Vowel Fusion and Antigemination in Guere and Mau *

Carole Paradis
Université Laval
Jean-François Prunet
Université du Québec à Montréal

I. Introduction

Three major articles on the Obligatory Contour Principle (OCP) were recently published in LI. McCarthy (1986) and Yip (1988) claim that the OCP is the cause of a number of apparently unrelated phonological processes. Odden (1988) contests the basic idea that the OCP plays such a widespread role in individual grammars. Based on a number of counterexamples to antigemination, an OCP effect defined below, Odden argues against the universality of the OCP. In this paper, we examine data having the formal characteristics of some of Odden's counterexamples and show how they can be reconciled with a universal OCP.

McCarthy (1986) argues that the OCP, defined in (1) below, is a principle of Universal Grammar (UG) which acts as an output filter on phonological rules (see also Leben (1973)).

(1) **Obligatory Contour Principle** (McCarthy (1986, 208)

At the melodic level, adjacent identical elements are prohibited.

The OCP, McCarthy argues, plays an important role as a rule blocker. Thus, under certain morphological conditions, rules are blocked which would normally delete a segment when this segment is flanked on both sides by identical segments. For instance, (2) shows examples from Afar (see McCarthy (1986, 220-1)), a Cushitic language analyzed in Bliese (1981), where a vowel normally deletes in a certain context (2a) but fails to do so when the consonants immediately preceding and following it are identical (2b).

\begin{itemize}
  \item[(2)] a. \textit{xamíla} \hspace{1cm} \textit{xaml-jí} \hspace{1cm} 'swampgrass' (acc./nom.-gen.)
  \textit{ấgára} \hspace{1cm} \textit{aggio-jí} \hspace{1cm} 'scabies'
  \textit{darágu} \hspace{1cm} \textit{darg-jí} \hspace{1cm} 'watered milk'
  
  b. \textit{miqáchí} \hspace{1cm} \textit{*miqjí} \hspace{1cm} 'fruit'
  \textit{sababa} \hspace{1cm} \textit{*sabba} \hspace{1cm} 'reason'
  \textit{xarar-é} \hspace{1cm} \textit{*xarré} \hspace{1cm} 'he burned'
\end{itemize}

This blocking effect, which prevents the creation of true (i.e., bisegmental) geminates, is called antigemination by McCarthy who concludes (p. 256) that the OCP is universal. For the sake of clarity, the configurations in (3) may be referred to as true (3a) and apparent (3b) geminates.

\begin{itemize}
  \item[(3)] a. \begin{tabular}{c|c}
    X & X \\
  \end{tabular}
  \begin{tabular}{c}
    \hline
    \alpha
  \end{tabular}

  b. \begin{tabular}{c|c}
    X & X \\
  \end{tabular}
  \begin{tabular}{c}
    \hline
    \alpha \\
    \alpha
  \end{tabular}
\end{itemize}

Yip (1988) documents other examples of OCP application, especially cases of partial identity, and argues that antigemination is only one of a number of OCP effects (for partial identity cases, see also Kenstowicz (1985, 245)) and McCarthy (1986, 242). Besides its
function as a rule blocker, the OCP also triggers language-specific insertion, deletion, and other rules which resolve OCP violations created by Tier Conflation (see McCarthy (1986)), i.e the morphological operation which collapses, or linearizes, the autosegmental tiers on which different morphemes are introduced upon affixation (see Kaisse (1987) for dissimilation repair strategies triggered by the OCP).

Assuming that the OCP is a principle, and that the proper morphological conditions with respect to Tier Conflation are met, no phonological process should ever generate true geminates. In other words, antigemination effects should be observed universally. However, Odden (1988) argues that antigemination is routinely violated and that neither antigemination nor the OCP are universal. He concludes that the OCP is not a principle or even a parameter\(^1\) but is ‘the surface manifestation of a more general problem in language learning and grammar selection, namely, the problem of selecting between competing analyses that are consistent with general linguistic theory and cover the same range of data’ (p. 474).

