Chapter 10

An Autosegmental Analysis of Compensatory Lengthening in Turkish

Engin Sezer

This paper presents a non-linear analysis of Compensatory lengthening in Turkish, within the framework of CV Phonology, developed by Clements and Keyser (1981) and (1983). In Section 1, I present the basic theoretical assumptions of this study. In Section 2, I discuss at some length the optional h-, y- and v- loss in modern Turkish and the compensatory lengthening associated with such deletions. In the light of the presented evidence I further question the adequacy of the representation of compensatory lengthening in linear phonology. In Section 3, I take a closer look at, what I refer to as dag-type words, also known from Clements and Keyser (1981), and I examine how fully concrete and fully abstract analyses would fare with the totality of relevant facts. I subsequently defend a CV analysis for such forms and propose a universal hierarchy of deletion for unmarked cases. Section 4 looks at consonant loss not accompanied by compensatory lengthening and presents arguments that such cases can be accounted for by the Hierarchy of Deletion Principle. In Section 5, I consider lengthening due to vowel assimilation and monophthongization, and present an alternative analysis for a class of cases that are considered to have undergone compensatory lengthening. Finally in Section 6, I discuss the adequacy of the proposal by de Chene and Anderson (1979), that compensatory lengthening effects are not achieved by the deletion of a consonant but by its gradual assimilation to an adjacent vowel. Given the data of this study this merger analysis will be shown to contain some serious shortcomings.

1. THEORETICAL FRAMEWORK

In this study I will adopt the following principles of CV Phonology from Clements and Keyser (1983).¹

(1) (i) A string of C's and V's that phonologically help to represent the functional positions in a syllable mediates between the syllable tier and the segmental tier.

(ii) Deletion rules may delete the representation of a segment at
the segmental tier without affecting its corresponding unit at the CV tier.

(iii) A segment may be multiply associated with CV-tier units without creating crossing association lines.

(iv) A segment associated with two units of the CV-tier phonetically defines a long segment.

(v) Syllable-initial consonants are maximized to the extent consistent with the syllable-structure conditions of the language in question, and the output of every rule is resyllabified according to the well-formedness conditions of the language.3

In addition to these general principles, a language-specific principle is required.

(2) Association of segmental units to CV units is only tauto-syllabic and progressive (to the right)

Let me illustrate how the principles stated so far interact to derive some simple cases of optional v-loss.

(3) (i) 'drum' davul ~ daul
     (ii) 'to get rid of' savmak ~ sa'mak

The forms on the right are due to optional v-loss, a process, I will elaborate shortly. Notice that while the consonant loss is accompanied by a lengthening of the preceding vowel in (3ii) no such reflex occurs in (3i).

The representation of davul and savmak, before v-loss, is as follows, in accordance with (ii) and (iv).

(4) \[ \sigma \]
    \[ \begin{array}{c}
    \ C V C \\
    \ s a v m a k
    \end{array} \]

An optional v-deletion rule operating at the segmental tier removes the segmental representation of v without affecting its C-slot at the CV tier, in accordance with (i)
An Autosegmental Analysis of Compensatory Lengthening in Turkish

(5)

\[
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
s & a & m & k \\
\end{array}
\quad
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
da & u & l \\
\end{array}
\]

Next, by the language-specific principle (2) the vowel associates with the empty tauto-syllabic C to its right.

(6)

\[
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
s & a & m & k \\
\end{array}
\quad
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
da & u & l \\
\end{array}
\]

By (1iv), [sa:ma]k has a long vowel but [da:ul] does not. Notice also that (2) is obligatory, and that its violation results in ill-formedness.

(7)

\[
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
s & a & m & k \\
\end{array}
\quad
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
da & u & l \\
\end{array}
\quad
\begin{array}{c}
\sigma \\
C & V & C \\
\sigma & & \\
\sigma \\
da & u & l \\
\end{array}
\]

In (7i) the obligatoriness of (2) is violated. In (7ii) association is not tauto-syllabic, and in (7iii) it is not progressive. In effect what (2) guarantees is that in Turkish there will remain no unassociated C units in coda position, and I believe this is correct.

2. CONSONANT LOSS

In this section, I consider optional h-, y-, and v-loss in Turkish. All these consonants are quite regularly deleted in casual speech and maintained in careful polite conversation.

2.1. h-Deletion

In syllable-final position, h is deleted before a continuant or a nasal stop.
230 Engin Sezer

(8) (i) 'steward' kalıya ~ ka:ya
    'index' fihrışt ~ fi:rist
    'education' tahsil ~ ta:sil
    'coffee' kalıve ~ ka:ve
    'special to' mahsus ~ ma:sus

(ii) man's name mehmet ~ me:met
    man's name ahmet ~ a:met
    'God's mercy' rahmet ~ ra:met

but not before oral stops.

(iii) 'counterfit' sahete ~ *sa:te
    'chit-chat' schbet ~ *so:bet
    'inmate' mahkum ~ *ma:kum
    'harlot' kahpe ~ *ka:pe
    'cook' ahći ~ *a:çi

In onset position, h is deleted after a vowel or a voiceless consonant.

(9) (i) 'engineer' mühendis ~ müendis
    'magician' sihirbaz ~ siirbaz
    'seed' tohum ~ toum

(ii) 'suspicion' şüphe ~ şupe
    'celebrity' meşhur ~ meşur
    'diarrhea' ishal ~ isal
    'unknown' meşhul ~ meçul

But not,

(iii) 'destruction' imha: ~ *ima:
    'the late' merhum ~ *merum

The rule of h-deletion may be formulated as follows:

(10) 

\[ h \rightarrow \phi \]

\[ \left\{ \begin{array}{c} [+syl] \\ [-syl] \end{array} \right\} \rightarrow \left\{ \begin{array}{c} [+syl] \\ [-syl] \end{array} \right\} \]

\[ \left\{ \begin{array}{c} [-voice] \\ [+voice] \end{array} \right\} \rightarrow \left\{ \begin{array}{c} [-voice] \\ [+voice] \end{array} \right\} \]

