Effects of /ʔ/ deletion in Wanka Quechua

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0. Introduction

The term "compensatory lengthening" has been used to describe a prosodic structure preservation phenomenon where the loss of one segment results in the lengthening of another. Compensatory lengthening (CL) is often a diachronic phenomenon, as in Latin, where the deletion of preconsonantal /s/ resulted in the lengthening of the immediately preceding vowel. But CL may also occur in synchronic morphophonemic alternations. In Luganda (Clements 1986), for example, the formation of a glide from a fully syllabic vowel nucleus results in the lengthening of the following vowel.

CL in the Wanka dialect of Quechua is the synchronic reflection of the pre-consonantal deletion of a /ʔ/. But as can be seen from Cerrón's comparison of numerous sub-dialects (1973), CL is only one of the many traces or side-effects of /ʔ/ loss that we observe.

While elegant diachronic and synchronic analyses of CL in a variety of languages have been proposed within recent frameworks (cf. Hayes 1987), it is reasonable to expect phonological theory to explain not only CL phenomena cross-linguistically, but also related phenomena within a single language. To the extent that a theory accomplishes this it is adequate.

In this paper, we will examine data from Wanka Quechua, focusing specifically on instances of CL as well as various other synchronic and diachronic side-effects of /ʔ/ deletion from the contrasting perspectives of CV phonology and moraic phonology. It will be shown that while both of the theories provide adequate accounts of CL, they encounter problems with respect to their treatment of the related phenomena. In spite of a number of indeterminacies, CV phonology has greater descriptive potential to account for the Wanka data due to certain consequences of the theory's representational system.

In the first section, we present an overview of the theories. In section 2, we describe the data that the theories must explain. We compare how each framework would analyze the data in section 3. In section 4 we reconsider the data strictly from the point of view of CV phonology and attempt to show that apparently anomolous derivational paths can be explained in terms of a principle of markedness reduction which I will expand. Section 5 discusses two further theoretical issues that the data bear on. We conclude with some final remarks in Section 6.

## 1.0 Overviews of moraic phonology and CV phonology

1.1 CV phonology (CVP)

The inadequacy of a strictly linear phonology in accounting for many generalizations prompted a formalization of the general notion of the syllable that had already been a part of structuralist descriptions (cf. Pike and Pike, 1947). Many works, such as those of Kahn (1976), Goldsmith (1976), Clements and Keyser (1983), Selkirk (1986) and others, develop analyses involving variations on a hierarchical multi-tiered conception of the syllable. Features such as [+long], that in Chomsky and Halle (1968) are associated with individual segments, are abandoned in these models for multi-tiered representations. Clements and Keyser utilize a scheme incorporating a system linking elements on a melodic tier to the CV tier (also called the "skeleton" or "core") which comprises C and V nodes corresponding to [+cons] or [-cons] respectively. These in turn are organized into syllables according to set principles of onset and coda creation (cf. Vogel (1977) and Lowenstamm (1981) for discussion of possible formalizations of

syllabification principles).

A widely accepted well-formedness condition on hierarchical representations proposed by Leben (1973) and named the Obligatory Contour Principle (OCP) by Goldsmith (1976) prohibits the repetition of adjacent identical segmental content on the melodic tier.[1] We thus derive representations of hypothetical forms such as those in (1). Note that the theory allows one-to-many and many-to-one linkings between melodic and CV tiers, as can be seen in b. and c.:

(1)

```
syllable tier    a. $      $      b. $      $      c. $      $
                    /|\    /|\        /|\    /|\        /|    /|\
CV tier             C V C  C V        C V V  C V        C V  C C V
                    | |  \ / |        | | \  / |        | |  | / |
melodic tier        t a    n  t a     t a    t a        t a  m b a

                    [tanta]            [ta:ta]           [tamba]
```
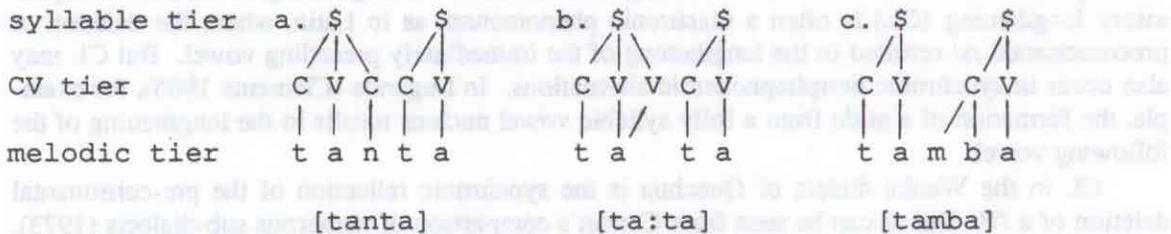
The OCP predicts that structures like (2)a. may resolve to produce (2)c. As a single long vowel cannot be associated with two distinct syllables, the representation of a long vowel as in b. is ruled out by convention as being ill-formed.

(2)

```
        a. $  $        b. *$  $        c.  $  $
            \ /            \  |           \  /
             V  V           V  V           V V
             |  |            \ |            \ /
             a  a             a a            a
```
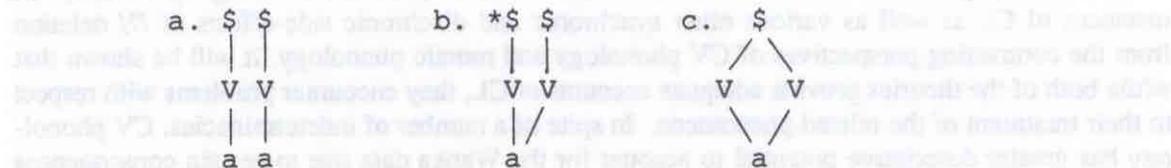
CL in this theory is the result of a segment on the melodic tier "spreading" to a node on the CV tier which has become unassociated through segmental deletion. Direction of spreading is stipulated language-specifically as being to the right or left.

(3) shows how CL is likely to occur. Since segmental deletion rules in CVP are written in terms of the melodic tier only, the deletion of a segment in the underlying representation (a.) results in an unassociated element on the CV tier (b.). The vowel preceding the empty node then "spreads" and becomes associated with more than one element on the CV tier (c.).

Note that the long vowel in (3)c. is linked to both a V and a C node rather than to two V nodes as it is above in (1). We will address this issue in section 5. For the present we will assume that this is not problematic and will allow long vowels to be represented as involving associations to either two V nodes or to a V and a C node.

(3)

```
        a. $      $      b. $      $      c. $      $
           /|\    /|\       /|\    /|\       /|\    /|\
           C V C  C V       C V C  C V       C V C  C V
           | | |  | |       | | |  | |       | |  \ | |
           t a t  a         t a    t a       t a    t a    = [ta:ta]
```
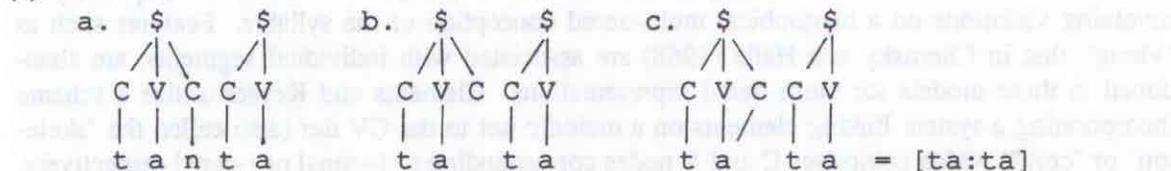
1.2 Moraic Phonology.

It has long been noted that phonological processes in many languages may be sensitive to particular syllable types. The application of a rule may depend on whether the syllable is "light" or "heavy". Latin stress, for example, is elegantly analyzed as falling on the first "heavy" non-ultimate syllable. Most often "light" syllables are those which are open ((C)V), while the term "heavy" is applied to both closed ((C)VC) syllables and syllables with with a long vowel ((C)V:).

Moraic phonology (MP), based on work by Hyman (1985), McCarthy and Prince (1986), and Hayes (1987), centers around the importance of syllable "weight", and formulates analyses in terms of weight/timing units or morae. A light syllable contains one mora and a heavy syllable contains two.[2] Hayes, for example, shows that by doing so, particularly difficult cases of CL phenomena can be accounted for in a simpler way than can be achieved under the CVP framework. Furthermore, the two theories make different empirical predictions concerning typologies of CL: MP predicts only those types which are known to occur, while CVP predicts not only these, but also others which are logical possibilities but are not attested.

The representations in (4) show that in this view morae (m), rather than C's and V's, are the immediate constituents of syllables. Long segments are linked to two morae, short segments to one. Syllable-final consonants are associated with their own mora, but onsets are not, since they seem to make no contribution to syllable weight.[3] Thus a syllable with a long vowel has the same bimoraic prosodic representation as a closed syllable.

(4)

a. $ $ b. $ $ c. $ $
    | | |\ | |\ |
    m m   m m   m   m m   m
   /| /| /|/   /| /| | /|
  t a t a   t a   t a   t a n t a

  [tata]   [ta:ta]   [tanta]
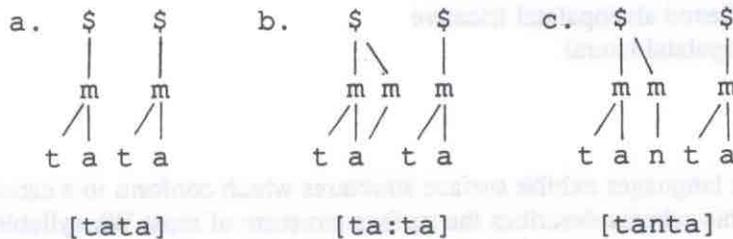
Like the CVP approach of Clements and Keyser, MP states segmental deletion rules in terms of the melodic tier. In (5)b. we see a hypothetical example where the deletion of a segment may strand a mora, in which case an adjacent segment then spreads to the stranded mora, resulting in CL (c.):

(5)

a. $ $ b. $ $ c. $ $
   |\ | |\ | |\ |
   m m   m   m m   m   m m   m
  /| | /| /| /| /|/   /|
 t a n t a   t a   t a   t a t a   = [ta:ta]
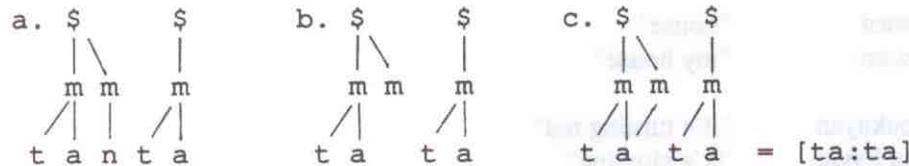
Note that in this view inherently long vowels and vowels derived as a result of CL have the same representation. Furthermore, we avoid CVP's apparently contradictory representation, i.e. a single element on the melodic tier that is simultaneously associated to [+cons] and [-cons] nodes.

