

VOWEL HARMONY

Vowel harmony systems occur in a wide range of Armenian dialects, from Marash in Turkey to Maragha in Iran to Shamaxi in Azerbaijan. These harmonic systems constrain specifications for the feature [back] (and occasionally [round] as well) within two phonological domains: roots and words. A third, local, type of harmony applies to epenthetic vowels. The dialects in (1a) show root harmony, according to which roots can possess no more than one contrastive specification for [back]. This harmony type is examined in 5.2. In group (1b), the same restriction on contrastive [back] specifications applies to the entire word; this harmony type is discussed in 5.3. Epenthetic harmony, which always involves both [back] and [round], occurs in the dialects in (1c). This type of harmony, which differs from the other harmony types in being strictly local, is considered separately in 5.4.

(1) Harmony domains

- a. Root
  - Karabagh
  - Marash
- b. Word
  - Agulis
  - Aresh
  - Karchevan
  - Maragha
  - Meghri
  - Shamaxi
  - Tigranakert
  - Xoy
- c. Epenthetic
  - Marash
  - Karchevan
  - Shamaxi
  - Maragha

All dialects with epenthetic or word harmony also have root harmony; for example, there are no cases where affixes harmonize to the nearest root vowel but the roots themselves do not obey harmony. However, dialects can have root harmony without word or epenthetic harmony; for example, Marash has root and epenthetic harmony, but affixes do not harmonize.

Each of the harmony types in (1) manifests several points of linguistic interest, which I consider in the course of this chapter. I focus on three case studies that serve to illustrate the three harmony types: Marash for root and epenthetic harmony, Agulis for word harmony, and Karchevan for word and epenthetic harmony. Before addressing these questions as they arise in the Armenian data, I first present my view of the theoretical machinery required to deal with attested vowel harmony systems within the framework of Rules and Representations Theory (RRT).

### 5.1. THEORETICAL ASSUMPTIONS

I assume on the basis of Steriade's (1994) work on phonological contrasts that harmonic systems may allow underlying contrasts for harmonic feature specifications in the following set of environments: initial (root) syllable, root, word. Languages that allow underlying contrasts only in initial syllables, such as Wolof (Kenstowicz, 1994), never have disharmonic roots, modulo neutral vowels. Languages that allow underlying contrasts only in roots, on the other hand, allow disharmonic roots but draw suffixal vowels from a limited subset of their vowel inventory. Examples of this type include Agn (Kenstowicz, 1994), Finnish (Kiparsky, 1981), Turkish, and the Armenian dialects discussed below. Turkish, for example, draws from the set  $\{a i o u\}$  in roots, but only the subset  $\{a i u\}$  in suffixes (Clements and Sezer, 1982, henceforth CS). Similarly, Chumash contrasts  $\{a i u e o i\}$  in roots but only  $\{a i u\}$  in suffixes (Steriade, 1995), and Proto-Bantu contrasts  $\{i u e \text{ } \text{ } a\}$  in roots but only the subset  $\{i u a\}$  in affixes (Steriade, 1995).

The underlying vocalic inventories of Turkish and Chumash presented here make use of CS's theory that harmonic features are floating morphemes unattached to skeletal material in underlying representations. In other words, the Turkish surface vocalic inventory  $\{a e i i o \ddot{o} u y\}$ , for example, derives from an underlying inventory  $\{a i o u\}$  via the attachment of  $\{\pm\text{back}\}$  morphemes: attachment of  $[-\text{back}]$  to underlying  $a$  produces  $e$ , attachment of  $[\text{+back}]$  to underlying  $i$  produces  $\ddot{i}$ , and so on. The Proto-Bantu surface inventory  $\{i u e \text{ } \text{ } a\}$  is similarly derived from underlying  $\{i u e \text{ } \text{ } a\}$  via the association of floating  $[\pm\text{ATR}]$  morphemes. CS's theory of floating harmonic features has important implications for the theory of contrast assumed here (see Chapter 1); we consider these implications at the end of this section.

The treatment of harmony presented here assumes that harmonic processes are feature-changing, an analysis that is required by the notion of full specification discussed in Chapter 1. Thus, on the one hand, an underspecification analysis such as CS assumes that all non-domain-initial segments are unspecified for the harmonic feature, and receive their surface specification as the result of a feature-filling rule spreading the harmonic feature (Fig. 5.1a). RRT, on the other hand, assumes that all relevant segments are prespecified for the harmonic feature; the

rule of harmonic spreading  
non-domain-initial segment

if F is a harmonic feature,  
a. underspecification C

(feature filling)

b. full specification C  
(feature changing)

Epenthetic harmony, on the other hand, is not at odds with the behavior of the epenthetic vowel. RRT's treatment of epenthetic harmony is based on the assumption that epenthetic vowels are inserted at the next stage in the derivation to fill the gap.

The theory of harmony based on floating morphemes treats disharmonic segments as 'underspecified', or underspecified rather than on general theoretical assumptions. In a simple manner, the theory of harmony in a simple manner treats disharmonic segments as simply associated with the treatment of harmony. This analysis is consistent with the treatment of harmony.

The treatment of neutral segments. RRT, like other theories of harmony, treats neutral segments: opaque and transparent segments: opaque and transparent segments, and do not allow opaque segments spread to the next segment in the domain and the next segment in the domain. Transparent segments do not allow features to propagate through them.

I assume that the behavior of neutral segments is the immunity of neutral segments.



rule of harmonic spreading therefore must change the feature specifications of all non-domain-initial segments (Fig. 5.1b).

if  $F$  is a harmonic feature,  $\alpha, \gamma = \pm, \beta = -\alpha$ :

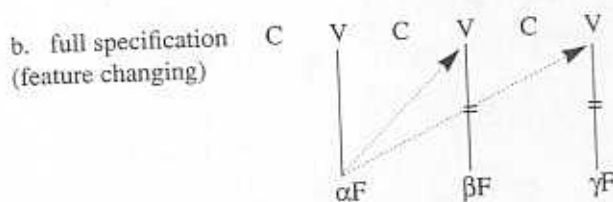
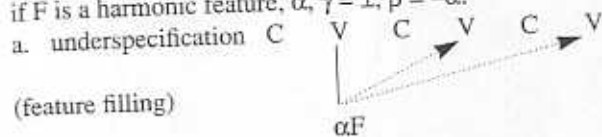


Fig. 5.1

Epenthetic harmony, on the other hand, must be feature-filling in order to account for the behavior of the epenthetic vowel in Karchevan, discussed in 5.4. This assumption is not at odds with full specification, which holds only over underlying representations. RRT allows segments produced by rules of epenthesis at later stages in the derivation to be incompletely specified.

The theory of harmony proposed here also differs from underspecification-based theories in its treatment of disharmonic segments. In the model of CS, disharmonic segments are considered to be prespecified for the harmonic feature. Though this analysis smacks of what Steriade (1995) terms 'opportunistic underspecification', or underspecification based on one's analysis of a given set of data rather than on general theoretical principles, it nevertheless accounts for disharmony in a simple manner. RRT, on the other hand, assumes that disharmonic segments are simply associated with a diacritic indicating that they do not undergo harmony. This analysis is empirically identical to that of CS, and is more consistent with the treatment of exceptions in other modules of phonological theory.

The treatment of neutral segments differs somewhat from that of disharmonic segments. RRT, like other theories of harmony, distinguishes two types of neutral segments: opaque and transparent. Opaque segments are further subdivided into two types: active and inert. Opaque segments fail to undergo harmonic alternations, and do not allow harmonic features to propagate through them. Active opaque segments spread their own specification for the harmonic feature to the next segment in the domain; inert segments do not spread their own specification, and the next segment in the domain surfaces with its underlying specification. Transparent segments do not undergo harmonic alternations, but allow harmonic features to propagate through them.

I assume that the behavior of neutral segments is determined by three factors. The immunity of neutral segments to harmonic alternations results from visibility

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conditions involved in harmonic spreading. As we saw in Chapter 1, universal marking statements determine which segments are marked and which are contrastive for a given feature in a phonemic inventory. Rules are specified for sensitivity to the distinctions drawn by marking statements in this way: for example, a rule sensitive to contrastive features ignores noncontrastive features. Thus, if a rule of harmonic spreading is specified as being sensitive to contrastive features, it will not apply to segments characterized by noncontrastive specifications for that feature; these noncontrastive segments constitute the neutral set with respect to the harmonic process in question.

If noncontrastive segments are invisible to harmonic rules sensitive to contrastive feature specifications, one may then ask why all neutral segments are not transparent. I assume that the opaque behavior of neutral segments, attested in many harmony systems including the Karchevan case discussed in 5.3, results from a locality condition that restricts propagation of harmonic features to adjacent syllables. The restriction of phonological rules to directly adjacent syllables is well attested crosslinguistically, and does not add any cost to the grammar.

One final way in which the RRT treatment of harmony differs from that of CS lies in the analysis of attachment of harmonic morphemes to the phonological skeleton. If we assume following CS that harmonic features are stored in the lexicon as floating features associated with but not attached to individual morphemes, we must also have a theory of *how* and *when* these floating features attach to the phonological skeleton in the course of the derivation.