2.2. v-Deletion

Again in infort sonorant conso

(12) (i) 'th' *thi ~ *thi
    'bu' *bu ~ *bu
    'Se' *Se ~ *Se
    'wa' *wa ~ *wa
    'lie' *lie ~ *lie
    'goe' *go ~ *go
    'is' *is ~ *is

but not

(ii) 'da' ~ *da
    'tail' ~ *tail
    'squ' ~ *squ
    'sle' ~ *sle
    'mu' ~ *mu

The y-deletion

(13) 

\[ [-syl] \]

\[ [-con] \]

\[ [+high] \]

\[ [-back] \]

2.3. v-Deletion

\[ v \]-loss occurs \( v \) preceded by a la

(14) (i) 'praise' ~ 'rub' ~
An Autosegmental Analysis of Compensatory Lengthening in Turkish

(10) also correctly predicts that $h$ is not deleted in absolute final or absolute initial positions.\(^5\)

(11) 'crocodile' timsah $\sim *$timsa:
    'air' hava $\sim *$ava

2.2. $y$-Deletion

Again in informal speech, $y$ is deleted after a front vowel and a following sonorant consonant or $i$.\(^1\)

(12) (i) 'thus' öyle $\sim *$öle
    'button' düymee $\sim *$düme
    'September' eylü $\sim *$elü
    'watch' seyret $\sim *$seret
    'lieutenant' taymen $\sim *$teyen
    'good' iyi $\sim i$
    'is not' deyil $\sim *$deil

but not

(ii) 'dairy cream' kaymak $\sim *$ka:mak
    'tail' kuyruk $\sim *$ku:ruk
    'square' meydan $\sim *$me:dan
    'sleep' uyu $\sim *$uu
    'mustache' bıyık $\sim *$biyık

The $y$-deletion rule may be formulated as follows.

(13)

\[
\begin{align*}
\left[ \begin{array}{c}
-syl \\
-con \\
+high \\
-back \\
\end{array} \right] & \rightarrow \emptyset / \\
\left[ \begin{array}{c}
+syl \\
+son \\
+syl \\
+high \\
-back \\
\end{array} \right] \\
\end{align*}
\]

2.3. $r$-Deletion

$r$-loss occurs when followed by a labial consonant or a vowel, or when preceded by a labial vowel.

(14) (i) Infinitive övmek $\sim*ömek$
    'praise'

    ovmak $\sim*omak$
    'rub'

    Över $\sim*őer$
    3. Aorist

    ovard $\sim*őar$
    3. Past

    ovdu $\sim*ődu$
It is not easy to subsume the p-deletion facts under a straightforward formulation, and I will not attempt one here.  

2.4. Summary

All of the consonant loss cases I have considered so far have two things in common: one, consonant loss is observed in both intervocalic and preconsonantal positions, and two, while consonant loss in intervocalic position has no effect on the neighboring vowels, the loss in preconsonantal position is accompanied by the obligatory lengthening of the preceding vowel. All such cases are adequately accounted for by the principles (1) and (2) and the specific deletion rules I have discussed so far.

2.5. Compensatory Lengthening in a Linear Framework

Although the interpretation of compensatory lengthening effects within non-linear phonology seems to have obliterated the linear representation of the process as a transformational rule, there has not been, to my knowledge, a serious critique of the type of rule that linear phonology offers for representing compensatory lengthening.  

Linear phonology offers the following rule type to represent compensatory lengthening effects.

\[
\begin{array}{c}
\text{[+syl]} \quad \text{[-syl]} \quad \text{[-syl]} \\
\text{1} \quad \text{2} \quad \text{3}
\end{array}
\rightarrow
\begin{array}{c}
\text{[+syl]} \quad \emptyset \quad \text{[-syl]} \\
+\text{long} \quad \text{[-syl]} \\
\text{1} \quad \text{2} \quad \text{3}
\end{array}
\]

This rule type can further be elaborated to include consonant loss without compensatory lengthening as in (16), below.

\[
\begin{array}{c}
\text{[+syl]} \quad \text{[-syl]} \quad \text{[asyl]} \\
\text{1} \quad \text{2} \quad \text{3}
\end{array}
\rightarrow
\begin{array}{c}
\text{[+syl]} \quad \emptyset \quad \text{[asyl]} \\
-\text{[asyl]} \quad \text{[-asyl]} \\
\text{1} \quad \text{2} \quad \text{3}
\end{array}
\]

What (16) says is that if the deleted segment is followed by a vowel,
An Autosegmental Analysis of Compensatory Lengthening in Turkish

[+syl], the preceding vowel will be [-long]. If the deleted segment is followed by a consonant, [-syl], the preceding vowel will be [+long].

A rule of the form (16), which collapses compensated and non-compensated deletions is certainly desirable to two separate rules for each consonant loss, which we believe to be a unitary phenomenon. These deletions occur under the same sociolinguistic conditions of informal speech and not in careful, formal speech. But notice that the rule type (16) offers only a roundabout way to refer to syllable structure; it provides no direct explanation as to why the vowel is lengthened when the deleted consonant is followed by another consonant. Notice also that the rule works because the consonant deletions we have considered so far do not take place in absolute final position. I will demonstrate later that in cases where deletion in final position gives rise to compensatory lengthening, (16) runs into serious difficulties.

My second objection to the rule type (16) is due to the redundancy it creates. Notice that for the consonant deletion cases considered so far we will need three rules of the format of (16), one for each of /h-, y-, and v/-loss, and the lengthening in question, which we consider to be a unitary phenomenon as expressed by (2), will have to be repeated three times with each such rule.

Thirdly, the problem with such an analysis is not only the redundancy just mentioned. In my view deletion and lengthening do not form a unitary process: each has a distinct contextual motivation. In the framework of (16) we cannot express independently the plain fact that regardless of the phonetic nature of the deleted consonant, a lost coda is compensated for by a lengthening of the tauto-syllabic vowel. The analysis under CV phonology has this explanatory advantage of expressing consonant deletion and lengthening as motivated by separate principles. I will return to this discussion of compensatory lengthening in linear frameworks in Section 3.3.

