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Theoretical Implications of Hungarian Vowel Harmony*

0. Introduction

In this article I give a formal account of vowel harmony in Hungarian. My purpose is to relate the proposed analyses to current issues in generative phonological theory, especially the controversial aspects of the description of vowel harmony. In section 1, I briefly state the salient facts. In section 2, I argue against Kiparsky (1973c) and motivate an abstract analysis. In section 3, I substantiate Kiparsky's (1973c) proposal to account for root harmony by morpheme structure conditions and suffix harmony by the phonological rule(s) of Vowel Harmony (VH); dismiss Lightner's (1965) diacritic markers and Zimmer's (1967) and Bach's (1968) archiphonemes as a means of describing vowel harmony; and show that Howard's (1972) and Jensen's (1974) recently suggested constraints on the intervening material in phonological rules are too strong. In section 4, I formalize VH, defend the controversial "Elsewhere Condition" of Kiparsky (1973b), and support Kiparsky's (1973a) equally disputed principle restricting certain rules to apply exclusively to derived representations.

1. The Facts of Vowel Harmony

Hungarian contains the following underlying and surface vowel system, given in orthographic representation¹:

(1)	Short		Long	
	Front	Back	Front	Back
High	i ü	u	í ű	ú
Mid	ö	o	é ő	ó
Low	e	a		á

* This article owes much to Paul Kiparsky; without his insight and contributions to the field, tackling the problems contained herein would have been much more difficult. I have discussed certain aspects of this work with Stephen Anderson, whose inspiration and suggestions I gratefully acknowledge. I am thankful to Charles Cairns and the anonymous referees of *Linguistic Inquiry* for helpful comments and criticisms of an earlier version, which was presented at the Winter 1974 LSA meeting in New York City. For a more detailed analysis of vowel harmony in Standard Hungarian, see Vago (1974, chapter III).

¹ The vowel *a* is rounded phonetically. There is sufficient evidence to justify setting up a basic unrounded vowel and rounding it by a low-level adjustment rule. In section 3, I will propose additional underlying vowels.

According to their vocalic content, root morphemes may be classified as: *back vowel roots*, containing only the back vowels /u ú o ó a á/; *front vowel roots*, containing only the front vowels /i í e é ü ü ö ő/; and *mixed vowel roots*, containing the unrounded front vowels /i í e é/ plus back vowels. Since unrounded front vowels may cooccur with both back vowels and front vowels, we may call them neutral vowels. Rounded front vowels and back vowels do not cooccur, except in a few obvious loanwords.

There is also a suffix harmony process, in the sense that most suffix morphemes have two alternants: one with a back vowel and another with a corresponding front vowel. The harmonic alternations are as follows: *u/ü, ú/ű, o/ő,*² *ó/ö, a/e, and á/é.* The vowels *i* and *í* have invariant phonetic shapes due to the fact that, on the surface, Hungarian has no unrounded back vowels.

The harmonic shape of a suffix is determined by the harmonic shape of the root to which it is attached.³ Back vowel roots and mixed vowel roots take back vowel suffixes, while front vowel roots take front vowel suffixes. Note the following alternations:

(2)		<i>-nál/nél</i> 'at'	<i>-tól/től</i> 'from'
a.	<i>ház</i> 'house'	<i>háznál</i>	<i>háztól</i>
	<i>hajó</i> 'ship'	<i>hajónál</i>	<i>hajótól</i>
b.	<i>szivar</i> 'cigar'	<i>szivarnál</i>	<i>szivartól</i>
	<i>radír</i> 'eraser'	<i>radírnál</i>	<i>radírtól</i>
c.	<i>föld</i> 'ground'	<i>földnél</i>	<i>földtől</i>
	<i>kép</i> 'picture'	<i>képnél</i>	<i>képtől</i>

Interestingly, about fifty monosyllabic roots containing the neutral vowels *i, í, e, é* take the back vowel alternant of a suffix instead of the expected front vowel alternant.⁴ For example:

(3)	<i>híd</i> 'bridge'	<i>hídnál</i>	<i>hídtól</i>
	<i>cél</i> 'aim'	<i>célnál</i>	<i>céltől</i>

I discuss the harmonizing behavior of these roots immediately below. The remaining root types will be treated subsequently.

² Actually, there is a three-way alternation here: *o/ő/e*. The *e* alternant is derived from the *ő* alternant by a general rounding assimilation rule that unrounds *ő* following an unrounded (front) vowel.

³ After the first suffix is harmonized to the root, the second suffix is harmonized to the first suffix, etc. Thus, vowel harmony is an iterative process, propagating from left to right.

⁴ There are only two roots with *é* that pattern this way: *éll* (earlier *éll*), cited in (3), and *héj* 'crust', which is used interchangeably with *haj* 'hair'; the other roots contain *i* or *í*. It is hypothesized by some Finno-Ugricists that these roots originally contained the unrounded back vowel *i*, which under certain conditions lengthened to *é*. It is also believed that some of the mixed vowel roots originally were back vowel roots, containing unrounded back vowels instead of unrounded front vowels. Both of these root types naturally governed back vowel harmony in suffixes. This morphophonemic behavior was retained even after a sound change fronted the unrounded back vowels. Thus, the fact that roots like those in (2b) and (3) take back vowel suffixes has a historical explanation.

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2. Abstract Vowel Roots

In Vago (1973) I argue that in roots like those in (3) the unrounded back vowels /i/, /í/, and /ɛ/ underlie the neutral vowels *i*, *í*, and *é*, respectively. The fact that these roots govern back vowel harmony follows automatically. After the application of VH, a low-level rule unconditionally fronts the unrounded nonlow back vowels to *i*, *í*, or *é*.

The underlying segments /i/, /í/, and /ɛ/ are abstract in the sense of Kiparsky (1973c): they undergo absolute neutralization so that they never appear on the surface. For this reason we may call the root types exemplified in (3) *abstract vowel roots*.

The abstract analysis of roots like *hid* is not universally accepted. The most celebrated criticism of analyses positing abstract underlying segments and context-free neutralization rules was advanced by Kiparsky in a widely circulated 1968 paper, which has recently been published as Kiparsky (1973c). In the past few years, a number of publications have sought to show that Kiparsky's original "alternation condition" is overly restrictive⁵; see Vago (1973) for references and arguments. If the abstract analysis of some Hungarian roots is correct, then a strong constraint on the abstractness of lexical representations cannot be maintained.

Several other accounts of roots like *hid* are possible. Kiparsky (1973c) proposes that these roots are lexically exempted from conditioning VH; this means that suffix vowels show up in their underlying representations. Since roots like *hid* take back vowel suffixes, all alternating suffix vowels have to be back underlyingly. Suffix harmony, then, is a fronting process. This analysis can be falsified by demonstrating that the underlying representation of an alternating suffix contains a front vowel. In Vago (1973) I give two such arguments; I summarize these below.

The directional case morphemes normally function as alternating suffixes attached to nominal stems; cf. the examples in (2). However, following a personal pronoun, the case morphemes function as stems to which a possessive suffix is attached that agrees with the personal pronoun in person and number; the personal pronoun may then be deleted. For example, in (*én*) *nálam* (**énnél*) 'at me', (*én*) *tőlem* (**éntől*) 'from me', *én* is the first person singular personal pronoun, *nál-* and *től-* are the adessive and ablative case morphemes that function as stems, and *-am/-em* is the first person singular possessive suffix.

The fact that some stem forms, like *nál-*, have back vowels, but others, like *től-*, have front vowels is explained quite naturally if we assume that the stem forms reflect the harmonic shapes of the underlying suffix forms; otherwise, ad hoc statements are required to specify the harmonic shapes of the stem forms. In this analysis, the underlying adessive and ablative suffixes are /nál/ and /tól/.⁶

It can further be shown that the conditional suffix *-na/-ne/-ná/-né* has an underlying

⁵ Kiparsky (1971 and 1973a) has since allowed for a weaker version of this constraint, although he seems uncommitted as to which version he subscribes to.

⁶ Turning the front vowel of suffixes like /tól/ into a back vowel before the operation of VH would be entirely unmotivated.

front vowel: /ne/.⁷ While this suffix alternates regularly (c.g. *hoznának* 'they would bring', *néznének* 'they would see'), in the first person singular indefinite forms only the alternant *-né* appears: e.g. *hoznék* 'I would bring', *néznék* 'I would see'. These facts suggest that the underlying form of the conditional suffix is /ne/, which is exempted from undergoing VH before the first person singular indefinite suffix /k/.⁸

The exception feature analysis of roots like *híd* fails in all those cases where an alternating suffix has a front vowel underlyingly. For example: /híd + tól/ ⇒ **hídtól*

instead of *hídtól* and /ír + ne + m/ ⇒ **irném* instead of *irnám* 'I would write it'.

Note that the exception feature/fronting rule analysis does not explain the fact that there exist no exceptional rounded front vowel roots. Further, this analysis requires a VH rule that assimilates a suffix vowel to the last preceding nonneutral vowel, or the first neutral vowel if only neutral vowels precede. Thus, in /híg + ít +

unk/ *hígtünk* 'we dilute' (lit. 'we cause to be diluted'), the back vowel of *-unk* is harmonized to the exceptional root *híg* and not to the causative suffix *-ít*; otherwise, **hígtünk* would result. I will argue in section 4 that if only neutral vowels precede, VH assimilates a suffix vowel to the adjacent neutral vowel.

There are two reasons why Kiparsky sets up back vowel suffixes. He is forced to take this position by claiming that roots like *híd* are exceptional; I have just provided arguments against this analysis. His second argument is that markedness theory requires that the unmarked vowel variants be basic; accordingly, the back vowel variants are underlying. But this is not a forceful argument. Markedness principles should be invoked only in the absence of direct evidence for basic representation, as in the case of vowel epenthesis rules, which normally insert back vowels (which are subsequently harmonized by VH). However, the empirical evidence for /tól/, /ne/, etc. supersedes general theoretical considerations. The point here is that markedness does not play an automatic role in setting up underlying representations.

Above I have presented arguments against a nonabstract exception feature analysis of roots like *híd*. Another possible analysis is to set up a diacritic marker like [+_o] that would trigger a backing rule. In section 3.1 I will present arguments against postulating diacritic features for vowel harmony.⁹

⁷ The long vowel variants *-ná* and *-né* are derived by a general rule that lengthens a morpheme-final low vowel before a suffix.

⁸ This exceptionality might be explainable: it avoids homonymy between the first person singular indefinite and the third person plural definite representations. Thus: *hoznák* 'they would bring it', but *hoznék*, **hoznák* 'I would bring'. However, in nonstandard dialects paradigm regularity is favored over avoidance of homonymy: *hoznák* 'I would bring' as well as 'they would bring it'.

⁹ Negative exception features like [-VH] simply block the application of a rule whose structural description is satisfied. Positive exception features like [+VH] specify that a rule should apply even though its structural description is not met. It should be kept in mind that positive exception features are but notational variants of diacritic features like [+_o].