In this paper, we concentrate on Odden’s arguments against antigemination which rest upon rules blindly deleting segments, even when they are flanked by identical segments. Odden (pp. 465-9) mentions several such cases, where vowel syncop rules in Hindi, Klamath and Maltese Arabic delete a vowel between two consonants irrespective of the identity of the consonants (e.g. /jedded + et/ \(\rightarrow\) jedd\(\ddot{d}\)-et [jeddet], an example from Maltese Arabic p. 465). In II we discuss a similar case in Guere in which a consonant deletes between two vowels even when the vowels are identical, e.g. /\(\text{u}\)o\(\text{lo}\)/ \(\rightarrow\) \(\text{u}\)\(\text{o}\) ‘wash’. Our position being that the OCP is a universal constraint and that phonological processes do not normally violate phonological constraints, we claim below that the Guere antigemination violations involve apparent vocalic geminates which are present in underlying representation (UR), i.e. before the intervening consonant deletes. As shown in (4), the representations, whose structure will be justified and made precise in II, do not exhibit true vocalic geminates at the time consonantal deletion takes place.

\[
\begin{array}{ccccccc}
X & X & X & \rightarrow & X & X \\
\backslash & \backslash & \backslash & \& \& \& \& \\
1 & 1 & 1 & \& \& \& \& \\
V & V & V & \& \& \& \& \\
\end{array}
\]

In III further evidence from Mau is presented. We will conclude that several antigemination counterexamples can be treated in the perspective of segmental fusion, and that, as a consequence, the OCP may be retained in the most constrained form which its universal status permits.

II. Vowel Fusion and Apparent OCP Violations in Guere

Guere, a Kru language of the Ivory Coast studied in Paradis (1983a; b)\(^2\) has maximally disyllabic (CVCV or CVV) nominal stems (most stems are monosyllabic), such as the ones cited below (the four tonal levels of Guere are not indicated).

\[
\begin{array}{ccc}
\text{m\(\tilde{u}\)} & \text{cockroach} & \text{\d\(\text{e}\)e} & \text{‘elephant} & \text{kpau} & \text{‘corn} \\
k\text{l\(\text{b}\)} & \text{‘rat} & \text{\(\text{j}\)\(\text{e}\)\(\text{\(\text{b}\)}\)} & \text{‘face} & \text{zi\(\text{g}\)}\text{\(\text{U}\)} & \text{‘chameleon} \\
\end{array}
\]

The coronals \(\text{\(\text{d}\)}\) and \(\text{\(\text{g}\)}\) are optionally deleted when in intervocalic position within non-compound, non-reduplicated words\(^3\). Such a deletion is observed whether the flanking vowels are distinct, as in (6a), or identical, as in (6b). Note that the implosive coronal \(\text{\(\text{d}\)}\),
which is in free variation with ı in intervocalic position, is realized as ıı in front of a nasal vowel. The rule is informally given in (6c).

(6) a. 

<table>
<thead>
<tr>
<th>UR</th>
<th>Variant</th>
<th>Variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>zıdə</td>
<td>zııa</td>
<td>zıa</td>
</tr>
<tr>
<td>kıdɛ</td>
<td>ııɛ</td>
<td>kıɛ</td>
</tr>
<tr>
<td>zıdɛ</td>
<td>zıe</td>
<td>zıe</td>
</tr>
<tr>
<td>fıdɛ</td>
<td>ıe</td>
<td>fıe</td>
</tr>
<tr>
<td>vıdɛ</td>
<td>vıe</td>
<td>vıe</td>
</tr>
<tr>
<td>bıdɛ</td>
<td>ıe</td>
<td>bıe</td>
</tr>
<tr>
<td>bęn̄ı</td>
<td>-</td>
<td>bę̄ı</td>
</tr>
<tr>
<td>kılα</td>
<td>-</td>
<td>kılα</td>
</tr>
<tr>
<td>vılo</td>
<td>vıldọ</td>
<td>vılo</td>
</tr>
</tbody>
</table>

b. 

<table>
<thead>
<tr>
<th>UR</th>
<th>Variant</th>
<th>Variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>bıdə</td>
<td>belıe</td>
<td>bıe</td>
</tr>
<tr>
<td>wıdɔ̄</td>
<td>wıılα</td>
<td>wııo</td>
</tr>
<tr>
<td>duɗu</td>
<td>duɗu</td>
<td>duu</td>
</tr>
<tr>
<td>sıɗɔ̄</td>
<td>sıơıe</td>
<td>sıııe</td>
</tr>
<tr>
<td>poɗɔ̄</td>
<td>poơıe</td>
<td>poıııe</td>
</tr>
</tbody>
</table>

c. d, l → ıı / ıı __ ıı

The rule in (6c), which is responsible for the optional deletion of d and l, brings into contact two identical vowels which previously were separated by a consonant. In other words, the deletion rule apparently creates, as shown in (7), true (i.e. bisegmental) geminates and, hence, violates antigemination.

