffixation, and I will motivate rules of <u>a-</u> and <u>t-</u> epenthesis which also apply in reduplication. Second, I will give the distribution facts of the velar glide and briefly discuss the syllable structure of A.C. Third, I will show that stems ending in the velar glide (about whose character I will say more later) behave like C-final stems, but that unlike the other glides <u>w</u> and <u>y</u>, the velar glide alternates with Ø and with <u>y</u>. I will then show how this behaviour is to be expected if the velar glide is an underlying unassociated C that surfaces as the velar glide if associated with <u>a</u>, as <u>y</u> if associated with <u>i</u>, and deletes if unassociated, and that the principles of A.C. syllable structure govern its association. Lastly, I will discuss a special rule that applies in the plural and that apparently deletes the peculiar mixture of epenthetic <u>t</u>, the velar glide, and <u>a</u>; these are precisely the segments that alternate with zero in A.C., and I show that given the preceding analysis of the velar glide, a much more natural explanation of the plural facts is available.

<u>t- and a- epenthesis</u>

The data in (3) illustrate typical verb forms of A.C.:

(3)

		to V V + aaN$¢^h$i	he will V iN + V + i	he will really V iN + V + piro + i
'hear'	kim-	kimaaN$¢^h$i	iNkimi	iNkimapiroti
'hit'	$¢^h$itok-	$¢^h$itokaaN$¢^h$i	iN$¢^h$itoki	iN$¢^h$itokapiroti
'sweep'	pisi-	pisitaaN$¢^h$i	iNpisiti	iNpisipiroti
'heap'	piyo-	piyotaaN$¢^h$i	iNpiyoti	iNpiyopiroti

Before vowel-initial suffixes (first and second columns) C-final stems (hear, hit) are unchanged, but V-final stems (sweep, heap) have an epenthetic <u>t</u> inserted. Conversely, an <u>a</u> is inserted between a C-final stem and a C-initial suffix (third column). This process is morphological, since it applies only in verb suffixation and may break up otherwise permissible syllables. Informally, I give the rules in (4):

$$(4)\quad \emptyset \dashrightarrow \underset{t}{C} \;\;/\;\; V]_{Verb} + \text{----}\;\; V$$

$$\emptyset \dashrightarrow \underset{a}{V} \;\;/\;\; C]_{Verb} + \text{----}\;\; C$$

The alternative analysis would take t, a as belonging to the stem or suffix, and being deleted. In this case it would be necessary to say that either all stems end in a, t or that all suffixes begin in a, t --an odd distribution. There are additional problems with a deletion analysis, but I will not go into them here.

The a-epenthesis rule also applies in reduplicated forms. Any C-final verb stem is reduplicated with -a:

(5) Reduplication

			has continued to V more and more V + V + waitaki
VC	'answer'	ak-	akaakawaitaki
CVC	'cut'	¢^{h}ik-	¢^{h}ika¢^{h}ikawaitaki
VCVC	'look'	amin-	aminaminawaitaki
CVCVC	'fan'	tasoNk-	tasoNkatasoNkawaitaki

There is one set of cases in which a form of t-epenthesis also applies; CV stems are 'extended' to CVCV length by the addition of -ta:

(6)	CV	'carry'	na-	natanatawaitaki
		'kiss'	t^{h}o-	t^{h}otat^{h}otawaitaki

This ta epenthesis actually happens in other environments too. The details of the rules remain to be worked out, but it is clear from (3), (5) and (6) that a and t epenthesis apply after C and V final stems in certain environments.

Velar glide distribution

Having set the scene, let us now look at the velar glide. Payne says (p. 71):

> "The velar glide is the weakest of the consonants in Axininca. Its articulation involves very little tongue movement from the neutral /a/. It occurs only between [+ low] vowels (as the glide corresponding to the low vowel) and, furthermore, only occurs contiguous to a long vocalic sequence or preceding /a ##/. Being weak, it is lost in any other environment which can afford to lose it, i.e. where it will not yield an unacceptable vowel cluster."

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Although I use Payne's term 'velar glide', his own description suggests that it should more properly be called a pharyngeal glide, since it is apparently articulated like /a/, i.e. [+ low, + back]. As the glide corresponding to /a/ it would, in our framework, be $\underset{a}{\overset{}{C}}$.