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It appears that, excluding the exception feature analysis and the above version of the diacritic marker analysis (respectively called the rule feature and morphological solutions in Vago (1973)), most, if not all, other accounts of roots like *hid* would have to entail setting up abstract segments. I will discuss the treatment of vowel harmony that does not assume fully specified underlying segments in section 3.1. To the extent that the exception feature and diacritic marker analyses are inadequate, the abstract analysis of a subset of Hungarian roots is substantiated.¹⁰ In this light, phonological theory must be rich enough to permit, with proper restrictions (see Vago (1973)), abstract lexical representations and unconditional neutralization rules in the grammars of natural languages.

3. Mixed Vowel Roots

In the preceding section I supported the argument that the neutral vowel of roots like *hid* is abstract at the underlying level. It is reasonable to consider now whether the neutral vowels that occur in mixed vowel roots are also abstract, i.e. [+back], or neutral, i.e. [-back]. The correct answer bears crucially on the following four problems concerning the description of vowel harmony. First, are root harmony and suffix harmony the same process? Second, is the value of the harmonizing feature specified in underlying representations or is it filled in by VH? Third, is VH a phonological assimilation rule or does it operate in terms of diacritic markers? And fourth, does VH assimilate a vowel to the immediately preceding vowel (adjacent assimilation) or does it skip over neutral vowels (nonadjacent assimilation)? The answer to the first three problems will emerge upon examining those mixed vowel roots in which a back vowel is preceded by a neutral vowel, as in *bika* 'bull' (section 3.1). The answer to the fourth problem is obtained by examining those mixed vowel roots in which a back vowel is followed by a neutral vowel, as in *radír* 'craser' (section 3.2).

3.1. The Diminutive Evidence

Let us first consider the description of roots represented by *bika*. Two equally plausible solutions are available. One possibility is that the neutral vowel is abstract underlyingly: e.g. /bika/. In this framework the abstract vowels /i/, /A/, and /á/ would also have to be assumed, in addition to /i/, for roots like *cstra* 'germ', *betyár* 'scamp', and *béka* 'frog'. The second solution is to admit the neutral status of *i*, *í*, *e*, and *é* at the underlying level in that these vowels are specified as [-back]: e.g. /bika/. Observe

The use of diacritic features (and archiphonemes) in describing vowel harmony goes back to Lightner (1965). He proposes the feature [± GRAVE]; even though this feature resembles the phonological feature [± grave], in reality, there is no difference among [± GRAVE], [± %], or any nonphonological symbol that is postulated to condition a phonological rule.

¹⁰ See Vago (1975, fn. 9) for diachronic facts consistent with the abstract analysis.

the crucial point that if this were the case VH would have to be prevented from applying within roots: /bika/ is realized as *bika* and not as **bike*.¹¹

Decisive support for the correct analysis is obtained from what I will call the *Diminutive Evidence*. In Hungarian, the diminutive of most proper names is formed by truncating the root to its initial (C)VC(C) sequence and adding the diminutive suffix *-i*. For example:

(4)		<i>Diminutive</i>
a.	Teréz	Teri
	Ferenc	Féri
	Erzsébet	Erzsi
b.	Klára	Klári
	Aladár	Ali
	Zsuzsanna	Zsuzsi

The diminutive suffix *-i* can, of course, be followed by other suffixes, such as the endearing diminutive suffix *-ka/-ke*, or the case suffixes. As is expected, the suffix vowel following *-i* alternates harmonically; it agrees in backness with the vowel preceding *-i*. Thus: *Erzsi*, *Erzsinél*, *Erzsitől*, but *Klári*, *Klárinál*, *Klárítól*.

Consider now the diminutive forms of the proper names *Tibor* 'Tiberias' and *Éva* 'Eve'. If the respective underlying representations are /tíbor/ and /éva/, then back vowel suffixes are expected: *Tibinál* and *Évinál*. On the other hand, the underlying representations /tíbor/ and /éva/ derive front vowel suffixes: *Tibinél* and *Évinél*. In reality, the correct forms are those with front vowel suffixes: /tib + i + nál/ ⇒ **Tibinál*, /tib + i + nél/ ⇒ *Tibinél*, and so on.

The Diminutive Evidence, therefore, unambiguously shows that the neutral vowel of proper names like *Tibor* and *Éva* behaves morphophonemically as a front vowel.¹² We thus conclude that in mixed vowel roots a neutral vowel that precedes a back vowel is not abstract; that is, it is specified as an underlying front vowel. As a consequence, VH does not apply to roots. I return to this topic in section 4.3.

Suffix harmony, then, is described by the phonological rule (or rules) of VH. Since VH is inoperative inside roots, root harmony has to be described by morpheme structure conditions. This is the conclusion of Kiparsky (1973c), who criticizes the descriptive framework of Lightner, Zimmer, Bach, and others, all of whom account for root harmony by a VH rule.

¹¹ VH could apply inside roots if it treated the vowels *i*, *é*, *e*, and *é* as neutral; that is, it would assimilate a vowel in backness to a preceding vowel that is either round (*ü, ú, ő, ő, u, ú, o, ó*) or low back (*a, á*). Thus, if /bika/ is the correct underlying representation of *bika*, *a* is not fronted to *e* because *i* is neither round nor back and low. This proposal must be rejected for the reason that it predicts, incorrectly, that neutral vowel roots take the underlying form of a suffix. In particular, a back vowel suffix will not be fronted: e.g. /kép + nál/ ⇒ **képnál* instead of *képnél*.

¹² The suffix *-i* is not restricted to proper names. It can also be used with certain common nouns to form slang expressions. E.g.: *fagyí* from *fogyólat* 'ice cream', *nyugi* from *nyugalom* 'tranquillity'. Note that forms like *cigi* (from *cigaretta* 'cigarette') and *diri* (from *direktor* 'director') are followed by front vowel suffixes: *cigitől*, *dirinél*.

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There are obvious differences between harmony in suffixes and roots. Suffix harmony is manifested in alternations; phonological rules are the appropriate device to describe regular alternating patterns. Root harmony is static; morpheme structure conditions are appropriate for stating lexical generalizations. Moreover, root harmony and suffix harmony have distinct exception classes. There exist borrowed root morphemes that are exceptional with respect to morpheme structure conditions: e.g. *safför* 'chauffeur' has rounded front and back vowels. However, these exceptional roots are entirely regular with respect to suffix harmony; for example, *safför* takes front vowel suffixes. In short, there are sound reasons for treating suffix harmony and root harmony separately.¹³

The Diminutive Evidence also suggests that vowel harmony should not be described in terms of diacritic features. Lightner (1965) proposes to leave the value of the harmonizing feature unspecified at the underlying level; the unspecified value is supplied by VH, which is conditioned by a diacritic marker like [\pm GRAVE] on the root. Thus, *Tibor* would be analyzed as /tIbOr/; the archiphonemes I and O are

[+ GRAVE]

converted to *i* and *o* by VH, which states that [+ GRAVE] vowels become [+ back]. However, the inflected diminutive forms cannot be derived in this fashion: for example /tIb + I + kA/ becomes **Tibika* by first spreading the diacritic feature of the root [+ GRAVE]

to the entire word, then applying VH, and finally fronting *i* to *i*.

Several other objections can be raised to the diacritic marker analysis. A theory that permits diacritic features to condition phonological rules fails to distinguish between predictable or phonological processes and unpredictable or morphological processes. Diacritics ought to be used only when phonological rules cannot be posited, as in classifying nouns into declension sets. The phonological use of features not connected with the speech event is highly undesirable and misses the obvious generalization that vowel harmony, for the most part, is a phonetically motivated assimilation phenomenon. Moreover, no single diacritic feature can predict the correct harmonic shapes of the vowels in roots like *safför*. Finally, the fact that the last vowel of these roots determines suffix harmony is rendered accidental.

Archiphonemes and diacritic features are independent descriptive mechanisms. Zimmer (1967) and Bach (1968) set up archiphonemes in noninitial syllables; the vowel of the initial syllable is fully specified, so that there is no need for diacritic features. VH fills in the unspecified values by assimilating to the first vowel. Thus, *Tibor* would have /tibOr/ as its underlying representation. (Note that abstract /i/ has

¹³ Kiparsky (1973c) claims that roots and suffixes have different exceptions in that suffix harmony is entirely regular but root harmony may be violated. However, in Vago (1973) I present a number of cases where suffix harmony is violated. I also show that exceptional roots fail to cause suffix harmony, but exceptional suffixes regularly condition harmony in the following suffix (though they themselves do not undergo harmony). In short, exceptional roots and suffixes behave differently.

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to be assumed.) It is immediately apparent that by postulating a back vowel in the initial syllable this analysis fails, too: e.g. /tib + IkA/ becomes **Tibika*.

The above discussion suggests that archiphonemes cannot be used in describing vowel harmony. Note also that the description of roots like *sofför* is problematic in terms of archiphonemes. In modern generative theory archiphonemes have to be excluded on general grounds. As pointed out by Stanley (1967), Kiparsky (1973c), and others, lexical redundancies and markedness conventions have to operate on fully specified matrices.

I am not aware of any proposal to set up (prosodic) diacritic features on morphemes without also postulating archiphonemes.¹⁴ This is a most powerful theory. The entire vowel harmony process is an accidental assimilation in that there is no inherent principle to predict the impossibility of rounded front vowel roots governing back vowel harmony, and conversely, back vowel roots governing front vowel harmony.

In sum, the arguments presented in this section cast doubt on three previous approaches to vowel harmony: describing root harmony and suffix harmony uniformly, permitting archiphonemes, and positing diacritic markers.

3.2. *The Doublet Evidence*

Let us now consider the description of roots exemplified by *radír*. If the last syllable of these roots contains an underlying abstract back vowel, then the backness value of the following suffix vowel can be attributed to the backness value of the vowel in the final syllable of the root. In this case, VH most generally assimilates a vowel to the immediately preceding vowel.

If, on the other hand, the neutral vowel of roots like *radír* is recognized as such at the underlying level, that is to say it is specified as [-back], then VH must assimilate a suffix vowel to the last preceding back vowel with a built-in provision to disregard all neutral vowels. The two analyses are summarized in (5), where the root vowel that determines suffix harmony is italicized:

- (5) a. /radír/
 b. /radír/

The crucial evidence for the correct description comes from the so-called "doublets". Some mixed vowel roots that have a neutral vowel in the last syllable may take either front vowel suffixes or back vowel suffixes. Most of these roots are fairly recent borrowings. Note for example the harmonizing behavior of *Ágnes* 'Agnes': *Ágnesuál*/*Ágnesnél*, *Ágnesfél*/*Ágnesfél*. These alternants, or doublets, are in free variation.

Based on the above facts, which I will call the *Doublet Evidence*, let us consider what the underlying representation of the root *Ágnes* might be. Clearly, it cannot be

¹⁴ Hetzron (1972) has fully specified vowels and a syntagmatic (linear) diacritic marker. See Vago (1974, section 3.10.6) for criticism.

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abstract /ágnas/: the front vowel alternant of an underlying back vowel suffix could not be derived. (E.g. /ágnas + nál/ derives *Ágnesnál* but not *Ágnesnél*.)

