

Transparency in Hungarian vowel harmony*

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1 Introduction

Phonologists have known for some time that the so-called 'standard' theory of generative phonology is not adequate for the analysis of vowel harmony. Ringen (1975, 1977, 1980) suggests that some of the problems can be solved by abandoning the assumption that phonological representations are fully specified. Clements (1977b, 1980) suggests that vowel harmony should be analysed autosegmentally.¹ Underspecification theory, developed in the recent work of Kiparsky, Archangeli and Pulleyblank, incorporates both of these proposals. This paper considers how Hungarian can be analysed within this theory.² It is shown that by adopting Goldsmith's (1985) proposal that vowel harmony in Hungarian involves the spreading of the feature [-back], the transparent (neutral) vowels in Hungarian are derived because the redundancy rule assigning [-back] to these vowels, although available, does not apply early in the derivation because its structural description is not met. Other accounts of transparent vowels involve stipulation (that is removing neutral vowels from the domain of harmony as in e.g. Kiparsky 1981), neutralisation (as in e.g. McCarthy 1984), or feature geometry (as proposed in Archangeli & Pulleyblank 1987, forthcoming a). If the account presented here is correct, it raises the following questions: Are there several sources for transparent vowels? Can other cases of transparent vowels be shown to have a similar source?

2 Background data

The vowels of the standard (Budapest) dialect of Hungarian are given in (1):

(1)	Front				Back		
	Short	Long	Short	Long	Long	Short	Long
High	i [i]	í [i:]	ü [y]	ű [y:]		u [u]	ú [u:]
Mid		é [e:]	ö [œ]	ő [œ:]		o [o]	ó [o:]
Low	e [ɛ]				á [ɑ:]	a [ɔ]	ó [o:]
	Unrounded		Round		Unrounded		Round

Front vowels do not generally occur in words with back vowels. The transparent or neutral vowels (*i*, *i̇* and *ė*) are not subject to this restriction.³ Non-neutral (harmonic) suffix vowels alternate depending on the harmonic quality of root vowels:⁴

- | | | | | |
|-----|-------|---------|-----------|------|
| (2) | ház | 'house' | ház-nak | dat. |
| | város | 'city' | város-nak | dat. |
| | űr | 'gap' | űr-nek | dat. |
| | öröm | 'joy' | öröm-nek | dat. |

When a root contains a back vowel followed by one transparent vowel (mixed vowel root), harmonic suffix vowels are back:

- | | | | |
|-----|------------|----------|------|
| (3) | radír-nak | 'eraser' | dat. |
| | kavics-nak | 'pebble' | dat. |
| | tányér-nak | 'plate' | dat. |

Following roots with only neutral vowels, harmonic suffix vowels are generally front, as illustrated in (4):

- | | | | | |
|-----|--------|---------|------------|------|
| (4) | víz | 'water' | víz-nek | dat. |
| | fillér | 'penny' | fillér-nek | dat. |

There are, however, about fifty roots with only transparent vowels that require back suffixes:

- | | | | | |
|-----|-----|----------|---------|------|
| (5) | híd | 'bridge' | híd-nak | dat. |
| | cél | 'goal' | cél-nak | dat. |

Loanwords often violate harmony restrictions. For example, *sofőr* 'chauffeur' and *büro* 'bureau' have both front and back harmonic vowels. Harmonic suffix vowels following such disharmonic roots agree in backness with the last harmonic root vowel:

- | | | | |
|-----|-----------|-------------|------|
| (6) | büro-nak | 'bureau' | dat. |
| | sofőr-nek | 'chauffeur' | dat. |

3 Analysis

Archangeli (1984) assumes that only one value (+ or -) of every feature is specified in underlying representation. Consider first the possibility that only [+back] is specified in underlying representations and that [-back]

is supplied by a redundancy constraint. The following vowels have the following features:

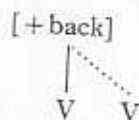
- | | | | | |
|-----|-------|---|---|---|
| (7) | | i | e | ε |
| | high | - | - | - |
| | low | - | - | + |
| | back | - | - | + |
| | round | - | - | + |

Finally, let us assume with Hungarian which states:

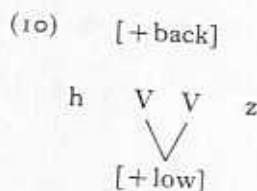
- (8) [+back] may only follow [+back].