3. THE deg-TYPE WORDS

In this section, I consider a set of words which end in a long vowel in the absolutive but behave as if they have a final consonant with respect to suffix-initial alternations. I first consider suffix-initial vowel and consonant deletions in some detail and subsequently argue that such deletions are different from other segmental deletions in not leaving behind their associated CV units.
3.1. Suffix-Initial Alternations

3.1.2. Consonant Deletions

In Turkish suffix-initial \( y \), \( n \) and \( š \) are regularly deleted after consonant-final stems. It is important to note here that although there are numerous suffixes with initial \( y \), there is only one suffix that has initial \( n \), the genitive, and one that has \( š \), the distributive.

(17) Absolutive Dative Genitive Distributive

"horse" at 
"room" oda 
"ten" on 
"six" altı-

atın odenin onarı altıšar

Additionally, while the initial s of the third person possessive regularly deletes after consonants, all other suffix-initial s's remain.

(18) Absolute 3. Possessive

'girl' kız
'pearl' inji
'salt' tuz
'air' hava
'child' çocuk
'come' gel
'read' oku

kız+ injisi Privative

tuzsuz havašş Resemblative

çocukšu Conditional

gelše okuşa

The fact that the deleted suffix-initial consonants do not constitute a natural class, and that in the case of s the deletion is limited to the possessive morpheme makes it highly suspicious that we are dealing here with a phonological rule. I will therefore assume that suffix-initial consonant deletion is a marked rule that specifically refers to a particular set of suffixes.

(19) \( C \rightarrow \emptyset / C^+[X] \)

Where "\( X \)" marks the set of suffixes that undergo the rule.

The crucial point in the formulation (19) is that it applies at the CV tier.
3.1.3. Vowel Deletions

Suffix-initial vowels of native suffixes regularly delete after vowel-final stems.

(20)

<table>
<thead>
<tr>
<th>Distributive</th>
<th>Absolute</th>
<th>I. Possessive</th>
</tr>
</thead>
<tbody>
<tr>
<td>onar</td>
<td>oda</td>
<td>odam</td>
</tr>
<tr>
<td>altıšar</td>
<td>ev</td>
<td>evim</td>
</tr>
<tr>
<td></td>
<td>Imperative</td>
<td>Reflexive</td>
</tr>
<tr>
<td></td>
<td>yıka</td>
<td>yıkan</td>
</tr>
<tr>
<td></td>
<td>giy</td>
<td>giyn</td>
</tr>
<tr>
<td></td>
<td>Reciprocal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>anla</td>
<td>anlaš</td>
</tr>
<tr>
<td></td>
<td>sev</td>
<td>seviš</td>
</tr>
<tr>
<td></td>
<td>dinle</td>
<td>dinler</td>
</tr>
<tr>
<td></td>
<td>koš</td>
<td>košar</td>
</tr>
</tbody>
</table>

I will assume that suffix-initial vowel deletion is also a morphological rule that applies at the CV tier and makes reference to the native suffixes that undergo the rule.

(21) \[ V \rightarrow \emptyset / V^\uparrow \overline{X} \]

Where "X" represents the set of suffixes that undergo the rule.

3.2. The Behavior of dağ-type Words

In this section I consider the dağ-type words with respect to the suffix-initial alternations they trigger, and the length alternations in their final vowels.9 Observe the following.

(22) (i)

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Locative</th>
<th>Dative</th>
<th>I. Possessive</th>
</tr>
</thead>
<tbody>
<tr>
<td>'topic'</td>
<td>mevzu:</td>
<td>mevzu:+da</td>
<td>mevzu+a</td>
</tr>
<tr>
<td>'poem line'</td>
<td>misra:</td>
<td>misra:+da</td>
<td>misra+a</td>
</tr>
<tr>
<td>'mountain'</td>
<td>da:</td>
<td>da:+da</td>
<td>da+a</td>
</tr>
<tr>
<td>'crotchet needle'</td>
<td>tı+:</td>
<td>tı+:da</td>
<td>tı+a</td>
</tr>
</tbody>
</table>
The irregular behavior of the stems in (22), above, cannot be due to the stem-final long vowels. Observe below the forms with final long vowels that behave regularly with respect to suffix-initial alternations.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>'spelling'</td>
<td>imla:</td>
<td>imla:+si</td>
<td>imla:+ya</td>
<td>imla:+m</td>
</tr>
<tr>
<td>'building'</td>
<td>bina:</td>
<td>bina:+si</td>
<td>bina:+ya</td>
<td>bina:+m</td>
</tr>
<tr>
<td>'the letter B'</td>
<td>be:+si</td>
<td>be:+ye</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'mus.'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>note A'</td>
<td>la:</td>
<td>la:+si</td>
<td>la:+ya</td>
<td></td>
</tr>
<tr>
<td>'prayer'</td>
<td>dua:</td>
<td>dua:+si</td>
<td>dua:+ya</td>
<td>dua:+m</td>
</tr>
</tbody>
</table>

Now returning to (22), let us recall that the stem-final long vowels of the absolute forms remain long before consonants but appear as short before vowels. I will, in what follows, consider how fully concrete and fully abstract analyses would handle the dag-type words in a linear framework.

3.2.1. A Fully Concrete Analysis
To my knowledge no fully concrete analysis has been suggested for the dag-type words. Let us assume that the absolute form /da:/ is posited as the underlying form for this word. Since /da:/ does not trigger the expected suffix-initial vowel deletion it has to be marked as a lexical exception to that rule. But it has to trigger suffix-initial consonant deletion despite its final vowel. Finally, the concrete analysis in question has to address itself to the long-short vowel alternations in these stems with perhaps a rule like the following.

\[(+\text{syl}) +\text{long} \rightarrow /+\text{long} / +(+\text{syl}) \]

It seems at first that (24) is likely to salvage the concrete analysis, because ordinarily, V:+V sequences do not arise in Turkish - due to the fact that after vowels suffix-initial vowels are ordinarily deleted and suffix-initial consonants are preserved. But notice in (25), below, that there are forms that contradict (24).
An Autosegmental Analysis of Compensatory Lengthening in Turkish 237

(25) ‘punishment’ jeza: ‘penal’ jeza:+i
‘accident’ kaza: ‘accidental’ kaza:+en
‘building’ bina: ‘based on’ bina:+en

Because of forms like (25) Rule (24) has to apply only with the dag-type stems.