Positing the allomorphs /ágnas/ and /ágnés/ to govern back and front vowel harmony, respectively, is not an acceptable solution for a number of reasons.

First, how is the fact that only mixed vowel roots of the type *Ágnes* have doublet representations (allomorphs) explained? Furthermore, what is the motivation for the existence of these doublets? The answers to these questions are not very satisfactory.

Second, this theory claims that abstract vowels are productive, in that they may underlie root morphemes that are added to the lexicon through borrowing. This is not the case at all. Neutral vowel borrowings consistently govern front vowel harmony: e.g. *menedzser* 'manager' *menedzsernél*, **menedzsernál*, *menedzsertől*, **menedzsertől*. Also, if abstract vowels may be assumed for roots having doublets, then the analysis of roots like *analízis* 'analysis' (cf. *analízistől*/*analízistől*) may be indeterminate: /analízis/ or /analízis/ for front vowel harmony, and /analízis/ or /analízis/ for back vowel harmony.

Third, in this system abstract vowels have a strange distribution in loanwords: they occur only in unstressed (noninitial) syllables and only if a back vowel precedes. Normally, the set of stressed syllable phonemes (underlying segments) is larger than the set of unstressed syllable phonemes. Note further that /ʌ/, which need not be assumed for the monosyllabic abstract vowel roots, now has to be set up for one of the allomorphs of roots like *Ágnes*.

And fourth, the allomorphy theory is weak: there is no intrinsic constraint on how one allomorph can be related to another. It is purely an accident that one allomorph differs from the other precisely in one respect, namely in that one has a front vowel where the other has a corresponding back vowel. (It would be just as simple to set up the allomorphs /ágnés/ and /ágnas/ for the hypothetical root alternation *Ágnes*/*Ágnas*, as the two allomorphs /ágnés/ and /ágnas/ for the nonalternating root *Ágnes*.) It is also coincidental that this difference is found in the specification of the particular feature that is harmonized. Furthermore, the lexicon would have to contain a considerably large list of allomorph pairs; the fact that each allomorphic alternant differs from the other in exactly the same way would not be explained.

The description that I advocate is the following. The mixed vowel status of roots like *Ágnes* is both a surface and a deep phonological fact. The underlying representation of *Ágnes*, namely /ágnés/, is sensitive to two vowel harmony rules. This root takes back vowel suffixes because one rule skips over neutral vowels and assimilates a vowel to the last preceding back vowel; it takes front vowel suffixes because another rule assimilates a vowel to the immediately preceding neutral vowel. I summarize this analysis in (6):¹⁵

¹⁵ One might suggest that roots having doublets be optionally exempted from conditioning back vowel harmony. That this alone does not suffice is shown by the facts that an underlying front vowel suffix may have a back vowel on the surface (e.g. /ágnés + től/ = *Ágnesből* or *Ágnesből*) and that the vowel following the diminutive suffix -i is back (e.g. /ág + i + től/ = *Ágitól*, **Ágitől*).

- (6) a. /ágnés + nál/ ⇒ Ágnésnál
 b. /ágnés + nál/ ⇒ Ágnésnél

In brief, the Doublet Evidence suggests that in the underlying representation of some mixed vowel roots a final neutral vowel is specified as [-back]. We can generalize this analysis to all mixed vowel roots containing a neutral vowel after a back vowel. The Diminutive Evidence of the preceding section showed that a neutral vowel preceding a back vowel is not abstract at the underlying level. It is not surprising, then, that a neutral vowel that follows a back vowel is not abstract either; the two facts are related and should be explained the same way. It follows from this analysis that in mixed vowel roots it is the (last) back vowel that determines the backness value of the following suffix vowel. Thus, VH disregards the last neutral vowels of mixed vowel roots.

3.3. Summary

In sections 3.1 and 3.2 we set out to answer the question: Are the neutral vowels of mixed vowel roots morphophonemically neutral or abstract? The conclusion we reached is that they are neutral. Therefore, the abstract solution, which is needed to explain the harmonic behavior of roots like *hid*, is not invoked to explain the harmonizing behavior of mixed vowel roots. (This is empirical confirmation of the proposal made in Vago (1973).)

The Diminutive Evidence suggests that the phonological rule of VH does not apply within roots. The Doublet Evidence shows that in some cases VH does not assimilate a vowel to the immediately preceding back vowel, but rather, it skips over the intervening neutral vowels. How these two facts are accounted for formally is the subject matter of section 4.

4. The Formalization of Vowel Harmony

In the preceding sections, we have examined the harmonizing characteristics of all native roots. We have seen that back vowel roots (including abstract vowel roots) and mixed vowel roots govern back vowel harmony and front vowel roots govern front vowel harmony. We have also looked at arguments that only suffix vowels are harmonized. It would make sense, therefore, if the root vowel that determines suffix harmony were located in or near the final syllable. Accordingly, we must recognize the following three rules of vowel harmony:

- (7) a. [+syll] ⇒ [+back] / $\left[\begin{array}{c} +\text{syll} \\ +\text{back} \end{array} \right] C_0 \left(\left[\begin{array}{c} +\text{syll} \\ -\text{back} \\ -\text{round} \end{array} \right] C_0 \right)_1$ —
 b. [+syll] ⇒ [+back] / $\left[\begin{array}{c} +\text{syll} \\ +\text{back} \end{array} \right] C_0$ —

c.

Rule (7c) replaces a suffix vowel in vowel roots:
 /bika + tól/
 /kert + nál/

In this section, we will specify the conditions under which this rule applies. Specifically, we will discuss the conditions under which the rule is applied (section 4.2).

4.1. The Ablative Case

In the description of the ablative case, the variable α in the rule is a variable that will be used in section I will discuss the conditions under which the rule is applied (section 4.2).

In the description of the ablative case, the variable α in the rule is a variable that will be used in section I will discuss the conditions under which the rule is applied (section 4.2).

(8) [-

Thus, if the root vowel that determines suffix harmony is located in or near the final syllable, the rule (7c) applies.

Accordingly, we must recognize the following three rules of vowel harmony:

(9) [-

¹⁶ See footnote 17. The footnote which I am aware of.

$$c. [+syll] \Rightarrow [-back] / \begin{bmatrix} +syll \\ -back \end{bmatrix} C_0 \text{ ---}$$

Rule (7a) skips over the final neutral vowel(s) of a mixed vowel root and assimilates a suffix vowel to the last back vowel of the root: e.g. /radir + töl/ \Rightarrow *radirtöl*. Rule (7b) accounts for the harmonizing behavior of back vowel roots and mixed vowel roots containing a back vowel in the final syllable; e.g. /ház + töl/ \Rightarrow *háztól*, /bika + töl/ \Rightarrow *bikától*.¹⁶ Rule (7c) describes the harmony of front vowel roots: e.g. /kert + nál/ \Rightarrow *kertnél*, /öröm + unk/ \Rightarrow *örömnünk* 'our joy'.

In this section we are concerned with the formal properties of vowel harmony. Specifically, we will explore the questions of how the three rules of (7) can be abbreviated (section 4.1), how the abbreviated rules are ordered with respect to each other (section 4.2), and how the rules are prevented from applying within roots (section 4.3).

4.1. The Abbreviation of the Rules

In the descriptive framework of Chomsky and Halle (1968) the subscript and the α -variable notational conventions can be invoked to abbreviate the rules of (7). In this section I will consider how these abbreviatory devices are utilized in the formalization of vowel harmony. Specifically, I will address the question of whether the rules are collapsed by: (a) the subscript notation; (b) the α -variable notation; or (c) both notations.¹⁷ In the following discussion, I will consider each choice as a viable hypothesis.

Let us first investigate hypothesis (a). A comparison of (7a) and (7b) reveals that the structural description of the former properly includes the structural description of the latter. (7a) expresses the fact that one or more syllables containing a neutral vowel may intervene between the vowel that undergoes assimilation and the vowel that causes assimilation; (7b) permits no intervening syllables. The subscript notation expresses this formal similarity:

$$(8) [+syll] \Rightarrow [+back] / \begin{bmatrix} +syll \\ +back \end{bmatrix} C_0 \left(\begin{bmatrix} +syll \\ -back \\ -round \end{bmatrix} C_0 \right)_0 \text{ ---}$$

Thus, if the rules in (7) are abbreviated only by the subscript notation, back vowel harmony is accounted for by rule (8); front vowel harmony is accounted for by rule (7c).

According to hypothesis (b), only the α -variable notation is relevant. This convention collapses (7b) and (7c) as follows:

$$(9) [+syll] \Rightarrow [\alpha back] / \begin{bmatrix} +syll \\ \alpha back \end{bmatrix} C_0 \text{ ---}$$

¹⁶ See fn. 7 for the *e* to *é* change.

¹⁷ The fourth possibility, not invoking either notational convention, is not supported by any evidence of which I am aware.

Thus, if only the α -variable notation is made use of, back vowel harmony is described by rules (7a) and (9), if $\alpha = +$; front vowel harmony is described by rule (9), if $\alpha = -$.

Hypothesis (c) claims that both conventions are relevant and collapses all three rules as follows:

$$(10) \quad [+syll] \Rightarrow [\alpha\text{back}] / \left[\begin{array}{c} +\text{syll} \\ \alpha\text{back} \end{array} \right] C_0 \left(\left[\begin{array}{c} +\text{syll} \\ -\text{back} \\ -\text{round} \end{array} \right] C_0 \right)_0 \text{ —}$$

Chomsky and Halle would presumably adhere to this solution since in their theory all relevant abbreviations must be carried out. Incidentally, note that rule (10) skips over the neutral vowel not only of mixed vowel roots but also of roots like *szegény* 'poor' and *öreg* 'old'.

I summarize below the vowel harmony rules of each of the above hypothetical grammars:

(11)	a.	b.	c.
	(8)	(7a)	(10)
	(7c)	(9)	

The three hypotheses make different claims as to which abbreviated rule schemata function together as a unit. To obtain evidence for the correct claim, we look for roots that are lexically marked for their exceptional behavior with regard to vowel harmony.

There is a small set of mixed vowel roots containing a neutral vowel in the final syllable that idiosyncratically take only front vowel suffixes: e.g. *Józsefnek*/**Józsefnak* 'to Joseph', *novemberben*/**novemberban* 'in November', *októbertől*/**októbertől* 'from October'. These roots are marked with the exception feature $[-\text{rule } x]$, where *rule x* refers to the particular vowel harmony rule that skips over the last neutral vowels of mixed vowel roots.

Consider now the underlying representation in (12), where the root is the truncated form of the exceptional proper name *József*, *-i* is the diminutive suffix, and *-tól* is the underlying ablative suffix¹⁸:

$$(12) \quad /j\acute{o}zs \quad + i + t\acute{o}l/ \text{ 'from Joe' } \\ [-\text{rule } x]$$

¹⁸ Note that the truncated form of the root is assumed to retain the exception feature of the full form. Alternatively, one might claim that the exception feature is either irrelevant for the diminutive forms or is specified only on that portion of the root that is not used in the diminutive forms, e.g. on the last two segments of *József*.