Following Pulleyblank (1986) the vowels are linked by Universal A, which states that vowels from left to right, or as a rule that spreads [+back]

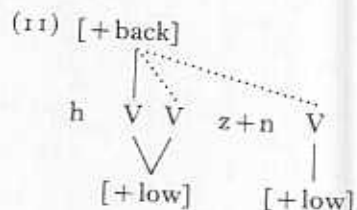
(9) Vowel Harmony



Because of the constraint in (8), the vowels which are either [+back] or [-back] are specified as [+low]:



After the UAC applies, the representation is as shown by the solid lines in (11):



is supplied by a redundancy rule.⁵ Assume further that the Hungarian vowels have the following underlying specifications:

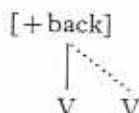
(7)		i	e	ɛ	u	o	a	ü	ö
	high		-			-			-
	low			+			+		
	back				+	+	+		
	round				+	+		+	+

Finally, let us assume with Kiparsky (1981) that there is a constraint in Hungarian which states:

(8) [+back] may only link with vowels that are [+low] or [+round]⁶

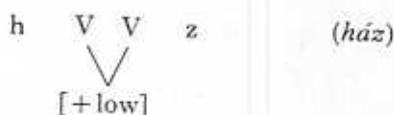
Following Pulleyblank (1986), we can assume that floating autosegments are linked by Universal Association Convention (UAC) to unassociated vowels from left to right, one-to-one. Vowel Harmony (VH) can be stated as a rule that spreads [+back] rightward:

(9) *Vowel Harmony*

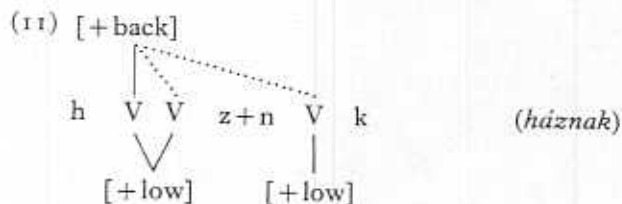


Because of the constraint in (8), VH will spread [+back] to all and only those vowels which are either [+low] or [+round]. The lexical entry for *ház* 'house' will have a floating autosegment and the vowel will be specified as [+low]:

(10) [+back]



After the UAC applies, the representation of the dative of *ház* would be as shown by the solid lines in (11):



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it subject to this restriction.³
ate depending on the har-

by one transparent vowel
re back:

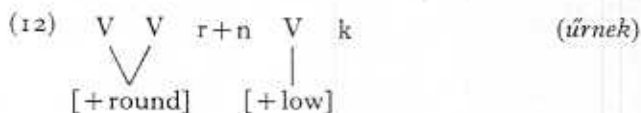
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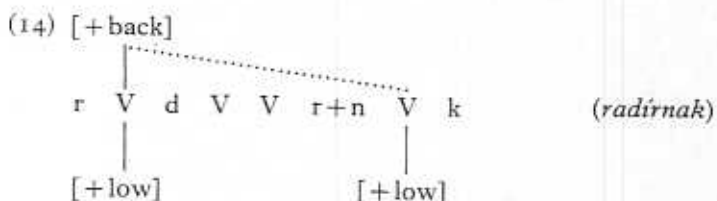
The application of VH, indicated by the dashed lines, would link the second and third vowels to the autosegment [+back]. Compare (11) to the dative of *úr* 'gap', which would have the underlying representation in (12):



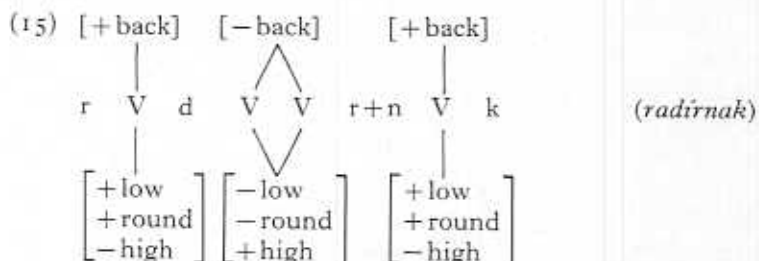
By the redundancy rules listed in (13), the root vowel would surface as *ú* and the suffix vowel as *e* [ɛ]:⁷

- (13) a. [] → [-back]
 b. [] → [-low]
 c. [] → [-round]
 d. [] → [+high]
 e. [+low] → [-high]

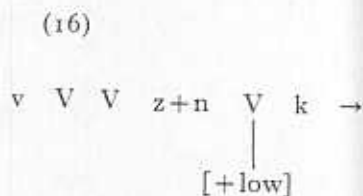
On this analysis, the representation of the dative of *radír* 'eraser' would be as in (14) after the UAC and Vowel Harmony apply (application of VH is indicated by the dashed line):