I will show that taking it to be this allows us to account for its distribution rather simply.

First, the facts. It is found only between a's, and either preceded or followed by a vowel cluster, or between /a -- a ##/. In general A.C. syllables may consist of:

(7) Syllable structure

(C) V (V) (N)
Medially, CV(V)(N)
Possible VV: aa,oo,ii,ai,oi
Word finally: ai,oi

Word medially, all syllables are C-initial. The two vowels may be identical, or the second must be i, giving aa, oo, ii, ai oi as the possible sequences. Word-finally, however, only the non-geminate ai, oi are possible.

With this in mind let us look at the verb stems in ɡ, as Payne writes the velar glide. The chart in (8) gives stems ending in short and long vowels, glides after similar and dissimilar vowels, and the velar glide after short and long vowels, each before a variety of suffixes.

(8) Stems in vowels, glides, and velar glide ɡ

	to V V + aaN¢^{h}i	I have V no + V + aki(ro)	you will V po + V + i(ro)	she might V continually o + V + waitiroota
koma- paddle	komataaN¢^{h}i	nokomataki	iNkomati	oNkomawaitiroota
naa- chew	naataaN¢^{h}i	nonaataki	pinaati	onaawaitiroota
kay- hull	kayaaN¢^{h}i	nokayaki	nokayi	oyawaitiroota (oy- = 'wait')
piy- lose	piyaaN¢^{h}i	nopiyakiro	piNpiyiro	oNpiyawaitiita
taɡ- burn	taɡaaN¢^{h}i	notaakiro	piNtayiro	oNtaawaitiroota
oyaaɡ- insert	oyaaɡaaN¢^{h}i	noyaaɡakiro	poyaayiro	oyaaɡawaitiroota

The V-final stems (first two) trigger t-epenthesis before V-initial suffixes (first three columns) as expected. The true glide-final stems (second two rows) do not, but show a-epenthesis before C-initial suffixes (last column). The stems in g (last two) show no t-epenthesis in columns 1-3, and for tag- (ag, mag, kag), an alternation $g \sim \emptyset \sim y$, for oyaag $g \sim y$ only. Furthermore, an extra a shows up before C-initial suffixes (last column), suggesting a-epenthesis has taken place even though, in the case of tag (ag), there is no visible consonant.

Suppose these roots are of the form in (9).

```
(9)  tag    C V C        oyaag   V C V V C
            | |                  | | \/
            t a                  o i  a
```

(I am assuming long vowels are only sequences on the CV tier, as required if we assume some form of the Obligatory Contour Principle.)
Since the stems in (9) end in C, they will rightly fail to trigger t-epenthesis but will trigger a-epenthesis, exactly as desired. The empty C-slot will then either be associated with some segment during the derivation, or not. If not, it will never surface--that is the velar glide will appear to delete; if associated with a it will surface as the velar glide, and if associated with i it will surface as y. The remaining task is then to discover the rules governing association of this C-slot. Payne noted that the velar glide is lost only 'where it will not yield an unacceptable vowel cluster': in other words, it only surfaces if necessary for proper syllabification. The environments in which g surfaces--between two a's and adjacent to a long vowel--are environments where its deletion would yield an unsyllabifiable three vowel sequence. The exception -word-finally between two a's, is also unsyllabifiable since word final vowel clusters must be non-geminate.

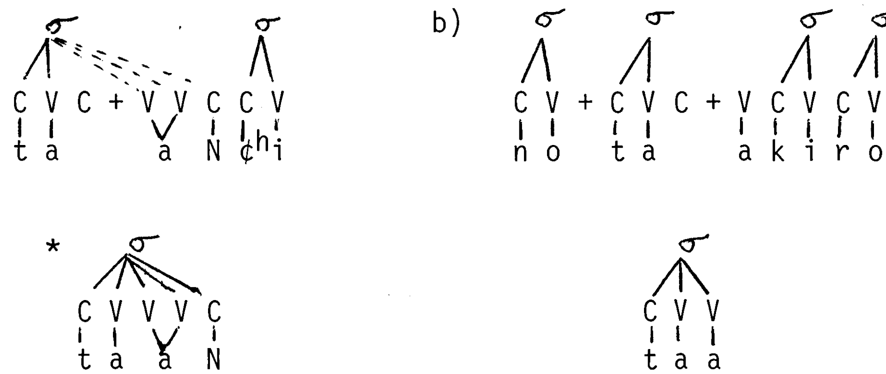
Suppose that the rules of A.C. syllabification are those given in (10).