In summary, then, the fully concrete analysis will require the following added mechanisms.

(26) (i) Mark all dag-type words as lexical exceptions to SIVD (21).
(ii) Suffix-initial consonant deletion will be complicated with alphabet notation to allow the rule to apply after these stems.
(iii) Add a vowel shortening rule to the phonology of Turkish, (24), exclusively for these forms.

3.2.2. A fully Abstract Analysis

A fully abstract analysis for the dag-type words was suggested by Lees (1961) who posits an underlying /g/ as the final segment of these forms and the following two rules.13

(27) (i) Compensatory Lengthening

\[
\begin{array}{c}
[+\text{syl}] \ g \ \{ \# \ \} \rightarrow \text{[+syl]} \text{[+long]} \ \emptyset \ \{ \# \ \} \\
1 \quad 2 \quad 3 \\
\end{array}
\]

(ii) Intervocalic -g-deletion

\[
g \rightarrow \emptyset / [+\text{syl}] \quad [+\text{syl}]
\]

By (27i) /g/ drops in syllable-final position and lengthens the preceding vowel, and by (ii) it deletes with no side effects. Now, the /g/ in this analysis is a pure diacritic with surface realization. There are no rules in the language, other than (27) that have to refer to the fully specified segment /g/. Since for the suffix-initial alternations the feature [-syl] is sufficient, the rest of the feature composition of the segment in question is arbitrary. Secondly, even with the assumption of a final /g/ in these forms it is phonologically impossible to justify two /g/-deletion processes independently.

Now, the α-notation employed in (16), above, to collapse the consonant deletion in intervocalic and pre-consonantal positions is not available here.13 Given the present facts the problems with the compensatory lengthening rule type of linear phonology cannot be overcome. It allows
no possibility for expressing consonant loss and lengthening as distinct but complementary phenomena. An analysis that incorporates (27) cannot express the unity of /g/-loss. Even if it did it would have to destroy the unity of lengthening by making it redundantly a part of several deletion rules.

3.3. On Transformational Rules in Phonology

Chomsky and Halle (1968) do not discuss compensatory lengthening but they consider a formally similar case where the effect of a lost nasal is observed as nasalization on the preceding vowel. Phonological processes of this sort are considered to provide strong motivation for transformational rules in linear phonology. Kenstowicz and Kisseberth (1979) argue that compensatory lengthening effects necessitate the rule type that simultaneously affects two segments.

One of the successes of autosegmental phonology is that it can naturally represent processes for which linear phonology has to posit transformational rules with recourse to different tiers of representation.

In view of these observations, I will suggest (28) as a formal condition on phonological rules.

(28) No phonological rule may affect the feature composition of more than one segment at a time.

3.2. Değ-Type Words in CV Framework

I will assume with Clements and Keyser (1981), (1983) that the değ-type words contain an unassociated final C in their CV-tier. Observe in (29), below, how this analysis operates.


\begin{align*}
\text{UR} & \quad \sigma \quad \sigma \quad \sigma \\
CV&C & CV&+&VC & CV&+&VC & CV&+&VC \\
& d & a & d & a & d & a & d & a & d & a & i & m
\end{align*}

An Autosegmental Approach

Re-syllabification (1v)

\[
\sigma
\]

\[
\text{C VC C C} \\
\text{d a d}
\]

Association

(2)

\[
\sigma
\]

\[
\text{C VC C C} \\
\text{d a d}
\]

(1iv) [da:]

Concerning the değ consonant deletions

Recall that because apply at the CV tier

d deleted CV unit. 1's rules leave their as

(30) The Hierarchy

Unless other mental tier applying at presentation

I will consider the f

4. CONSONANT LOSS

The cases of common linking c to its right. In this complementary me losses result in cor cases, and present ciple (30).
An Autosegmental Analysis of Compensatory Lengthening in Turkish 239

Re-syllabification (1iv)

Association (2)

(1iv) [da:] [da:dan] [da:] [da:m]

Concerning the difference between suffix-initial deletions and optional consonant deletions discussed in Section 2, a clarification is necessary. Recall that because of the way they are formulated suffix-initial deletions apply at the CV tier and remove the segmental units associated with the deleted CV unit. I stipulated also, however, that specific segment deletion rules leave their associated CV units intact. I will propose the general principle (30), below, to remedy this apparent inconsistency.

(30) The Hierarchy of Deletion Principle

Unless otherwise stipulated, a deletion that applies at the segmental tier does not remove the associated CV unit. Deletions applying at the CV-tier automatically remove the segmental representation.

I will consider the further relevance of this principle in Section 4.

4. CONSONANT LOSS WITHOUT COMPENSATORY LENGTHENING

The cases of compensatory lengthening considered so far involve the automatic linking of a vowel to the unassociated tauto-syllabic floating C to its right. In this analysis deletion and lengthening are independent but complementary mechanisms. It is also true, however, that not all consonant losses result in compensatory lengthening. In this section I consider such cases, and present an analysis based on the Hierarchy of Deletion Principle (20).
4.1. The r of -iyor

The final r of the progressive suffix, -iyor, is usually deleted in informal speech in syllable final position without the accompanying compensatory lengthening.

(31) 'laugh+3.sg.'
    ' " +2.sg.'
    ' " +Past+1.pl.'
    ' " +Cont.+1.sg.'
  gülüyo(r)
gülüyo(r)sun
gülüyo(r)duk
gülüyo(rom) / *
gülüyoum

Another example of r-loss in casual speech is observed in the word, bir 'one'. The deletion occurs in absolute final position when followed by another word.