The autosegment [+back] would not link with the final root vowels because these vowels are not [+low] or [+round], as required by the constraint in (8). By application of the redundancy rules in (13), the representation of *radírnek* is derived:⁸

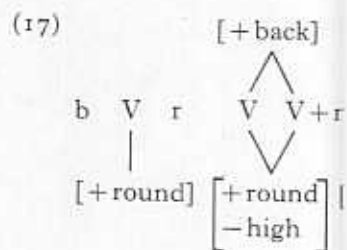


Roots with only neutral vowels specified autosegment; by the surface as front vowels:

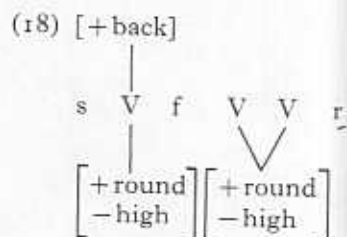


Exceptional forms such as *hi* would spread to suffix vowels and root vowels because of the constraint.

Disharmonic roots such as *a* are lexically bound to the second

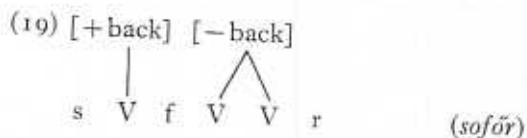


The [+back] autosegment is correctly defined as operating only rightward, but it must be assumed to be bound to the *first* vowel, as in



It can be assumed that some vowels block the spreading of [+back] to the suffix vowel. The spreading of [+back] to the suffix vowel *must* be

earlier autosegmental treatments of vowel harmony, both vowels in disharmonic loans such as *sofőr* were lexically bound to (different) autosegments as in (19). Hence, spreading of [+back] was blocked by the prohibition against crossing of association lines (Goldsmith 1976):



This option is not available if we assume that only one value of a given feature, + or -, may occur in lexical representations. Unless we abandon the claim that root and suffix harmony are both accounted for by the VH rule (as does Goldsmith 1987), it appears that it is not possible to describe Hungarian vowel harmony in underspecification theory as outlined in Archangeli (1984) and Pulleyblank (1986) if it is assumed that the feature [+back] is lexically specified in Hungarian.

Consider next the possibility that [-back] is lexically specified rather than [+back] and that underlying vowels in Hungarian are as in (20):

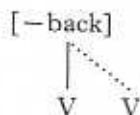
(20)		i	e	ɛ	u	o	ü	ö
	high		-		-		-	
	low		+		+			
	back			-		+	-	-
	round	-	-					

The following redundancy rules will correctly fill in the blanks:

- (21) a. [+low] → [-high]
 b. [] → [+round]
 c. [] → [-low]
 d. [-round] → [-back]
 e. [] → [+back]
 f. [] → [+high]

On this analysis, Vowel Harmony (VH) spreads [-back]:

(22) *Vowel Harmony*



Roots such as *űr*, with fi
 a free [-back] autosege

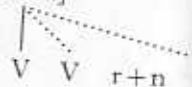
(23) [-back]

V V r+n

[+]

Application of the UAC

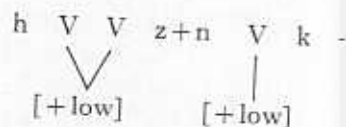
(24) [-back]



[+]

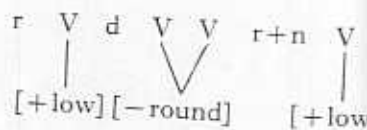
Back vowel roots such as *hu*
 [+back] specification of t
 supplied by the redundanc

(25)



Mixed vowel roots such as *re*
 the redundancy rules in (21),
 second root vowel surfaces

(26)



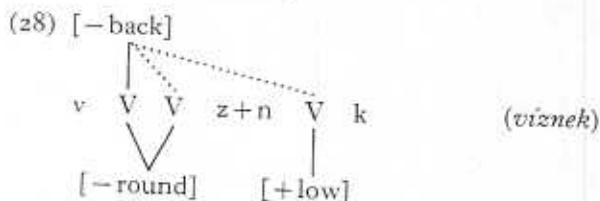
Notice that because VH refers to [-back], the Redundancy Rule Ordering Constraint (Archangeli 1984) will require that the redundancy rule (21d), which fills in the [-back] specification of transparent vowels, be assigned to the same component as VH:

(27) *Redundancy Rule Ordering Constraint*¹²

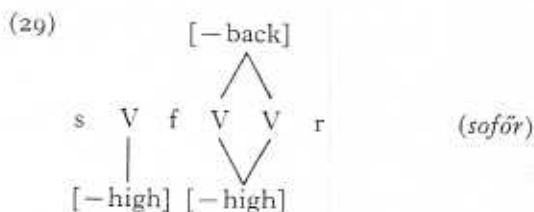
A redundancy rule assigning [α F], where ' α ' is '+' or '-', is automatically assigned to the first component in which there is a rule which refers to [α F].