(10)
- I. Syllabify all associated CV elements as far as possible.
- II. If associated material is left unsyllabified, use available unassociated CV slots for syllabification.
- III. At the end of the derivation all syllabified CV slots must be associated with tautosyllabic material.

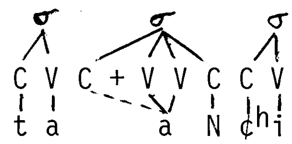
These rules have the effect of involving the unassociated C in syllabification only if there would otherwise be unsyllabifiable vowel clusters. Once syllabified the C slot must then be associated and will surface, usually as g.

Let us now look at how this works for tag followed by long and short a suffixes as shown in (11) and (12).

(11) a) b)



(12) a) b)

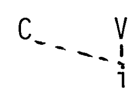


[tagaaN¢^{h}i] [notaakiro]

The solid lines in (11) show syllabification by (10.I); the middle portion of (11a) is not properly syllabifiable without using the unassociated C slot, since there is a three-vowel sequence. By (10.II) we get the syllabification shown in (12a), and the dotted line associating C to a is inserted by (10.III). The result is [tagaaN¢^{h}i], with the velar glide. In (11b), however, before a short V suffix, proper syllabification is possible without the C slot, so we get simply [notaakiro] --the velar glide has deleted.

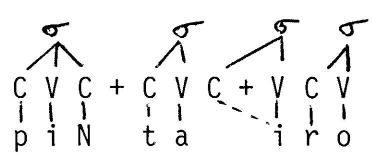
As for the remaining forms in (8), first look at tag before the high vowel suffix -i. In front of a high vowel a special rule of high-front vowel spreading is needed:

(13) High Vowel Spreading



The glide insertion and palatalization facts of A.C. suggest that this rule may apply to associated as well as unassociated C elements alike, so I have stated it very generally here. This yields, after syllabification:

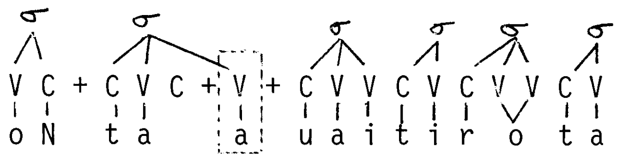
(14)



[piNtayiro]

Before C-initial suffixes a-epenthesis happens, since these stems end in C:

(15)

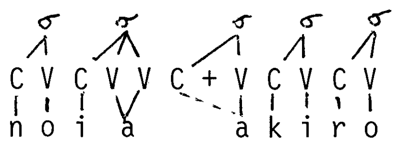


[oNtaawaitiroota]

This is properly syllabifiable by principle (10.I), so we get [oNtaawaitiroota].

The long V stem <u>oyaag</u> differs only in that even a short vowel suffix like <u>-aki</u> requires the unassociated consonant for proper syllabification;

(16)



[noyaagakiro]

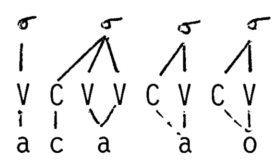
and the syllabified C, by (10.III) becomes associated with <u>a</u> to give [noyaagakiro]. The velar glide thus never deletes when preceded by a long V in the stem.

There is one case in which <u>g</u> alternates with <u>w</u>: Informants hesitate over the two forms in (17).

(17) ac̦aagawo ac̦aagago 'my things'

If these are represented as:

(18)



then, since <u>ao</u> is not a possible vowel cluster in A.C., <u>both</u> C elements are needed for proper syllabification, as shown. The only question is how the association works. The first C must be associated with <u>a</u> and surfaces as <u>g</u>, but the second would by (10.III) be associated with <u>o</u> giving, we would expect, a rounded <u>uvular</u> glide. In fact the informant hesitates between the two forms in (17), giving sometimes the rounded non-low truly velar [w] and sometimes the unrounded non-high pharyngeal [g] : such a hesitation is not surprising since the morphology never produces other tokens of $\underset{o}{C}$.