(32) 'one'
    'one hour'
    'one man'
    'someone'
    'suddenly'
  bir / *bi
  bi(r) saat
  bi(r) adam
  birisi / *biisi
  biden / *bißen / *biden

The fact that the environments of r-deletion in -iyor and bir are not the same indicates that we are not dealing here with a productive r-deletion rule. In fact, -iyor is the only suffix that optionally drops its final r in syllable-final position. Others like -er/- Ir, aorist, -ərə the distributive, etc. never do. The r-loss in bir is, so far as I know, only peculiar to this form. There is therefore no reason to believe that we are dealing with a productive r-loss. Rather it is the case that these two forms lose their final consonant in some environments. Here, as in the case of suffix-initial alternations earlier, I am assuming that productive deletion rules are to be expressed at the segmental level but unproductive, morphologically (i.e. lexically) motivated deletion rules refer only to the elements of the CV-tier. I will then formulate the r-loss rule as follows.

(33) (i) C → φ / V C V

[ + Rule
(33i) ]

(ii) C → φ / C V ≠ x [ φ

[ + Rule
(33ii) ]

Where φ is some phonological phrase

An Autosegmental.

The Hierarchy of I rules (33) leave no no complications at
There are, how syllable-final positiv predicts in such operate at the seg
unit. 17

(34)

'there is'
'(s)he gave'
'they go'
'(s)he cooks'
'(s)he gives'

I will formulate the

(35) 

[ +son
 -an
 +cor

In line with the 1 associated with r, : obligatorily associ
rise to lengthening.

(36) g d æ

5. VOWEL ASSIMILATION

In this section I d compensatory len... by two independ... phthongization.
The Hierarchy of Deletion Principle, (30), will ensure that the deletion rules (33) leave no segmental representation of deleted C's and therefore no complications arise.\textsuperscript{16}

There are, however, dialects of Turkish where $r$ is regularly lost in syllable-final position with the accompanying compensatory lengthening. Predictably in such cases $r$-deletion is a productive rule and hence must operate at the segmental tier leaving behind, by (30), its associated CV unit.\textsuperscript{17}

\[
\begin{array}{ll}
(34) & \text{Standard Turkish} & \text{Western Anatolian} \\
\text{‘there is’} & \text{var} & \text{va:} \\
\text{‘(s)he gave’} & \text{verdi} & \text{vaedi} \\
\text{‘they go’} & \text{giderler} & \text{giderler} \\
\text{‘(s)he cooks’} & \text{pişirir} & \text{pişirae} \\
\text{‘(s)he gives’} & \text{verir} & \text{veri:}
\end{array}
\]

I will formulate the $r$-deletion rule as follows.

\[
(35) \quad \begin{array}{c}
+\text{son} \\
-\text{ant} \\
+\text{cor}
\end{array} \quad \rightarrow \quad \emptyset / [+\text{sy}l]
\]

In line with the Hierarchy Principle, (30), (35) does not delete the C associated with $r$, and as predicted by Principle (2), the preceding vowel is obligatorily associated with the tauto-syllabic C on the right thus giving rise to lengthening.

\[
\begin{array}{c}
\text{g} \quad \text{i} \quad \text{d} \quad \text{ae} \quad \text{l} \quad \text{ae}
\end{array}
\]

\text{‘they go’}

5. VOWEL ASSIMILATION AND LENGTHENING

In this section I discuss a particular case of vowel lengthening not due to compensatory lengthening. I argue that such cases may be accounted for by two independently motivated processes; vowel assimilation and monophthongization.
5.1. Vowel Assimilation

Vowel assimilation is a poorly understood phenomenon in Turkish; my analysis here will also be somewhat cursory. First, vowel assimilation is optional, contiguous and regressive.

(37) ‘heavy’ aɪr ~ aar ~ *aɪːr
‘yogurt’ yourt ~ yoort ~ *yuurt
‘retch’ oýr ~ oör ~ *ühr

Secondly, assimilation involves only lowering. In other words the assimilating vowel must first agree in backness and rounding with the preceding vowel.

(38) ‘hen’ taʊk ~ *taɑk ~ *taok

Finally, the assimilating vowel must be one of the three high vowels, [i, u] or [ɪ]; [e] does not assimilate to a preceding [e],

(39) ‘fits’ siar ~ *siɛɾ
‘couplet’ boeɪt ~ *boeɛt
‘incline’ miel ~ *meɛl
‘horse groom’ seis ~ *sees

There are further special restrictions on assimilation. For example [ɪ] fairly regularly assimilates to a preceding [a].

(40) ‘heavy’ aɪr ~ aar
‘paper’ kaɪt ~ kaat
‘disperse’ daɪl ~ daal
‘sewer’ laɪm ~ laam
‘donation’ baɪs ~ baas

The assimilation of [u] or [ʊ] to a preceding vowel is rather restricted; usually a following sonorant is necessary.

(41) ‘ward’ kouş ~ *kuoʃ
‘willow’ sʊt ~ *suʊt
‘knead’ your ~ yoor
‘son’ oul ~ ool
‘bellow’ bʊr ~ booɾ

An Autosegamental

5.2. Monophthongs.

The other phonological monophthongs, whether they ar

(42) ‘heavy’ ‘paper’ ‘yogurt’ ‘bellow’ ‘hour’ ‘tree’ ‘era’ ‘value’ ‘basting’ ‘tangent’

In what follows restructuring that same syllable node

(43) a
      (i) C V  Y
  s a a

By (1v) (43i) is ir

5.3. A Case of No.

Consider first the 1

(44) ‘mouth’ ‘lower chic’ ‘flank’ ‘era’ ‘son’ ‘good luck

Historically all th second vowel i
5.2. Monophthongization

The other phenomenon which is relevant to the present issue is the optional monophthongization of two adjacent homorganic vowels, except ee, whether they arise from vowel assimilation or not.