(7) \( V_1 \{d', l\} \ V_1 \rightarrow V_1 V_1 \ V_1 \)

While there is some debate in the literature as to what level(s) of segmental structure the OCP may scan (see Yip (1988)), the OCP is violated in the cases at hand irrespective of the level assumed, be it the Root Node or any lower class node (see Clements (1985)). Moreover, all words cited so far are monomorphemic; there is no possibility to invoke any ordering between the consonant deletion and Tier Conflation. The cases discussed, then, appear to be genuine violations of antigemination. However, such a conclusion rests on a crucial assumption: that the two identical vowels are truly separate segments before the consonant deletes. It is this crucial assumption which is misguided. In what follows, we attempt to show that the two identical vowels are already fused across the phonetically intervening consonant in UR. Consonant deletion consequently does not produce a bisegmental geminate. Let us now turn to some background on Guere phonology so as to provide evidence that the two identical vowels are monosegmental at the level of UR.

Guere has a nine vowel inventory (omitting phonemic nasal vowels, which do not affect the argument). All vowels are short; hence \( V_1 V_1 \) is disyllabic. Given that stems are maximally disyllabic in Guere, it follows that stems like CVCVV or CVVCV do not exist.
While one would expect to find any combination of vowel heights in stems, one observes, in fact, the following distributional restriction. High vowels (I, U, I, U) may combine between themselves or with a non-high vowel (e, o, e, o, a), as shown in (9), but there may not be two non-high vowels in a stem⁴.

Let us claim along with Paradis (1983a; b) and Paradis and Prunet (1988a; b) that this restriction is the result of a constraint, the Height Constraint (henceforth HC), which can be formulated as in (10). Note that the representation below, where the node involved is the articulator (viz. the Dorsal Node), allows the HC to apply across consonants since consonants do not have a dorsal node, an assumption which is drawn from Steriade (1987), and developed later.

The HC is supported by the examples in (11a), where a non-high vowel is raised by a repair strategy (i.e. a fix up rule, see Paradis forthcoming a) subsequent to the suffixation of an object-pronoun vowel which is [-high]. In (11b), it is shown that the repair strategy (viz. vocalic raising) does not apply when the pronoun vowel is high. Object pronouns, which are slot-less (they only consist of a floating vowel), attach directly to the last timing unit of a preceding stem. This accounts for the loss of one of the surface vowels below (see Paradis (1988; forthcoming b) and Paradis and Prunet (1988a)).⁶

---

(9) bûi 'ashes' nInU 'milk' jreu 'monkey' mëû 'needle'
    meU 'tongue' KIba 'rat' yiBa 'face' bai 'robe'
    Klua 'ground' boû 'foot' bUO 'round' boU 'frog'
    daU 'smoke' gIÎë 'cayman' gbau 'box' klûe 'monkey'
    kwI 'brave' jië 'road' müÎ 'cockroach' jië 'wound'
    niûe 'cowrie' niû 'person' jiûe 'know!' yiûe 'pimple'
    ciû 'learn!' maI 'forget' nûÎ 'whisper' taI 'loincloth'
    gÎûI 'burn! (pepper)'

(10) **Height Constraint**

Dorsal Node  Dorsal Node

* [-high]  [-high]

---

(11) a. nêe + e  → nÎe  
    nêe + o  → nIô  
    gbîee + e  → gbîÎë  
    gbîee + o  → gbîIô  
    wûC(1)e + e  → wûU(1)e
    wûC(1)e + o  → wûU(1)o

b. (*nêe) 
    (*nIô) 
    (*gbîÎë) 
    (*gbîIô) 
    (*wûU(1)e) 
    (*wûU(1)o)
b. \( nʕɛ + U \) → \( nʕɛU \) "stick it!" (*\( nɪU \))
\( nʕɛ + I \) → \( nʕI \) "stick! it" (*\( nɪI \))
g\( \text{blee} \) + U → g\( \text{blee}U \) "welcome it!" (*\( gβlɪU \))
g\( \text{blee} \) + I → g\( \text{blee}I \) "welcome it" (*\( gβlɪI \))
\( wɔ(1)q + U \) → \( wɔ(1)U \) "wash it!" (*\( wU(1)U \))
\( wɔ(1)q + I \) → \( wɔ(1)I \) "wash it!" (*\( wU(1)I \))

There are two classes of exceptions to the HC. First, two vowels may both be [-high] if they are identical and adjacent (12a). Second, two non-high vowels may be separated by a coronal, again if they are identical (12b).