These alternative views make a much weaker claim about exceptionality. In the first case, a statement is needed to restrict the exception feature to the full forms. In the second case, a lexical feature is allowed to refer to arbitrary segments of a morpheme; however, idiosyncracies ought to be the property of morphemes and not segments. Suppose the root *Klára* idiosyncratically took front vowel suffixes. We would certainly expect the diminutive *Klári* also to be followed by front vowel suffixes. These situations are automatically explained if the use of exception features is constrained as suggested above.

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Hypothesis (a) claims that $x = (8)$. If rule (8) does not apply to the string in (12), the front vowels of the suffixes are not converted to back vowels; since rule (7c) is inapplicable, hypothesis (a) predicts the incorrect output **Józsitől*. Hypothesis (c) claims that $x = (10)$. Since (10) is the only vowel harmony rule, hypothesis (c) also predicts incorrect **Józsitől*. Hypothesis (b) claims that $x = (7a)$. Even though this rule is blocked from applying, rule (9) is still applicable. Hypothesis (b), therefore, predicts *Józsitől*, which is the correct phonetic representation.

Thus, we see that only hypothesis (b) can be accepted as the correct description of the facts. Vowel harmony, then, is described by the two rules of (7a) and (9).

The validity of the above argument rests on the assumption that lexical features may refer to an abbreviated rule schema, but not to its subrules. All things being equal, a theory that accepts this premise is more restrictive, hence stronger, than a theory that rejects it. But this argument, by itself, is not very conclusive. One might claim, for example, that by not accounting for vowel harmony by a single rule schema like (10), a significant generalization is lost. It is incumbent upon me to show that this is not the case.

By postulating only one rule of VH, one makes the claim that adjacent and non-adjacent assimilations are evaluated equally. However, a number of facts seem to indicate that they should not be evaluated equally. As far as I know, nonadjacent assimilation phenomena presuppose adjacent assimilation (cf. nasalization, voicing, palatalization, labialization, vowel harmony, umlaut, etc.); the converse is not true. The two processes have different exception classes, as has been demonstrated above. In loanwords, almost all mixed vowel roots with a final *e* or *é* (e.g. *affér* 'affair') or with more than one final neutral vowel (e.g. *analízis*) have doublets. In most of these cases, the front vowel variants (adjacent assimilation) developed *after* the back vowel variants (nonadjacent assimilation).¹⁹ Moreover, the more final neutral vowels these roots contain, the greater the tendency to prefer the front vowel alternants.

The above facts suggest that adjacent assimilation and nonadjacent assimilation are asymmetrical: the former is more prevalent, tends to be preferred, and is simpler in formalistic terms than the latter. Adjacent assimilation, then, ought to be more highly valued; by claiming that adjacent assimilation is more "natural", we provide an explanation for the existence of doublets, and for the fact that only mixed vowel roots like *Ágnes* have doublets. But these explanations are possible only if we recognize that adjacent and nonadjacent assimilations are different processes and, consequently, describe them separately.

Based on the preceding discussion, it should be apparent that, by postulating rule (7a) to describe nonadjacent assimilation and rule (9) to describe adjacent assimilation, we are capturing, rather than missing, generalizations. For the sake of convenience, I repeat below the two rules I suggest for the grammar:

¹⁹ Also, roots like *József*, which govern front vowel harmony, used to govern back vowel harmony. Some dialects retain the nonadjacent assimilation (e.g. *Józseftől* instead of *Józsefől*).

(13) *Vowel Harmony (VH)*

a. marked ((m)VH)

$$[+syll] \Rightarrow [+back] / \left[\begin{array}{c} +syll \\ +back \end{array} \right] C_0 \left(\left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \right)_1 \text{ —}$$

b. unmarked ((u)VH)

$$[+syll] \Rightarrow [\alpha back] / \left[\begin{array}{c} +syll \\ \alpha back \end{array} \right] C_0 \text{ —}$$

The environment of (m)VH is an abbreviation of the following schema:

(14)

$$\begin{array}{l} \text{a. } / \left[\begin{array}{c} +syll \\ +back \end{array} \right] C_0 \left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \text{ —} \\ \text{b. } / \left[\begin{array}{c} +syll \\ +back \end{array} \right] C_0 \left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \text{ —} \end{array}$$

Rules (14a) and (14b) account for the suffix harmony of roots like *Aprilis* 'April' and *radir*, respectively.

(13) contains two abbreviated vowel harmony rules. One set of rules, formalized as (m)VH, assimilates a vowel to another vowel that is not in the adjacent syllable. Another set of rules, formalized as (u)VH, assimilates a vowel to another vowel that is located in the adjacent syllable. I call these two types of assimilations *marked* (m) and *unmarked* (u), respectively, to bring out the fact that the latter is a more "natural" and general assimilation phenomenon than the former.

If the arguments for (m)VH are accepted, then this rule is a counterexample to the Crossover Constraint of Howard (1972) and the Relevancy Condition of Jensen (1974). Howard proposes a weak constraint on the operation of phonological rules: the string that intervenes between the focus (segment(s) undergoing the change) and the determinant (segment(s) conditioning the change) cannot contain a possible focus. Jensen's constraint, quoted below, is stronger (1974, 680):

- (15) Only *irrelevant* segments may intervene between focus and determinant in phonological rules. The class of segments defined by the features common to the input and determinant of a rule is the class of segments *relevant* to that rule, provided that at least one of the common features is a major class feature. If there is no common class feature, then *all* segments are relevant.

The rule of (m)VH states that a neutral vowel may intervene between the focus and the determinant. Howard's Crossover Constraint predicts that the intervening string may not contain *any* syllabic segment, since *all* syllabic segments are possible inputs. Jensen's Relevancy Condition predicts the same: the class of segments that is

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relevant to (m)VH is defined by the features common to the focus and the determinant, namely [+syll]. It appears, therefore, that the Crossover Constraint and the Relevancy Condition have to be modified in order to allow for rules like (m)VH.²⁰

It has already been pointed out that neutral vowels cannot be excluded from the determinant. The same is true with respect to the focus. The neutral vowel *e* is harmonized; for example, the underlying dative suffix /nek/ (cf. *nekem* 'to me') shows up as *-nak/-nek*. The evidence that the neutral vowel *i*, and presumably the vowels *í* and *é* as well, must be harmonized is obtained from underlying representations like the following: (= 12)

$$(16) \quad /j\acute{o}zs + i + t\acute{o}l/ \\ [- (m)VH]$$

Due to the exception feature, (m)VH cannot assimilate *-t\acute{o}l* to the root. If (u)VH does not apply to neutral vowels, then it cannot assimilate *-i* to the root; it can apply to *-t\acute{o}l*, but since the preceding vowel is front, *-t\acute{o}l* retains its front vowel. The expected output, however, is incorrect: **J\acute{o}zsit\acute{o}l*. In order to derive correct *J\acute{o}zsit\acute{o}l*, (u)VH has to apply first to *-i* and then to *-t\acute{o}l*: $/j\acute{o}zs + i + t\acute{o}l/ \Rightarrow /j\acute{o}zs + i + t\acute{o}l/ \Rightarrow /j\acute{o}zs + \acute{i} + t\acute{o}l/ \Rightarrow J\acute{o}zsit\acute{o}l$. Note that if this is the case, the absolute neutralization rule fronting unrounded back vowels, which is crucial to the abstract analysis of roots like *hid*, is justified independently.

4.2. The Ordering of the Rules

In a theory stipulating that rules apply in a sequential (nonsimultaneous) order, (m)VH applies either before or after (u)VH. If (m)VH follows (u)VH, then the two rules must apply conjunctively. For example:

(17) a.	/radír + nál/	b.	/radír + nál/
	(u)VH ²¹ é		(u)VH é
	(m)VH á		(m)VH —
	<i>radírnál</i>		* <i>radírnél</i>

The ordering in (17) makes a claim that seems counterintuitive. In the derivation of *radírnál* the suffix vowel is assimilated to both vowels of the root: first to the neutral vowel and then to the back vowel, although only the latter assimilation shows up phonetically. An important point is being missed: the assimilation phenomenon described by (u)VH is irrelevant to the harmonizing behavior of mixed vowel roots like *radír*. The rules of (u)VH and (m)VH describe the slightly different manifestation of basically the same process; in this situation our expectation is that each rule should apply to a distinct set of inputs.

²⁰ Jensen argues, convincingly it seems, that his Relevancy Condition should replace Howard's Crossover Constraint. A referee of this article has suggested that, in order to accommodate a rule like (m)VH, the Relevancy Condition might be reformulated so as to exclude a determinant, not focus, from the intervening material.

²¹ More precisely, (u)VH fronts *á* to *é*, which is raised to *é* by a low-level rule.

If (m)VH precedes (u)VH, then the two rules must apply disjunctively. For example:

(18) a.	/radír + tól/	b.	/radír + tól/
	(m)VH ó		(m)VH ó
	(u)VH —		(u)VH ð
	radirtól		*radirtól

Disjunctive application is exactly what is expected: it is a formal mechanism ensuring that only one of the rules applies.

The disjunctive application of (m)VH and (u)VH, in the order given, is predicted by the "Elsewhere Condition" of Kiparsky (1973b).²² In the Chomsky and Halle framework, rules apply disjunctively if they can be abbreviated by certain notational conventions. Kiparsky replaces this formal requirement on disjunctive application with the Elsewhere Condition, which he defines as follows (1973b, 94):

(19) Two adjacent rules of the form

$$\begin{array}{l} A \rightarrow B / P \text{ — } Q \\ C \rightarrow D / R \text{ — } S \end{array}$$

are disjunctively ordered if and only if:

- a. the set of strings that fit PAQ is a subset of the set of strings that fit RCS, and
- b. the structural changes of the two rules are either identical or incompatible.

The rules of (m)VH and (u)VH are adjacent; the set of strings that fit the structural description (SD) of (m)VH is a subset of the set of strings that fit the structural description of (u)VH; the structural changes are identical if $\alpha = +$ in (u)VH, and incompatible if $\alpha = -$ in (u)VH. Therefore, (19) defines disjunctive application for (m)VH and (u)VH.

In brief, the more specific rule of (m)VH applies before the more general rule of (u)VH in a disjunctive manner. The Chomsky and Halle theory of disjunctive application makes an incorrect claim here, if the argument in the preceding section is correct; that is, the two VH rules are not abbreviated by any formal mechanism. The conjunctive application of (u)VH followed by (m)VH misses the well-supported generalization that a less general rule should precede a related rule that is more general. The facts thus support the Elsewhere Condition, a recently proposed and still controversial theory of disjunctive rule application; see Harris (1974) pro, and Howard (1975) con.

Two additional points might be mentioned here. First, it is not always obvious whether vacuous application should count as application (positive) or nonapplication

²² See Anderson (1969), Howard (1972), Johnson (1972), and others, for similar proposals.

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(negative). The following fact suggests that vacuous application is interpreted positively:

$$(20) \quad \begin{array}{l} /radír + nál/ \\ (m)VH \quad \text{---} \\ (u)VH \quad \text{---} \end{array} \quad \text{(vacuous)}$$

radírnál

The vacuous application of (m)VH counts as application, and, therefore, disjunctive ordering automatically prevents (u)VH from applying.