The redundancy rule (21d) does not actually apply, however, because the vowels *i*, *i* and *e* are not yet specified as [-low] and hence the structural description of the rule is not met.¹³ Were the redundancy rule (21d) to apply to the vowels of *radír*, the analysis being developed here would not be tenable because subsequent application of VH would, incorrectly, result in front harmonic suffix vowels following mixed vowel roots such as *radír*.

Roots with only neutral vowels can be assumed to have a floating [-back] autosegment which is associated with the first vowel by the UAC and with other vowels by VH:



Roots such as those in (5), which require back harmonic suffix vowels, yet contain only transparent vowels, have no autosegment. By the redundancy rules in (21), the root vowels become front unrounded vowels, but harmonic suffix vowels following these roots become [+back]. A disharmonic loanword such as *sofór*, which was problematic if [+back] was lexically specified, is not problematic if [-back] is the lexically specified feature:



It can be assumed that *sofór* has a [-back] autosegment that is lexically bound to the second root vowel. Suffix vowels following this root will be [-back] (by VH), but the first root vowel will become [+back] by the redundancy rules, since VH cannot apply to spread [-back] to it. The

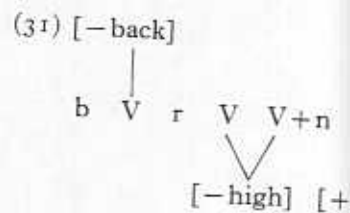
form *büró*, however, appear under consideration as *sof* lexically bound to the first second vowel, but how can

4 Locality Condition

Archangeli & Pulleyblank local:

- (30) *Locality Condition*
A rule can apply only trigger.

They note that if features a Clements (1985), and if a rule highest level of syllabic structure then, in general, consonants but vowels will block rules whose targets and triggers are heads, a level which provides rules affecting consonants will access to both consonants and If the Locality Condition is of the [-back] autosegment.



Assuming that the SCC blocks the last vowel in *büró*, then the Locality Condition of VH to the suffix vowel because the autosegment would require spreading of the Locality Condition.¹⁴

5 Spreading of [+back]

It might appear that a similar situation is available if VH spreads [+back]

form *büro*, however, appears to present the same difficulty for the analysis under consideration as *sofőr* did for the previous one. If [-back] is lexically bound to the first vowel, the SCC can prevent spreading to the second vowel, but how can the spreading to suffix vowels be blocked?¹⁴

4 Locality Condition

Archangeli & Pulleyblank (1987) suggest that all spreading must be local:

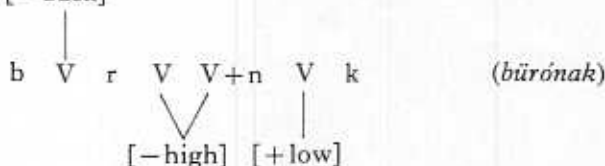
(30) *Locality Condition*

A rule can apply only if a specified target is adjacent to a specified trigger.

They note that if features are organised hierarchically, as suggested by Clements (1985), and if a rule whose target is node or feature α scans the highest level of syllabic structure providing access to α (maximal scansion), then, in general, consonants will be transparent to rules affecting vowels, but vowels will block rules applying to consonants. This is because rules whose targets and triggers are vowels will scan at the level of syllable heads, a level which provides access to vowels but not consonants, whereas rules affecting consonants will scan the skeletal tier, a level which provides access to both consonants and vowels.

If the Locality Condition is adopted, it is possible to block the spreading of the [-back] autosegment of *büro*:¹⁵

(31) [-back]



Assuming that the SCC blocks the application of VH root internally to the last vowel in *büro*, then the Locality Condition will block the application of VH to the suffix vowel because linking the suffix vowel to the [-back] autosegment would require skipping over the root final vowel, a violation of the Locality Condition.¹⁶

5 Spreading of [+back] reconsidered

It might appear that a similar solution invoking the Locality Condition is available if VH spreads [+back].¹⁷ It will be recalled that a disharmonic