Both theories will need a rule (N-erasure) which deletes an unassociated node from the skeletal tier when spreading does not apply.

1.3 Summary

In this section we have compared the basic principles of CVP and MP, briefly illustrating the process of segmental deletion and the mechanisms utilized to account for CL phenomena. In the following section we will discuss the diachronic and synchronic facts related to /ʔ/ deletion in the Wanka dialect of Quechua, which we will then examine from the perspectives of the two theories.

2.0 The data

2.1 Wanka Quechua

Wanka Quechua (Wk) is spoken in the central Peruvian Andes near and around the city of Huancayo, in the department of Juni'n, and is the first language of approximately 250,000 people. It is classified among those dialects variously known as either Quechua B (Parker 1963), Quechua I, (Torero 1964) or as Central Peruvian (Landerman 1981). The data were collected between 1982 and 1986 under the auspices of the Summer Institute of Linguistics and the Peruvian Ministry of Education. Unless otherwise specified, the data are representative of the dialect as it is spoken in the community of San Pedro de Pihuas, in the district of Cullhuas.

I have utilized the the following phonetic conventions:

$\hat{c}$ = retroflexed alveopalatal affricate
$\hat{s}$ = retroflexed alveopalatal fricative
λ = alveopalatal lateral.

2.2 Syllable structure

Almost all Quechua languages exhibit surface structures which conform to a canonical syllable pattern, (C)V(C). This schema describes the surface structure of most Wk syllables as well. (Apparent exceptions involve instances of /ʔ/ loss, and so we will postpone discussion of these for the present.) Like most of the central dialects of Quechua, Wk exhibits contrastive vowel length:

(6)

a. takuyalkan	"they are stirring"	
b. ta:kuyalkan	"they are sitting down"	
c. wasi	"house"	
d. wasi:	"my house"	
e. pukayan	"it's turning red"	
f. pu:kayan	"it's blowing"	

There are three constraints on syllable structure which we indicate in (7): V-initial syllables can occur only word initially, long vowels never occur in closed syllables, and sequences of distinct vowels do not occur in the same syllable.

(7)

    a. *...$V...
    b. *$ (C)V:C $
    c. *V_iV_j$$

VC and V: constitute "heavy" syllables, which figure in certain morphophonemic alternations that are sensitive to the light/heavy distinction. For example, the morphemes for DIRect evidence, GENitive, ACCusative, INDirect evidence, and CONJecture in) have alternate forms depending on whether the preceding syllable is "Light" or "Heavy" (shown in (9)):

(8)

Following	Light $	Heavy $
DIR	-m	-mi
GEN	-p	-pa
ACC	-kta	-ta
IND	-š	-ši
CONJ	-ĉ	-ĉa

(9)

DIR	GEN	ACC
malka-nčik-mi	akaŝ-pa	am-ta
town-12P-DIR	guinea:pig-GEN	you-ACC
wamla-:-mi	aλu-:-pa	wasi-:-ta
girl-1P-DIR	dog-1P-GEN	house-1P-ACC
walmi-m	amu-p	aŝnu-kta
woman-DIR	manure-GEN	donkey-ACC

Further evidence that Wk morphology is sensitive to a light-heavy syllable distinction comes from alternations in the forms of possessive suffixes. If one of the possessive suffixes in (10) is attached directly to a stem ending in a C, as in (11)b, d. well-formedness constraints on syllable structure will be violated. In such cases the epenthetic syllable -ni is inserted between the root and the possessive marker:

(10)

-:	"1P"
-yki	"2P"
-n	"3P"
-nčik	"12P"

(11)

    a. aŝnu-:
    b. akaŝ-ni-:

    c. čakla-nčik
    d. čikiš-ni-nčik

This same process applies to stems ending in a long vowel:

(12) a. mama-n   "his mother"
       b. papa:-ni-n   "his father"

In the examples above a long vowel determines the variant of the morpheme that follows it. We refer to the phenomenon whereby underlying vowel length the survives the course of the derivations as long vowel "retention". Although retention occurs with nominals, potential syllable canon conflicts in verbal morphology are resolved by vowel truncation, i.e. underlying long vowels are shortened in closed syllables.

(13) li-ya:-lka:-n ⟹ liyalkan   "they are going"
     go-IMPF-PL-3

Thus the language has two strategies for dealing with violations of syllable canonicity depending on morphological class. Not surprisingly, then, nominalized verbs may consequently exhibit vowel truncation as well as vowel retention. Example 14 shows shortening of the first long vowel, but retention of the third.

(14) li-ya:-lka:-ŝa-:-kta ⟹ liyalka:ŝa:ta "our going ACC"
     go-IMPF-PL-NOM-1-ACC

Thus far we have examined constraints on syllable canonicity and strategies for dealing with potential violations. We now turn to the diachronic and synchronic effects of /ʔ/ deletion.

2.3 Effects of /ʔ/ deletion at word boundaries

According to Cerrón (1976 a,b,c) the reflex of proto-Quechua */q/ in Wk is /ʔ/[4] , which synchronically does not appear word initially. (15) shows the forms reconstructed for proto-Wanka compared to the synchronic forms:

(15)

*Wk   Wk

a. ʔam   am   "you"
b. ʔuy   uy   "give"
c. ʔišyay išyay   "be sick"

Word-finally there is free variation between /ʔ/ and ∅. Yet when followed by another suffix, e.g. -mi "DIR", both forms evidence CL:

(16)

a. pusa?	pusa	pusa:mi	"eight"
b. atu?	atu	atu:mi	"fox"
c. -pa?	-pa	-pa:mi	"PURPOSE"
d. -nila?	-nila	-nila:mi	"SIMILARITY"

2.4 Effects of /ʔ/ deletion word-internally

As mentioned above, deletion of /ʔ/ pre-consonantally results in CL. Furthermore, there is a neutralization of contrast between */Vʔ/ and */V:/ in this environment; all synchronic forms show the latter and are therefore indistinguishable from other forms with original long vowels in this position[5]:

(17)

*Wk	Wk	
a. aʔča	a:ča	"hair"
b. suʔta	su:ta	"six"
c. taʔšay	ta:šay	"wash clothes"
d. ĉiʔniy	ĉi:niy	"hate"
e. wa:la	wa:la	"morning"
f. pu:kay	pu:kay	"blow"
g. wi:win	wi:win	"it slithers"

Post-consonantal deletion of /ʔ/ parallels word-initial deletion in the vast majority of instances, in that there are no discernible synchronic "traces" of the /ʔ/:

(18)

*Wk	Wk	
a. hulʔuy	huluy	"go out"
b. ayʔin	ayin	"he flees"
c. likalʔa	likala	"he saw it"

However, consider */nʔ/ consonant clusters. (19) shows that /n/ has a syllable-final velar allophone (a.-c.) unless it is followed by a stop, in which case there is assimilation to the stop's point of articulation (d.-f.).

(19)

a. mama-n   →   [máman]   "his mother"
    mother-3

b. mama-n-si   →   [mamánsi]   "his mother also"
    mother-3-ALSO

c. mama-n-la   →   [mamánla]   "his mother still"
    mother-3-STILL

d. mama-n-pa   →   [mamámpa]   "his mother's"
    mother-3-GEN

e. mama-n-ta   →   [mamánta]   "to his mother"
    mother-3-ACC

f. mama-n-kuna   →   [mamankúna]   "his mothers"
    mother-3-PL

Even when /ʔ/ has been deleted, the syllable-final velar allophone surfaces intervocalically:

(20)

a. *tanʔay   →   [taŋay]   "push"
b. *kutinʔa   →   [kutiŋa]   "he will return"
c. *mamanʔa   →   [mamaŋa]   "his mother TOP"

That the [ŋ] is indeed syllable-final is corroborated from careful pronunciations of the above words, where syllabification clearly takes place after the nasal, not before. (Compare this with careful pronunciations of the words in (18), where syllabification takes place before the consonant which begins the second syllable.) Furthermore, in native authored texts a word such as (20)a. may appear written as *tan-ay, tanhay*, or even as two separate words *tan ay* with the explanation, "it's like two words but it's really only one."

    Thus we see that the syllable-final allophone of /n/ provides the only synchronic trace of post-consonantal deletion of /ʔ/. Furthermore, unlike all other instances of post-consonantal /ʔ/ deletion, the forms here appear to be violations of the syllable canon in that superficially the syllable following the /n/ begins with a vowel.

    Finally, consider intervocalic deletion of /ʔ/. Historically, if the first vowel was [+hi] the /ʔ/ was replaced by a transition glide sharing the rounding features of the first vowel:

(21)

a. *uʔa   →   uwa   "tuber"
b. *uʔi   →   uwi   "gray"
c. *wiʔaw   →   wiyaw   "waist"

If, however, the first vowel was [-hi] we observe another apparent synchronic exception to syllable canonicity:

(22) *a?uy → auy "massage"

Now consider the data in (23). The historical deletion of /?/ between identical vowels has resulted in the possibility of multiple synchronic forms:

(23)

                                  b. ya:-ta "to me"
                                       I-ACC

a. *ya? a'. ya:

                                  c. ya:-kta "to me"
                                       I-ACC

                                  e. ñi:-ni-n "his mud"
                                  mud-(epenth. $)-3P

d. *ñi?i d'. ñi:

                                  f. ñi:-n "his mud"
                                  mud-(epenth. $)-3P

Deletion of /?/ produces a citation form with a phonetically long vowel. We would initially assume that forms a'. and d'. are composed of heavy syllables and consequently enter into those morphological processes which are sensitive to heavy syllables, as we see in b. and e. But notice that a'. and d'. also participate in morphological processes associated strictly with light syllables (c.) and (f.). Further note that c. and f. on the surface appear to be violations of the prohibition on long vowels in closed syllables.