Second, the following fact suggests that an exception feature is interpreted as an instruction to disregard not only the structural change (SC) of a rule, but also its structural description:

$$(21) \quad \begin{array}{l} /józsef + nál/ \\ [- (m)VH] \\ (m)VH \quad \text{---} \\ (u)VH \quad \text{---} \end{array} \quad \acute{e}$$

Józsefnél

The input string contains a root that is marked as not conditioning (m)VH. The exception feature blocks the application of (m)VH; this nonapplication is followed by the application of (u)VH. Note that "nonapplication" cannot be defined as "check SD, disregard SC": this instruction is identified as vacuous application, which is interpreted as application, and therefore (u)VH could not apply subsequently. Instead, the exception feature is interpreted as an instruction to "disregard SD, disregard SC"; in other words, "disregard the rule completely".

4.3. The Domain of the Rules

We have concluded in section 3.1 that VH does not apply within roots. The central concern of this section is to discuss the formal mechanism that excludes root vowels from the domain of VH. I will motivate one mechanism after having examined and dismissed a couple of others.

An input string like /bika/ meets the SD of (u)VH, whose application results in the incorrect output **bike*. One possible solution is to restrict (u)VH, and also (m)VH, to apply only to suffix vowels by including the morpheme boundary + in the structural description of the rules before the vowel which is assimilated. Since /bika/ contains no morpheme boundary, VH is inapplicable; the output is the correct *bika*.

There are two basic objections to the explicit mentioning of the morpheme boundary in VH. First, alternations like *bokor* 'shrub' (plural *bokrok*) and *tükör* 'mirror' (plural *tükrök*) are analyzed as containing underlying final consonant clusters (/bokr/ and /tükr/) that are broken up by the epenthetic vowel *o* in word-final position and before a consonant-initial suffix. This epenthetic vowel is later subject to VH, even

though no morpheme boundary separates it from the determining first root vowel: /bokr/ ⇒ bokor, /tükr/ ⇒ /tükör/ ⇒ tükör. Note in particular that, if the epenthesis rule inserted a harmonic vowel, it would duplicate the work of VH; this solution, therefore, misses a generalization. The alternative analysis, namely positing the underlying representations /bokor/ and /tükör/ and a rule of syncope, is less appealing since a great number of roots would have to be considered exceptional: cf. zápor '(rain) shower', plural záporok, *záprok. (This is the productive paradigm.) In sum, if VH applied only across morphemes, it would not be able to derive tükör from /tükör/ (derived from underlying /tükr/).

The second and more obvious problem is that polysyllabic suffixes have alternating vowels. Cf. the verbal derivational suffix -dogál/-dögél/-degél: áll 'stand', álldogál 'stand about'; ül 'sit', üldögél 'sit about'. Since no morpheme boundary appears between the two vowels of the suffix, the second vowel would not be harmonized.

To sum up, the explicit morpheme boundary approach is untenable in two general situations: in case a vowel is inserted inside a root whose harmonic shape depends on the harmonic shape of another vowel in the root, and in case a polysyllabic suffix alternates harmonically.

Another possible solution is to specify that the vowel undergoing assimilation is marked with a feature like [-ROOT]. Underlying root vowels, which are inherently marked [+ROOT], are automatically exempted from VH; suffix vowels, which are inherently marked as [-ROOT], and epenthetic vowels, which acquire this marking by convention, fall under the domain of VH.

The diacritic feature [±ROOT], or something like it, has some linguistic reality: it brings out the natural division of lexical items into roots and affixes. This diacritic approach, however, misses a significant point about the general character of vowel harmony: the explicit mentioning of the feature [-ROOT] in the vowel harmony rule(s) of every language having vowel harmony renders the distinct harmonizing behavior of roots and affixes accidental. Phonological theory should explain this essential distinction on a universal basis.

The fact that root vowels do not undergo VH but suffix vowels do is explained by the theory of Kiparsky (1973a). Kiparsky makes the claim that there is a universal constraint on rule application such that rules that neutralize one segment with another segment and that are nonautomatic (i.e. that have exceptions) apply only to nonbasic, or derived, inputs.²³ Derived inputs are those that are obtained by affixation or by the application of phonological rules. Since underlying root vowels are basic, they are immune to VH. Suffixes are derived through the process of suffixation; suffix vowels are therefore defined as derived, and undergo VH. Similarly, nonunderlying root vowels that owe their existence to the operation of some phonological rule are consid-

²³ As Kiparsky points out, the "nonautomatic" restriction is needed if absolute neutralization rules, which are automatic and apply to both basic and derived representations, are allowed in phonological descriptions.

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ered derived; thus, the epenthetic (second) vowel of roots like *bokor* and *tükör* is under the domain of VH.

Since some vowels that appear within roots are harmonized, we can conclude that the fundamental phonological opposition is not between root vowels and suffix vowels, but between derived vowels and basic vowels. The facts of vowel harmony, then, support Kiparsky's insightful thesis, which he motivates quite convincingly on independent grounds. By comparison, the diacritic approach of positing the feature [\pm ROOT] lacks explanatory value.

As a matter of fact, evidence can be obtained that falsifies the diacritic approach. In Hungarian, there exists a set of roots that exhibit the alternation *u/v* or *ü/v*; for example, *falu* 'village' (plural *falvak*), *tetű*²⁴ 'louse' (plural *tetvek*). These roots are analyzed respectively as /falw/ and /tetw/; the syllabic alternants are derived by a rule that converts underlying abstract /w/ to *u*. In the derivation of *tetű* from /tetw/, *w* is first syllabified to *u*, which subsequently is harmonized to the front vowel of the preceding syllable: /tetw/ \Rightarrow /tetu/ = /tetü/ (\Rightarrow *tetű*). Observe the critical fact that even though *u* is specified as [+ ROOT] (since it is derived from underlying /w/, which belongs to the root), it undergoes VH.²⁵ Clearly, the diacritic approach that claims that only [- ROOT] vowels are harmonized cannot be maintained. The facts are predicted by Kiparsky's constraint: VH applies to the intermediate representation /tetu/ because *u* is derived by the application of the syllabification rule to underlying /w/.

The argument in the preceding paragraph rests crucially on the correctness of underlying forms like /falw/ and /tetw/. I will now defend this analysis of the *u/v* and *ü/v* alternations against three alternative views.²⁶ (I assume a late neutralization rule that converts /w/ to *v*; the correctness of underlying /w/ as opposed to /v/ is not at issue here.)

First, deriving *v* from /u/ or /ü/ is not possible: the regular phonological rules cannot derive the plural forms *falvak* and *tetvek* from /falu + k/ and /tetü + k/. Besides, the majority of *u*- and *ü*-final roots would have to be exceptional, since they do not form their plurals with *v*. (Cf. *kapu* 'gate' (plural *kapuk*, **kapvak*.)

A second solution is to posit a front /w̃/ glide for roots like *tetű*. Accordingly, the syllabification rule derives /tetü/ from /tetw̃/ and /falu/ from /falw/, and VH need no longer apply to the root vowels. But this kind of abstractness is not motivated at all. The segment /w̃/ would have an extremely restricted distribution, occurring only in postconsonantal, root-final position, and only in a few front vowel roots. Moreover, by positing /w̃/ one makes the bizarre claim that rounded glides are also harmonic. The proper constraints on the abstract solution will certainly rule out this analysis.

²⁴ Morpheme-final *ü* is lengthened to *ü*.

²⁵ Note also that *tetű* cannot be derived if the morpheme boundary is included in the structural description of VH.

²⁶ Jensen's (1972) analysis of the *bokor/bokrok* and *falu/falvak* alternations is the same as mine, but his theoretical conclusions are different; see Vago (1974).

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Reply to "Theoretical Implications of Hungarian Vowel Harmony"*
 John T. Jensen

0. Introduction

Vago (1976) has presented an interesting and provocative analysis of Hungarian vowel harmony and its theoretical implications. At the heart of his analysis are two vowel harmony rules: a marked vowel harmony rule (m)VH that skips over neutral vowels (i.e. [+syll, -back, -round, -low]) and an unmarked vowel harmony rule (u)VH that iterates left-to-right, skipping no intervening vowels. In Vago's analysis these rules do not operate within roots, but only on suffix vowels; Vago therefore proposes that harmony within roots is the result of morpheme structure conditions. In this reply I show that, of these devices, only the unmarked vowel harmony rule is needed to cover all the facts adduced by Vago and additional facts as well; I therefore conclude that Vago's more complex solution is unmotivated and unnecessary and that my solution is to be preferred by the simplicity criterion, which Vago accepts.

1. The Facts of Vowel Harmony

To a considerable extent, vowel harmony in Hungarian requires that, within a word, all vowels must have the same value for the feature [back], except that prefixes are entirely exempt from undergoing or influencing harmony and may be assumed to be

* This article has benefited from extensive comments on earlier versions by Margaret Stong-Jensen, Douglas C. Walker, Ian MacKay, Catherine Ringen, and three anonymous reviewers of this journal, although none of these individuals necessarily agrees with me, Vago, or anybody else. A version of this article was presented at the LSA winter meeting, December 1976, in Philadelphia.

separated from the rest of the word by an internal word boundary.¹ Because the harmonic properties of suffixes depend on those of the root and not vice versa, we can state this fact in the most straightforward manner as a left-to-right, adjacent assimilation rule, which I will simply call Vowel Harmony.

(1) *Vowel Harmony*

$[+syll] \rightarrow [\alpha back] / \left[\begin{array}{l} +syll \\ \alpha back \end{array} \right] C_0 \text{ — (left-to-right iterative)}$

There are a number of interesting cases where this simple generalization does not hold.

For one, there are a number of roots with only $\left[\begin{array}{l} -back \\ -round \\ -low \end{array} \right]$ vowels (the so-called neutral vowels), such as those in (2a), which invariably take back vowel suffixes; these contrast with the roots in (2b), which require front vowel suffixes.

- (2) a. híd 'bridge' hídnál hídtól nál/nél 'at'
 cél 'goal' célnak céltól tól/tól 'from'
 b. víz 'water' víznek víztől

A straightforward approach to this type of example is to assign the lexical items of type

(2a) $\left[\begin{array}{l} +back \\ -low \\ -round \end{array} \right]$ vowels in lexical representation. Because such vowels do not exist as

surface segments in Hungarian, words of the type (2a) have been called *abstract vowel roots*. As underlying back vowels, they will correctly condition back harmony in suffixes attached to them, by the regular rule of Vowel Harmony (1). A later rule, Absolute Neutralization (AN) (3), converts the abstract vowels to their surface manifestations.

(3) *Absolute Neutralization*

$\left[\begin{array}{l} +syll \\ -round \\ -low \end{array} \right] \rightarrow [-back]$

While it is not an uncontroversial position, there are a number of good arguments for

¹ There is independent syntactic motivation for this analysis, since under specified conditions such prefixes are separated from their roots. For example:

- (i) a. Felszállok a villamosra.
 'I get on the tram.'
 b. A villamosra szállok fel.
 'I get on the tram.'
 (ii) a. Felszállsz a villamosra?
 'Are you getting on the tram?'
 b. Fel.
 'Yes.'