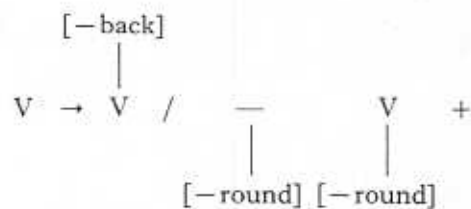
root such as *sofőr* was problematic because, although root-internal spreading of the [+back] autosegment could be blocked by the SCC, nothing would prevent it from spreading to suffix vowels. However, if VH is assumed to apply to a projection of [+round] and/or [+low] vowels, then the Locality Condition could be invoked to prevent VH from skipping the harmonic vowel in a disharmonic root such as *sofőr*. Specifically, since transparent vowels would not appear on such a projection, they would be skipped, but harmonic vowels – even in the disharmonic roots – would appear on the projection and hence could not be skipped. The difficulty with such an analysis is that although a single non-low unrounded vowel can be skipped, two or more cannot. If transparent vowels are excluded from the harmonic projection, they should not be able to block spreading.

6 Mixed vowel roots with sequences of neutral vowels

It is usually claimed that harmonic suffix vowels following mixed vowel roots ending in two neutral vowels vacillate, i.e. they allow both front and back harmonic vowels. However, the empirical investigations of Kontra & Ringen (1986, 1987) show that, in fact, very little vacillation occurs. Most of Kontra & Ringen's subjects used exclusively *front* suffix vowels with most mixed vowel roots ending in multiple transparent vowels.¹⁸ For example, the overwhelming majority of subjects use front harmonic suffix vowels with a word such as *bronchitisz* 'bronchitis': *bronchitisz-nek*. The fact that a sequence of transparent vowels apparently can influence suffix vowel choice shows an analysis such as the one just sketched, involving the projection of only the harmonic vowels, to be inadequate.

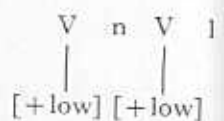
On the other hand, if [-back] is the spreading feature, the behaviour of suffix vowels following mixed vowel roots ending with more than one transparent vowel can be described by a rule that inserts a [-back] autosegment whenever a morpheme ends with a sequence of transparent vowels:

(32) [-back] Insertion¹⁹

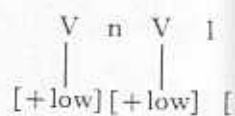


This rule feeds VH, so that neutral vowels become front

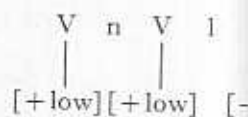
(33) a. underlying repres



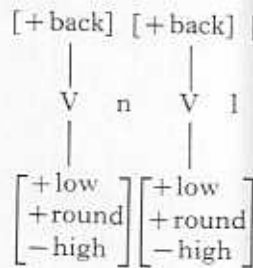
b. by rule (32): [-back]



c. by Vowel Harmony

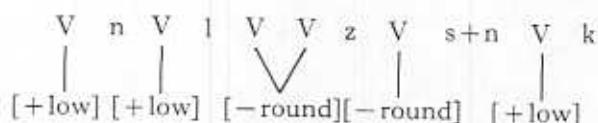


d. by the redundancy

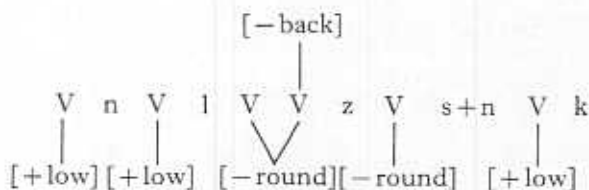


This rule feeds VH, so that suffix vowels following roots ending with two neutral vowels become front:

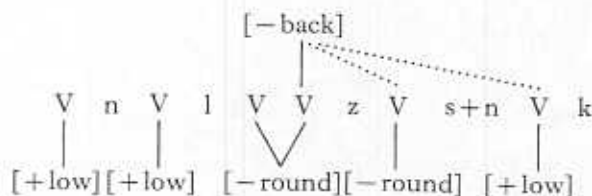
(33) a. underlying representation



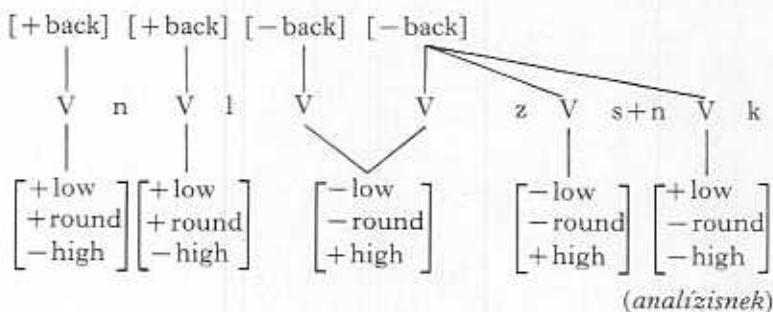
b. by rule (32): [-back] Insertion



c. by Vowel Harmony



d. by the redundancy rules in (21)