    So we see that deletion of /?/ between vowels resulted in a transition glide, apparent violations of syllable canonicity and/or multiple synchronic forms.

    By way of summary, we see that the deletion of /?/ has had multiple effects depending on the environment. These are summarized in (24).

(24)

| Environment	Effects of deletion
#?	no trace
?#	Ø ˜ ?
?C	CL
C? (if C ≠/n/)	no trace, resyllabification
n?	velar allophone; syll.-structure violation
V[+hi] ? V	transition glide
V[-hi] ? V	syll.-structure violation
V1 ? V1	2 surface forms; syll.-structure violation

We now turn to an examination of how the two theories account for the Wk data.

3.0 Comparison of analyses

## 3.1 Word boundary deletions

(25) illustrates how the CVP approach accounts for the diachronic facts in a derivation involving word-initial /ʔ/ deletion. We would assume an initial structure such as that in a. Deletion of /ʔ/ derives the structure in b., which leaves an unassociated C in the CV tier. According to the principles of CVP, we could theoretically derive a long vowel at this point by spreading the [a] leftward. But since CL in this environment is not attested either in Wk or cross-linguistically, the theory requires that we stipulate a general constraint against leftward spreading to an onset. A rule of N-erasure may then apply at the end of the derivation to produce the correct structure in c.:

(25)

```
     a.    $          b.    $          c.    $
          /|\              /|\              |\
         C V C            C V C            V C
         | | |              | |            | |
         ? a m            a m          a m   = [am]
```
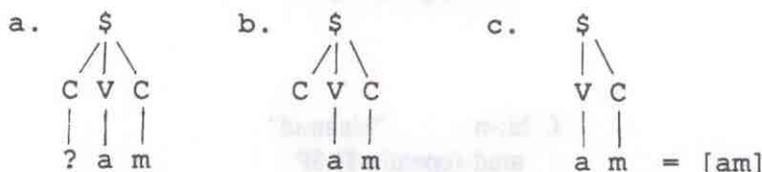
The MP derivation proceeds as illustrated in (26). Segment loss produces the structure in b. Since syllable-initial segments do not have their own mora, there is no mora stranding when the segment is deleted. So MP derives the correct form directly without the need of a rule of N-erasure, or the stipulation against leftward spreading.

(26)

```
     a.    $              b.    $
           |\                   |\
          m m                  m m
          | |                  | |
         ? a m               a m    = [am]
```
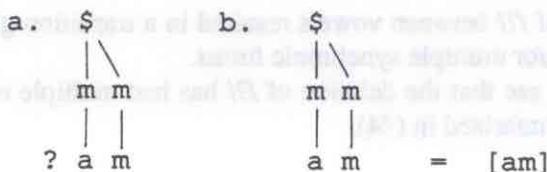
With respect to word-initial /ʔ/ deletion, then, both theories account for the diachronic facts. In one respect the MP account is more elegant than the CVP account; there is no need to stipulate against leftward spreading, which consequently eliminates the need for N-erasure word-initially.

Word-final fluctuation between /ʔ/ and ∅ can be explained in terms of an optional /ʔ/-deletion rule. If the rule applies, the CVP account would be that which is illustrated in (27). We assume the underlying representation in a., to which we apply /ʔ/ deletion to derive the structure in b. In theory, the unassociated C node could prompt CL in c., so we must specify that spreading may not occur word-finally either. The correct structure is d., after application of N-erasure.

(27)

```
        a.    $    $              b.   $    $
             /|  /|\                  /|  /|\
            C V C V C              C V C V C
            | | | | |              | | | |
            p u s a ?              p u s a
```

```
        c.    $    $              d.   $    $
             /|  /|\                  /|  /|
            C V C V C              C V C V
            | | | |/               | | | |
            p u s a = *[pusa:]     p u s a = [pusa]
```
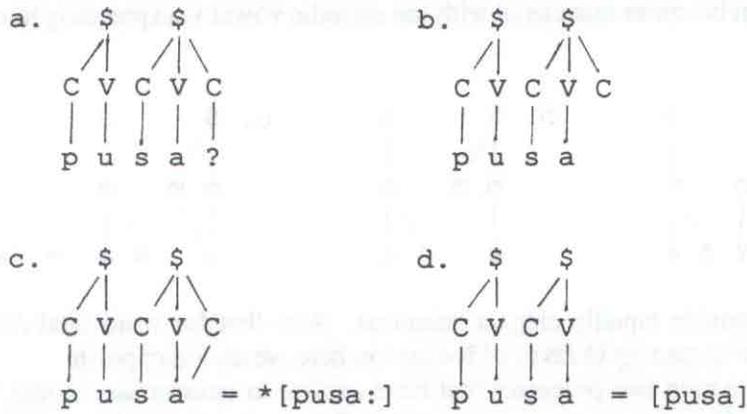
The MP derivation appears in (28).

(28)

```
     a.   $     $                  b.     $     $
          |     |\                        |     |\
          m    m m                        m    m m
         /|   /| |                       /|   /|
        p u s a ?                       p u s a
```

```
     c.   $     $                  d.     $     $
          |     |\                        |     |
          m    m m                        m    m
         /|   /|/                        /|\   /|
        p u s a  = *[pusa:]             p u s a = [pusa]
```
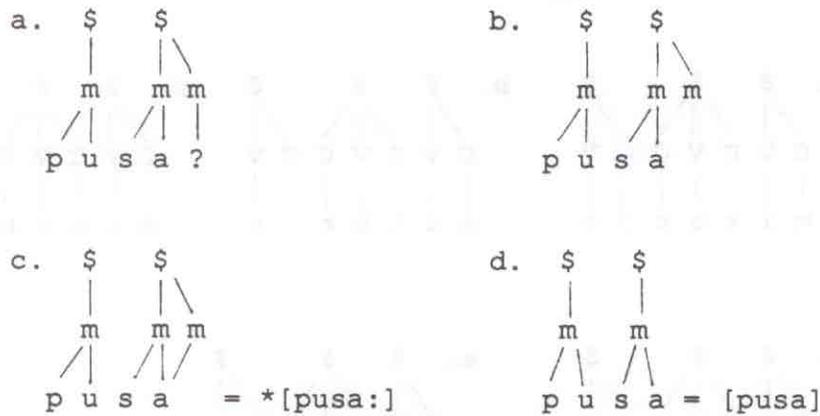
A general restriction on word-final spreading must be incorporated under this view as well, to prevent the incorrect c., rather than the correct d. Note, however, that in this instance MP needs N-erasure to delete the stranded mora.

Therefore, provided that we specify that spreading may not occur word-finally, both theories account for the synchronic data equally well.

3.2 Word-internal deletions

The diachronic deletion of /ʔ/ pre-consonantally resulted in CL, and all instances are adequately accommodated by both theories.

The mechanisms available in CVP produce a derivation such as that given in (29). Deletion on the melodic tier results in an unassociated C node (b.), which then becomes associated with a vowel segment on the melodic tier via spreading (c.):

(29)

```
     a. $    $        b. $    $        c. $    $
        |\  /|\          |\  /|           |\  /|
        V C C V C        V C C V          V C C V
        | | | | |        | | | |          | |/ | |
        a ? č a          a   č a          a   č a  = [a:ča]
```
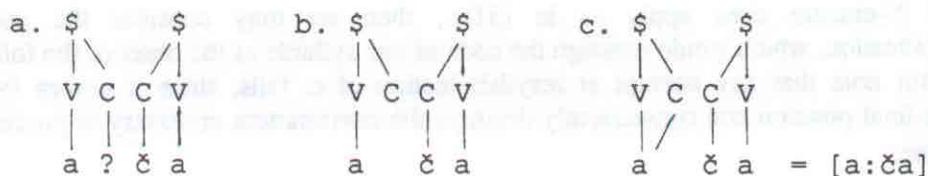
The corresponding MP derivation follows in (30). Deletion on the melodic tier strands a mora in b., which then becomes associated with the melodic vowel via spreading in c.:

(30)

```
    a.  $       $         b.  $       $         c.  $       $
        |\      |             |\      |             |\      |
        m m     m             m m     m             m m     m
        | |    /|             |      /|             |/     /|
        a ? č   a             a     č a             a    č  a   = [a:ča]
```
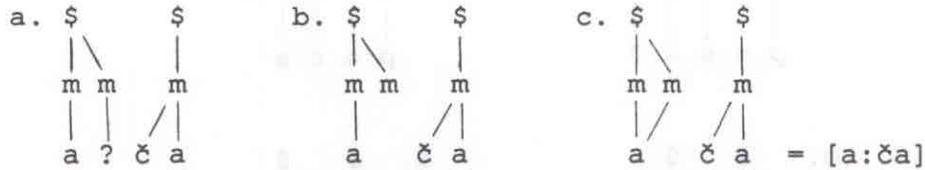
Both theories provide equally elegant solutions. Note that for word-final /ʔ/ deletion we suspend application of spreading in favor of N-erasure; here we do the opposite.