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the "abstract" analysis of these words (see Jensen (1972), Vago (1976), among others). Since Vago and I agree on this analysis, I will say no more about it here.

A second kind of example that appears to contradict the generalization of rule (1) lies in roots containing both back and neutral vowels; we shall refer to such roots as *mixed vowel roots*. For expository purposes it is convenient to distinguish between two classes of mixed vowel roots. In the first type, the neutral vowel is first, as in *bika* 'bull'.

(4) *bika* 'bull' *bikánál* *bikától*

The other type of mixed vowel root has a neutral vowel after a back vowel, as in *radír* 'eraser'.

(5) *radír* 'eraser' *radírnál* *radírtól*

A third class of counterexamples may be called *irregular roots*: in these the root vowels differ in the feature [back] but neither is a neutral vowel, as in *soffór* 'chauffeur'.

(6) *soffór* 'chauffeur' *soffórnél* *soffórtól*

2. The Analysis

Vago argues that Vowel Harmony (1) is inadequate to deal with the cases given in (4)–(6), and proposes a system of two vowel harmony rules together with a set of morpheme structure conditions to account for them. I will argue that rule (1) alone is indeed sufficient to deal with these superficial irregularities, given certain plausible assumptions concerning the underlying forms of (4)–(6) and the exception mechanism proposed in Chomsky and Halle (1968; hereafter SPE). It follows that the additional complications of additional vowel harmony rules and morpheme structure conditions are unnecessary.

Given the possibility of abstract vowels in underlying forms such as *hid*, a natural way to treat nouns such as *bika* (4) would be to assign them an abstract underlying representation such as /bika/. Vowel Harmony (1) could then apply left-to-right to a form such as /bika + tól/, generating the correct back vowel suffix. Absolute Neutralization and other rules would follow, giving the correct surface form *bikától*. Vago rejects such abstract underlying forms on the grounds of what he calls the *diminutive evidence*. A subset of this class of examples contains proper names like *Tibor*, which like *bika* is harmonically back. But unlike *bika*, proper names are subject to a morphological process forming diminutives, which truncates the root to its initial

(C(C))VC(C) syllable and adds *-i*.² While *Tibor* is harmonically back, its diminutive formed in this way is harmonically front, as shown in (7).

- (7) *Tibor* *Tibornál Tibortól*
Tibi (diminutive) *Tibinél Tibitól*

But if *Tibor* is analyzed with an underlying abstract vowel, parallel to *bika*, incorrect derivations result in the diminutive form, as shown in (8).

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|--------|--------------|----|--------------|-------------------------|
| (8) a. | /tɪbor/ | b. | /tɪbor/ | <i>Underlying</i> |
| | /tibi/ | | /tibi/ | <i>Diminutivization</i> |
| | /tibi + nál/ | | /tibi + nál/ | <i>With Suffix</i> |
| | /tibi + nél/ | | tibi + nél | <i>VH (twice)</i> |
| | *tibinál | | tibinél | <i>AN</i> |

From this Vago concludes that the underlying form of *Tibor* must contain the neutral vowel /i/ rather than the abstract vowel /i/. He further concludes that Vowel Harmony must not be allowed to apply within this morpheme, or else the incorrect forms **Tibör* and **Tibörnél* will be generated. These conclusions from the diminutive evidence are valid. However, I take issue with Vago's final conclusion from this argument, which is that Vowel Harmony never applies within roots, and that the harmonic properties of roots should be described by morpheme structure conditions distinct from the phonological rules. This conclusion is not warranted for two reasons: (1) Vago has shown that Vowel Harmony must be prevented from applying within a small subclass of noun stems in Hungarian. From this it does not follow that Vowel Harmony is prevented from applying within *all* roots of the language. As I shall argue, Vowel Harmony does not apply within nouns of the *Tibor* type because these words carry an exception feature. (2) To state vowel harmony within roots as a morpheme structure condition misses a generalization, since the morpheme structure condition essentially duplicates the Vowel Harmony rule. Vago argues that the evaluation metric should value this kind of duplication highly. This assertion denies any empirical content to the evaluation metric, which could also be made to value highly the duplication entailed in maintaining the autonomous phonemic level, thus "proving" that the autonomous phonemic level exists (Hooper (1975, 542, footnote 6)).

I submit that an alternative analysis is possible without this duplication. For normal words, Vowel Harmony (1) applies within roots and from roots to suffixes as well, assimilating all vowels in the word to the backness of the one preceding, so that ultimately all vowels assume the same backness value as the first vowel. Nouns like *Tibor* are exceptions in that they do not undergo Vowel Harmony; that is, they carry

² There are some words other than proper names that undergo this process, e.g.

- (i) a. *cigaretta* 'cigarette'
cigaretttától
 b. *cigi* (diminutive)
cigitól

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the morphological feature [-VH]. By convention, this morphological feature is distributed to all segments of the morpheme (SPE, 374). Thus, given an underlying form such as /tíbor + tól/, the derivation proceeds as in (9).

- (9) /tíbor + tól/ Underlying
 [-VH]
 / VH (blocked within root by exception feature)
 ó VH (applies to suffix)

In (9), Vowel Harmony does not apply within the root because of the exception feature. But the suffix, which carries no such exception feature, is correctly assimilated to the backness of the final root vowel. Exactly the same exception mechanism blocks root harmony in the irregular roots of (6), while correctly allowing the suffix to assimilate in backness to the last vowel of the root. Hence it is not necessary to claim, as Vago does, following Kiparsky (1968), that "root harmony and suffix harmony have different exception classes," and are therefore distinct processes. All that is necessary is to say that all suffixes assimilate to the last vowel of a root, but that some roots are exceptions in not undergoing internal harmony.

The analysis of *Tíbor* in terms of exception features does not resolve the question of the correct underlying form for *bika*, since there is no diminutive in -i for words of this type. The underlying form can be either /bika/ or /bika/. Both these forms are "marked" in some way: by an abstract vowel in one case and by an exception feature in another. I leave it to the still to be developed evaluation metric to resolve this question, by providing a principled relative cost to these two types of irregularity.

Nouns of type (5) such as *radír* are less problematic for the analysis based on rule (1). Vowel Harmony propagates rightward, giving the intermediate form *radír nál*, which is converted to the correct phonetic form by Absolute Neutralization. The correct result is obtained with either an abstract vowel /i/ or a neutral vowel /i/ in the underlying form. But since the neutral vowel is less marked than the abstract vowel, we take the neutral vowel underlying form in these cases.

Vago accepts the underlying form /radír/. However, because of his a priori restriction on Vowel Harmony that it does not apply within roots, he cannot use rule (1) alone to derive the correct forms of *radír*, since by his assumptions suffixes on these words would incorrectly assimilate to the last vowel of the root and appear with a front vowel. To account for these forms, Vago posits a second vowel harmony rule, given in (10), which he calls marked Vowel Harmony ((m)VH), which is formulated to skip over neutral vowels.

- (10) (m)VH

$$[+syll] \rightarrow [+back] / \left[\begin{array}{c} +syll \\ +back \end{array} \right] C_0 \left(\left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \right)_1 \text{ ———}$$

Vago argues that (m)VH applies before (u)VH (unmarked Vowel Harmony = (1)) and that they are disjunctively ordered, as predicted by Kiparsky's (1973b) Elsewhere Condition. Vago notes that (m)VH is a counterexample to Howard's (1972) Crossover Condition and my (1974) Relevancy Condition. We will return to these points in section 3.

Both my analysis and Vago's correctly derive those words of the *radír* type that take only back suffixes. Vago attempts to find an observational difference between the two theories on the basis of a subclass of these nouns that were termed "doublets" by Esztergar (1971). These include some recent borrowings (e.g. *szalamander* 'salamander'), certain proper names with *e* in the last syllable (e.g. *Ágnes*), and a few words with *i* (e.g. *analízis* 'analysis'), which may take either front or back suffixes, in free variation for many speakers. Some doublets are illustrated in (11).

(11) <i>Ágnes</i> 'Agnes'	<i>Ágnes</i> tól	<i>Ágnes</i> tól
<i>szalamander</i> 'salamander'	<i>szalamander</i> tól	<i>szalamander</i> tól
<i>analízis</i> 'analysis'	<i>analízis</i> tól	<i>analízis</i> tól

Vago argues correctly that the underlying form /ágnas/ would produce only the back vowel variant, and that the positing of allomorphic underlying forms would be an ad hoc and unsatisfactory solution. He therefore concludes that the underlying form is /ágnes/ and that this form is sensitive to both Vowel Harmony rules (1) and (10). If (m)VH applies, the neutral vowel is skipped and the output is *Ágnes*tól. If on the other hand (m)VH does not apply, (u)VH does, skipping no vowels, and *Ágnes*tól is the result. It is curious that Vago does not explain specifically how the grammar determines whether or not to apply (m)VH. We might suppose that these forms are subject to an optional readjustment rule that provides them with the exception feature [- (m)VH]. The other words of the *radír* class, which are not doublets, are presumably not lexically marked for this readjustment rule.

The doublet evidence does not provide a decisive argument for Vago's system incorporating two vowel harmony rules, however, since an alternative analysis is available. With (1) as the only vowel harmony rule, doublet morphemes are marked to undergo an optional readjustment rule marking them [-VH]. If this readjustment rule does not apply, VH applies throughout the word to give the back suffix. If the readjustment rule does apply, the suffix assimilates to the [-back] character of the last root vowel.³

³ The second vowel in *Ágnes* is a neutral vowel, i.e. [-back, -round, -low]. When Vowel Harmony applies throughout the word, it produces an intermediate form /a:gnas/. This is converted to the phonetic [a:gneš] by Absolute Neutralization and other rules. Note that the orthographic symbol *e* is ambiguous between the underlying mid neutral vowel /e/ and the underlying low nonneutral vowel /ɛ/, a distinction that is maintained phonetically in some dialects.

Some mixed vowel words contain a harmonic back vowel flanked by two (or more) neutral vowels, e.g. *financér* 'financier', pointed out by Vago during the oral presentation of this article. This has the underlying form /financér/ in my analysis. These are analyzed exactly like *radír* (if they take only back vowel suffixes) or like *Ágnes* (if they are doublets, as is *financér*, according to Vago).

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3. Theoretical Implications

3.1. *The Evaluation Metric*

Vago splits the process of vowel harmony into three parts: two rules and a set of morpheme structure conditions. The original theory of generative phonology placed a premium on capturing generalizations, formally expressed in terms of simplicity, technically defined in terms of the number of features required to write a grammar. In the present case the simplicity metric values more highly the analysis with a single Vowel Harmony rule and no morpheme structure conditions for vowel harmony.⁴ Vago (1973) argues convincingly that the simplicity criterion provides a basis for choosing the abstract analysis of vowel harmony systems over the exception class approach. But there is considerable disagreement over the scope of the simplicity criterion. For example, Hale (1971), Kiparsky (1971; 1972), and Miller (1970) have brought forth evidence from linguistic change indicating that the simplicity criterion must be supplemented by additional criteria including abstractness conditions, opacity conditions, paradigm regularity, and perhaps others of a poorly understood sort. But Vago has not shown any empirical evidence that would prove his more complex analysis superior to the simpler one advocated here. In the absence of additional evidence, I believe the simplicity criterion is the deciding factor in this case.