(12) a. \( bəq \) 'maniac' \( ɗoo \) 'week' \( ɨɛ \) 'to dry'
b. \( wɔdə \) 'to wash' \( sədə \) 'to lose weight' \( bɛdə \) 'to hang'

Let us consider (12a) first. Actually we argue that such stems do not violate either the HC, or the OCP, because they include only one vowel segment, i.e. only one [-high] specification, spread onto two syllabic nuclei. In other words, because the geminate is only apparent as shown in (13), it is not subject to the HC, which is restricted to true geminates (i.e. sequences of distinct identical vowels).

(13)
\[
\begin{array}{c|c|c|c|c}
N & N & \mid & \mid \\
X & X & X & \mid & \mid \\
\mid & \mid & \mid & \mid & \mid \\
b & a & \text{baq} & \text{'maniac'}
\end{array}
\]

Let us refer to these vowels as fused vowels. While it is clear that fused vowels share all of their features, current models permit several possible representations. For instance, in a feature geometry model (see Mascaro 1983, Clements 1985 among others) fused vowels could share a Dorsal Articulator or any class node up to the Root Node. Let us make explicit the model of segmental structure which is assumed in this discussion, essentially that of Sagey (1986). We assume, with Steriade (1987), that velars have a Velar Articulator (see Halle (1983) on the concept of articulator) and with Piggott (1988) that the feature nasal branches off the Root Node.

(14)
\[
\begin{array}{ccc}
\text{X} & \text{R} & \text{L} \\
\mid & \mid & \mid \\
\text{P} & \text{nasal} & \text{Labial} \\
\mid & \mid & \mid \\
\text{Coronal} & \text{Dorsal} & \text{Velar} \\
\end{array}
\]

\( X = \) timing unit
\( R = \) Root Node
\( P = \) Place Node
\( L = \) Laryngeal Node

The second class of exceptions to the HC provides us with the needed evidence to decide on the correct representation of fused vowels.
We have argued in Paradis and Prunet (1988b, c) that coronals universally lack a Place Node in UR. We will see that this aspect of coronal structure provides us with an explanation i) for the apparent HC violations, and ii) for the apparent OCP violations. It also answers the question of fused vowels: fused vowels in Guere are fused at the level of the Place Node. They, of course, share all nodes below the Place Node. If they were fused only from the Dorsal Articulator down, then all consonants could intervene between two identical vowels, since the Dorsal Articulator is specific to vowels (see Steriade (1987)), and articulators consist of unordered planes (see Sagey (1986); see also Clements (1985) for unordered daughter nodes). As it is not the case that all consonants can intervene, fused vowels cannot be fused lower than the Place Node, i.e. they cannot be fused at the Dorsal Articulator. They cannot be fused higher than the Place Node either, since all consonants, except coronals, are also represented at all nodes including the Place Node and above. As indicated in (6b) and (12b), only coronals may intervene between the two branches of a fused vowel. A representation of a fused vowel across an intervening coronal is given below. The examples of (12a) have the same structure without the intervening consonant.

(15)

<table>
<thead>
<tr>
<th>terminal features</th>
<th>[-low] [-high] [-back] [+ATR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>dorsal tier</td>
<td>\</td>
</tr>
<tr>
<td>labial tier</td>
<td>/</td>
</tr>
<tr>
<td>place tier</td>
<td>/</td>
</tr>
<tr>
<td>root tier</td>
<td>\</td>
</tr>
<tr>
<td>skeletal tier</td>
<td>X</td>
</tr>
<tr>
<td>phonetic rep</td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>e</td>
</tr>
<tr>
<td></td>
<td>d</td>
</tr>
<tr>
<td></td>
<td>e</td>
</tr>
</tbody>
</table>

We argue that two identical vowels across a phonetically intervening /d/ are already fused in UR, a claim which accounts for the apparent HC violations as well as for the apparent OCP violations. Since there is only one vowel involved in (12), deletion of /d/ does not give rise to a true vocalic geminate, i.e. it does not violate antigemination nor does it create a disallowed sequence of two non-high vowels. We conclude that the facts of Guere, although they have the formal characteristics of Odden's (1988) counterexamples to antigemination, in fact respect the OCP.

Putting aside the issue of fused vowels, let us focus on the status of the HC itself. So far we have said that a HC violation was present whenever two adjacent Dorsal Articulators dominate [-high]. We have also said that our definition of “adjacency” includes intervening consonants, since consonants are typically non-dorsal and, thus, transparent to vowels. We would like to claim that this is the effect of a parameter on vocalic sequences, which also applies in English. The only difference between Guere and English comes from the fact that consonants are opaque to vowels in English (i.e. the two vowels must be phonetically adjacent), which means that, as discussed later, “adjacency” must be redefined in a slightly different fashion.