Thus far we have seen two processes that have applied to unassociated nodes in the course of a derivation: either N-erasure, as we saw in section 3.1 or vowel spreading resulting in CL, as in section 3.2. We now examine deletion of /ʔ/ after /n/ and show that neither rule must apply to the unassociated C; it must remain in the structure unassociated. Consider aspects of the CVP derivation involving the FUTure morpheme *-n?a:

(31)

```
    a.  $    $    $        b.  $    $    $        c.  $    $   *$
       /|  /|\  /|            /|  /|\  /|            /|  /|\  |
      C V C V C C V          C V C V C C V          C V C V C V
      | | | | | | |          | | | | |   |          | | | | | |
      m i k u n ? a          m i k u n   a          m i k u n a
```

```
    d.  $    $    $        e.  $    $    $
       /|  /|\  /|            /|  /|\  /|
      C V C V C C V          C V C V C C V
      | | |  | | |           | | | | |/  |
      m i k u  n a           m i k u n a    = *[miku:na]
```
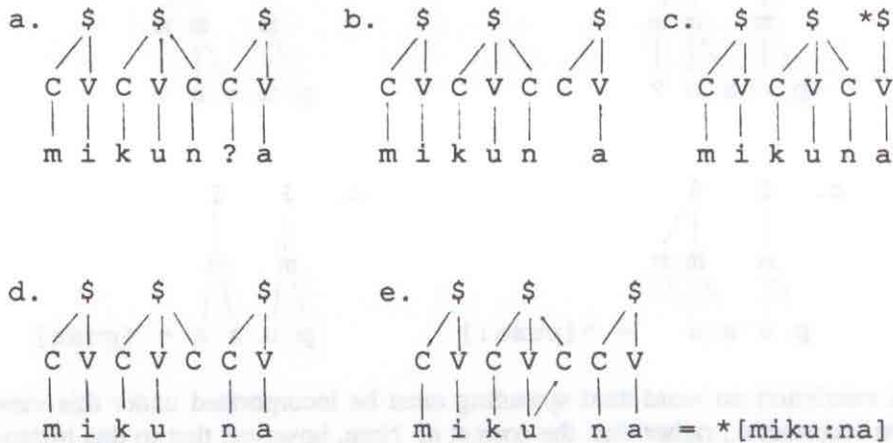
Once /ʔ/ deletion occurs in b. the unassociated C-node is potentially subject to association by spreading of the vowel, but this option is blocked by the constraint against leftward spread needed earlier. The only rule that can apply is N-erasure, which would derive the syllabically illegal structure in c.

We may consider strategies to resolve b. other than application of N-erasure that do not necessitate the derivation of illegal syllabic structures in the process. In a similar configuration for Ancient Greek, Hayes (1987) utilizes a "double flop" rule where the original syllabification between the CV and syllabic tiers remains intact, but segments on the melodic tier are reassigned to a different node on the CV tier. Such a rule applied to the Wk data, however, would always predict CL in the penultimate syllable, as shown in d. and e., which is clearly incorrect. Presumably, then, "double flop" must be a language-specific rule, since there is no evidence for such a rule in Wk.

If N-erasure does apply as in (31)c., then we may consider the possibility of resyllabification, which would reassign the coda of one syllable as the onset of the following syllable. But note that any attempt at resyllabification of c. fails, since it moves /n/ out of its syllable-final position and consequently destroys the environment necessary to produce the velar allophone.

We claim that the correct output is (31)b. There is no violation of the syllable canon and /n/ remains in syllable-final position so that allophonic rules apply to produce [ŋ]. That b. is the correct representation receives further support from the behavior of long vowels in the preceding syllable. b. predicts that underlyingly long vowels will be truncated in the penultimate syllable to avoid violation of syllable canonicity. This is indeed the case, as we can see from (32):

(32) puša-ma:-nʔa → [pušamaŋa]
     lead-1OBJ-FUT
     "He will lead me"

Such unassociated nodes have been proposed for French to account for "h-aspiré", as well as for Keley-i by Archangeli (1986:9), where a totally unspecified C remains featureless and does not surface, although its effects are observed in syllabification.

    If (31)b. is the correct representation, we must motivate the blocking of N-erasure. It might be suggested that the rule cannot apply word internally, but rather only at word boundaries.[6] But we will presently show why such a constraint will not work as a general principle for Wk, since it predicts that we would never encounter resyllabification of the kind we have just needed to avoid. We will develop a different proposal in section 4.

    Consider a case representative of the other instances of post-consonantal /ʔ/-deletion. A diachronic analysis involving the PST suffix, *-lʔa, would initially assume a proto-form such as that in (33)a. Deletion of /ʔ/ strands a C node. If we cannot apply N-erasure word-internally, as suggested above, we derive (b) as the final output:

(33)

```
a.  $    $    $          b.  $    $    $
   /|   /|\  /|             /|   /|\  /|
  C V  C V C C V          C V  C V C C V
  | |  | | | | |          | |  | |  | |
  l i  k a l ? a          l i  k a l    a
```
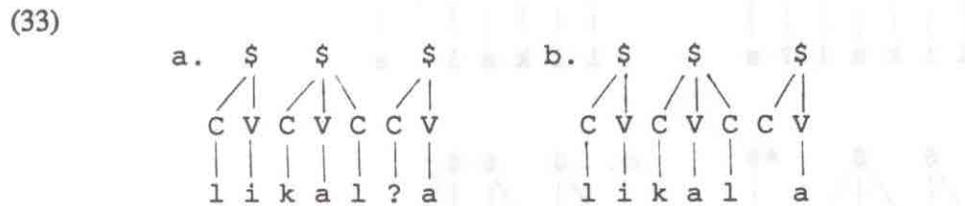
This does not prove to be an adequate analysis, however, since such a proposal would predict that underlying long vowels will be truncated in the penultimate syllable as they were with FUT. But this is clearly not the case, as we see in (34), where the underlyingly long vowel does indeed surface.

(34) lika-ma:-lʔa => [likama:la]
     see-1OBJ-PST
     "He saw me."

So, in contrast to the FUT case, we cannot constrain N-erasure and must allow the derivation to proceed beyond the stage in (33)b. in some fashion.

    We suggest that the correct synchronic representation requires disassociating /l/ from its syllable final position and reassociating it as the onset of the following syllable. This can be accomplished in two ways.

    One alternative, shown in (35), reassigns /l/ to the following syllable (the first move of the "double flop" rule) followed by N-erasure rather than spreading.

(35)

```
   a.  $       $          b.  $     $       $
      /|      /|\            /|    /|      /|\
     C V C   V C C V        C V   C V     C C V
     | | |   | | | |        | |   | |     | | |
     l i k   a l ? a        l i   k a     l   a
```

```
   c.  $    $      $       d.  $    $     $
      /|   /|\    /|          |   /|\   /|
     C V   C V C  C V        C V C V   C V
     | |   | | |  | |        | | | |   | |
     l i   k a    l  a       l i k a   l a  = [likala]
```
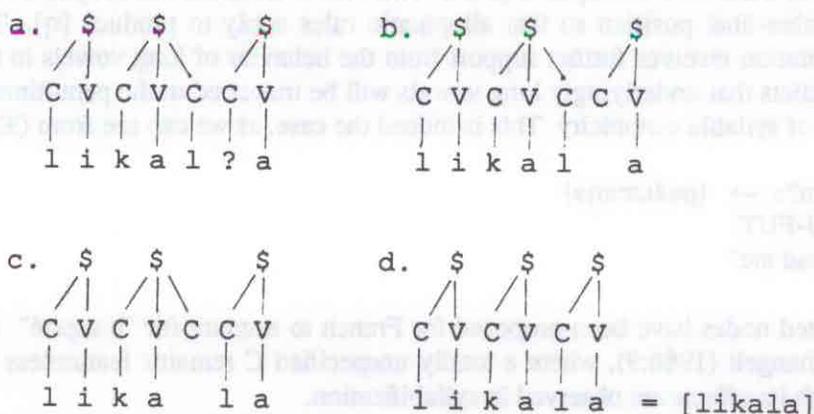
On this account spreading in c. must be blocked in favor of N-erasure. However, there is no way to predict that this should occur. A better solution is given in (36), which involves N-erasure ((36)c.) followed by resyllabification (d.):

(36)

```
   a.  $       $          b.  $     $       $
      /|      /|\            /|    /|      /|\
     C V C V C C V          C V C V C C V
     | | | | | | |          | | | | | | |
     l i k a l ? a          l i k a l   a
```

```
   c.  $     $      *$      d.  $    $  $
      /|    /|\      |          /|   /|  |\
     C V C V C       V        C V C V C V
     | | | |  |      |        | | | | | |
     l i k a  l      a        l i k a l a  = [likala]
```
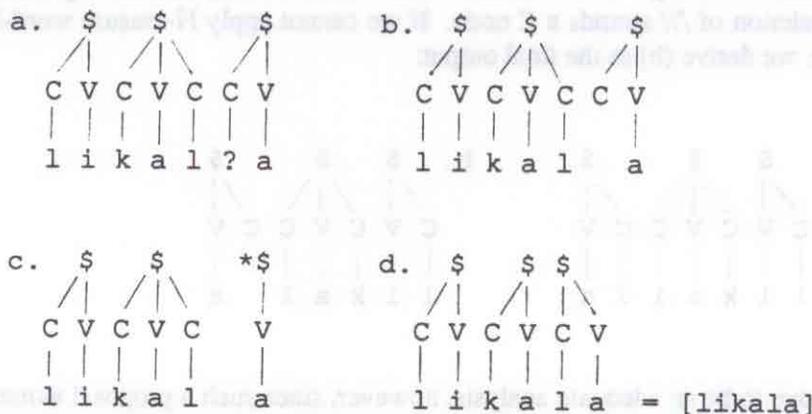
In either case /l/ ends up as the onset of the following syllable, and the penultimate syllable is light. The point we wish to emphasize is this: even though the end result can be derived in two ways, there is a principle (which will be elaborated in section 4) that pushes the derivations of /C?/ and configurationally identical /n?/ sequences in diverse directions.

In (37) we summarize the diachronic derivations for the FUT and PAST morphemes. The CV tier in the synchronic form for FUT is identical to its historical protoform even though the surface form is not. On the other hand we see that the PAST morpheme, which historically had the same CCV shape as FUT, has been restructured to CV. Even though the CV tier for PAST in the interim stage ((37)b.) adheres to the syllable canon, that in itself is apparently insufficient to prevent the deletion of the phonetically empty C and the consequent resyllabification. In the case of FUT however, even though the /?/ has dropped, something "blocks" tampering with a structure to which N-erasure could potentially apply. We note that there is nothing within the theory or the structural configurations themselves that indicates why the derivation should stop after /?/-deletion in one case but in the other it must proceed to obtain a restructured result. I will return to this in section 4 below.