Regarding the question of *how* harmonic features attach, in the CS model, where harmonic segments are underlyingly unspecified for harmonic features, one can state that the floating feature attaches to the leftmost (or rightmost, depending on the language) available segment. The term 'available' in this model means that the potential host segment must not possess a specification for the harmonic feature, and must constitute a legitimate phoneme of the language once attached to that feature. Thus, a prespecified segment would not be a legitimate host, nor would a segment which when combined with the harmonic feature formed an illegitimate phoneme; the first type constitutes the class of disharmonic segments, and the second neutral segments.

RRT, on the other hand, cannot make use of the type of attachment procedure just sketched, for all segments are assumed to be prespecified for the harmonic feature. Nevertheless, the attachment procedure assumed in RRT differs only slightly. We need only remove from the definition of 'availability' the requirement that the potential host be unspecified for the harmonic feature. The burden of evaluation then lies on the second component of the CS definition, which requires that the segment resulting from attachment of the harmonic feature to the potential host be a legitimate phoneme of the language. In RRT, the evaluation of this requirement differs only in the treatment of disharmonic segments, which as in the case discussed above are simply specified as exceptions to the general procedure of harmonic attachment.

Let us say that we have the Turkish root *gyl* 'rose', for example. In CS's model,

this root will have a floating backness. Consequently vowel at a later stage in still a floating [-back] *m* *u*, which is [+back]. Acc should be disharmonic; free to replace the lexical result in a segment that

The question of *when* of contrast presented in directly related to the *i* Turkish has the underlying marking statements defining morphemes also requiring and surface. In the [back] specification of *i* *i o ø u y*) it is contrast sensitive to contrastive contrastive [back] specifies the derivation that employs hand, the same rule applying surface definition of considered in this chapter, assumed to make reference

Let us begin with the (Galustean, 1934). This affixal full vowels do harmony systems at involving [round].

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this root will have a floating [-back] specification and a vowel unspecified for backness. Consequently, the floating [-back] feature will be free to attach to this vowel at a later stage in the derivation. In our model, on the other hand, there is still a floating [-back] morpheme, but the root vowel is specified in the lexicon as *u*, which is [+back]. According to CS, a vowel prespecified for a harmonic feature should be disharmonic; in our theory, however, the harmonic [-back] feature is free to replace the lexical [+back] specification of the *u*, provided that it does not result in a segment that is not part of the surface inventory.

The question of *when* harmonic features attach is directly relevant to the theory of contrast presented in Chapter 1. The definition of contrast in a given system is directly related to the inventory of segments. When, for example, CS state that Turkish has the underlying inventory {*a i o u*}, this presupposes a different set of marking statements defining contrasts than we would have if the underlying system were identical to the surface system {*a e i i o ø u y*}. CS's theory of floating morphemes also requires that contrast be defined on at least two levels, underlying and surface. In the underlying Turkish inventory {*a i o u*}, for example, the [back] specification of *i* is not contrastive, whereas in the surface inventory {*a e i i o ø u y*} it is contrastive. This fact has implications for the behavior of rules sensitive to contrastive specifications; continuing our example, a rule sensitive to contrastive [back] specifications would ignore *i* if it applied during the portion of the derivation that employed the underlying definition of contrast. If, on the other hand, the same rule applied during the portion of the derivation that employed the *surface* definition of contrast, it would *not* ignore *i*. In the Armenian dialects considered in this chapter, the rules sensitive to contrastive feature specifications are assumed to make reference to surface rather than underlying contrast.

## 5.2. ROOT HARMONY

Let us begin with the dialect of Marash, spoken in Cilicia in central Turkey (Galustean, 1934). This dialect shows root harmony and epenthetic harmony, but affixal full vowels do not harmonize. In this section I consider the two root harmony systems at work in this dialect, one involving [back] and the other involving [round].

The workings of the Marash harmony systems crucially depend on the structure of the vowel inventory, given in Fig. 5.2. The fact that the vowels {*e ε a*} lack their counterparts for backness, {*ɤ ʌ æ*} respectively, is crucial to the analysis of apparent cases of disharmony, as we shall see below. Schwa (ə) is placed in parentheses because it appears only as a result of epenthesis, and does not belong to the phonemic inventory of the dialect.

The vowels in Fig. 5.2 have the feature specifications in Fig. 5.3. For the purposes of harmony, these vowels divide into two classes for backness and rounding, as schematized in Figs. 5.4 and 5.5 respectively (vowels that do not contrast for the feature in a given row are enclosed in curly brackets).

## VOWEL HARMONY

<i>i</i>	<i>y</i>	<i>(ə)</i>	<i>u</i>
<i>e</i>	<i>ø</i>		<i>o</i>
<i>ɛ<sup>a</sup></i>			
	<i>a</i>		

Fig. 5.2. Marash vowel inventory. (\* Though the best description of Marash dialect, Galustean (1934), transcribes this vowel as <ɛ:> (i.e. [ɛ]), in the speech of my informants it is phonetically [æ]. Nevertheless, it does not behave phonologically as a low vowel, so I follow Galustean's transcription here.)

	<i>i</i>	<i>y</i>	<i>e</i>	<i>ø</i>	<i>ɛ</i>	<i>a</i>	<i>o</i>	<i>u</i>
high	+	+	-	-	-	-	-	+
low	-	-	-	-	-	+	-	-
back	-	-	-	-	-	+	+	+
round	-	+	-	+	-	-	+	+
ATR	+	+	+	+	-	-	+	+

Fig. 5.3

[-back]	<i>i</i>	<i>e</i>	<i>ɛ</i>	<i>y</i>	<i>ø</i>	
[+back]				<i>u</i>	<i>o</i>	{ <i>a</i> }

Fig. 5.4

[-round]	<i>i</i>	<i>e</i>	{ <i>ɛ</i>	<i>a</i> }
[+round]	<i>y</i>	<i>ø</i>	{ <i>u</i>	<i>o</i> }

Fig. 5.5

Thus, we expect the nonround vowels to behave neutrally with respect to harmonic processes involving backness, and we expect {*ɛ a o u*} to behave neutrally with respect to harmonic processes involving rounding.

With these preliminaries in mind, let us turn to the distribution of Marash roots. Lexical roots in this dialect conform to the following generalizations:

## (2) Root harmony conditions

- a. Roots contain no more than one contrastive [back] specification.
- b. Roots contain no more than one contrastive [round] specification.

McCarthy (1988) suggests when considering a similar constraint on the occurrence of laryngeal features in Indo-European roots that conditions of the type in (2) are driven by the Obligatory Contour Principle (OCP). However, the Marash facts suggest that this analysis is incorrect. Since the OCP prohibits only adjacent identical feature specifications (\* $\alpha F \alpha F$ ), we should expect sequences such as [ $\alpha F \beta F \alpha F$ ], which do not contain adjacent identical feature specifications, to be allowed in OCP-driven systems. In fact, sequences of this type are *not* allowed in Marash vowel harmony. As stated in (2), the relevant constraint is rather that a

given phonological domain specification (contrastively). This formulation lacks the detail required to account for

According to the contour principle, whereas those in Fig. 5.2 are not, my Marash informants have provided by Galustean, 19.

- (3) Harmonic Roots
- a. [back]
    - Maras
    - k'ana*
    - enyr*
    - hyner*
    - ege*
    - escr*
    - p'et'eɣ*
    - erin*
    - hige*
    - t'sirin*
  - b. [round]
    - øør*
    - Gyk'*
    - ybyr*
    - urunc*

a. [t

b. [r

Roots of the type *i* hold. However, if we consider the Marash system, the set of root

<sup>1</sup> The forms in (3) also occur in Armenian, which in their historical context elaborate on these historic

given phonological domain (in this case the root) cannot contain more than one specification (contrastive in this case) for a given feature (in this case [back]). This formulation lacks the representational appeal of McCarthy's OCP, but is required to account for the facts.

According to the conditions in (2), roots of the type in (3)<sup>1</sup> are well formed, whereas those in Fig. 5.6 are not (I have included the forms produced by one of my Marash informants (Paren Sanentz (PS)) where they differ from those provided by Galustean, 1934).

## (3) Harmonic Roots

a. [back]	Marash	Standard	Gloss
	<i>k'ana</i>	<i>k'ani</i>	how many/much
	<i>enyr</i>	<i>anor</i>	his (PS <i>ænyr</i> )
	<i>hynær</i>	<i>hunar</i>	art (PS <i>hynær</i> )
	<i>εge</i>	<i>ajgi</i>	vineyard (PS <i>æk'æ</i> )
	<i>εsεk</i>	<i>asek</i>	needle (PS <i>æsæk</i> )
	<i>p'et'eg</i>	<i>p'et'ak</i>	beehive (PS <i>p'etæk</i> )
	<i>erin</i>	<i>arjun</i>	blood (PS <i>ærin</i> )
	<i>hige</i>	<i>hogi</i>	soul (PS <i>hik'æ</i> )
	<i>t'sirin</i>	<i>t'soren</i>	grain (PS <i>t'sirin</i> )
b. [round]	<i>øsør</i>	<i>ajsor</i>	today
	<i>Gyk'yr</i>	<i>Grigor</i>	Gregory
	<i>ybyr</i>	<i>jerb vor</i>	when
	<i>urunog</i>	<i>orinak</i>	example (PS <i>urnog</i> )

a. [back]	*CuCy	*CuCø
	*CyCu	*CyCo
	*CoCø	*CoCy
	*CøCo	*CøCu
b. [round]	*CeCy	*CiCy
	*CeCø	*CiCø
	*CøCe	*CøCi
	*CyCe	*CyCi

Fig. 5.6. Disharmonic roots

Roots of the type in Fig. 5.6 are not attested; thus the generalizations in (2) hold. However, if we knew nothing about the structure of the Marash vowel system, the set of roots in (4) would appear to contradict (2).