(42)  'heavy'  a̱r  ~  aar  ~  aːr
      'paper'  kãt  ~  kaat  ~  kaːt
      'yogurt'  yoort  ~  yoort  ~  yoːrt
      'bellow'  bōr  ~  bōːr
      'hour'  saat  ~  saːt
      'tree'  aːr  ~  aːr
      'era'  ēr  ~  ēr
      'value'  dear  ~  *deːr
      'casting'  teel  ~  *teːl
      'tangent'  teet  ~  *teːt

In what follows, I will assume that monophthongization is a syllable re-structuring that interprets adjacent homorganic vowels as part of the same syllable nucleus.

(43)  \[\begin{array}{c}
    g \\
    C \quad V \quad V \\
    s \quad a \quad t
  \end{array}\]  \rightarrow  \[\begin{array}{c}
    g \\
    C \quad V \quad V \quad C \\
    s \quad a \quad t
  \end{array}\]

By (1iv) (43ii) is interpreted as saːt.¹⁹

5.3. A Case of Non-Compensatory Lengthening

Consider first the following forms.

(44)  \begin{array}{ccc}
  'mouth' & aːz  & aːzdän  & aːzdī \\
  'lower chest' & bār  & bāzdän  & bāːrdī \\
  'flank' & bōr  & bōːrdän  & bōːrdī \\
  'era' & ēr  & ēːrdän  & ēːrdī \\
  'son' & ool  & ouːldän  & ouːlu \\
  'good luck charm' & uur  & uʊrdän  & uːru
\end{array}

Historically all these forms contained a g after the first vowel, and the second vowel is usually analysed as epenthetic to break up the imper-
missible cluster. In Lees (1961), these roots are analysed as having an underlying consonant which is subject to deletion by Rule (27), above. A sample derivation follows.

(45)

<table>
<thead>
<tr>
<th></th>
<th>Abs.</th>
<th>Abl.</th>
<th>3. Poss.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>/aɡz/</td>
<td>/aɡz+dan/</td>
<td>/aɡz+sl/</td>
</tr>
<tr>
<td>SICD (19)</td>
<td></td>
<td></td>
<td>aɡz+1</td>
</tr>
<tr>
<td>Epenthesis, harmony</td>
<td>aɡz</td>
<td>aɡz+dan</td>
<td>a:zi</td>
</tr>
<tr>
<td>Rule (27i)</td>
<td></td>
<td></td>
<td>a:zi</td>
</tr>
<tr>
<td>Rule (27ii)</td>
<td>əzi</td>
<td>a:zdan</td>
<td>a:zi</td>
</tr>
</tbody>
</table>

I reject this analysis on the same grounds that I rejected the fully abstract analysis for the dağ-type words. But more importantly there are good reasons to believe that the forms in (44) do not involve compensatory lengthening.21

Let me begin by pointing out that in addition to the forms in (44), above, we have the following.

(46)

<table>
<thead>
<tr>
<th></th>
<th>Absolutive</th>
<th>3. Possessive</th>
</tr>
</thead>
<tbody>
<tr>
<td>'mouth'</td>
<td>a:zi / a:zi</td>
<td>a:zi / a:zi</td>
</tr>
<tr>
<td>'lower chest'</td>
<td>ba:ri / ba:ri</td>
<td>ba:ri / ba:ri</td>
</tr>
<tr>
<td>'ear'</td>
<td>b:ur</td>
<td>b:ur</td>
</tr>
<tr>
<td>'chest'</td>
<td>g:os / g:os</td>
<td>g:os / g:os</td>
</tr>
<tr>
<td>'son'</td>
<td>o:li</td>
<td>o:li</td>
</tr>
</tbody>
</table>

The absolute and 3 Possessive forms in (44) and (46) are in free variation.22 Notice that the analysis in (45) requires vowel assimilation and monophthongization to account for the absolute forms in (46), but it cannot account for the 3 possessive forms in (46).

I assume that the underlying forms of (44) are the same as their absolute forms, and the 3 possessive forms in (44) and the alternate forms in (46) are derived by vowel assimilation and/or monophthongization.

6. AGAINST A MERGER ANALYSIS OF COMPENSATORY LENGTHENING

In an interesting paper, de Chene and Anderson (1979) claim that compensatory lengthening, as a historical phenomenon, is decomposable into several successive stages none of which involving deletion. In the first stage, a post-vocalic consonant weakens into a glide. In the second stage, the glide is reassigned to the vowel mem independent length long. A schematic below.

(47) (i)

\[ C_1 \bar{v} \]

(ii)

\[ C_1 \bar{v} \]

Let me repeat that it does not all follows, check this compensatory leng that with respect tc and Anderson's by!

Historically, but subsequently disap

(48)

(i) 'gummy syn'
(ii) 'oleaster'

[i]'heave'

In (48), Stage C r are represented b do not have long [γ]'s anywhere.

Let us now ta where compensat analysis of (47), tl ing vowel, but th words, the merge:
An Autosegmental Analysis of Compensatory Lengthening in Turkish

Glide is reassigned to the nucleus of its own syllable giving rise to a diphthongal representation. Finally, in the third stage the glide fully assimilates to the vowel member of the nucleus. If furthermore the language has independent length contrast the complex nucleus will be interpreted as long. A schematic representation of the successive stages is presented below.

\[
\begin{array}{ccc}
\text{(i)} & \text{(ii)} \\
\begin{array}{c}
\sigma \\
C_1 \quad V \quad C_2 \quad C_3
\end{array} & \begin{array}{c}
\sigma \\
C_1 \quad V \quad G \quad C_3
\end{array}
\end{array}
\]

\[
\begin{array}{ccc}
\text{(iii)} & \text{(iv)} \\
\begin{array}{c}
\sigma \\
C_1 \quad V \quad G \quad C_3
\end{array} & \begin{array}{c}
\sigma \\
C_1 \quad V_1 \quad V_2 \quad C_3
\end{array}
\end{array}
\]

Let me repeat for emphasis that the crucial aspect of this analysis is that it does not allow deletion anywhere along the process. I will, in what follows, check this analysis first against a well known case of historical compensatory lengthening effects in Turkish. Subsequently, I will argue that with respect to synchronic compensatory lengthening effects de Chene and Anderson's hypothesis is inadequate.