(37)

```
                      FUT        PAST
                       \  /|      \  /|
  a. Proto-Wk     CC  V   CC  V
                   *-n? a    *-l? a    /?/ present

                       \  /|      \  /|
  b. Pre-Wk        CC  V   CC  V
                    *-n a    *-l a    /?/ deleted

                       \  /|      \ /|
                        $   $      $   $
                          /|          /|
  c. Present        CC  V   C  V
                     -n a    -l a    PAST restructured
```
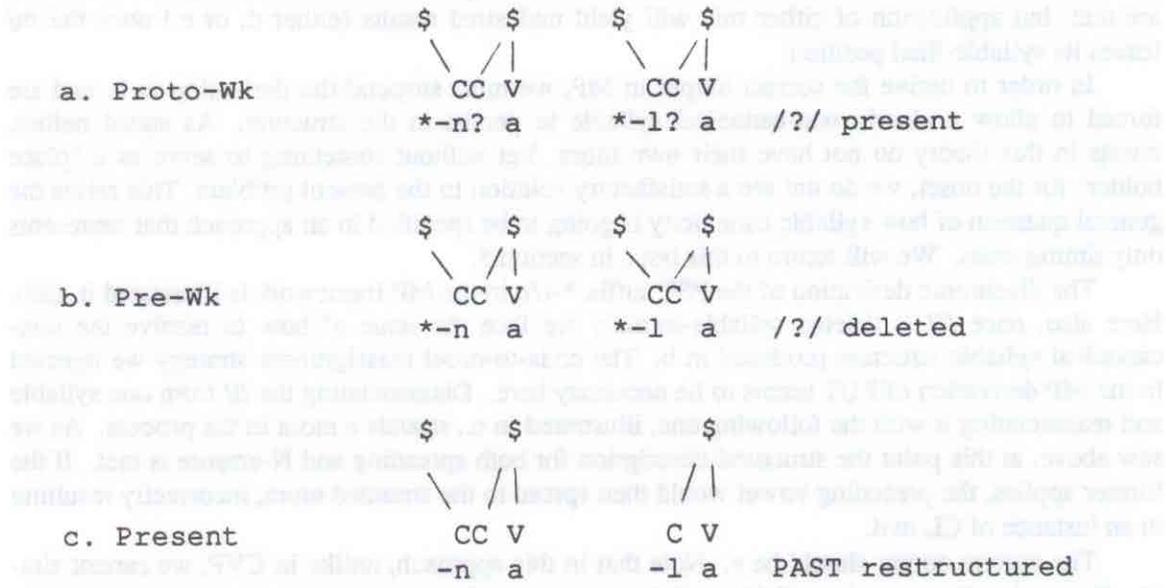
Let us now consider a MP treatment of the same facts. (38) below illustrates the derivation of *miku-n?a*. Like the CVP account, if the derivation stops immediately after the deletion of the /?/, we predict the correct output as far as the pronunciation of /n/ is concerned, since it maintains its syllable-final position. But note a major difference: in the CVP derivation ((31)b.) deletion of the /?/ still leaves us with a well-formed final syllable in terms of the CV tier; the MP derivation does not, since the final syllable consists only of a single vowel.

(38)

```
  a.  $    $    $        b.  $    $    $
      |    |\   |            |    |\   |
      m    m m  m            m    m m  m
     /| /|| /|              /| /| |  |
    m i k u n ? a          m i k u n  a   = [mikuŋa]


  c.  $    $    $        d.  $    $    $
      |    |\   |            |    |\   |
      m    m m  m            m    m m  m
     /| /|  /|              /| /|/  /|
    m i k u  n a           m i k u  n a   = *[miku:na]


  e.  $    $    $
      |    |  /|
      m    m m m
     /| /|/| /|
    m i k u n a   = *[mikuna]
```
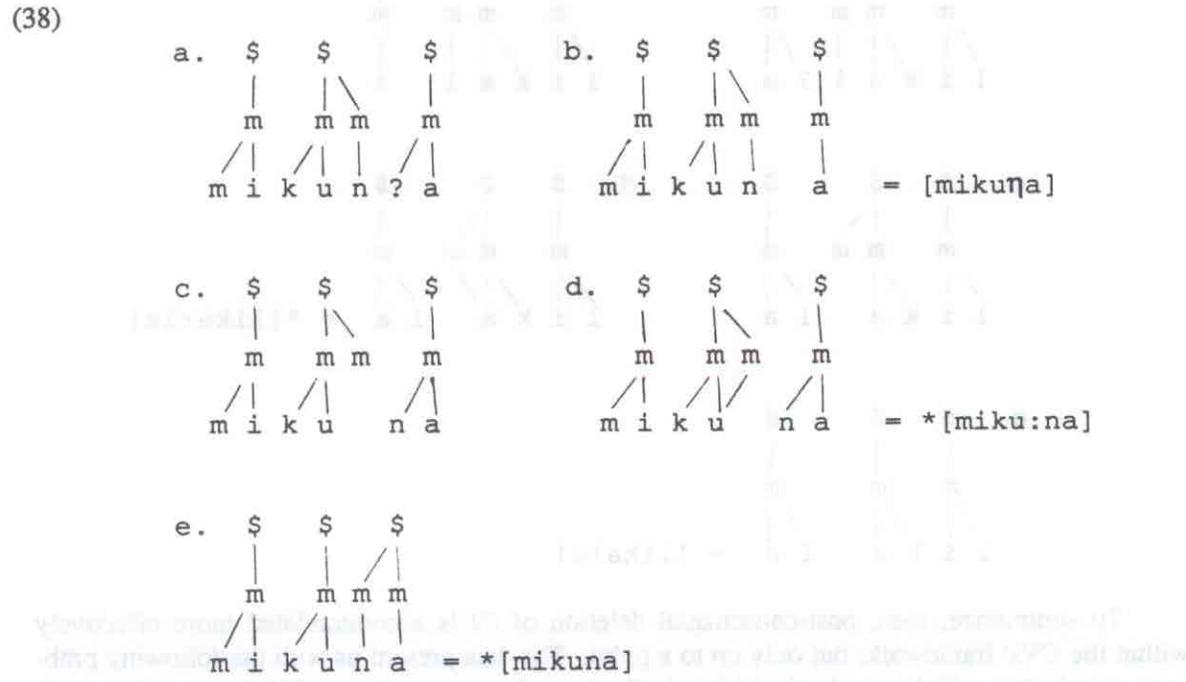
Of course, any attempt to restructure via reassociation of the preceding coda to make it the onset of the illegal syllable as seen in (38)c. not only fails to leave /n/ in syllable-final position, but also strands a mora. At this stage the structural descriptions of both spreading and N-erasure are met, but application of either rule will yield undesired results (either d. or e.) once the /n/ leaves its syllable-final position.

In order to derive the correct output in MP, we must suspend the derivation at b. and are forced to allow a clearly non-canonical syllable to persist in the structure. As stated before, onsets in this theory do not have their own mora. Yet without something to serve as a "place holder" for the onset, we do not see a satisfactory solution to the present problem. This raises the general question of how syllable canonicity is going to be specified in an approach that represents only timing units. We will return to this issue in section 5.

The diachronic derivation of the PST suffix *-l?a in the MP framework is illustrated in (39). Here also, once /ʔ/ is deleted syllable-initially we face the issue of how to resolve the non-canonical syllable structure produced in b. The coda-to-onset reassignment strategy we rejected in the MP derivation of FUT seems to be necessary here. Disassociating the /l/ from one syllable and reassociating it with the following one, illustrated in c., strands a mora in the process. As we saw above, at this point the structural description for both spreading and N-erasure is met. If the former applies, the preceding vowel would then spread to the stranded mora, incorrectly resulting in an instance of CL in d.

The correct output should be e. Note that in this approach, unlike in CVP, we cannot simply disassociate between the syllable and skeletal tiers and then reattach to the following syllable node. This would result in an onset with its own mora, which the theory dissallows. In MP we must achieve coda-to-onset reassociation between the skeleton and the melody only, and block spreading in favor of N-erasure.

(39)

a.
```
  $   $       $       b.  $   $   *  $
  |   |\  |           |   |\    |
  m   m m  m          m   m m   m
 /|  /| | /|         /|  /| |  |
l i k a l ? a       l i k a l    a
```

c.
```
  $   $       $       d.  $   $      $
  |   |\  |           |   |\   |
  m   m m  m          m   m m  m
 /|  /| | /|         /|  /|/ | /|
l i k a   l a       l i k a   l a  = *[lika:la]
```

e.
```
  $   $    $
  |   |    |
  m   m    m
 /|  /|   /|
l i k a  l a  = [likala]
```
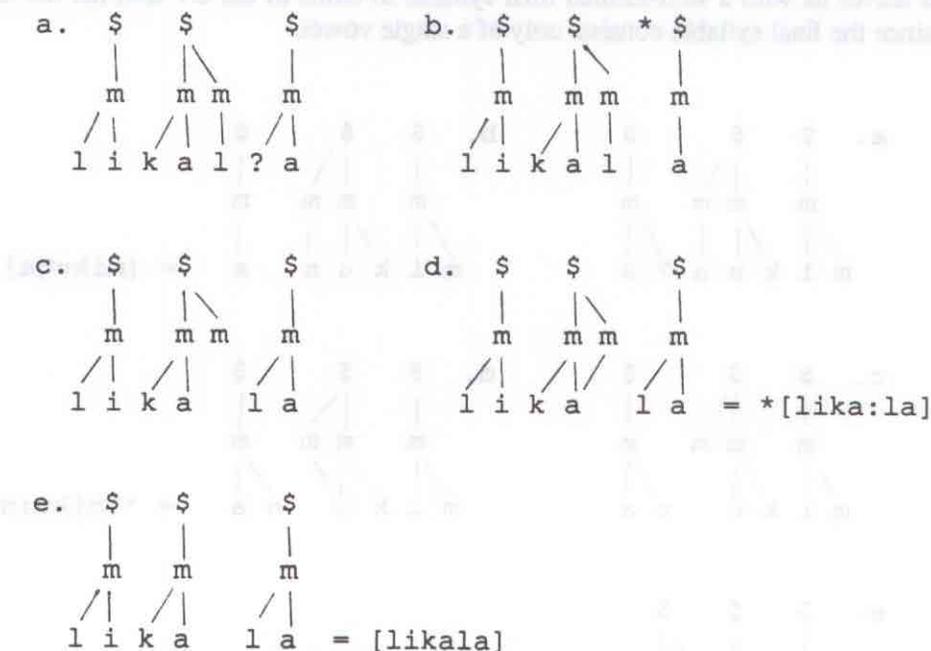
To summarize, then, post-consonantal deletion of /ʔ/ is accommodated more effectively within the CVP framework; but only up to a point. The data present us with the following problem: morphemes which are identical historically from the perspective of CV shape undergo different processes diachronically for reasons which neither theory illuminates very clearly.