<sup>1</sup> The forms in (3) also serve to illustrate some of the ways in which roots inherited from Common Armenian, which in their original state would be disharmonic, come to be harmonic. I will not elaborate on these historical developments here, however.

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## (4) (Apparently) disharmonic roots

	Marash	Classical	Gloss
a. [back]	<i>agif</i>	<i>akif</i>	iron shovel for fire or ashes
	<i>andzriv</i>	<i>andzrew</i>	rain
	<i>anidz</i>	<i>anits</i>	nit
	<i>angez</i>	<i>ankojz</i>	walnut (PS <i>ængæz</i> )
	<i>arigog</i>	<i>aregagn</i>	sun
	<i>ariv</i>	<i>arew</i>	sun
	<i>adin</i>	<i>aten</i>	time
	<i>avetʃkʰ</i>	<i>awatʃ</i>	song (PS <i>avedz</i> )
	<i>avil</i>	<i>awel</i>	broom
	<i>aʀetʃ</i>	<i>aʀadz</i>	before (PS <i>æʀætʃ</i> )
	<i>æʀbeʒ</i>	<i>arpeʒ</i>	water vessel (PS <i>æʀbâʒ</i> )
	<i>axʃin</i>	<i>axdzik</i>	girl (PS <i>laxʃin</i> )
	<i>dzæmirog</i>	<i>dzæmeruk</i>	watermelon
	<i>havetʃ</i>	—	hot pepper (PS <i>haveʒz</i> )
	<i>hiru</i>	<i>heru</i>	last year
	<i>irgom</i>	<i>erikam(unkʰ)</i>	bowels
	<i>irgon</i>	<i>erekoj</i>	evening
	<i>irgotʰ</i>	<i>erkatʰ</i>	iron
	<i>irgu</i>	<i>erku</i>	two
	<i>iroz</i>	<i>eraz</i>	dream
	<i>ifadog</i>	<i>jifatak</i>	souvenir
	<i>isdog</i>	<i>jstak</i>	clean
	<i>izod</i>	<i>zat</i>	separate
	<i>izom</i>	<i>zam</i>	church
	<i>girizmon</i>	<i>gerezman</i>	tomb
	<i>laʃir</i>	<i>laʃer</i>	clothing
	<i>lesa</i>	<i>lesi</i>	bile
	<i>lizo</i>	<i>lezu</i>	tongue (PS <i>lizæ</i> )
	<i>mækdæsi</i>	—	pilgrim
	<i>malez</i>	—	= hummos (PS <i>malæz</i> )
	<i>meku</i>	<i>mesu</i>	bee (PS <i>aræ</i> )
	<i>mertʃon</i>	—	coral (PS <i>mirʒon</i> )
	<i>nugi</i>	<i>unki</i>	ounce
	<i>barigom</i>	<i>barekam</i>	friend
	<i>hendzor</i>	<i>bandzar</i>	leaf of white beetroot
	<i>bezor</i>	<i>bazar</i>	bazaar
	<i>biron</i>	<i>beran</i>	mouth
	<i>dirtʃon</i>	<i>derdzan</i>	tailor
	<i>udzel</i>	<i>odzil</i>	louse (PS <i>utʃil</i> )
	<i>zəl:ig</i>	—	onion sprout
	<i>tʰæʃ</i>	<i>tʰerʒa(r)ʃ</i>	soft-boiled
	<i>pʰæʒand</i>	<i>pʰoxind</i>	hasty-pudding (PS <i>pʰæʒænd</i> )

	Marash
	<i>xeʀu</i>
b. [round]	<i>æʃa</i>
	<i>tʃøjen</i>
	<i>æʀduonk</i>
	<i>erʒyʒz</i>
	<i>erʃyʃyn</i>
	<i>hengytʃ</i>
	<i>guda</i>
	<i>loʃatʃə</i>
	<i>minnøkʰ</i>
	<i>bedyhyr</i>
	<i>seʃyr</i>
	<i>tʰaso</i>
	<i>tʰegevyr</i>
	<i>ʒarʒud</i>
	<i>ʒəjəʒ</i>
	<i>kʰeryz</i>
	<i>kʰyleg</i>
	<i>kʰurag</i>

In (4a) we see cases where the [back] specification is not present at the evaluated. If the schwa 'were present at the evaluated, no contrastive [back] specification would be possible. For example, with *y*, the *æ* is not contrastive [back] since it possesses a contrastive [round] specification.

The analysis presented in (4a) is not present at the evaluated. If the schwa 'were present at the evaluated, no contrastive [back] specification would be possible. For example, with *y*, the *æ* is not contrastive [back] since it possesses a contrastive [round] specification.

Forms such as *xeʀu* need not be attached to the [back] specification since the same conditions hold for *æ* and *ə*. For example, *dzæmirog* 'watermelon' is contrastive but that of *æ* is not a specification of the first vowel.

<sup>2</sup> The feature specification *vide* evidence for these spec

	Marash	Classical	Gloss
	<i>xeɾu</i>	<i>heɾu</i>	far
for fire or ashes	b. [round] <i>sufa</i>	–	bundle of thread
	<i>tʃøjen</i>	–	soap-wort root that foams in hot water
	<i>æɾduonkʰ</i>	<i>erdumn</i>	oath
<i>ængæz</i> )	<i>æɾdzydʒ</i>	<i>artʃif</i>	lead, bullet, weapon (PS <i>æɾdzydʒ</i> )
	<i>æɾpʰysym</i>	<i>apɾifum</i>	silk thread (PS <i>abæɾsɔm</i> )
	<i>hengyɾʃ</i>	<i>hangojʃ</i>	knot (PS <i>hængyɾʃ</i> )
<i>ædʒ</i> )	<i>guda</i>	<i>gati</i>	belt
	<i>losatʃə</i>	–	wooden tool for dragging stone-rollers
	<i>minnøkʰ</i>	–	without cause
<i>æɾæɾʃ</i> )	<i>bedyhyn</i>	<i>patuhan</i>	window (PS <i>pendʒerɛ</i> )
l (PS <i>æɾbæɾx</i> )	<i>selyr</i>	<i>salor</i>	plum (PS <i>sælyr</i> )
<i>ɾfin</i> )	<i>tʰaso</i>	–	worry
l	<i>tʰegɛvyr</i>	<i>tʰagawor</i>	king (PS <i>tʰækvyr</i> )
(PS <i>havædʒ</i> )	<i>χarχud</i>	<i>χarχul</i>	shaky (PS <i>χæχyd</i> )
	<i>χajox</i>	<i>χaxox</i>	grape (PS <i>χæxyx</i> )
	<i>kʰeryz</i>	<i>kʰaroz</i>	sermon (PS <i>kʰæɾæz</i> )
	<i>kʰyleg</i>	–	wooden basket (PS <i>kʰylæg</i> )
	<i>kʰurag</i>	<i>kʰurak</i>	baby donkey

In (4a) we see cases where [+back] and [–back] vowels cooccur in a single root. In each case, however, the [back] specification of one or both of these vowels is noncontrastive. For example, though in *udʒel* 'louse' the *u* contrasts in backness with *y*, the *ɛ* is not contrastive for backness; thus the root contains only one contrastive [back] specification. In forms such as *andʒriv* 'rain', neither vowel possesses a contrastive [back] specification.

The analysis presented here crucially depends on the assumption that schwas are not present at the point in the derivation where the conditions in (2) are evaluated. If the schwas in forms such as *tʰæχɛɾʃ* 'soft-boiled' and *zəl:ig* 'onion sprout' were present at this stage, we would not expect *i* to be neutral with respect to [back] harmony, nor would we expect *u* to be neutral with respect to [back] harmony, for *i* and *ə* would contrast in terms of backness and *u* and *ə* would contrast in terms of rounding.<sup>2</sup> However, it is a relatively simple matter to derive the distribution of surface schwas from principles of epenthesis of the type presented in Chapter 3; this being the case, the behavior of *i* and *u* is not problematic.

Forms such as *xeɾu* 'far' indicate that the contrastive harmonic specifications need not be attached to the first root vowel. In this particular form, for example, the [back] specification of the first vowel, *e*, is not contrastive, but that of *u* is. The same conditions hold for [round], as shown by the contrast between forms such as *dʒæmirog* 'watermelon', where the [round] specification of the first root vowel is contrastive but that of the second is not, and *udʒel* 'louse', where the [round] specification of the first root vowel is not contrastive but that of the second is.