Thus, while vowel sequences are not infrequent in English, an exhaustive check of Kenyon and Knott's (1953) A Pronouncing Dictionary of American English reveals that they always involve at least one high vowel (Kenyon and Knott's broad phonetic transcriptions have been replaced by the narrower transcriptions of Jones' (1977) English Pronouncing Dictionary).
(16) baobab [baʊæbæb]  beatify [bɪætɪfaɪ]  boa [bɔa]
briché [brɪʃ]  bruin [braɪn]  chaos [kəʊæs]
Creole [kriːəl]  co-axial [koʊæksjəl]  deity [dɪətɪ]
geography [dʒiəɡrəfi]  ideology [aɪdɪədʒɪ]  idea [aɪdɪə]
Israel [ɪzrəəl]  kaolin [kəʊæliən]  neon [nɪən]
poet [pəʊət]  radio [reɪdɪəʊ]  theocrat [θeɪkræt]
viola [vɪəʊələ]  video [vɪdɪəʊ]

As these data show, orthographic instances of non-high vowel sequences always include a high vowel phonetically. It is true that the tendency of English vowels to diphthongize eliminates many possible non-high sequences independently of the HC but it does not explain the absence of all such vowel sequences. For instance, diphthongization could play no role in low-mid sequences (*ae, *o, *ae, *a2 etc.), and yet these sequences are systematically absent, requiring an independent constraint. While the form of and conditions on constraints, in their traditional sense, may vary without limit, parameters must be finite in number. Attributing the HC to a constraint makes it a coincidence that they are observed in more than one language. The similarity between Guere and English can be captured if it is assumed that the HC does not result from an arbitrary constraint but from a parameter dealing with sequences of non-high vowels as in (17).

(17) (HC) non-high vowel sequences?  Guere: no  English: no

The setting of the HC is negative in English and Guere but positive in languages such as French (e.g. poète [poɛt] ‘poet’), Spanish (e.g. poeta [poetə] ‘poet’) or Japanese (e.g. kao ‘face’). English and Guere differ only in the level at which adjacency is defined. Adjacency is required on the Dorsal tier in Guere, rendering two adjacent Dorsal nodes subject to the HC, while it is defined on the Place Node level in English. Because intervening consonants have a Place Node, only phonetically adjacent vowels are subject to the HC in English, which accounts for existing words such as ‘potato’ and ‘tomato’, whose first two vowels are [-high].

(18)  
\[ \begin{array}{ccc} 
R & R & R \\
| & | & | \\
P & P & P & \text{ <-- Adjacency (English)} \\
| & | & | \\
* & Dors & Dors & \text{ <-- Adjacency (Guere)} \\
[-\text{high}] & [-\text{high}] 
\end{array} \]

To sum up, while both languages disallow adjacent non-high vowels, the observed surface sequences differ widely owing to a minimal distinction: the level at which adjacency is defined. In spite of these surface differences, a parameter disallowing sequences of [-high] feature specifications captures the similarities between the two languages.

III. Vowel Fusion and Apparent OCP Violations in Mau

In II we claimed that the antigemination violations in Guere were apparent, and resorted to feature geometry to show that sequences of identical vowels were fused across an intervening segment, namely a coronal. However, invoking fused Place Nodes, or fused articulator nodes, whenever antigemination is violated would render antigemination
unfalsifiable. In the least constrained theory, identical segments would be held to be separate when antigemination effects are observed but fused when antigemination is violated. Such a line of reasoning would deprive antigemination of any relevance to linguistic theory, as it could never be proved wrong. Our solution involves no such weakening of the theory because, as in the Guere case, independent evidence for fused structures is available (see the apparent HC violations in II). Here we will show that Guere is not an isolated case. Mau, a Mandingo language of the Ivory Coast, also displays apparent OCP violations which require intramorphemic fused vowels, in many cases across an intervening consonant (viz. the coronal l). Similarly to Guere, the interest of the Mau case lies in the fact that the fused vowels must be posited for reasons independent of antigemination, more specifically for tonal purposes.9

Mau has a LH melody (L and H are transcribed ˊ and ˋ respectively) which is always realized as L on the first syllable and H on all subsequent syllables, or as a LH contour on monosyllables. All words cited are monomorphemic.