We now consider alternative analyses involving instances of the deletion of /ʔ/ between distinct vowels where the first vowel is [+hi].

First the CVP derivation.

(40)

```
      a. $   $         b. $  $         c. $   $
         |  /|            |  /|           |  /|
         V  C V           V  C V          V  C V
         |  | |           |  | |          |  |/|
         u  ? a           u  ? a          u  a   = [uwa]
```
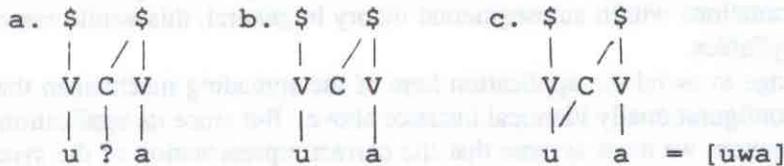
If we motivate spreading rather than N-erasure after /ʔ/ deletion then the theory correctly predicts that a transition glide will replace the /ʔ/. Glide formation here thus bears similarity to the same spreading process that in other cases derived CL. Two differences should be noted, however: 1) the C node to which the vowel spreads is syllable-initial instead of syllable-final; and 2) a melodic vowel is associated with two syllables instead of just one. The association of the vowel on the melodic tier to a C node is crucial here, since it is its "C-ness" that allows it to be interpreted as the onset of the following syllable and not the nucleus.

Unlike in CVP, in MP the deletion of /ʔ/ results in an illegal structure ((41)b.) that needs to be resolved. Presumably the hiatus could be resolved as in c. But note that in CVP vowel spreading to form the transition glide is motivated by a principle of automatic association from a melodic element to a stranded element on the CV tier. Heretofore, instances of spreading in MP similarly have been required to link some melodic element to a stranded mora in the moraic tier. But in this case the required spreading is not prompted by any such configurational considerations. Since there is no stranded mora here, the spreading must be viewed as an attempt to resolve an illegal construction. But once again, how is such an illegal structure defined within a theory that only represents syllable weight?

(41)

```
      a. $    $        b. $  *$        c. $  $
         |    |           |   |           |  |
         m    m           m   m           m  m
         |   /|           |   |           |/ |
         u ? a            u   a           u  a   = [uwa]
```
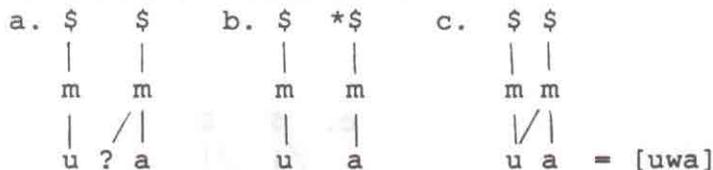
The deletion of /ʔ/ between distinct vowels when the first is [-hi] has curious consequences in both theories. We have seen that in principle any vowel may spread to an unassociated C resulting in CL. We have also seen that within the CVP framework the spreading of [+hi] vowels to unassociated C's in the production of transition glides is not qualitatively different from the spreading that all vowels may undergo. But if we allow spreading to apply to the [-hi] vowel in this structure, we derive the representation in (42)c.:

(42)

```
      a. $   $         b. $   $         c. $   $
         |  /|            |  /|           |  /|
         V  C V           V  C V          V  C V
         |  | |           |  | |          |  |/|
         a  ? u           a  u            a  u   = ?
```
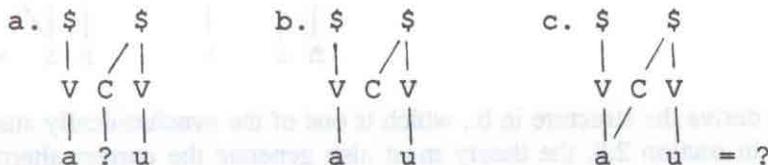
Configurationally it is identical to the previous case involving [+hi] vowels. The representation

claims that the vowel segment plays a dual role of nucleus to one syllable and onset to the following syllable. But it is uncertain what the phonetic interpretation of c. actually is, since there is no transition glide which corresponds to [a] in the same way that [y] and [w] correspond to [i] and [u]. Furthermore, even though vowel length can be represented via multiple linking to a V and a C node, c. cannot be considered a valid representation of a long vowel, given the conventions on permissible representations within autosegmental theory in general, this would associate a single nucleus with two syllables.

It seems strange to avoid the application here of the spreading mechanism that works perfectly well in the configurationally identical instance above. But since its application produces an uninterpretable structure, we must assume that the correct representation of the synchronic form in this theory would be that shown in b. Thus, like *-n?a, this appears to be another case where the derivation must simply terminate after /?/ deletion, without an immediately apparent theoretical motivation.

We illustrate the MP derivation in (43). Here /?/ deletion derives a configuration which involves a non-canonical final syllable. There is no clear way of motivating hiatus resolution, since, as we mentioned before, it is not clear how moraic theory even defines such a configuration as being ill-formed in the first place. In any case, resolving the hiatus via spreading only results in the same problem we see in the CVP derivation regarding the interpretation of [a] as a syllable onset.

(43)

```
     a.  $     $     b.  $    *$    c.  $  $
         |     |         |     |       |  |
         m     m         m     m       m  m
         |     |         |    /|       | /|
         a  ?  u         a     u  =  ?  a  u
```
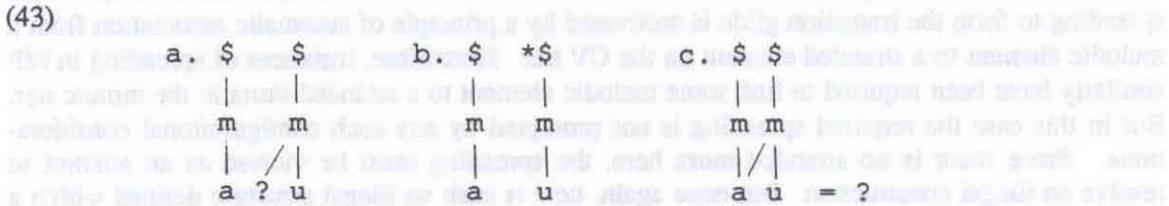
Finally we examine instances of /?/ deletion between identical vowels. Recall that in this case there are two synchronic forms that we must be able to derive. (44) shows the CVP derivation.

(44)

```
                              c.  $      $
                                 /|     /|
                                 C V  C V
                                 | |  |/
                                 ñ i    i  = *[ñiyi]

   a.  $     $    b.  $     $
      /|    /|       /|    /|
      C V  C V       C V  C V
      | |  | |       | |  |/
      ñ i  ? i       ñ i    i  = [ñii]    d.  $    *$    e.  $
                                               /|    |       /|\
                                               C V   V       C V V
                                               | |   |       | |/
                                               ñ i   i       ñ i  = [ñi:]
```
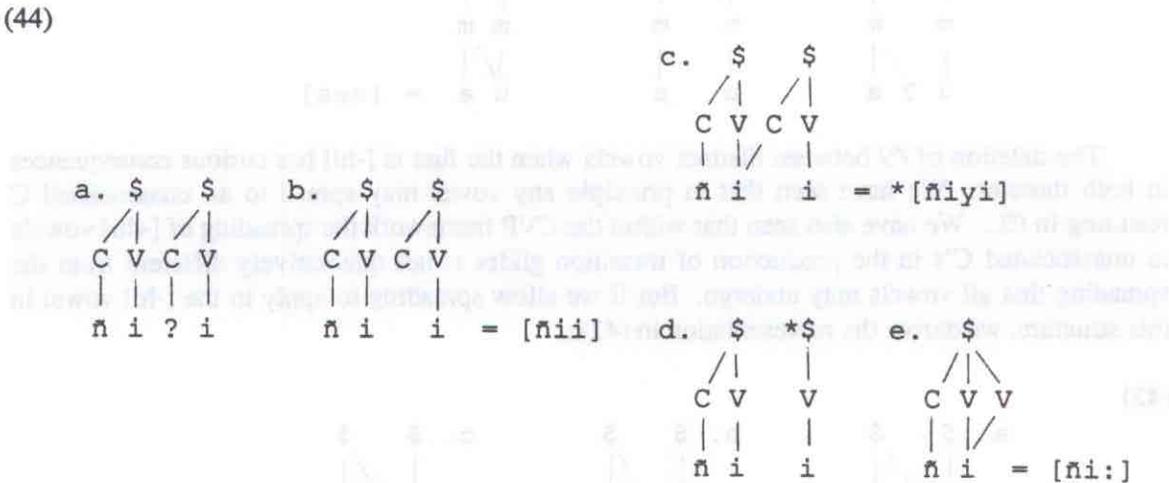
After /?/ deletion we derive the structure in b., which is one of the synchronically attested forms. But as we indicated in section 2.8, the theory must also generate the correct alternative form, which we assume would derive from the configuration in b. The difficulty at this point is one seen previously: the derivation could justifiably proceed in either one of two directions. We saw

above that in similar VCV configurations the language allows spreading of [+hi] vowels to derive transition glides. Yet if spreading occurs here, we derive the incorrect result in c. Since the theory overgenerates, this derivational path must be blocked in some way. But it is not immediately obvious how this should be done.

The correct derivation involves an application of N-erasure on b. The resulting hiatus in d. is resolved by what Hayes (1986) refers to as "melodic degemination", essentially restructuring as licensed by the OCP, which in this case results in a single syllable with a long vowel (e.).

Note the similarity to the derivation of *-l?a above: even though the CV tier does not violate the syllable canon in stage b., that does not prevent it from being further restructured. The difference is that there are two synchronic forms derived from a single historical form.

The MP derivation is given in (45).