Historically, both intervocalic and syllable-final g first became a \(\gamma\) and subsequently disappeared in some dialects including standard Turkish.

\[
\begin{array}{cccc}
\text{(48)} & \text{Stage A} & \text{Stage B} & \text{Stage C} \\
\text{(i)} & \text{'gummy syrup}' & \text{agda} & \text{ayda} & \text{a:da} \\
& \text{'oleaster'} & \text{igde} & \text{i:de} & \\
& \text{'wheat'} & \text{bugday} & \text{b:uday} & \\
\text{(ii)} & \text{'throat'} & \text{boğaz} & \text{boğaz} & \text{boaz} \\
& \text{'cattle'} & \text{s+i+r} & \text{s+i+r} & \text{s+i+r} \\
& \text{'heavy'} & \text{a+i+r} & \text{a+i+r} & \\
\end{array}
\]

In (48), Stage C represents modern standard Turkish, and Stage A and B are represented by some geographical dialects. Stage A and B dialects do not have long vowels before \(\gamma\) or \(\gamma\), and Stage C dialects have no \(\gamma\)'s anywhere.

Let us now take the historical transition from Stage B to Stage C, where compensatory lengthening shows up. According to the merger analysis of (47), the \(\gamma\) in the forms in (48ii) fully assimilate to the preceding vowel, but the \(\gamma\)'s in (48i) will be lost by a deletion rule. In other words, the merger analysis is forced to analyse a straightforward, across-
the-board γ-loss at some point in the history of Turkish as two distinct processes. There is virtually no evidence that this is the case: no dialects have been attested which at a given time retain the [γ] in forms like (48i) but not in forms like (48ii), or vice-versa. All dialects that lost the [γ], lost it in all positions.

All of the native dag-type words originally contained a final [g], which is still retained in some dialects, and disappeared with all other [γ]s in standard Turkish. As I have argued above, the presence of a final C at the CV-tier of such forms is substantiated not only by the compensatory lengthening effects but also by the suffix-initial alternations they trigger.

Switching now to the synchronic h-, y-, and r-deletions, it should be pointed out that the merger analysis is forced to posit two separate rules for each deletion: assimilation and restructur-ing to account for the compensatory lengthening effects, and deletion for intervocalic loss. If this were the case it would be very natural to expect the deletion and merger processes to have different distributions dialectally. That is, one would expect to find some speakers or dialects that have h-, y- and r-loss intervocally but not preconsonantally, or vice-versa. But no such distributions across dialects or idiolects have been attested.

The CV analysis defended in this study, however, provides a straightforward analysis of the facts considered. In Stage B, there are forms like the following:

(49) (i) [γ] [γ] (ii) [γ] [γ]

```
V C a
  d
```

At some point in history, all [γ]'s are lost in some dialects. The γ-deletion being a productive rule applies at the segmental tier leaving the associated C intact. The independently motivated re-association Principle (2) yields the expected forms.

(50) (i) (ii)

```
V C a
  d
```

Notes

1. This paper is the nothing more than a indebted to Harry Be Yükseker for many h
2. On the developm
3. By the first con Onset First Principle will be syllabified as
That, in fact, the historical γ-deletion in standard Turkish happened at the segmental tier not affecting the CV-tier is supported by the forms like the dəg-type words, already discussed.

7. SUMMARY

I have argued in this paper for the following points: First, compensatory lengthening effects are due to the loss of a consonant. Secondly, deletion and the ensuing reassociation are governed by distinct and inherently unrelated principles because they operate under distinct environmental motivation, and that deletion may or may not create an environment for lengthening through reassociation. Therefore, theories like linear phonology, that consider compensatory lengthening a unitary phenomenon are inadequate. Interestingly, my rejection of de Chene and Anderson (1979) analysis of compensatory lengthening effects is based on the same point although I agree with them that there is nothing special about compensatory lengthening. Recall that the basic problem with the linear model was that it could not represent a particular consonant loss as a unitary phenomenon. The same inadequacy holds true for the merger analysis. The consonant loss in intervocalic positions will be treated as a separate process than the merger in pre-consonantal positions.

Finally, to provide an explanation for those cases where a consonant loss does not give rise the expected compensatory lengthening effects, I proposed the Hierarchy of Deletion Principle (30). If this is correct then it follows that consonant deletions not accompanied by compensatory lengthening have to be unproductive morphologically motivated rules, applying at the CV-tier – assuming of course that there are no independent language-specific conditions that otherwise block lengthening.

NOTES

1. This paper is the revised version of Sezer (1982) by the same title, which was nothing more than a sloppy draft. The revisions here are mainly clarificational. I am indebted to Harry Bochner, Nick Clements, Karin Michaelsen, Leo Wetzel and Hitay Yüksel for many helpful comments. The remaining errors and shortcomings are all mine.

2. On the development of CV Phonology see the references cited in this study.

3. By the first conjunct of this principle, which is more fully articulated as the Onset First Principle in Clements and Keyser (1983), sequences of CV's like V C V will be syllabified as

\[ ((σ, σ, V C V) \]
only. Other aspects of Turkish syllabification need not concern us here.
4. Some exceptions exist.

| 'stage' | sahne | *sa:n
| 'negligence' | ihmal | *i:mal

5. Consider he:ne *a:ne 'house'. But also kütüpha:ne kütüpa:ne 'library' where he:ne forms a phonological unit with the preceding word.

6. In the earlier version of this paper I totally underestimated the complexity of this rule. Notice in 3. Past of the forms for 'praise' and 'rub' that the preceding labial vowel is not sufficient to trigger deletion.

7. For some discussion, see Frisch et al. (1984) and Clements (this volume).

8. This possibility is brought to my attention by Leo Weitz.

9. These words historically had a final ğ. There is in Turkish orthography the letter ğ, called 'soft ğ', which is used to represent this historical ğ. I choose here the word da:ğ 'mountain' to represent the class of forms that end in a vowel but behave as if they have a final consonant. The first two forms in (22) are Arabic loans that originally had a final glottal stop in the absolutive.