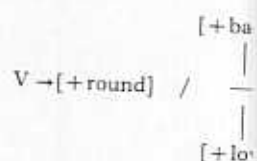
7 Conclusion

We have seen that it is possible to describe Hungarian vowel harmony in underspecification theory as outlined by Archangeli (1984) and Pulleyblank (1986) if, as proposed by Goldsmith (1985), the feature that spreads in Hungarian is [-back]. The analysis outlined here describes disharmonic loanwords and other complications of vowel harmony without abandoning the claim that root and suffix harmony is a single process or the claim that the feature [-back] occurs only on one tier. More interesting, perhaps, are the questions raised by the analysis sketched here. Must multiple sources for transparent vowels be admitted? Can transparent vowels in Khalkha Mongolian, which derive from the feature geometry in Archangeli and Pulleyblank's work, be analysed in a similar fashion?

NOTES

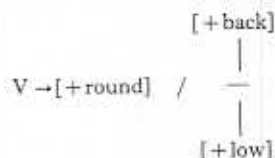
- * I am grateful to D. Archangeli, M. Kontra and an anonymous reviewer for their helpful comments on an earlier draft of this paper. Discussions with D. Archangeli, J. Goldsmith, G. Iverson, C. Kesterson, V. Urkewich and R. Vago have helped me clarify my thinking about some of the issues raised in this paper. The usual disclaimers apply.
- [1] Autosegmental analyses of various vowel harmony systems involving different (and often incompatible) assumptions have appeared in recent years. These include quite a few that deal with Hungarian: Clements (1977a), Kiparsky (1981), Booij (1984), Goldsmith (1985), Ewen & van der Hulst (1985), van der Hulst (1985), Steriade (1987), Kornai (1987), and Farkas & Beddor (1987), to name a few.
- [2] Ewen & van der Hulst (1985) suggest that the assumption of single-valued features is similar to, but simpler than, the underspecification assumption of Archangeli (1984). They analyse Hungarian in this framework, but are forced to index autosegments as either word level or syllable level. Archangeli & Pulleyblank (1987) adopt a set of assumptions which, they suggest, predicts that a language like Hungarian, with neutral vowels of two heights, cannot exist.
- [3] Although Hungarian vowel harmony has received considerable attention in recent years, even statements about which vowels are transparent are not uncontroversial. I base the claim that *e* is front harmonic, and not transparent, on the arguments in Ringen (1975, 1978, 1980) and on the empirical investigations summarised in Kontra & Ringen (1986, 1987) and Ringen & Kontra (1988).
- [4] Hungarian also has roundness harmony, which is ignored here. For a recent discussion see Kornai (1987).
- [5] Archangeli assumes two types of redundancy rules, Default Rules and Complement Rules. For our purposes it is not necessary to distinguish between these two types of rules.
- [6] Kiparsky's constraint is stated negatively.
- [7] I assume that the interaction of these rules is determined by universal constraints on rule application. Although both (13d) and (13e) are applicable to the suffix vowel, the 'elsewhere' condition (Kiparsky 1973) or Proper Inclusion Precedence (Sanders 1974) predict that (13d) applies. That the interaction of rules filling in unspecified features is predictable by universal constraints is assumed by Ringen (1975) and Archangeli (1984), among others.

- [8] In addition to the redunc



- so that short low back vowels condition this rule will ta
- [9] Even if VH operated left cation of VH.
- [10] Recent discussions (e.g. *J* good (1984) for discussion SCC in the case of dishar the version of the SCC as cations in non-derived fo (1985) blocks the root-in distinctness is defined as i
- [11] As in the previous analysi: dundancy rules will have to analyses also ignore the fac long non-high front unrou to the vowel specified as [+ face.
- [12] The Redundancy Rule Orc sion of the original constr
- [13] This was pointed out to m that the analysis sketched i refers to [-low] in the sam such a rule, then the RRC introduces [-low], apply in structural description of (2 (incorrectly) feed vowel har
- [14] Van der Hulst & Smith (19f for reasons that are not cor viz show that redundancy r forms like *radír* show that though the RROC puts the cannot apply there. Hence, i cification of *viz*. I see nothir viz are specified lexically wi An alternative analysis wou segment for roots containi
- [15] I continue to represent the present analysis depends on features.
- [16] Following Farkas & Beddo suffixes following disharmor [-back] must spread. As v following disharmonic loanw both [+back] and [-back] (1976), that harmony must be which he now rejects (persc suffixes occur as independe others with back vowels. He

[8] In addition to the redundancy rules in, (13) we must assume a rule:



so that short low back vowels will be specified as [+round]. By the 'elsewhere' condition this rule will take precedence over (13c).