(19)  yê  ‘gourd’  bwê  ‘race’
    wô  ‘hole’  tô  ‘terminarium’
    sôsô  ‘mosquito’  gbêné  ‘embarrassment’
    têe  ‘popular bank’  bûzâ  ‘renting of a field’
    lônâ  ‘cock’  lâbâ  ‘storm lantern’ (<Fr. lampe)
    sisyê  ‘chicken’  wôô  ‘cola’
    mâhîne  ‘pity’  ñlâa  ‘alphabet’
    tôñô  ‘worm’  kâbîne  ‘toilet’ (<Fr. cabinet)
    sêfînê  ‘soap’ (<Fr. savon)  masuwa  ‘misfortune’

Phonetic VV sequences are classified as two syllables rather than as one syllable with a long vowel. These VV sequences, where the first vowel is always identical to the second (omitting differences in nasality, non-identical vowel sequences do not exist in Mau), behave as two syllables in, for instance, the following language game, in which bV (or its nasalized variant mV, with V a copy of the preceding vowel) is inserted after every syllable. A VV sequence is broken into two V units, both followed by bV, which shows that VV counts as two syllables.

(20)  kitî  →  kîbitibî  ‘judgment’
    tôñô  →  tôboñômô<sub>w</sub>ôbô  *tôboñômô  ‘worm’

The basic LH melody results from association conventions which link the first tone (L) to the first syllable and the second tone (H) to the following syllables (with the additional requirement, needed for monosyllables, that all tones must be associated). In this perspective, LL sequences, as opposed to HH ones, which always result from spreading, must be construed as true intramorphemic geminates, and then as OCP violations (see Odden (1986) for other OCP violations with tones). One must assume that the first L tone is present in UR, i.e. it is learned, whereas the second results from the basic LH-association conventions.10 Now, there are two cases where a LH melody does not yield the regular surface patterns: when a word begins with two adjacent identical vowels (21a) and when a sequence of two identical vowels are separated by the coronal l (21b). In both cases, L links to both vowels of VV and VlV, creating problematic (for the OCP as well as for the basic tonal melody) LL sequences.11
(21) a.  gwí 'sulphur'     wóótó 'cobra'
        tí tí 'road'       deéké 'shirt'
        hee yábú 'protection'     lóónu 'illness'
        sísáá 'asthma'

    b.  bóótí 'thread'     màláká 'Marka' (ethnic group)
        sàlàbá 'wick'     màlásí 'card game' (<Fr. marriage)
        fáláti 'bad behavior'     yòókó 'chain'
        fálázi 'French person' (<Fr. Français)

The situation is so general in the language that one can make the following generalizations.

(22) a.  All CVVCV(·) words with a LH melody have LL on VV.
    b.  All CVjVjCV words with a LH melody have L on both Vj vowels.
    c.  There is no surface CjVC2VC3V (LLH) word where C2 is not the coronal J.

We claim that the tonal melody in (21b) is LH, although its surface realization is [LLH.].
Both VV and VVV sequences involve only one vowel associated to a single tone spread onto
two nuclei. The configuration is exactly that of the Guere fused vowels: identical vowels
either phonetically adjacent or separated by a coronal (except that in Mau the intervening
coronal must be J) are fused vowels. This representation is exemplified below with the
word fáláti 'bad behavior'. The representation of VV sequences is the same, but without
the intervening J.

(23)  f a l a t i
       X X X X X X X
       R R R R R R R
       ... ... P P
       Dors  Dors

If one assumes, as we claim, that the association conventions select the Place Nodes of
vowels as P-bearing units (and not Root Nodes, nuclei or syllables, as usually assumed),
one is now provided with a very interesting solution where the L-tone association counts VV
and VVV sequences as one unit (since there is only one Place Node involved), and where H
associates to all subsequent vowels. This appears to be the only alternative to claiming that i)
there is an OCP-violating LLH melody which is paired only with words beginning with
initial CVVCV(·) or CVjVjCV sequences, and that ii) the correct LH melody, oddly enough,
happens never to be paired with such syllabic sequences. For the Mau tonal patterns to be
explained in a principled manner, it is necessary that identical vowels across an intervening J
be fused. This is exactly what we claimed in Guere, and Mau provides evidence for the same
point.

Our analysis predicts that two words with a LH melody and J in the onset of the second
syllable will have different tonal patterns if the first and second vowels are identical (fused)
or different (two segments): CVjVjV2CV vs. CVjV2CV. There is one CVjV2CV word
known to us: māłḗeka ‘angel’ (from Arabic malaₕa?eka ‘angels’), and its pattern is, indeed, LH HH as predicted by the fact that a and e are distinct and cannot be fused across l (compare with the LH in yələkọ ‘chain’, ēlətī ‘bad behavior’, ēləzí ‘French’, sələba ‘wick’ etc.).