10. Some forms ending in short vowels behave as consonant-final with the possessive but not with other suffixes.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>'dealer'</td>
<td>ba:yi</td>
<td>ba:yi:i</td>
<td>ba:yi+nin</td>
<td>ba:yi+ye</td>
<td>ba:yi+m</td>
</tr>
<tr>
<td>'industry'</td>
<td>san:iy+ri</td>
<td>san:i+yi+n</td>
<td>san:i+yi+n</td>
<td>san:i+y+ye</td>
<td>san:i+m</td>
</tr>
<tr>
<td>'mosque'</td>
<td>ja:mi</td>
<td>ja:mi+i</td>
<td>ja:mi+nin</td>
<td>ja:mi+y+ye</td>
<td>ja:mi+m</td>
</tr>
</tbody>
</table>

11. One such formalism would be to resort to alphabet features.

(i) \[ C \rightarrow \emptyset \left\{ \begin{array}{c}
\{ C \\
\{ [+A] \end{array} \right\} + [\begin{array}{c}
X
\end{array}] \]

(i) says, in effect, that C is deleted in the X class of suffixes after consonants or stems marked with [+A].

12. Less' rules are not exactly written in this format but are intended to achieve the same effect. The exact feature composition of \[ \phi \] need not concern us here.

Let me also note in this context that Konrot (1981) reports that corresponding to the orthographic ğ in both intervocalic and syllable-final positions, there is in the spectrograms of these forms, "a coming together of the second and third formants of the immediately preceding vowel" which is very characteristic of velar consonants". Konrot thus challenges all analyses that consider da:ğ-type words phonetically ending in a vowel. Konrot (1981) also notes that the so-called "velar gesture" is not obvious in all of the relevant forms investigated, and in some cases - not numerically and phonetically identified - it becomes almost impossible to identify the portion of the wave form that represents the velar closing. Secondly, also reported by Konrot (1981) are the results of a test with synthesized forms. The two forms ada 'reddish' and ada 'island' were identified as a:ğə [a:ə] 'cry' and a:da [a:da] 'thick syrup', respectively, when the initial vowels of these forms were lengthened to 140 msec. Or longer - showing, as Konrot points out, that pure length is a sufficient cue for the da:ğ-type words in general. Through these tests one can hardly obtain a clear understanding of the exact nature of the velar closing. It is not reported, for instance, whether or not pairs like da:ğ [də:ğ] 'mountain' and ada [a:da] 'mane', or a:ğə [a:ğə] 'mouth' and ada [a:da] 'sermon' etc., are phonetic rhymes - which I believe they are.
An Autosegmental Analysis of Compensatory Lengthening in Turkish 249

13. So far as I can see, the two rules (27i) and (ii) cannot be collapsed. Consider as one possibility, the following.

\[
\begin{align*}
1 & \quad \text{ [+syll]} \\
2 & \quad \text{ [asy]} \\
3 & \quad \# \\
4 & \quad \text{ [+syll]} \\
5 & \quad \# \\
\end{align*}
\]

(i) can delete the final /\#/ in the absolutive forms but it cannot lengthen the preceding vowel, since length in this formalism is geared to syllability, and \#, not being a segment, cannot be defined in terms of syllabicity features.

14. I am assuming here that the effect of a segment on a neighboring one before its deletion can be represented by the linking of the affected segment to an autosegment that originally dominated the deleted segment. The only questionable case that remains is metathesis. But metathesis need not ordinarily affect (i.e. displace) two segments simultaneously; the same effect can be achieved by moving a single segment over others.

15. The "unless" clause here is intended to guard against, what I would consider, marked cases where a CV unit may delete without the loss of its segmental associate. On the necessity of a strategy see Keyser and Kiparsky (1984), Keigl (in preparation) Mascaro (this volume) and Whitman (1985).

16. To account for the consonant loss without the accompanying compensatory lengthening of the preceding vowel Ingris (1980) proposes the following Empty Node Principle.

(i) Empty W nodes which are part of a syllable coda are to be associated with the terminal element dominated by the immediately preceding syllable nucleus. All other empty nodes are to be pruned.

This principle is certainly not strong enough to account for the examples cited here. See also a criticism of the ENC by Clements (1982).

17. These examples are from Kormfi (1956).

18. Bat see /g\̆s/ in (46), below.

19. I am assuming here after Wetzel (this volume) that (i), below, is equivalent to (ii).

\[
\begin{align*}
\sigma & \quad \text{[asy]} \\
\lambda & \quad \text{[asy]} \\
\end{align*}
\]

20. Permissible final clusters are either a sonorant followed by an obstruent, or a fricative followed by a stop. See Clements and Sezer (1982) for some discussion.

21. See Kormfi (this volume) for a compensatory lengthening analysis of these forms for a conservative dialect.

22. The forms, /aaz/ and /aaz/ for /aaz/ are both very rare and the closest to me. Consider, [aaz\̆k] [aaz\̆k] "mouthpiece" also [aaz\̆k] - [aaz\̆k] a\̆z\̆k kaldk] 'my mouth was left open'. Kormfi observes that [pul\̆m] 'my son' is emphatic, which I agree. Not all such forms are emphatic, however. Consider, [g\̆s\̆li\̆m] 'my chest' as well as [g\̆s\̆li\̆k] 'pinafore' and [g\̆s\̆l] 'kansen' 'breast cancer'. Kormfi rightfully questions my assumption that these are in free variation. There
is apparently some sociolinguistic distribution which I do not have a theory for. I still maintain that by and large my analysis, which represents a levelling of these forms, is correct.

REFERENCES


Clements (this volume), "Compensatory lengthening and consonant gemination in Lu Ganda."


Kornšl, J. (this volume), Stem-Penultimate Empty C's, Compensatory Lengthening and Vowel Epenthesis in Turkish.


Masaró, J. (this volume), "Compensatory Diphthongization in Majorcan Catalan."


*Nijmegen University
The Netherlands*