3.2. *Adjacent Versus Nonadjacent Assimilation*

Vago claims that his two-rule analysis captures rather than misses a generalization on the grounds that it evaluates adjacent assimilation more highly than nonadjacent assimilation. Of the two rules of Vowel Harmony he proposes, the marked one effects nonadjacent assimilation, and the unmarked one effects adjacent assimilation. But the only thing that makes (m)VH "marked" is Vago's labelling of the rules. There is nothing in his presupposed metatheory that values either of these rules more highly than the other. For one thing, Vago has not defined the term "adjacent assimilation". The vowels affected by Vowel Harmony are in most cases not adjacent but are separated by consonants. Loosely speaking, we can say that the consonants do not matter in Hungarian vowel harmony, only the vowels do. But in Finnish it's the consonants and neutral vowels together that 'don't matter; only the nonneutral vowels do. In Jensen (1974) I proposed the Relevancy Condition, according to which only irrelevant segments may intervene between the segments causing and undergoing a phonological rule. Since Vago rejects the Relevancy Condition, and offers nothing to replace it, he has no nonarbitrary way of making a relative evaluation of his two Vowel Harmony rules. Further, his statement that adjacent and nonadjacent assimilations

⁴ It seems that any theory of vowel harmony in Hungarian that incorporates abstract vowels will need some morpheme structure conditions on their distribution. Since this applies equally to Vago's analysis and mine it does not bear on the discussion of the comparison of the two theories.

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"have different exception classes" (1976, 255) is simply an artifact of his minor rule analysis. When Vowel Harmony is stated as a single rule, the "different exception classes" disappear entirely.

Vago has implicitly given an historical argument in his statement that "in most cases [referring to the doublet class] the front vowel variants (produced by adjacent assimilation) developed after the back vowel variants (produced by nonadjacent assimilation)" (1976, 255). And some roots, like *József*, which used to govern back harmony, now govern front harmony. Vago cites this as evidence that the less marked form of assimilation is taking over cases formerly governed by the more marked form. He further claims that a theory with only one rule of Vowel Harmony cannot make this generalization.

In the absence of an independent criterion for the "markedness" of a rule, this statement is vacuous. But in any case, there is a natural way to capture this historical change in the theory with one Vowel Harmony rule. This is to say that forms like *József* have acquired the exception feature [-VH], and that forms like *Ágnes* have acquired this exception feature optionally. While this appears to represent an increase in complexity, a number of cases of increased complexity, measured by the traditional evaluation metric, are accompanied by a decrease in opacity, as shown by Kiparsky (1971). In the one-rule theory, Vowel Harmony (1) is opaque with regard to surface forms like *Józseftól*, where the suffix vowel is in the environment of a front vowel *e* and looks as if it should have undergone fronting by Vowel Harmony. The change to *Józseftól* reduces this opacity. In Vago's theory, both Vowel Harmony rules are transparent: (m)VH is transparent by *Józseftól*; (u)VH is transparent by *Józseftól*. Thus Vago cannot appeal to the principle of opacity to explicate this historical change.

3.3. The Elsewhere Condition

Vago claims that his analysis provides evidence for Kiparsky's (1973b) Elsewhere Condition, since the only ordering of his two rules that works is the one predicted by this condition. The analysis using one Vowel Harmony rule provides no evidence one way or the other for this proposed condition.

3.4. The Revised Alternation Condition

Vago claims that his analysis provides evidence for Kiparsky's (1973a) revised (weakened) Alternation Condition, according to which nonautomatic neutralization rules apply only to derived forms. My analysis violates this condition, since I reject the position that vowel harmony within roots should be accounted for by different means than harmony in suffixes.

3.5. The Relevancy Condition

Vago's rule of marked Vowel Harmony violates my (1974) Relevancy Condition, and he takes this as evidence against the condition and Howard's (1972) weaker Crossover

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Condition. I have presented evidence here showing that the additional complications that Vago advocates are by no means necessary to account for the data. It is perhaps not accidental that the simpler analysis is also in accord with the Relevancy Condition.

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Exceptions and Vowel Harmony in Hungarian

Elaine Phelps

Hungarian vowel harmony as described by Vago (1976)¹ requires two Vowel Harmony rules and the application of two controversial innovations proposed by Kiparsky: the "Elsewhere Condition" that induces disjunctive ordering of adjacent rules under certain conditions (1973b), and the constraint that nonderived strings cannot undergo nonautomatic phonological rules (1973a). The account of vowel harmony that will be presented here resembles Vago's in that it includes abstract vowels along with a rule of absolute neutralization. But exceptions are treated in accordance with proposals made by Coats (1970) and Kisseberth (1970), and the consequences are significant. It becomes unnecessary to assume two rules of Vowel Harmony or to prevent Vowel Harmony from applying to roots; as a result, the innovations proposed by Kiparsky are not supported by the analysis.

Vago gives the following chart of phonetic vowels, using Hungarian orthography.

	Short		Long	
	Front	Back	Front	Back
High	i	ū	í	ú
Mid	õ	o	é	ó
Low	e	a		á

Suffixes exhibit front/back vocalic alternations that are conditioned by the vowels of the roots to which they are affixed (all data are from Vago).

(2)	-nál/nél 'at'	-tól/tól 'from'
ház 'house'	háznál	háztól
hajó 'ship'	hajónál	hajótól
föld 'ground'	földnél	földtől
kép 'picture'	képnél	képtől

Vago shows that the suffixes are underlying *-nál*, with a back vowel, and *-tól*, with a front vowel. The following rule (Vago's (9)) accounts for the above alternations.²

(3) Vowel Harmony

$$[+syll] \rightarrow [\alpha\text{back}] / \left[\begin{array}{l} +syll \\ \alpha\text{back} \end{array} \right] C_0 \text{ —}$$

There are other forms that appear to be exceptions to this rule, either because the root contains both front and back vowels ("mixed vowel roots"), or because a front vowel conditions back vowel harmony, or both.

¹ Hereafter, all references to Vago not specified by date refer to this article.

² Further rules, not to be discussed here, apply to the output of Vowel Harmony to derive the correct phonetic form; see Vago (1975).

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(4) szivar 'cigar'	szivarnál	szivartól
radír 'eraser'	radírnál	radírtól
híd 'bridge'	hídnál	hídtól
cél 'aim'	célnál	céltől

Vago argues persuasively that the last two roots in (4) are underlying /híd/ and /cél/, with abstract back vowels that correctly condition back vowel harmony, after which the back root vowels are converted to front vowels by a rule of absolute neutralization.

$$(5) \text{Fronting} \\ \left[\begin{array}{l} +\text{syll} \\ -\text{low} \\ -\text{round} \end{array} \right] \rightarrow [-\text{back}]$$

However, in order to account for *radírnál*, *radírtól*, where the suffixes show back vowels despite the fact that the last vowel of the root is a front vowel, Vago proposes the following rule (his (7a)), which harmonizes a suffix vowel to the last back vowel of a root, skipping over intervening front unrounded ("neutral") vowels.

$$(6) [+syll] \rightarrow [+back] / \left[\begin{array}{l} +\text{syll} \\ +\text{back} \end{array} \right] C_0 \left(\left[\begin{array}{l} +\text{syll} \\ -\text{back} \\ -\text{round} \end{array} \right] C_0 \right)_1 \text{---}$$

The main motivation for this rule derives from Vago's assumption that abstract vowels are restricted to monosyllabic roots, which means that there are many roots with mixed vowels, like *radír*. He therefore contends that the Vowel Harmony rules do not apply to root vowels, and that the only way to account for this restriction is by invoking Kiparsky's constraint on the applicability of nonautomatic rules.³ The question of underlying representations will be considered after the evidence for rule (6) has been examined.

Vago points out that there are some roots with mixed vowels which, unlike *radír*, condition front vowel harmony: *Józsefnek* 'to Joseph', *novemberben* 'in November', *októbertől* 'from October'. He states: "These roots are marked with the exception feature [-rule x], where rule x refers to the particular vowel harmony rule that skips over the last neutral vowels of mixed vowel roots" (254). On the assumption that there cannot be exceptions to a subrule of an abbreviated rule schema, Vago argues that rules (3) and (6) must be separate rules, since the forms cited above are exceptions to rule (6) but not to rule (3). He tries to show that the rules must nevertheless apply disjunctively, with (6) preceding (3), and appeals to Kiparsky's Elsewhere Condition to provide this ordering.

³ It is not correct to assume, as Vago does (260), that vowel harmony in roots is universally different from vowel harmony in affixes. In Kasem, a language of West Africa, vowel harmony in roots and affixes is identical.

There is an alternative way of dealing with mixed vowel roots that condition front-vowel harmony, and that is to mark the nonharmonizing front vowel of the root as an exception to the focus (the segment to the left of the arrow) of the Vowel Harmony rule (3), but not as an exception to the context of the rule. Let us call this a FOCAL EXCEPTION, in contrast to a CONTEXTUAL EXCEPTION. Although the vowel will not itself harmonize to a preceding vowel, it will induce harmony in vowels that follow it. This distinction is not novel—see Coats (1970) and Kisseberth (1970), who present convincing evidence that exactly this distinction between the two kinds of exceptions is needed in unrelated languages and for a variety of rules.

There may also be segments that are exceptions to only the context of a rule,⁴ as well as segments that are exceptions to both the focus and the context. The *e* in *József* is marked as a focal exception to Vowel Harmony (3), but not as a contextual exception, which means that although it will not be subject to the change, it will condition front vowel harmony in succeeding vowels.

Note that Vago tacitly uses a similar distinction as well.⁵ If, as he argues, a universal principle prevents the application of Vowel Harmony to roots, what motivation would there be to mark a root as an exception to a rule that cannot apply to it in the first place? Vago states: "the exception feature is interpreted as an instruction to 'disregard SD, disregard SC'; in other words, 'disregard the rule completely'" (259). Clearly, the instruction to disregard the structural change is redundant if all roots are automatically exempted from undergoing the rule. Therefore, the only idiosyncratic information provided by the exception feature is that *József* is an exception to the context of rule (6).

It is not necessary to assume, as Vago does (254, fn. 8), that exception features are properties of entire roots rather than of segments, although this is the convention proposed by Chomsky and Halle (1968, 376). Rule exception features are different from diacritics that designate lexical or syntactic categories. It is quite appropriate to treat such diacritics as properties of formatives. However, it is a segment, not a formative, that conditions or is subject to the change specified by a phonological rule, unless the rule is lexically or syntactically restricted. We must allow for the possibility, especially in loanwords, that different segments in a given formative may depart from the rules in varying ways.