<sup>2</sup> The feature specification of schwa is assumed to be [+high, +back, –round], as in Turkish. I provide evidence for these specifications in the discussion of epenthetic harmony below.

. *lizæ*)(PS *malæz*)

ə)

*nirdʒon*)

ite beetroot

*utʃil*)

ut

l

ɾing (PS *pʰæsvænd*)

## 5.3. WORD HARMONY

In this section I present two interesting cases of word-level harmony, found in the dialects of Agulis and Karchevan. One can make the following generalizations concerning the harmony systems in these two dialects: roots normally share a single value for [back]; *i* and *e*, however, freely occur in both [+back] and [-back] roots and are not affected by harmony; and *ə* generally does not play a role in harmony processes.<sup>3</sup> The harmonic systems examined here are consistent with the assumption that vowel harmony applies iteratively from left to right within words (both roots and suffixes), and may be blocked by active marking statements. Propagation of the harmonic feature through the word is strictly local; that is, a given feature can only affect the immediately following visible feature. This restriction may be further constrained to immediately following syllables, as we shall see in the case of Karchevan. Like the projection of metrical boundaries discussed in 2.3, harmonic spreading occurs in an iterative fashion; in other words, once a given vowel has had the opportunity to propagate its specification for the harmonic feature, the next vowel to the right gets its chance, and so on for all the vowels in a word.

5.3.1. Agulis<sup>4</sup>

Agulis, a penultimate stress dialect spoken in Nakhichevan, shows [back] harmony and has the underlying vowel inventory in Fig. 5.7.

[+back]	<i>a</i>	<i>o</i>	<i>u</i>	
[-back]	<i>æ</i>	<i>ø</i>	<i>y</i>	{ <i>e</i> <i>i</i> }

Fig. 5.7

The chart should be interpreted as follows: *a* occurs in [+back] spreads, and alternates with *æ* in [-back] spreads, and similarly for *o* ~ *ø* and *u* ~ *y*. The brackets surrounding *i* and *e* indicate that both are neutral, and can occur after [+back] or [-back] vowels in words (5a),<sup>5</sup> but spread [-back] to following vowels (5b).

<sup>3</sup> I assume that this epenthetic schwa is underlyingly specified as [+high], as in Turkish. I employ the symbol *ə* rather than *i*, however, in order to preserve the Armenological notation and reflect the fact that this vowel is epenthetic.

<sup>4</sup> My analysis of Agulis harmony is based on forms collected from Atjarjan (1935) and fieldwork with Ervand Melik-Mussian, a native speaker of Agulis dialect born in 1899 who, sadly, died on Thanksgiving Day of 1995.

<sup>5</sup> Within roots, however, *e* can only occur after [-back] vowels, except in borrowings from the literary language, e.g. *pāker* 'picture'.

<sup>6</sup> *e* regularly raises to *i* in final syllables of polysyllabic words.

- (5) Underlying form  
 a. *g'axti*  
    *kah-e-l*  
    *axandz-ner*  
 b. *Avetis-a*  
    *axandz-ner-av*

The diphthongs *ej*, *oj*, they spread [-back] to harmony system, where The epenthetic schwa case with the Marsh : important for our anal assume that all vowel: neutrality of front vowel ment disallowing the these assumptions, al [-back, -low, -round] blocked by the mark configuration \*[+back were present in the un ing statement \*[+back explain the neutrality

Harmony applies it rule were instantaneous spreading of [back] v depicted in Fig. 5.8.<sup>7</sup> that Agulis roots conti However, the specific affairs can only be of such as standard Arm

- (6) Standard Arme  
*tʃamitʃ*  
*p'etur*  
*vitʃak*

<sup>7</sup> Note that the polysyll If we assume, as in the Kar ally block clash deletion, v -ner-. The fact that -ner- it applies on the cycle in wh suffixes.

<sup>8</sup> Note that the apparent first *a* crosses the [-back] s states that non-contrastive rules sensitive to contrasti

	Underlying form	Surface form	Gloss
(5) a.	<i>g'axti</i>	<i>g'áxti</i>	belt
	<i>kah-e-l</i>	<i>káhil</i> <sup>6</sup>	trample
	<i>asandz-ner</i>	<i>asandzner</i>	roast-pl.
b.	<i>Avetis-a</i>	<i>Avetisæ</i>	Avetis (personal name)-gen.
	<i>asandz-ner-av</i>	<i>asandz-ner-æv</i> <sup>7</sup>	roast-pl.-instr.

The diphthongs *ej*, *oj*, *aj*, and *uj* pattern with the [-back] vowels; in other words, they spread [-back] to following vowels. This is to be expected in a left-to-right harmony system, where following vowels see only the right half of the diphthong. The epenthetic schwa does not play any role in the harmony system. As was the case with the Marash schwa discussed in the previous section, this assumption is important for our analysis of the neutral vowels *i* and *e*. As discussed in 5.1, I assume that all vowels are fully specified in underlying representations, and the neutrality of front vowels in Agulis is produced by the activity of a marking statement disallowing the configuration \*[+back, -round] in [-low] vowels. Given these assumptions, all nonlow front vowels will be specified underlyingly as [-back, -low, -round], and spreading of harmonic [+back] to these vowels will be blocked by the marking statement because it would produce the disallowed configuration \*[+back, -low, -round]. If schwa, which is [+back, -low, -round], were present in the underlying inventory, we would have to assume that the marking statement \*[+back, -low, -round] was deactivated, and we would be unable to explain the neutrality of *i* and *e*.

Harmony applies iteratively from left to right within roots and suffixes. If the rule were instantaneous rather than iterative, we would be unable to explain the spreading of [back] values from neutral vowels following [+back] vowels, as depicted in Fig. 5.8.<sup>8</sup> The results of harmony within roots can be seen in the fact that Agulis roots contain only one value for [back] (not including neutral vowels). However, the specific activities of harmony within roots that lead to this state of affairs can only be observed by comparison with forms in nonharmonic dialects such as standard Armenian. Some examples are provided in (6).

	Standard Armenian	Agulis	Gloss
(6)	<i>tʃamitʃ</i>	<i>tʃamutʃ</i>	raisin
	<i>p'etur</i>	<i>t'æp'yɨ</i>	feather
	<i>vitʃak</i>	<i>vitʃæk</i>	condition

<sup>7</sup> Note that the polysyllabic plural *-ner-* always bears stress, even when followed by another suffix. If we assume, as in the Karabagh case, that final stress morphemes such as the *-ner-* plural exceptionally block clash deletion, we might expect the stress to move rightward when suffixes are added after *-ner-*. The fact that *-ner-* retains stress in such cases indicates that the blocking of clash deletion only applies on the cycle in which *-ner-* is added, and does not persist in the metrification of subsequent suffixes.

<sup>8</sup> Note that the apparent line-crossing violation in Fig. 5.8a, where the [+back] specification of the first *a* crosses the [-back] specification of the *e*, is permitted by our definition of rule sensitivity, which states that non-contrastive specifications (such as the [-back] component of the *e*) are not visible to rules sensitive to contrastive features.

## VOWEL HARMONY

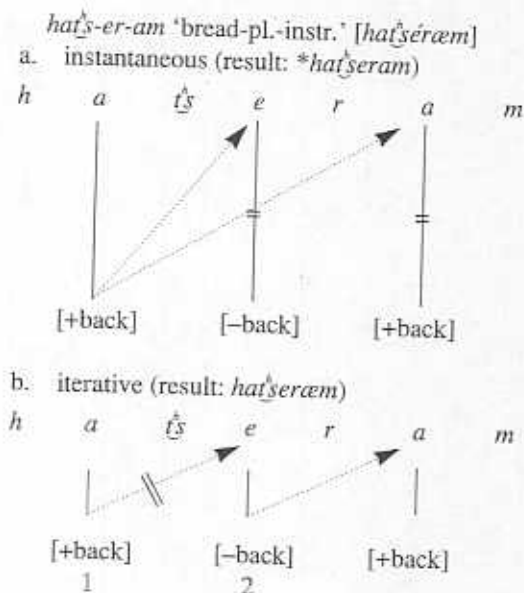


Fig. 5.8

In this section I do not consider the complex series of historical changes that ultimately caused all native Agulis roots to be harmonic.

However, Agulis also possesses a number of apparently disharmonic words. Some examples are given in (7).

- (7) Form Gloss
- a. *sesan* table
- geg'at̂* summit
- g'arezman* tomb
- divun* couch
- b. *g'ærunk̂* spring

The forms in (7a) show sequences of a neutral vowel followed by a [+back] harmonic vowel. Given the fact that neutral vowels spread their [-back] specification to harmonic vowels in suffixes, we should expect the same spreading to occur within roots, producing the incorrect forms \**sesæ̃n*, *geg'æt̂*, \**g'arezmæ̃n*, \**divyn*. Since spreading does not occur, I assume (as in the case of Marash root harmony) that contrastive specifications for harmonic features within Karchevan roots are not limited to the first syllable, but instead can be preceded by one or more neutral vowels.