<u>Plural alternations</u>

In (19) A I show the plural forms of several verbs. Stems ending

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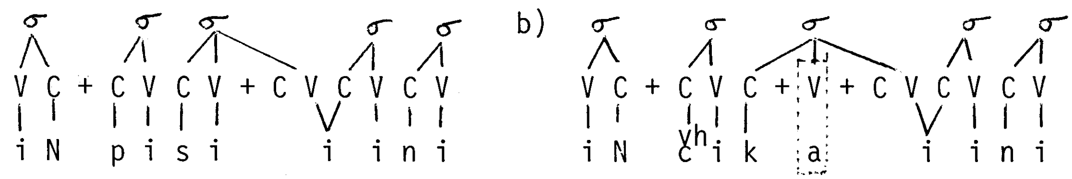
in vowels and ǥ have the alternative pronunciations in column B. The forms in A have the suffix aiy (+ini), triggering t-epenethesis in vowel final stems; those in B differ in that the a is missing, no t-epenthesis happens, and ǥ is deleted.

(19)

	A	B
	iN + V + aiy + ini	iN + V + Ciy + ini
'sweep' pisi-	iNpisitaiyini	iNpisiiyini
'paddle' koma-	iNkomataiyini	iNkomaiyini
'cut' $\check{c}^h$ ik-	iN$\check{c}^h$ikaiyini	-
'wait' oy-	hoyaiyironi	-
'sleep' maǥ-	himaǥaiyini	himaiyini

I would like to suggest that the plural suffix has two suppletive forms: $\underset{a}{V}\,\underset{i}{V\,C}$ and $C\,\underset{i}{V\,C}$, the second with an unspecified consonant. This proposal immediately explains most of the above facts, in this way: The column A forms are derived exactly as expected, and I will say no more about them. Consider now pisi- and $\check{c}^h$ik- and the column B suffix:

(20) a) b)



[iNpisiiyini] [iN$\check{c}^h$ikaiyini]

In (a), no epenthesis will take place, and the string is syllabifiable as is, so we get [iNpisiiyini] ; in (b) we have C + C, so a-epenthesis happens and syllabification proceeds normally and we get [iN$\check{c}^h$ikaiyini] . This is the same form as in column A, so the 'absence' of B-type forms for C-final stems is now seen as straightforward surface merger as a result of standard a-epenthesis. The lack of t-epenthesis in (a) is also due to the presence of the unassociated initial C slot in the suffix.

In (21) I show the ǥ-final form.

(21)

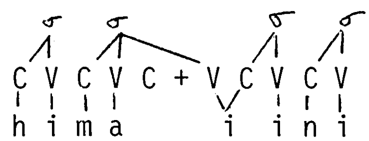
```
C V C V C + C V C V C V
| | | |       \/  | | |
h i m a        i  i n i
```

There are two adjacent C elements here, so we might expect a-epenthesis, but in fact it doesn't happen. I therefore propose a rule deleting an unassociated C next to another unassociated C:

(22) $C' \rightarrow \emptyset \ / \ C'$ ---

This then gives us (23):

(23)



[himaiyini]

Syllabification works as shown, and we get [himaiyini] . Postulating an underlying unassociated consonant slot for the column B forms simultaneously explains the lack of t-epenthesis and the non-existence of surface alternates for the C-final stems. The only rule is a straightforward one simplifying sequences of unassociated consonants. By contrast, Payne needs a rule deleting the unlikely mixture of a, epenthetic t, and the velar glide g.

Conclusions

I hope to have shown that A.C. provides evidence not only for the existence of a CV tier and underlying unassociated elements on that tier, but also for the theoretically desirable extension of the use of vocalic elements associated with C slots to the non-high vowels. I also hope to have shown that syllabification in A.C. at least must crucially distinguish between associated and unassociated CV elements, in contrast to Clement's and Keyser's assumptions for Turkish and French.

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