(45)

```
      a.   $    $        b.   $   *$        c.    $
           |    ᚦ             |    |              | \
           m    m             m    m             m   m
           |   /|             /|   |             /|/
           ñ i ? i            ñ i  i             ñ i    = [ñi:]
```
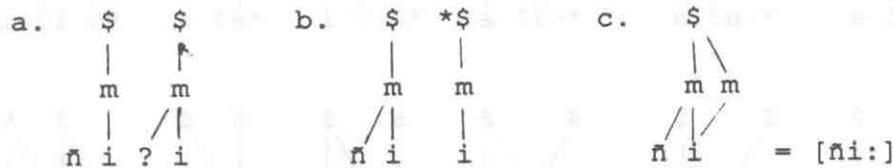
After /ʔ/ deletion, b. is ill-formed with respect to syllable canonicity, and therefore must be resolved. Through the OCP we may merge elements on the melodic and syllable tiers, to derive c. In this view we correctly predict [ñi:] as one of the outputs.

But unlike CVP, MP does not provide us with a satisfactory rationale for also being able to terminate the derivation at b. to derive the form that ends in a light syllable. In that sense MP undergenerates.

Let us summarize the salient points of this section. CVP and MP purport to capture significant generalizations about diachronic and synchronic facets of CL, and this they do well. Both theories require some stipulations concerning the directionality of spreading, although MP predicts that there will not be any leftward spreading to a vacated onset position.

When we apply the theoretical mechanisms to other related phenomena we find that CVP theory has certain advantages over the MP approach. For example, CVP theory correctly reflects the fact that glides replaced /ʔ/ in certain environments, and that this bears similarity to the process involved in CL; the same phenomena are not necessarily viewed as related in MP. Also, an abstract but phonetically null element left in the structure is a consequence of the CVP representations that has value in that it can provide a theoretically consistent "explanation" for why /n/ retains its syllable final pronunciation intervocalically without violating other principles of syllable canonicity. MP suffers mainly from the inability to identify illegal syllables. Consequently certain moves that must be made to derive the correct results are not clearly motivated.

Certain aspects appear to be problematic for CVP, such as motivating why a configuration that meets the descriptions of more than one rule may choose one, the other or neither of those rules to terminate the derivation. But this is also at least as problematic to MP, so in that respect CVP is no worse off. So although a number of things remain unclear at this point, CVP seems to have greater potential for being able to adequately describe the effects of /ʔ/ deletion.

In the following section I will develop a notion which may help motivate the direction a particular derivation takes when more than one is possible.

4.0 Principles of markedness reduction

Let us reconsider the derivational facts strictly from the CVP perspective. We summarize the derivations in (46). In each case /ʔ/ deletion produces a structure with an unassociated C-

node that makes up part of a canonical CV tier. Note that some of the derivations stop after /ʔ/ deletion (b. and e.), while others progress in diverse directions, either spreading (a. and d.), or N-erasure and subsequent resyllabification (c. and f.): deletion (b. and e.), while others progress in diverse directions, either spreading (a. and d.), or N-erasure and subsequent resyllabification (c. and f.):

(46)

```
      a.              b.              c.              d.              e.              f.
   $     $         $     $         $     $         $     $         $     $         $     $
   |\   |\|        |    /|         |    /|         |   |\         |   |\         |   /| |
   V  CC V         CC  V          CC  V          V  C  V        VC  V          C  VC  V
   |  || |         || |           | | |          | | |          | | |          |  ||| |
  *a  ?č a        *-n? a         *-l? a          *u ? i         *a? u          *ñ i? i
```

```
   $     $         $     $         $     $         $     $         $     $         $     $
   |\   /|         |   /|          \  \/          |   |          |  /|          /|  /|
   V  CC V         CC  V          CC  V          V  C  V        VC  V          C  VC  V
   |  |  |         |  |           |  |           | | |          | | |          |  | | |
  *a    a        *-n   a         *-l    a        *u  i         *ñ  i  i
```

[-ŋa]   [au]   [ñi:]

```
                                   $     $                          $     $
                                   |\   /|                          |   |\
                                   V  CC V                          V  C  V
                                   |  |  |                          | | |
                                   a     ča                         u  i
```

[a:ča]   [uwi]

```
                  $  *$                          $  *$
                  \                              /|
                   C  V                         C  V  V
                   |  |                         |  | |
                  *-l  a                        *ñ  i  i
```

```
                  $                              $
                  |\                             |\
                  C  V                          C  V  V
                  |  |                          |  | |
                 *-l  a                        *ñ  i  i
```

[-la]   [ñi:]

It is possible to handle these facts in terms of rules. For example, we would require minimally two spreading rules, (47)a. and b. and a resyllabification rule (47)c. (C'=unassociated C).

(47)   a. V Ç′C   b. V Ç′V   c. $
              |/| |/| \|/
           [-cons]   [+hi]   C C V
           [+syl]   ‡/
                           [+nas]   [+cor]
                           [+cor]

These rules are to be read as follows: a) spread any vowel to the following unassociated C if this is followed by another C. b) spread hi vowels rightward to unassociated C if this is followed by V; c) disassociate non-/n/ from syllable final position, associate to following C′ and delete previously dominating C.

But in this case rules of the "X meets the structural description of rule Y; therefore apply Y"-type are only descriptions of the facts in a formalized notation. I suggest that we might find a more satisfying explanation by moving in a slightly different direction.

The general approach to linguistics has shifted from the *Aspects* model to those in which the role of rules is minimized in favor of the interaction of independent principles. With respect to the present problem, a number of elements exert their influence on the overall structure of a language simultaneously: universal principles of phonology guiding the hierarchical organization of structure, and well-formedness conditions, such as the OCP, as well as language-specific constraints on syllable structure, the general tendency in all Wk dialects toward deletion of /ʔ/, etc. Considering the CV tier by itself, for instance, we would not initially expect to find perfectly canonical sequences of C's and V's being altered and resyllabified if this level itself were sufficiently "stable" independent of any surface phonetic associations. This brings into question the degree of autonomy between the CV and melodic tiers. The Wk data clearly imply that an element on the CV tier that is associated to the melody clearly has a different status than one which is not. We therefore suggest that the language considers unassociated C's in any structure as marked, and that the phenomena we have discussed are indicative of the various strategies the language has at its disposal for resolution of the marked structures.

The idea behind the view of markedness reduction presented here is as follows: the language considers a structure with an unassociated C-node as marked, and consequently seeks to resolve it. The language has at its disposal mechanisms of spreading, N-erasure, and C-retention, represented below, as alternative strategies for dealing with such instances.

```
                    C′
                   /|\
                 /  |  \
               /    |    \
           spread   |   C-retain
                    |
                    |
                 N-erase
                    |
                    |
               resyllabify
```

Each strategy carries with it consequences having to do with the amount of structural "damage" it inflicts and a concomitant degree of markedness it achieves. The language will attempt to employ the least structurally cataclysmic strategy first, which would be spreading, since all that is involved is simple association of melody to core. If this is prevented by some other principle (e.g. constraint against word-final spreading) it will attempt to erase the C-node. And if in the process of erasure there is still an illegal structure, resyllabification takes place. Empty C-retention is the last resort. If all other strategies fail to produce a legal structure, there is no other option but to retain the empty C.

Let us consider how this idea might apply in the case of [au]:

(48)

```
        a.    $      $
               \    /|
                V  C V
                 \ | /
                   a

   b.  $     $         e.  $      $
        |   /|              |   /|
        V  C V              V  C V
         \ |/|              |   |/|
          *a                *a     u


      c.  $    *$         

          V    V
          |    |
          *a   u


      d.         $    *$

                 V     V
                 |     |
                 a     u
```
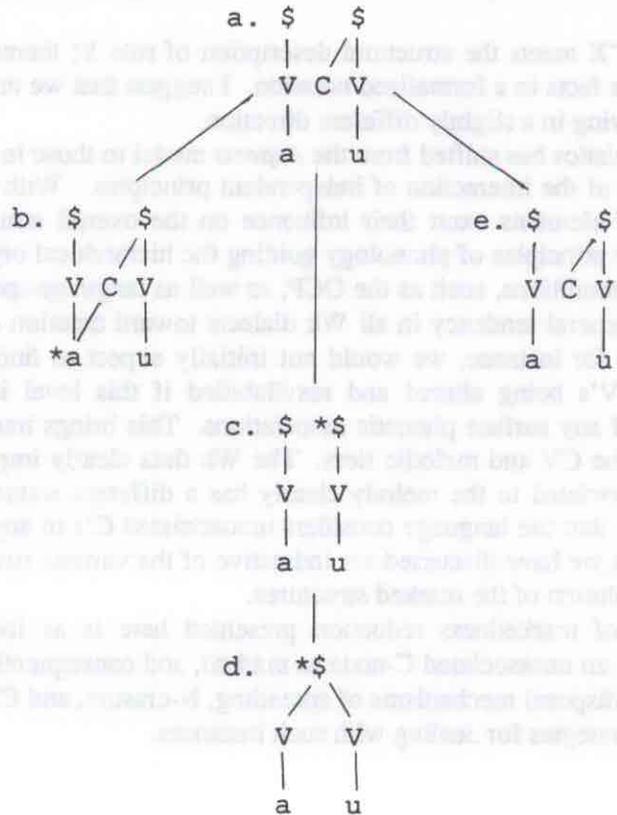
The structure after /ʔ/ deletion is represented in (48)a. Spreading of the low vowel in b. is ruled out by a universal sonority scale (cf. Steriade 1982) which reflects the fact that no glide corresponds to [a] in the same way that [y/w] parallel [i/u].

The option to delete the unassociated C (c.) produces a structure which itself demands further resolution. The structure in c. cannot be resolved into d. because of the language-specific *ViVj constraint. C-retention (e.) remains as the only theoretically coherent option, even though it is also marked.

The case of [ñii/ñi:] shows that both C-retention and N-erasure/resyllabification are viable options in the language. But the fact that the younger generation tends to use the restructured form suggests that the language is moving in the direction of the more "stable" alternant that has no unassociated C's.