The form in (7b) is easily dealt with in the framework of CS, where harmony is feature-filling, harmonic features are underspecified, and disharmonic segments are prespecified for the harmonic feature. In this analysis, both the *æ* and the *u* in (7b) would simply be prespecified for backness. In the theory I am developing

here, however, the *u* harmony rule, in the considered in the prev  
Unlike in the case confined to roots, as v representative alternat

- (8) Suffix  
-ar (pl.)

	u
	i
	k
	a
	a
	g
	g
	a
	ʒ
	ø
	χ
	h
	a
	a
-avan (comp.)	d̂
	k
	k
-anut̂s (ord.)	n
	t̂
	h
	ŝ
	t̂
	ŝ
	ŝ
	g
	χ
-am (loc.)	t̂
	a
	h
	g
-av (instr.)	a
	a
	h
	g

Harmony interacts wit these forms. In stressed where (9b) except befo

here, however, the *u* in (7b) is simply specified as an isolated exception to the harmony rule, in the same way as the disharmonic cases in the Marash dialect considered in the previous section.

Unlike in the case of Marash, however, vowel harmony in Agulis is not confined to roots, as we can see in the alternations undergone by suffixes. Some representative alternations are given in (8).

(8) Suffix	Underlying form	Surface form	Gloss
-ar (pl.)	<i>ton-ar</i>	<i>tónar</i>	houses
	<i>kuft-ar</i>	<i>kúftar</i>	callouses
	<i>diřd-ar</i>	<i>dářdar</i>	dregs
	<i>dasđz-ar</i>	<i>dásđzar</i>	mints
	<i>git-ar</i>	<i>g'ítær</i>	rivers
	<i>gyg-ar</i>	<i>g'ýg'ær</i>	bosoms
	<i>des-ar</i>	<i>désær</i>	drugs
	<i>zæng-ar</i>	<i>zæng'ær</i>	rusts
	<i>øřd-ar</i>	<i>øřdær</i>	canals
	<i>χujl-ar</i>	<i>χújlær</i>	scirrihi
	<i>hajn-ar</i>	<i>hájnær</i>	old ones
	<i>dejz-ar</i>	<i>déjzær</i>	heaps
	<i>ag'-ar</i>	<i>ág'ær</i>	females
	-avan (comp.)	<i>đzig-avan</i>	<i>đzig'ævæn</i>
<i>karmir-avan</i>		<i>kærmæravæn</i>	slightly redder
<i>kanantʃ-avan</i>		<i>kænəntʃ'avæn</i>	slightly greener
-anutʃ (ord.)	<i>mujn-anutʃ</i>	<i>mujnænýtʃ</i>	first
	<i>tʃurkʰ-anutʃ</i>	<i>tʃʃurkʰ'anútʃ</i>	fourth
	<i>hing-anutʃ</i>	<i>hæng'ænýtʃ</i>	fifth
-ats (pple.)	<i>sajr-ats</i>	<i>sájraets</i>	loved
	<i>t'ak-ats</i>	<i>t'ákats</i>	mauled
	<i>sk'-ah-ats</i>	<i>sk'æhæts</i>	dressed
	<i>sur-ats</i>	<i>særéts</i>	sharpened
	<i>gir-ats</i>	<i>g'aréts</i>	written
	<i>χm-ats</i>	<i>χəméts</i>	drunk
	<i>ʃar-am</i>	<i>ʃár-am</i>	means-loc.
-am (loc.)	<i>ajtʃ-am</i>	<i>ájtsæm</i>	goat-loc.
	<i>hæřs-anikʰ-am</i>	<i>hæřsənkʰúm</i>	wedding-loc.
	<i>gir-am</i>	<i>g'arým</i>	letter-loc.
-av (instr.)	<i>ar-av</i>	<i>ásav</i>	salt-instr.
	<i>ajtʃ-av</i>	<i>ájtsæv</i>	goat-instr.
	<i>hæřs-anikʰ-av</i>	<i>hæřsənkʰóv</i>	wedding-instr.
	<i>gir-av</i>	<i>g'aróv</i>	letter-instr.

Harmony interacts with a number of independent rules of Agulis phonology in these forms. In stressed final syllables, *a* becomes *u* before nasals (9a) and *o* elsewhere (9b) except before *v* (9c) and *l* (9d).

(9)	Underlying form	Surface form	Gloss
a.	<i>zam</i>	<i>zum</i>	hour
	<i>nfan</i>	<i>nafún</i>	sign
	<i>dadastán</i>	<i>dadastún</i>	judgement
b.	<i>sar</i>	<i>sor</i>	mountain
	<i>hrat</i>	<i>hərót</i>	advice
	<i>orot-á-l</i>	<i>ərətól</i>	thunder (v.)
c.	<i>as</i>	<i>as</i>	salt
	<i>masdž</i>	<i>masdž</i>	bile
d.	<i>sal</i>	<i>sojl</i>	anvil
	<i>tal</i>	<i>tojl</i>	husband's sister

The underlying forms of the roots in (9) surface when suffixes are added, as we have already seen in (8). In addition, as in Karabagh, pretonic vowels delete in a class of roots, as we can see in forms such as *ərətól* (9b) and *hərsənk'óv* (8). On the basis of alternations such as *karmir* 'red' ~ *kərmərvæn* 'slightly red', we can deduce that harmony applies before pretonic vowel deletion. It is not clear where the changes in (9) undergone by stressed *a* are ordered relative to harmony and vowel deletion. The locative and instrumental singular forms of 'wedding' are problematic in that they appear to apply deletion before harmony. Another important change involved in (8) is the raising of stressed *a* to *e* in the past participle *-ats*;<sup>9</sup> we know this rule occurs before harmony, because suffixes following *-ets-* are [-back] (e.g. *sur-ats-am* → *sərvətsəv* 'cut-past pple.-instr.'). Forms such as *g'ərvəts* and *sərvəts* are somewhat problematic, because the penultimate stress system should produce \**g'irəts*, \**sürəts*. I assume that high vowels can be specified in the lexicon as non-bracket-projecting, and as a result do not normally receive stress, thereby becoming eligible for high vowel reduction. Assuming, for example, that the root *sur* contains a non-projecting vowel, we obtain the derivation in (10).

(10)	Underlying form	<i>sur-ats</i>				
1.	Palatalization	N/A				
2.	Stress assignment					
a.	X projection	<i>s</i>	<i>u</i>	<i>r</i>	<i>a</i>	<i>tʃ</i>
			x		x	
b.	Bracket projection		x		(x)	
c.	Edge marking		x		(x) <sup>10</sup>	
d.	Heading (L)	line 0	x		(x)	
		line 1			x	

<sup>9</sup> I assume that this raising rule is the same as we find in the monosyllabic plural suffix *-ar-*, which becomes *-er-* when stressed, e.g. *as* 'salt' : *as-ar* 'salt-pl.' : *as-er-əv* 'salt-pl.-instr.'

<sup>10</sup> Agulis crucially must have RRR edge marking in this analysis, or else we would lose the effects of supposing that high vowels may not project.

(10) *contd.*

e. Edge marking

f. Heading (R)

3. Raising

4. Harmony

5. Vowel deletion

6. Epenthesis

Vowel harmony in K to the classification : Armenia near the Ira the Agulis system, b theoretical interest. I dialect; words may e schwas receive initi vowels.

*e* is described as 'a (Muradjan, 1960: 15) of the area that I am 1 However, closer insp by a consonant with phoneme as /e/, whic vation for this backin are presented in Cha vowels fall into the h

[+back] *a*[-back] *æ*

(10) *contd.*

e.	Edge marking	line 0	x	(x)
		line 1		x
f.	Heading (R)	line 0	x	(x)
		line 1		x
		line 2		x
3.	Raising	<i>sur-áts</i> → <i>sur-éts</i>		
4.	Harmony	-		
5.	Vowel deletion	<i>sr-éts</i>		
6.	Epenthesis	<i>səréts</i>		

## 5.3.2. Karchevan

Vowel harmony in Karchevan (Muradjan, 1960; a subdialect of Meghri according to the classification in (1)), an Armenian dialect spoken in the southern finger of Armenia near the Iranian border and quite close to Agulis, superficially resembles the Agulis system, but closer examination reveals significant differences of great theoretical interest. Like Agulis and Karabagh, Karchevan is a penultimate-stress dialect; words may exceptionally receive final stress, and words containing only schwas receive initial stress. Karchevan has the following inventory of surface vowels.

<i>i</i>	<i>y</i>	<i>ə</i>	<i>u</i>
<i>e</i>	<i>ø</i>		<i>o</i>
<i>ɛ</i>			
<i>æ</i>		<i>a</i>	

Fig. 5.9

*ɛ* is described as 'a simple vowel pronounced in a position between *ə* and *e*' (Muradjan, 1960: 15). Muradjan represents this vowel as <*æe*>, and in the dialects of the area that I am familiar with it indeed sounds at first like the sequence [*əe*]. However, closer inspection reveals that this sound sequence is in fact [*ɛ*] preceded by a consonant with a [+back] secondary articulation. I therefore represent this phoneme as /*ɛ*/, which is underlyingly [-high, -low, -ATR] (the phonetic motivation for this backing and additional reasons for assuming this vowel is [-ATR] are presented in Chapter 6). According to Muradjan (1960: 73), the ten surface vowels fall into the harmonic classes in Fig. 5.10.