As the sequences (V₁l₁V and V₁V₁), which count as one segment for tone mapping, are precisely the same for which Guere vowels were held to be fused, the facts of Mau tonology vindicate a crucial component of our analysis, viz. the claim that identical vowels across the coronal l in Mau (and across coronals in general in Guere) are fused. As a consequence, l-deletion between two identical vowels involves no antigenimation violation.

- Odden (1988, 465) presents several interesting examples of vowel deletion rules which fail to be blocked between identical consonants. Examples of both tautomorphic and heteromorphic contexts are provided, both of which appear to violate antigenimation. A detailed investigation of these counterexamples is beyond the scope of this paper. However, the reasoning applied to the Guere and Mau cases may be applicable to these examples as well. In particular, these problematic identical consonants could be argued to share an articulator node across the intervening deleting vowel, either underlyingly (for tautomorphic cases) or as a result of fusion of articulators after Tier Conflation (for heteromorphic cases). As we pointed out earlier, applying the solution advocated here to all antigenimation counterexamples without independent evidence would trivialize the OCP and antigenimation. However, we submit that at least a substantial number of problems for antigenimation may be accounted for in this manner.

IV. Conclusion.

In this paper, we have discussed in some detail the case of a Kru language, Guere, which appears to violate antigenimation (an effect of the OCP). A process of consonant deletion in intervocalic position which applies tautomorphemically has been shown to be blind to the identity of the surrounding vowels which it brings into contact. Such a deletion process, because it creates apparent OCP violations in the form of true (i.e. bisegmental) vowel geminates, presents the formal characteristics of known antigenimation violations, namely those discussed in Odden (1988). We have argued that the restrictions on vowel sequences in Guere reveal that the offending bisegmental vowel geminates are in fact monosegmental as early as the level of UR, being fused at the Place Node when immediately adjacent or separated by a coronal. This claim was supported by the tonal behavior of Mau, where the L tone of a basic LH tonal pattern proved to be fused through the coronal l when attached to a vowel spread to two syllables. Although the examples we have discussed involve fusion of identical segments at the PN level, most cases of segmental fusion will likely involve shared articulators, rather than shared PNs. This would account for vowel fusion through other consonantal types than coronals. We believe that such could also be the case for vowel deletion between identical consonants as in some of Odden’s (1988, 465) examples, an assumption which requires further research.

Notes

* We are grateful to Shelly Lieber, Morris Halle and Donca Steriade for useful comments on a previous version documenting the Guere case in 1987-88 when C. Paradis was a Visiting Scholar at MIT. We are also grateful to many people at Glow (1988) and Nels 19 for interesting comments on the Guere case. Above all, we are indebted to Moussa Bamba of the African Linguistics Project at UQAM for his precious help with Mau data. Of course we are solely responsible for any mistake. C. Paradis acknowledges SSHRC grant # 410-88-1166 and SSHRC Canadian Research Fellowship # 455-88-0103. J.-F. Prunet benefited from funds SSHRC # 411-85-0012 and FCAR # 88-EQ-2681.
As an alternative to potential counterexamples, McCarthy suggests that the OCP may, if such cases were identified, have to be parametrized (see also Odden (1986), Kenstowicz and Kidda (1987), Lowenstamm and Prunet (1987) for discussion).

The dialect studied here is mainly Zibiao Guere spoken in the village of Bangolo Tahouaké whereas that referred to in Paradis (1983a; b) was mainly Zagna Guere spoken in the village of Gohou. However, both dialects are very similar.

As far as we know, the other coronals of Guere (viz. t, d, s, z) are not found intervocally within non-compound, non-reduplicated stems.

I and ñ, on the one hand, and ÿ and ù, on the other hand, which are very close phonetically, have been often confused in the literature on Guere.

One may wonder why this constraint disallows two adjacent negative values of [high] while two adjacent positive values are permitted. It is interesting to notice that, in an element-based theory, in which all and only non-high vowels share an A element, the constraint may be reformulated as an OCP prohibition against two adjacent A's (i.e. *A A), a generalization which cannot be captured in the feature-based theory that we use here. See Anderson and Jones (1974), Schane (1984) and Kaye, Lowenstamm and Vergnaud (1985), among others, on elements as the primitive segmental units.