- [9] Even if VH operated leftward, the SCC would block the root-internal application of VH.
- [10] Recent discussions (e.g. Archangeli & Pulleyblank forthcoming b) cite Levergood (1984) for discussion of how root-internal spreading is blocked by the SCC in the case of disharmonic loanwords. It should be noted, however, that the version of the SCC assumed by Levergood (1984) blocks most rule applications in non-derived forms. The version of the SCC assumed in Kiparsky (1985) blocks the root-internal spreading in disharmonic loanwords only if distinctness is defined as in Pulleyblank (1986).
- [11] As in the previous analysis, I am ignoring the complication that the actual redundancy rules will have to specify the short low back vowel as [+round]. Both analyses also ignore the fact that it is necessary to formulate a rule stating that a long non-high front unrounded vowel is [-low]. The application of harmony to the vowel specified as [+low] will yield [ɛ:], which doesn't occur on the surface.
- [12] The Redundancy Rule Ordering Constraint (RROC) cited here is a recent version of the original constraint (see Archangeli & Pulleyblank forthcoming a).
- [13] This was pointed out to me by D. Archangeli (personal communication). Note that the analysis sketched here can be maintained only if there is no rule that refers to [-low] in the same lexical component as the harmony rule. If there is such a rule, then the RROC requires that redundancy rule (21c), which introduces [-low], apply in that component. This, in turn, would mean that the structural description of (21d) would be met and this rule would apply and (incorrectly) feed vowel harmony.
- [14] Van der Hulst & Smith (1986) reject an analysis similar to the one just sketched for reasons that are not completely clear to me. They suggest that forms like *víz* show that redundancy rule (21d) must apply at the lexical stratum, but that forms like *radír* show that it cannot. As pointed out in the text, however, although the RROC puts the Redundancy Rule (21d) in the lexical stratum, it cannot apply there. Hence, this rule cannot be responsible for the [-back] specification of *víz*. I see nothing, however, that precludes assuming that roots like *víz* are specified lexically with a floating [-back] autosegment as I have done. An alternative analysis would be to formulate a rule to insert the [-back] autosegment for roots containing only unrounded non-low vowels (see note 19).
- [15] I continue to represent the features non-hierarchically because nothing in the present analysis depends on (or is inconsistent with) hierarchically organised features.
- [16] Following Farkas & Beddor (1987), Steriade (1987) cites the behaviour of suffixes following disharmonic loanwords as evidence that both [+back] and [-back] must spread. As we have seen, however, the behaviour of suffixes following disharmonic loanwords can be accounted for without assuming that both [+back] and [-back] spread. Steriade also assumes, following Vago (1976), that harmony must be feature changing in Hungarian. Vago's argument, which he now rejects (personal communication), is that certain (alternating) suffixes occur as independent stems, some with front harmonic vowels and others with back vowels. He takes the quality of the vowel in the independent

Hungarian vowel harmony in Archangeli (1984) and Pulleyblank (1985), the feature that underlies the analysis outlined here describes the process of vowel harmony with respect to backness. The analysis of vowel harmony is a single process that operates only on one tier. More precisely, the analysis sketched here predicts that only front vowels be admitted? Can the analysis of vowel harmony be analysed in a similar

and an anonymous reviewer for the analysis of this paper. Discussions with D. Archangeli, V. Urkewich and R. Vago have raised some of the issues raised in this

harmony systems involving different vowels have appeared in recent years. These include Archangeli (1977a), Kiparsky (1981), Van der Hulst (1985), van der Hulst & Beddor (1987), to name a

the assumption of single-valued features and underspecification assumption of features at the syllable level. Archangeli & Pulleyblank (1986), which, they suggest, predicts that a vowel of two heights, cannot exist.

received considerable attention in the literature. Vowels that are transparent are not unrounded, and not transparent, on the surface, and on the empirical investigations of Archangeli (1977) and Ringen & Kontra (1988).

which is ignored here. For a recent analysis of the interaction of the redundancy rules, Default Rules and Comprehensibility, it is necessary to distinguish between

is determined by universal constraints (13d) and (13e) are applicable to the analysis of Kiparsky (1973) or Proper Inclusion (13d) applies. That the interaction of the redundancy rules is predictable by universal constraints is predicted by Archangeli (1984), among others.