[+back]	<i>a</i>	<i>o</i>	<i>u</i>	<i>ɛ</i>	<i>ə</i>
[-back]	<i>æ</i>	<i>ø</i>	<i>y</i>	<i>e</i>	<i>i</i>

Fig. 5.10

I argue below that the system in Fig. 5.10, based on generalizations concerning the surface distribution of vowels, is better viewed as a product of the phonemic system in Fig. 5.11.

[+back]	<i>a</i>	<i>o</i>	<i>u</i>	
[-back]	<i>æ<sup>a</sup></i>	<i>ø</i>	<i>y</i>	{ <i>e e i</i> }

Fig. 5.11. (<sup>a</sup> Actually, I assume for the reasons presented in section 5.1 that {*æ ø y*} are not part of the underlying inventory, but rather are allophones produced by the attachment of a [-back] morpheme to underlying {*a o u*} respectively. The traditional notation in (22) is simply for convenience.)

The system in Fig. 5.11 differs from the one in Fig. 5.10 in stating that Karchevan has only three pairs of vowels that contrast in terms of backness: *a* : *æ*, *o* : *ø*, and *u* : *y*. Of the four remaining vowels, *ə* has been eliminated from the harmonic system in Fig. 5.11 because it does not participate in harmonic alternations (with the exception of epenthetic harmony, which I treat separately in section 4). This follows from the fact that *ə* is not part of the underlying phonemic inventory in Karchevan, but appears solely as the product of a rule of epenthesis which applies after word harmony in the derivation.

The remaining three vowels {*e e i*} are placed in brackets to represent the fact that they are not contrastive for the harmonic feature [back] in Karchevan. Muradjan was perhaps misled into assuming that *e* and *e* formed a harmonic pair because of the alternations found in the past participle /-ats/ and the monosyllabic plural /-ar-/, which become [-ets-] and [-er-] respectively when stressed (11).

(11) Underlying form	Surface form	Gloss
<i>as-ats</i>	<i>ásats</i>	say-pple.
<i>hærb-ats</i>	<i>hárbæts</i>	drink-pple.
<i>χm-ats</i>	<i>χméts</i>	drink-pple.
b. <i>tsar-ar</i>	<i>tsáar</i>	trees
<i>æts-ar</i>	<i>étsær</i>	goats
<i>tsæts-ar</i>	<i>tsætsér</i>	breasts

The first problem with Muradjan's analysis lies in the fact that the alternations are not between *e* and *e* but rather between *a* and *e*. Since we know from independent evidence that *a* forms a harmonic pair with *æ*, it does not make sense that it should also enter into a harmonic relationship with *e*. Furthermore, it should be clear from the forms in (4) that the alternations in the past participle and the plural result from an unrelated morphophonemic rule that is sensitive solely to stress, and not to neighboring segments. I believe the rule whose effects can be seen in (11) is related to the Agulis raising rule discussed in 5.3.1. The alternations in (11) should therefore not be viewed as harmonic alternations; for this reason I have represented *e* in Fig. 5.11 as a neutral [+back] vowel.

The remaining two vowels that are not contrastive for [back], the front vowels

*e* and *i*, interestingly other times they do

Before considering basic working of K elements, so that root of neutral vowel 'un-', does not under applies from left to right Agulis, the workings non-harmonic dialect roots (12b).

- (12) standard Arme
- a. *lezu*  
*amañ*  
*tʃoban*  
*tʃamitʃ*  
*aveluk*
- b. *alevor*  
*salak*  
*fabat<sup>a</sup>*  
*asves*  
-<sup>11</sup>  
*agah*  
*asavni*  
*gerezman*  
*gih(uk)*

Harmony applies to [+back] suffixes (13c).

- (13) Suffix Underlying
- a. -ar- *tsar-*  
*muty*  
*onk<sup>a</sup>*  
*dezn*  
*ton-c*  
*æts-c*  
*gʷyl-c*  
*gʷörn*  
*mat<sup>b</sup>*  
-u- *angu*

<sup>11</sup> This word derives from

examples of *e* preceded by a f

<sup>12</sup> Palatalized consonants

when a consonant intervenes

*e* and *i*, interestingly sometimes appear to behave as if they were [+back], and at other times they do not; I discuss the relevant facts below.

Before considering the problems involving [*e e i*], let us quickly survey the basic working of Karchevan harmony. As in Agulis, harmony applies to all word elements, so that roots and suffixes share a single value for [back], with the exception of neutral vowels. The one productive prefix containing a full vowel, *an-* 'un-', does not undergo harmonic alternations. This could be because harmony applies from left to right, or because the prefix is non-harmonic (see (13b)). As in Agulis, the workings of harmony on roots can only be seen by comparison with non-harmonic dialects (12a); *i* and *e* freely occur in both [+back] and [-back] roots (12b).

(12)	standard Armenian	Karchevan	Gloss
a.	<i>lezu</i>	<i>lýzy</i>	tongue
	<i>amañn</i>	<i>ámáñnə</i>	summer
	<i>tʃoban</i>	<i>tʃobán</i>	shepherd
	<i>tʃamitʃ</i>	<i>tʃímítʃ</i>	raisin
	<i>aveluk</i>	<i>yvýlyk</i>	dock
b.	<i>alevor</i>	<i>hilévur</i>	old
	<i>ʃalak</i>	<i>ʃélak</i>	back
	<i>ʃabatʰ</i>	<i>ʃébætʰ</i>	sabbath
	<i>árves</i>	<i>árvest</i>	fox
	- <sup>11</sup>	<i>ʃiráťʃepʰ</i>	measure of wine
	<i>agah</i>	<i>akahi</i>	greedy
	<i>asavni</i>	<i>súni</i>	pigeon
	<i>gerezman</i>	<i>gírízman</i>	tomb
	<i>gih(uk)</i>	<i>gihók</i>	herd of sheep

Harmony applies to some suffixes (13a), but not others (13b); *i* and *e* take [+back] suffixes (13c).

(13)	Suffix	Underlying form	Surface form	Gloss
a.	-ar-	<i>tsar-ar</i>	<i>tsárar</i>	trees
		<i>mutʃ-ar</i>	<i>múťʃar</i>	big ones
		<i>onkʰ-ar</i>	<i>ónkʰar</i>	eyebrows
		<i>dezñ</i>	<i>déznar</i>	wild mints
		<i>ton-ar</i>	<i>tónár</i>	houses
		<i>ætʃ-ar</i>	<i>éťʃær</i>	goats
		<i>gʷyl-ar</i>	<i>gʷylær</i>	wolves
		<i>gʷörn-ar</i>	<i>gʷórnær</i>	sheep-pl.
		<i>matʰkʰ-ar</i>	<i>mátʰkʰær</i>	minds <sup>12</sup>
	-u-	<i>anguz-u</i>	<i>angúzu</i>	walnut-dat.

<sup>11</sup> This word derives from Persian *ʃira* 'sweet wine' + Armenian *tʃapʰ* 'measure'. I have found no examples of *e* preceded by a front vowel other than *i* and *e* within a root.

<sup>12</sup> Palatalized consonants regularly spread [-back] to immediately following harmonic vowels; when a consonant intervenes spreading does not occur, e.g. *asinkʰ-nor-u* 'bowel-pl.-dat.').

## VOWEL HARMONY

Suffix	Underlying form	Surface form	Gloss
	<i>byn-u</i>	<i>býny</i>	nest-dat.
	<i>anguf-u</i>	<i>àngufú</i>	ear-dat.
	<i>sar-u</i>	<i>sáru</i>	mountain-dat.
	<i>tset-u</i>	<i>tsetí</i>	sparrow-dat.
	<i>kæfʃin</i>	<i>kæfʃny</i>	axe-dat.
-(n)or-	<i>anguz-nor-u</i>	<i>anguznóru</i>	walnut-pl.-dat.
	<i>ařǫ-or-u</i>	<i>ařǫóru</i>	bear-pl.-dat.
	<i>byn-or-u</i>	<i>bynóry</i>	nest-pl.-dat.
b. -ná-	<i>kloř-ná</i>	<i>kəlořná</i>	head-pl.
	<i>byřyř-ná</i>	<i>byřyřná</i>	little bell-pl.
	<i>řebæfʃ-ná</i>	<i>řebæfʃná</i>	sabbath-pl.
c.	<i>izn-ar</i>	<i>iznar</i>	oxen
	<i>beřn-ar</i>	<i>béřnar</i>	burdens
	<i>řřimifʃ-nor-u</i>	<i>řřimifʃnóru</i>	raisin-pl.-dat.

It initially appears to be difficult to determine whether *i*, *e*, and *ɛ* are transparent or opaque. The optimal test case would be of the type in Fig. 5.12:

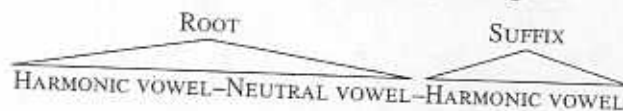


Fig. 5.12

In this case, transparent neutral vowels should allow the harmonic feature of the preceding harmonic vowel to spread to the following harmonic vowel, whereas opaque neutral vowels should not. Forms such as [*birgædir-u-n*] 'together-dat.-def.' → [*birgædirun*] demonstrate that harmonic values do not spread through neutral vowels in Karchevan. If the neutral vowel *i* were transparent, we would expect the *æ* in *birgædirun* to be able to spread its [-back] specification through the neutral vowel *i* to the following *u*, producing \*[*birgædiryn*]. Consequently, we can conclude that Karchevan neutral vowels are opaque.