Of course, Vocalic Raising does not apply either (even to the pronoun vowel) when the stem vowel is already high: /ðu + (z, ù, ü, ñ)/ → ñu, ñu, ñu, ñu, ñu (vy represents a light diphthong, i.e. two segments attached to a single timing unit).

Every noun belongs to a nominal class in Guere, and an object pronoun is selected according to the nominal class of its referent.

For reasons which are not relevant here, wU(1)F is realized as glU(1)F in most Guere dialects.

We are grateful to Moussa Bamba for drawing our attention to these facts and providing us with many important insights into his language. The tonal system of Mau is analyzed in detail in Bamba (1984; forthcoming). A Mau lexicon can be found in Creissels (1982). This document contains errors, as Creissels himself cautions (p. 1-2), but it is the only lexicon. Mau has two phonologically different types of nasal vowels, which we do not distinguish here.

The tone association conventions in Mau, which conform to the logic of the universal association conventions proposed by McCarthy (1981, 382), are precisely the following: i) associate tones to melody-bearing units one-to-one from left to right (see also Pulleyblank (1986, 11), ii) the rightmost tone spreads onto all remaining toneless tone-bearing units, iii) an unattached tone links to the nearest (rightmost) tone-bearing unit. The left-to-right direction of association predicts a left/ right asymmetry where, given the basic LH melody in Mau, a surface sequence is well-formed with LHH but ill-formed with *LLH. Assuming with McCarthy that association conventions are exceptionless, *LLH sequences must be construed as problematic OCP violations resulting from an underlying L tone which is put in contact with another L tone resulting from the LH tonal melody. The argument is essentially the same as that which McCarthy (1981, 395-6) invokes to account for the fact that verbs like *gasam are unknown in Semitic (because they would constitute OCP violations) whereas those like samam (from a bilateral sm root) are very common and well-formed.

Note that (CVIVIVCV) words do not exist in Mau.

Vocalic fusion through a consonant seems to be limited to the coronal l in Mau for reasons that are not clear to us yet. We leave this issue aside as the important point here is that vowels be shown to be fused across the deleting consonant (for more details on coronal transparency, see Paradis and Prunet (1988b; c)).

Due to the paucity of CVjIVjCV words (only one example), we have tested the adaptation of two nonsense words: malini and malibu, both of which were adapted as
LHH (*LH), as our analysis predicts: målini and målibu (*målíní, *målíbú). The word sèrìya ‘Islamic law’, reported in Creissels (1982), appears to contradict our prediction since it has two initial L tones on two different vowels across an intervening L, which is a variant of L in Mau. However it is in fact a learned Arabic word (from farrīsá) whose normal Mau form is sèvá with a regular tone pattern. An exhaustive search of Creissels’ (1982) lexicon reveals fifteen other apparent counterexamples to (22c). Since this document contains errors in form and meaning, as pointed out in note 9, some of the forms we quote have been corrected. The first class of apparent exceptions is composed of compounds: fòrotò d’èmúú ‘grapefruit’ (fòrotò-d’èmúú ‘pepper (Maninka)-citrus (Mau)’), kàamèssye ‘whiskers’ (kàa-màa-syé ‘face-on-hair’), mòñìgbè ‘albinos’ (mòñì-gbè ‘person?-clear’), sàmàyí ‘rain season’ (sàmà-yí ‘?rain’), tèmènnisì ‘zebu’ (tèmè-ñisì ‘hump-cattle’). The second class is composed of loan-words: bàdègí ‘letter’ (from Arabic, but in fact this word has an alternative, regular, bàlàqí pronunciation), gígírás ‘place’ (in fact a Maninka word), òbìyákí ‘guava’ (probably from Maninka biyàkì, but in fact there is an alternative Mau pronunciation with a HLH melody: òbìyàkì), ëbòtás ‘paper’ (a learned Arabic word, from gërtas, the Mau word being seè-à ‘sheet-skin’). The third class consists of one onomatopoeia: gwònùnà ‘to murmur’. The fourth class consists of words which, upon verification, were found to differ from the transcribed forms: mìdéé ‘what, which?’ (in fact mìdéè; as a wh-word, the added H is due to the interrogative intonation which normally accompanies this word), mòñìvì ‘person’ (in fact mòñìvì: the difference being irrelevant since the word is also a compound: mòñì-flì ‘person?-black’), sòzwè ‘to crouch’ (in fact sòzwè, zàà ‘a tree’ (in fact zàà, zàà meaning ‘a tree, isn’t it?’). We are left with dòdò ‘bee’, which seems to be the only exception to (22c).

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