The question remains as to why the nasal in /nʔ/ sequences does not resyllabify as the onset of the following syllable. One significant difference between /nʔ/ and other /Cʔ/ sequences is that

there is an allophonic rule dependent on the C remaining in the structure of the latter. Intuitively the allophone of /n/ is "associated" with the empty C via the allophonic rule. Could this act as a "stabilizing" force that enters into the equation in some way and inhibits "tampering" with a structure to which N-erasure/ resyllabification could apply? We are quick to point out that perhaps such a circumstance only inhibits the restructuring of /n?/, but does not prevent it, since in the Andamarca subdialect, all */n?/ sequences have been restructured radically to sequences of long vowels. But if allophonic rules *can* have such an effect, we would need to explicate "configurational stability" related to a particular notion of "phonetic concreteness" that was not limited to association lines between melody and skeleton. On this view, phonetic output could not be seen merely as uninteresting surface phenomena, but rather as a force which exerts influence on the preservation of underlying abstract structure.

5.0 Further issues

In this final section we will discuss two further issues that the data have raised. Rather than attempting to be exhaustive, we will elaborate on what we see as potentially fertile ground for further investigation.

5.1 The nature of the elements on the CV tier

According to Clements and Keyser (1983:10):

> In the present theory ... the units of the CV-tier themselves define functional positions (peak vs. nonpeak) within the syllable. In this respect the CV-tier can be seen as subsuming the function of the earlier feature category [syllabic]. However, the elements of the CV-tier are not merely analogues of the features [+syllabic] and [-syllabic], but serve the additional and equally important function of defining the primitive units of timing at the sub-syllabic level of phonological representation. In particular, it appears as if the useful but ill-defined notion of 'phonological segment' can best be reconstructed at this level.

Because of the kinds of configurations utilized by the framework, however, it appears that more clarification is in order. For example, we have seen that a long vowel may appear as associated to either two V nodes or to a V and a C node. According to the above statement, then, (49) claims that "all of (a)" presumably would constitute a syllabic peak, while only the "first part of (b)" would. This would predict that tautosyllabic long vowels derived from consonant loss would then have different properites than inherently long vowels, but this has not been proven.

(49)   a. V V   b. V C
                            |/ |/
                            i   i
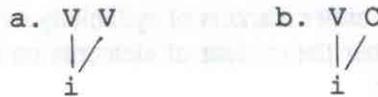
Some insight may be gained from a consideration of Weber and Landerman (1985). Although they have not couched their analysis specifically in CVP terms, they provide convincing evidence for interpreting all long vowels in Quechua as VC sequences. But a detailed review of their analysis is beyond the scope of the present study.

Representations like those in (49)b. are valid for transition glides where a long vowel and the glide differ only in their associations with the syllable tier:

(50)

```
        a.  $          b.  $   $
            |\              |   /
            V C             V  C
            |/              |  /
            i               i
```
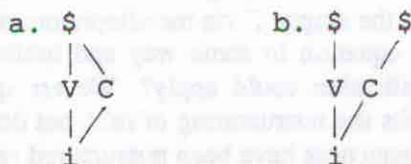
But again, it is uncertain what this possibility implies for (51) where there is no corresponding glide for the low vowel.

(51)

```
        a.  $          b.  $   $
            |\              |   /
            V C             V  C
            |/              |  /
            a               a
```
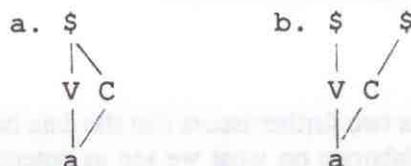
Clements and Keyser refer to the CV-tier as being representative of timing units, but it is clear they mean suggests that mora count in CV theory can be discerned from the configuration itself and does not require a separate representation. It is evident that Clements (1986) has utilized V's to indicate mora-count in his treatment of geminate consonants in LuGanda, where the first "half" of a geminate counts as a mora. Consequently Clements' representation, in (52)a., is interpreted as a form having three morae. The syllabic associations are never given, however, but are presumably those in b. This is surely a curious representation; b. claims that the first syllable has two vocalic nuclei separated by a consonantal element. So the distinction between status as a mora and status as a vowel is totally obscured.

(52)

```
        a.  V C V C V
             \| | | |
              t a b i

        b.  $      $
           /|\    / |
          V C V  C  V
           \| |  |  |
            t a  b  i
```
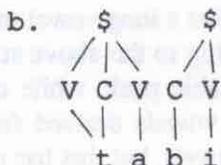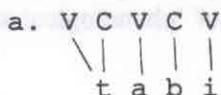
It is clear, then, that work needs to be done to define C and V in more explicit terms, since at present the function of the CV elements as either markers of syllabicity or definers of morae cannot be determined independently from either the content of elements on the melodic tier or the CV-tier's associations with the syllabic tier.

5.2 Defining syllable-structure constraints in MP

It is not clear in MP how restrictions on syllable canonicity will be stated, since the only representation is of timing units. (53) shows that within CV theory there are two possible representations for the bisyllabic root /aa/ "grind": a. is well-formed but b. constitutes a violation of the constraint against word-medial vowel-initial syllables. On the other hand, we cannot discern a syllable's CV composition from the moraic representation in c., which claims that the

word consists solely of two vowel nuclei. So we see that CVP allows us a degree of independence between surface and abstract structure not afforded by MP.

(53)

```
      a.  $    $      b.  $   $      c.  $      $
          |    |          | /           |      |
          v  C v          *V V          *m     m
          |    |          |  |          |      |
          a    a          a  a          a      a
```
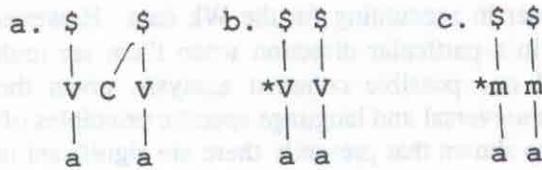
In a monosyllabic word we do not have to be concerned with the constraint against word-medial vowel-initial syllables mentioned above. But consider (54). Maximal syllable structure in Wk is CVC or CVV, both of which have two morae. But the ill-formed CVVC syllable in (54)c. also has only two morae . The corresponding moraic structures in (55) do not indicate in and of themselves why (55)c. should be considered ill-formed.

(54)

```
      a.  $          b.  $          c. *$
         /|\            /|\            /|\
        C V C          C V V          C V V C
```

(55)

```
      a.  $          b.  $          c.  $
          |              |              |
          m m            m m            m m
```
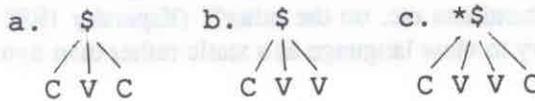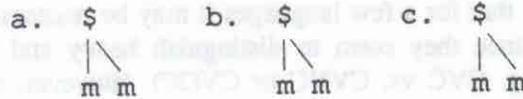
Perhaps by adapting an idea from Selkirk, MP could utilize well-formedness templates such as those in (56). This in effect amounts to a general constraint for the language that no syllable may contain more than one branching mora. But such syllable templates may diminish the status of the moraic tier as an independent entity, since it then must make implicit reference to sub-moraic elements.

(56)

```
      a.  $          b.  $          c. *$
          |              |              |
          m              m m            m m
```
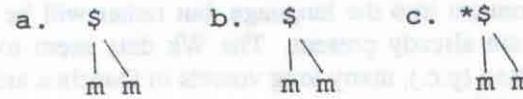
Finally, according to Hayes, "the full variety of underlying forms is relevant only for languages that employ moraic structure contrastively; in fact, many languages need not include moras in underlying forms at all." (1987: 5). We must then ask, for languages which do not distinguish between heavy and light syllables, what principles of syllabic structure *will* be relevant? If a language makes no use of a moraic tier, presumably it needs a CV tier at some other level. Moraic theory then becomes only an optional subcomponent of a more encompassing phonological theory. Perhaps the solution lies in a multi-dimensional approach such as that proposed by Hofshi (1988), where morae are represented on a plane parallel to but different from the syllable, CV and melodic tiers.

6.0 Conclusion

In this study we have examined instances of /ʔ/ deletion in Wk from the perspective of two competing phonological theories and have shown that the CVP approach has certain characteristics that give it greater explanatory power in accounting for the Wk data. However, it fails to explain why a derivation will proceed in a particular direction when there are multiple viable options available. We have suggested one possible coherent analysis, given the notion of markedness reduction as it interacts with universal and language-specific principles of phonological theory. Apart from this, we have also shown that presently there are significant indeterminacies in both CVP and MP theories which remain to be resolved.

We deal with language in the process of change. To talk of configurational stability in Wk is to talk simultaneously of synchronic and diachronic processes and of degrees between extremes. This is not currently an aspect of the phonological equation which the theories coherently express, but perhaps they should. How this is actually formalized is another question for which I have no answer. To what degree do we expect the mechanisms formulated within a particular theory to reflect actual processes of sound change? How close should the tie be between fact and theory to achieve "maximal generality and elegance of descriptions on the one hand, and maximal realism, naturalness etc. on the other?" (Kiparsky 1982:173). Or will we be forced by the nature of the theory to view language as a static rather than dynamic entity?

Notes

1 Although the universality of the OCP has been questioned (Odden 1986, and others), for the present study we will assume its validity.

2 Hayes recognizes that for a few languages it may be necessary to allow syllables with three morae since they seem to distinguish heavy and superheavy (double closed) syllables (e.g. CVC vs. CVVC or CVCC). However, since such cases are rare, they are considered as the marked case and do not affect his argument for setting a general two-morae limit on syllable structure.

3 See Everett & Everett 1984 for apparent counterclaims.

4 Cerrón's classification of Wanka encompasses a larger geographic area than we do. His analysis is essentially a reconstruction of proto-Wanka. Consequently he includes many more occurances of /ʔ/ than actually appear on the surface in the dialect under consideration.

5 According to de Chene and Anderson (1979) compensatory lengthening will not introduce a length contrast into the language, but rather will be allowed if independently long vowels are already present. The Wk data seem to confirm this since, according to Landerman (p.c.), many long vowels in Quechua arose historically from the loss of /y/ in a /VyV/ sequence.

6 In one sense the proposal bears resemblance to solutions for "h-aspiré" in French, where the particulars of liaison phenomena require a phonetically empty abstract element in the representation. But constraining N-erasure so that it applies only at word boundaries will not work for French, since the abstract element occurs only at word boundaries and should not, therefore, undergo erasure at all.

7 In class lectures at the University of California, San Diego, 1988.

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