Furthermore, the [+back] value of the suffixal *u* clearly cannot have spread from the [-back] value of the root *æ* preceding the neutral *i*. I suggest that the best way to account for the fact that the *u* surfaces as [+back] is to assume that Karchevan neutral vowels are not only opaque, but also are inert; in other words, they block the propagation of harmonic [back] specifications. Consequently, any vowel following a neutral vowel in Karchevan will surface with its underlying [+back] specification. Given that the phonemic inventory of vowels in Karchevan is {*a o u e e i*} (see below for further discussion), the underlying form of the genitive/dative suffix must be /*u*/, which is underlyingly specified as [+back] and surfaces as such in [*birgædirun*].

Let us now consider the behavior of the neutral vowels *i* and *e* in more detail (leaving out *ɛ*, whose distribution is severely restricted in the language). The behavior of these vowels falls into three patterns:

(14)

- Can be preceded or
- Followed by back
- Spread [-back] to

The facts in (14a) follow contrastive [back] values. Neutral vowels are fully specified for [back] contrasts: *a* : *o* and *e* : *ɛ* but are both [-back], as shown in statement \*[+back, -ro] from {*a o u*} to neutral vowels. The facts in (14b) show that both [+back] and [-back] are neutral internally, whereas only [+back] is neutral to suffixes such as *-or* in the mother dialect of Karchevan (see below). The facts in (14c) show that suffixes to surface in the Hungarian vowel harmony (see below, 1995), but differs from the facts in (14a). Consequently, only [-back] is neutral internally. We have seen that Karchevan neutral vowels are not only opaque, but also are inert; they block the propagation of harmonic [back] specifications. Consequently, any vowel following a neutral vowel in Karchevan will surface with its underlying [+back] specification. Given that the phonemic inventory of vowels in Karchevan is {*a o u e e i*} (see below for further discussion), the underlying form of the genitive/dative suffix must be /*u*/, which is underlyingly specified as [+back] and surfaces as such in [*birgædirun*].

5.4

Like the other dialects of Karchevan, the [back] and [front] values are determined by neighboring segments. The facts in (15) show that the [+back] and [-back] values of the definite article alternate with the [back] and [front] values of the noun.

(15) Underlying form

- hak<sup>h</sup>-n*
- værd-n*
- beh-n*

Gloss  
 nest-dat.  
 ear-dat.  
 mountain-dat.  
 sparrow-dat.  
 axe-dat.  
 walnut-pl.-dat.  
 bear-pl.-dat.  
 nest-pl.-dat.  
 head-pl.  
 little bell-pl.  
 sabbath-pl.  
 oxen  
 burdens  
 raisin-pl.-dat.

r *i*, *e*, and *ɛ* are transparent  
 in Fig. 5.12:



the harmonic feature of the  
 g harmonic vowel, whereas  
*irgædir-u-n/* 'together-dat.-  
 lues do not spread through  
 were transparent, we would  
 [-back] specification through  
*birgædiryn*). Consequently,  
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clearly cannot have spread  
 tral *i*. I suggest that the best  
 [+back] is to assume that  
 also are inert; in other words,  
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 surface with its underlying  
 tory of vowels in Karchevan  
 the underlying form of the  
 gly specified as [+back] and

vowels *i* and *e* in more detail  
 icted in the language). The

(14)

- a. Can be preceded or followed by front or back vowels within roots.
- b. Followed by back or neutral suffixes.
- c. Spread [-back] to epenthetic vowel.

The facts in (14a) follow naturally if we assume that Karchevan harmony spreads contrastive [back] values iteratively from left to right within a word, and that all vowels are fully specified underlyingly. Given the system in Fig. 5.11, the only [back] contrasts are *a : ɔ*, *o : ɒ*, and *u : y*. The vowels *e* and *ɛ* contrast for [ATR] but are both [-back], and *i* has no [+back] counterpart. As in Agulis, the marking statement \*[+back, -round]/[-low] is active, and blocks spreading of [+back] from {*a o u*} to neutral vowels. I further assume that roots draw from the vocalic inventory in Fig. 5.11 (i.e. {*a o u ɛ e i*}), whereas suffixes contain only the cardinal vowels {*a e i o u*} in their underlying representations (for further discussion of this restriction see 5.1). This being the case, we can account for the fact that both [+back] and [-back] harmonic vowels can follow neutral vowels root-internally, whereas only cardinal vowels can occur in suffixes after roots ending in one or more neutral vowels. The insight here is that *i* and *e* do not spread [+back] to suffixes such as the plural (as Grigorjan, 1957 claimed for Meghri, the mother dialect of Karchevan) but rather do not spread any back value, enabling suffixes to surface in their underlying form. Inertness of this type is also found in Hungarian vowel harmony (see Ringen 1988, van der Hulst and van de Weijer, 1995), but differs from Agulis harmony, which spreads all [back] values and consequently allows only [-back] vowels to surface after neutral vowels. We thus far have seen that Karchevan neutral vowels need not be [+back] in order to produce the [+back] specification that surfaces in following vowels. However, we have not yet provided evidence that these neutral vowels themselves need to be specified as [-back] during the phonological derivation. In the next section I demonstrate that we in fact have to make this assumption in order to account for the behavior of epenthetic harmony.

## 5.4. EPENTHETIC HARMONY

### 5.4.1. Karchevan

Like the other dialects in (1c), Karchevan shows epenthetic harmony, according to which the [back] and [round] specifications of epenthetic vowels are determined by neighboring segments under certain conditions. Consider first the noun + definite article alternations in (15).

(15)	Underlying form	Surface form	Gloss
a.	<i>hak<sup>h</sup>-n</i>	<i>hák<sup>h</sup>ə</i>	foot-def.
b.	<i>værd-n</i>	<i>várdi</i>	rose-def.
	<i>beh-n</i>	<i>béhi</i>	spade-def.

	<i>knag<sup>l</sup>-n</i>	<i>kanági</i>	woman-def.
c.	<i>myrdzym-n</i>	<i>myrdzými</i>	ant-def.

Muradjan (1960: 103) states that the definite article has the allomorphs [ə i y], each of which may be followed by *n* when preceding a vowel-initial clitic. I assume that, as in standard Armenian, these alternations result from the addition of a clitic definite article *-n*, which triggers epenthesis and then deletes when not followed by a vowel. Karchevan differs from standard Armenian and resembles Turkish in applying two harmonic processes to this vowel, one that spreads [back] and another that spreads [round]. According to Muradjan (1960: 103), the definite article surfaces as [ə] after back vowels, [i] after nonround front vowels and roots ending in palatalized consonants or [ʃ f tʃ tʃʰ] (i.e. [-anterior] coronals), and [y] after roots having *y* as their last vowel. Though Muradjan does not give examples of the definite article with roots ending in  $\emptyset$ , we can tell from forms such as *bədzr* → [bədzr] 'high' that  $\emptyset$  also spreads [+round] to the epenthetic vowel.

The appearance of *ə* after back vowels (15a, 16a) is not surprising. The appearance of *i* after neutral vowels (15b, 16b) is somewhat unexpected, however, since if the harmony process affecting the epenthetic vowel were the same as that affecting full vowels, we would not expect neutral vowels to spread [-back]. The harmonic process in (15) must therefore be different from the one in (13). This assumption is further justified by the fact that the harmony rule in (13) applies before epenthesis, whereas the one in (15) applies after epenthesis. This being the case, it is a simple matter to state that the post-epenthesis harmony rule spreads all [-back] values,<sup>13</sup> and the vowels *i* and *e* therefore spread [-back].

The rounding rule, on the other hand, must spread only marked [round]. Since [round] is marked only in [-back] vowels, *o* and *u* are not expected to be triggers. The alternations in the ordinal suffix *-mndzi* in (16c) confirm that *o* and *u* do not spread rounding.

(16)	Underlying form	Surface form	Gloss
a.	<i>tʃok<sup>h</sup>-mndzi</i>	<i>tʃək<sup>h</sup>məndzi</i>	fourth
	<i>hang<sup>l</sup>-mndzi</i>	<i>həng<sup>l</sup>məndzi</i>	fifth
	<i>tasn<sup>h</sup>-mndzi</i>	<i>təsəməndzi</i>	tenth
b.	<i>irik<sup>h</sup>-mndzi</i>	<i>irik<sup>h</sup>-mindzi</i>	third
	<i>viʃ<sup>h</sup>-mndzi</i>	<i>viʃmindzi</i>	sixth
c.	<i>jorku-mndzi</i>	<i>jorkuməndzi</i>	second
	<i>joxtn-mndzi</i>	<i>joxtəməndzi</i>	seventh
	<i>ot<sup>h</sup>:n-mndzi</i>	<i>ot<sup>h</sup>:əməndzi</i>	eighth

The forms 'fourth' and 'tenth' demonstrate that [back] spreading does not apply from right to left. If [back] spreading did apply from right to left, we would expect the final *-i* of the ordinal suffix to spread its [-back] vowel to the preceding schwas, which is not the case.