stem to indicate the (underlying) quality of the suffix vowel. But as van der Hulst (1985) has shown, Vago's argument does not show that suffix vowels must be specified for backness in Hungarian. Moreover, I do not see how Steriade's analysis will work if some suffix vowels have underlying [+back] vowels. Specifically, she introduces the [-back] feature of *i*, *i* and *é* by a (late) redundancy rule which applies after the VH rule applies. If, following Vago (1976), we assume that a suffix *nél/nál* (addessive) has an underlying back vowel, a root with only transparent vowels (e.g. *víz* 'water') will be predicted to have the addessive **víznál*, which is not correct; only *víznél* is possible.

- [17] If [+back] is assumed to be the lexically specified feature, then the transparent *i*, *i* and *é* must be skipped by vowel harmony. Archangeli & Pulleyblank suggest that if hierarchically organised features are assumed, it is possible to skip one transparent vowel – the one that is totally unspecified – if it is assumed that in addition to rules involving *maximal* scansion, some rules involve *minimal* scansion. In the case of minimal scansion, a rule whose target is node or feature α scans the tier containing α . A vowel harmony rule which scans the secondary place tier (the tier containing [+back]) will skip a vowel that is totally unspecified on the secondary place tier without violating the Locality Condition. As Archangeli & Pulleyblank note, this allows for one neutral vowel (e.g. *i* in Khalkha Mongolian), but not for neutral vowels of different qualities as found in Hungarian and Finnish.

	front	back	both	
[18] paralizis	94.3	4.7	0.9	'paralysis'
alibi	95.3	2.8	1.9	'alibi'

Compare the results obtained with roots ending in a single neutral vowel:

profit	0.0	100.0	0.0	'profit'
kurzív	4.1	93.9	2.0	'italic'
ankét	3.8	90.5	5.7	'meeting'

(Between 50 and 100 subjects participated in all experiments.) Although roots ending in two neutral vowels did not show vacillation, other types of roots which have been claimed to induce vacillation *did* show vacillation in Kontra & Ringen's studies. For example, *né* 'wife of' is a suffix which Vago (1980) claims induces vacillation of suffix vowels: *Farkas-nak* but *Farkasnének/nak*. Subjects in Kontra & Ringen's (1987) studies did exhibit much less agreement about suffix vowel choice in such cases than with mixed vowel roots ending with two neutral vowels:

	front	back	both	
tanár-né	28.9	64.4	6.7	'teacher's wife'
Farkas-né	16.0	71.7	12.3	'Mrs Farkas'

- [19] I assume that no suffix vacillation occurs with roots ending with two neutral vowels. If, however, vacillation does occur, then the rule can be assumed to be optional. This rule must be prevented from applying to the exceptional roots with only neutral vowels (e.g. *hid*) when followed by a suffix with transparent vowels. This can be done by restricting the insertion rule to apply only on the first lexical stratum. Note that this rule would also insert a [-back] autosegment in all roots containing only transparent vowels except monosyllabic ones. Thus, if another rule inserting a [-back] autosegment to monosyllabic roots with a transparent vowel were adopted, it would be unnecessary to specify [-back] for any roots containing only transparent vowels. Exceptional roots such as *hid*, which require back vowel suffixes, would have to be marked with a rule feature to prevent such a rule from applying to them. This is actually a welcome complication because otherwise the exceptional roots like *hid* are formally less complex than the regular roots like *víz*, since the former would have no autosegment specified lexically whereas the latter would have a [-back] autosegment.

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Underspecific harmony systems

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1 Introduction

The recent phonological literature has formed a significant body of research and theory. This model of inquiry was first developed more deeply in Archangeli (1987) and Archangeli & Pulleyblank (forthcoming). The questions advanced in these works are: how is a value specified underlyingly and how is it changing harmony, which requires a particularly interesting challenge to its restrictiveness. Indeed, it figures in such works as Steriade (1987b), to justify feature values at the underlying level.

Feature changing harmony is a rare phenomenon (cf. Lieber 1987). Height harmony in Spanish, as analysed by McCauley (1987), is the most solid piece of evidence for this phenomenon. The main purpose of this article is to show that harmony is in fact not feature changing. The article provides additional support for the structure of harmony which recognises only a single feature.

In §2 I outline the basic facts and the theoretical issues. In §3 I account for the transparent harmony as an interaction of feature architecture and underspecification. I motivate the underspecification of the feature changing property of height harmony. The feature [high] is floating in the feature structure. I formalise that first link and the second link. I summarise the major findings of the theory.