<sup>13</sup> One must stipulate a correlation between [coronal, [-anterior]] and [dorsal, [-back]] in order to account for the behavior of palatals, as has already been discussed in Ch. 2. I return to this issue in Ch. 6.

To summarize the structure constraint (17).

- (17) a. deletic  
b. harmo  
c. epenth  
d. harmo  
e. harmo

The deletion rule in certain vowels are frequently undergo uns must occur before h in (18).

- (18) Underlying f  
a. *kəʃin-u*  
b. *sərt-u*

In (18a), [-back] spreading were still present at spreading, and the *si* before deletion we should apply to the trative [back] specif

In my analysis the crucially ordered relations therefore apply to the [+high] (as in Turkish)

The Marash dialect similar to the Karchevan deduced by epenthesis vowel in the preceding of the definite article triggering epenthesis triggers epenthesis at [+back, -round], the is [-back, -round], t

<sup>14</sup> This sort of harmony Lusin Chorbajian and Taku Sunentz.

To summarize the above discussion, I propose that in addition to the root structure constraint discussed in 5.2, Karchevan harmony involves the rules in (17).

- (17) a. deletion  
 b. harmony 1 spread contrastive [back] iteratively L → R  
 c. epenthesis  
 d. harmony 2 spread all [back] L → R  
 e. harmony 3 spread marked [round] L → R

The deletion rule in (17a) closely resembles the one discussed above for Agulis: certain vowels are lexically specified as unable to project brackets, and subsequently undergo unstressed vowel deletion. Unlike in Agulis, Karchevan deletion must occur before harmony in order to account for alternations of the type found in (18).

(18)	Underlying form	Surface form	Gloss
a.	<i>kæʔsin-u</i>	<i>kæʔsny</i>	axe-dat.
b.	<i>sært-u</i>	<i>særtú</i>	heart-dat.

In (18a), [-back] spreads from the *æ* of the root to the dative suffix *-u*. If the root *i* were still present at the time harmony applied, we would expect it to block this spreading, and the suffix to surface as *-u*. Similarly in (18b), if harmony applied before deletion we should expect *\*særtú*. Given the scheme in (17), harmony should apply to the intermediate form *\*srt-u*; since the root contains no contrastive [back] specifications, the suffix surfaces in its underlying form.

In my analysis the harmony rules that affect the epenthetic vowel are not crucially ordered relative to one another. I assume that both are feature-filling and therefore apply to the epenthetic vowel, which is only prespecified for the feature [+high] (as in Turkish), but do not affect full vowels.

#### 5.4.2. Marash

The Marash dialect shows an interesting epenthesis harmony system somewhat similar to the Karchevan system just discussed.<sup>14</sup> In this dialect, the vowel produced by epenthesis can surface as *ə*, *i*, *u*, or *y*, depending on the quality of the vowel in the preceding syllable. These alternations are exemplified by the forms of the definite article in (19). The underlying form */-n/* surfaces as such without triggering epenthesis when added to vowel-final roots (19a), but otherwise triggers epenthesis and then deletes, as in Karchevan. If the preceding vowel is [+back, -round], the epenthetic vowel surfaces as *ə* (19b); if the preceding vowel is [-back, -round], the epenthetic vowel surfaces as *i* (19c); if the preceding

<sup>14</sup> This sort of harmony is common to the speech of Galustean (1934) and two of my informants, Lusin Chorbajian and Takuhi Der Manuelian, but does not occur in the dialect of my informant Paren Sanentz.

vowel is [+back, +round], the epenthetic vowel surfaces as *u* (19d); if the preceding vowel is [-back, +round], the epenthetic vowel surfaces as *y* (19e).

## (19) Definite article /-n/

	Surface form	After	Examples
a.	-n	vowels	<i>dəwε-n</i> 'boy'
b.	-ə	<i>a</i>	<i>manatʃ-ə</i> 'spinner'
c.	-i	<i>i, e, ε</i>	<i>agif-i</i> <i>χetʃ-i</i> 'cross'
			instr. - <i>ev-i</i>
d.	-u	<i>o, u</i>	Examples <i>dəgol-u</i> 'spoon'
e.	-y	<i>y, ø</i>	<i>tʰuz-u</i> 'fig' <i>ysgyr-y</i> 'bone' <i>døn-y</i> 'festival'

Similar alternations can be observed in the indefinite enclitic /m/ (20) and the imperfective prefix /g/ (21).

## (20) Indefinite article /m/

	Surface form	After	Examples
a.	<i>mə</i>	<i>a</i>	<i>fabag mə</i> 'shirt'
b.	<i>mi</i>	<i>i, e, ε</i>	<i>axʃin mi</i> 'girl' <i>pʰed mi</i> 'wood'
c.	<i>mu</i>	<i>o, u</i>	<i>danog mu</i> 'knife' <i>mug mu</i> 'mouse'
d.	<i>my</i>	<i>y, ø</i>	<i>ysgyr my</i> 'bone' <i>ør my</i> 'day'

## (21) present prefix /g-/

	Surface form	Before	Examples
a.	<i>g</i>	vowels	<i>g-enim</i> 'I do'
b.	<i>gə</i>	C + <i>a</i>	<i>gə hagnam</i> 'I wear'
c.	<i>gi</i>	C + <i>i, e, ε</i>	<i>gi sirim</i> 'I love'
d.	<i>gu</i>	C + <i>o, u</i>	<i>gu tʰusum</i> 'I allow'
e.	<i>gy</i>	C + <i>y, ø</i>	[no cases available]

The harmony rule responsible for the alternations in (19–21) also produces intricate systems of alternation in paradigms, as exemplified for the declensions of the words in (22), to which the definite article /-n/ has been added.

## (22) Synchronic alternations

		'Mother'	'Man'	'Brother-in-law'
nom.	UR	<i>mer-n</i>	<i>martʰ-n</i>	<i>dəgr-n</i>
	SR	[ <i>meri</i> ]	[ <i>mortʰu</i> ]	[ <i>dəgri</i> ]

gen./dat. UR  
SR

abl. UR  
SR

instr. UR  
SR

pl. nom. UR  
SR

pl. gen./dat. UR  
SR

The analysis of the M: as in Karchevan, a rule dictated by the syllab rule, sensitive to all [round] values of a r epenthesis rule.

Now, as in the case section, we are faced is sensitive to one set sensitive to a different sensitive to contrastive was sensitive to all [Marash, on the other h tive to all feature spec ing [+round] from o epenthetic vowel.

The theory present cesses affecting full a here, by the same tok found in Karchevan a sented here that we ca in the Armenian diale contrastive [back] s between the various d vowel harmony that d capture these importar

gen./dat.	UR	<i>mør-n</i>	<i>mart<sup>h</sup>-u-n</i>	<i>degr-ydž-n</i>
	SR	[møry]	[mart <sup>h</sup> un]	[degrydžy]
abl.	UR			<i>degr-ε-n</i>
	SR			[degren]
instr.	UR		<i>mart<sup>h</sup>-ev-n</i>	<i>degr-ev-n</i>
	SR		[mart <sup>h</sup> evi]	[degrevi]
pl. nom.	UR	<i>mer-d-ek<sup>h</sup>-n</i>		
	SR	[merdek <sup>h</sup> i]		
pl. gen./dat.	UR	<i>mer-d-of<sup>h</sup>s-n</i>		
	SR	[merdot <sup>h</sup> su]		

The analysis of the Marash data just presented is fairly straightforward. First, just as in Karchevan, a rule of epenthesis inserts a [+high] vowel under conditions dictated by the syllable structure. Subsequently, a feature-filling local harmony rule, sensitive to all [back] and [round] specifications, spreads the [back] and [round] values of a neighboring vowel rightward to vowels produced by the epenthesis rule.

Now, as in the case of Karchevan epenthetic harmony discussed in the previous section, we are faced with the problem of explaining why Marash root harmony is sensitive to one set of feature specifications, whereas epenthetic harmony is sensitive to a different set. However, in Karchevan, root and word harmony were sensitive to contrastive [back] and [round] specifications, but epenthetic harmony was sensitive to all [back] specifications and marked [round] specifications. In Marash, on the other hand, both [back] and [round] epenthetic harmony are sensitive to all feature specifications. Thus, Marash differs from Karchevan in spreading [+round] from *o* and *u*, whose [round] specification is unmarked, to the epenthetic vowel.

The theory presented in this chapter, which requires that the harmonic processes affecting full and epenthetic vowels be independent in the cases discussed here, by the same token does not require that the rules of epenthetic harmony found in Karchevan and Marash be identical. It is an advantage of the theory presented here that we can treat the harmonic alternations affecting roots and words in the Armenian dialects as the results of a common harmony rule that spreads contrastive [back] specifications; furthermore, we can localize differences between the various dialects in their systems of epenthetic harmony. Theories of vowel harmony that do not distinguish root, word, and epenthetic harmony fail to capture these important generalizations.