In Vago's analysis, the exception feature is associated with the entire root, so that not only is *József* marked as an exception to rule (6), but the abbreviated root, *józs-*, which occurs in the diminutive *Józsitól*, is also an exception to rule (6). This means that

⁴ A reader for *Linguistic Inquiry* points out that it may not be desirable to allow exceptions that are contextual but not focal. So far, I have not found any such exceptions, and there may be a universal constraint such that [-context] implies [-focus], but for the present I leave the question open.

⁵ He states (262) that *József* is "obligatorily exempted from conditioning" rule (6), and in Vago (1975, 23) he suggests that this distinction explains the difference between stem and suffix exceptions with respect to vowel harmony.

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the diminutive, which shows back vowel harmony instead of the front vowel harmony of the full root, is also subject only to rule (3).

The same result obtains if we recognize the distinction between focal and contextual rule exceptions, and associate the exception feature with the segment rather than with the formative. *József* contains a segment, *e*, that is a focal exception to rule (3). The diminutive *Józsitól* lacks the exceptional segment and therefore conditions back vowel harmony, as in the following derivation, which is identical to the derivation in Vago (257).

- (7) *józs + i + tól*
 VH (3) *józs + i + tól*
 VH (3) *józs + i + tól*
 Fronting (5) *józs + i + tól*

Thus, in both analyses, it is rule (3) that accounts for the front vowel harmony of *Józsefnek* and the back vowel harmony of *Józsitól*. These forms do not argue for the inclusion of rule (6) in the grammar—exceptions to a rule cannot be used to show that the rule exists—but only that rule (6), if it is a rule, must be kept separate from rule (3).

If Vowel Harmony (3) is allowed to apply to root vowels, the same derivational sequence shown in (7) will also account for *radírnál*, *radirtól*, without rule (6). Rules (3) and (5) will also account for the following diminutive forms.

- (8) Terez Teri
 Ferenc Feri
 Erzsébet Erzsi Erzsike Erzsínél Erzsitól
 Klára Klári Kláríka Klárinál Kláritól
 Aladár Ali
 Zsuzsanna Zsuzsi

The last kind of evidence adduced in support of rule (6) consists of the "doublets", alternants in free variation. Vago states: "Some mixed vowel roots that have a neutral vowel in the last syllable may take either front vowel suffixes or back vowel suffixes. Most of these roots are fairly recent borrowings" (250). He cites *Ágnes* 'Agnes', *Ágnesnáll*/*Ágnesnél*, *Ágnesstóll*/*Ágnesstól*. Vago discusses several possible ways of accounting for these alternants, rejecting all but the one that posits two rules of Vowel Harmony, with (3) accounting for the front vowel variants and (6) for the back vowel variants. Vago states: "Roots having doublets are optionally exempted from conditioning (m)VH" (262); (m)VH is rule (6).

Let us consider the implications of this account. Vago points out (254, fn. 19) that mixed vowel roots such as *József*, which presently govern front vowel harmony, formerly governed back vowel harmony. This means that at an earlier stage, *József* was not an exception to rule (6), and only later became an obligatory exception to the rule. However, more recent borrowings such as *Ágnes*, which freely alternate between

governing back and front vowel harmony, are treated as optional exceptions to rule (6). The claim seems to be that the more recent borrowings are better assimilated to the native phonology than are the older borrowings, since the newer ones may optionally undergo rule (6), while the older ones like *József* never do.

A more satisfactory explanation for the difference in behavior of the older versus the newer borrowings would show that the later ones are more exceptional, less assimilated, than the older ones. Such an account is available if we adopt the conventions for rule exceptions advocated here. The *e* of *Ágnes* is marked as a focal exception to Vowel Harmony, [-VHf], and is also marked as an optional contextual exception [(−VHc)] to the rule, which must be revised as follows.

$$(9) [+syll] \rightarrow [\alpha\text{back}] / \left[\begin{array}{c} +\text{syll} \\ \alpha\text{back} \end{array} \right] C_0 \left(\left[\begin{array}{c} +\text{syll} \\ -\text{VHc} \end{array} \right] C_0 \right) _$$

The rule now states that if a vowel is marked as a contextual exception to Vowel Harmony, that vowel is skipped over in determining the harmonic behavior of the vowel that follows it.⁶ Observe that rule (9) contains in its formulation the information that assimilation that is controlled by a vowel in a nonadjacent syllable is exceptional, occurring only when an intervening vowel is idiosyncratically marked as not conditioning vowel harmony. This conforms to Vago's view that rule (6) is a less natural rule than rule (3). However, to say that a rule is less natural, or "marked" (255-256), does not explain why, if it is part of the native grammar, nonnative additions to the language should first condition the rule and only later become exceptions to it. We should expect exactly the opposite development.

Given rule (9), the difference between older and later borrowings is accounted for by the fact that older borrowings, having at first conditioned back vowel harmony, contained segments marked [-VHf, -VHc], which subsequently became less exceptional and lost the marking [-VHc]. Since they retain [-VHf], they condition front vowel harmony. Later borrowings vacillate between [-VHf, -VHc] and [-VHf], that is, they are [-VHf, (-VHc)]. When the *e* of *Ágnes* is treated as [-VHf, -VHc], the back vowel alternants of the suffixes will emerge; when the *e* is only [-VHf], the front vowel alternants are produced.

We should ask why it is that only, but not all, front unrounded vowels in mixed vowel roots are marked [-VHc]. A possible explanation is the following. After the merger of back unrounded vowels with front unrounded vowels, some phonetic front vowels conditioned front vowel harmony while others conditioned back vowel har-

⁶ In order to harmonize more than one suffix vowel, both rule (6) (Vago's rule) and the proposed rule (9) require the same conventions for the application of iterative rules that contain subscripted terms. These conventions cannot be the ones that are usually assumed (disjunctive application, longest expansion applying first), since a longer expansion of (6) or (9) may have to apply at an earlier point in a given derivation, while a shorter expansion may also have to apply at a later point to another part of the string in the same derivation. For the conventions that I assume for such rules, see Phelps (1973, chapter II), where subscripted segments are discussed; the same convention should be extended to subscripted strings.

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mony. Native roots retained the earlier underlying representations, which conformed to the requirements of vowel harmony. Nonnative roots need not, although they may, so conform. Those that do not conform may alternate between the two patterns, formally expressed as described in the preceding paragraph. The ultimate resolution of the ambiguity favors front vowel harmony because this is adjacent assimilation, which is preferred.

Vago points out that the evidence from the diminutives of *Tibor* and *Éva* shows that the first vowel in each is an underlying front vowel. According to the analysis being proposed here, the second vowel of the root is an exception to the structural change of Vowel Harmony (9). The second vowel does not occur in the diminutives, and we get *Tibinél*, *Évinél*, with front vowel harmony.

Because he is able to show that some front unrounded vowels in mixed vowel roots must be underlying front vowels, Vago concludes that all such vowels are underlying front vowels and that vowel harmony does not apply in roots. Neither conclusion is justified. He offers no evidence that *szivar* and *radír* (4), for example, which condition back vowel harmony, cannot be underlying *szívar* and *radír*. In Vago's analysis, abstract vowels are restricted to monosyllabic roots, a highly skewed, and therefore suspect, distribution. At two points in his article, Vago uses skewed underlying distribution as an argument against positing certain underlying representations (251, 262), but he does not discuss the distribution of the abstract vowels in his analysis.

Since abstract vowels and the Fronting rule (5) are needed in the grammar independently of the mixed vowel roots, we can assume that many of the front unrounded vowels of such roots are underlying back unrounded vowels unless they condition front vowel harmony. As a result, the distribution of the abstract vowels parallels that of other vowels, occurring in polysyllabic roots as well as in monosyllabic roots, in both initial and noninitial root syllables.⁷ This means that there are far fewer mixed vowel roots and exceptions to Vowel Harmony than there appear to be on the surface, which suggests that root vowel harmony and suffix vowel harmony are not independent phenomena.

Vago proposes to account for root vowel harmony by morpheme structure conditions, but he does not offer a formal description of these conditions.⁸ There is thus no way for us to assess his statement (249) that "root harmony and suffix harmony

⁷ Abstract vowels are not posited for suffixes, but it is also true of other languages that a greater variety of vowels can occur in stems than in affixes. In Kasem nominals, for example, *i*, *u*, and *a* appear in stems and affixes, but *e* and *o* are restricted to stems.

In Vago's full analysis (1975), from which the article under discussion is drawn, all underlying vowels occur in pairs, one long and one short, except for /*i*/, which has no short counterpart. By assuming /*i*/ in some mixed vowel roots, this anomaly is eliminated. The Fronting rule (5) converts /*i*/ to /*e*/, a mid vowel, and another rule, independently needed, converts this to [æ], which is the phonetic value of orthographic *e*. Interestingly, Vago states (1975, 35) that there was a merger in Standard Hungarian of [e] and [æ], and that the distinction is still preserved in other dialects.

⁸ The status of morpheme structure conditions is open to question (Clayton (1976); Phelps (1975)). It may well be that they are entirely derivative, without independent significance.

have distinct exception classes". In the analysis proposed here, there are some root vowels marked [-VHf], and some marked [-VHf, (-VHc)], all of the latter in comparatively recent borrowings. Since the set of affixes in a given language is far more resistant to additions by borrowing than the set of roots, we should not expect to find suffix vowels in Hungarian marked [-VHc], and, so far as I am able to tell, this is indeed the case. Thus, both roots and suffixes contain vowels marked [-VHf], but only roots contain vowels marked [-VHc] because [-VHc] occurs only in recent borrowings, and all of the recent borrowings are roots.⁹

Most languages that have been investigated in some depth reveal a partition of the lexicon into native and nonnative forms, although the synchronic partition does not necessarily reflect the history of each item. On the basis of the small sample that Vago presents, it would appear that all of the roots that can be shown to have mixed vowels in their underlying as well as in their phonetic representations are borrowings. If this is correct for the language in general, then the underlying representations of native roots conform to the requirements of Vowel Harmony; allowing the rule to be applicable to roots explains this relationship.

It has been shown that it is not necessary or desirable to prevent Vowel Harmony from applying to roots. All data are accounted for without this restriction and without an additional Vowel Harmony rule. The present analysis is therefore incompatible with the proposal that nonderived strings cannot undergo nonautomatic phonological rules, and it does not support the Elsewhere Condition on disjunctive ordering. The simplification of the grammar is made possible by adopting the distinction between focal and contextual exceptions to rules (a distinction that is attested by other rules in other languages), and by assigning rule exception features to segments rather than to formatives.

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⁹ This is proposed as the pattern for exceptions to Vowel Harmony in Hungarian. It is not a universal restriction on all [-context] exceptions.

Vago, R. M. (1974) "Vowel Harmony in Hungarian," *Linguistic Inquiry* 5, 243-267.

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Another View
Catherine O'Neil

1. Introductory

In a recent issue of *Linguistic Inquiry*, the vowel harmony issues in phonology are analyzed in a way that is in conflict with the analysis in this article.

The fact that the surface vowels are

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Vowels participate freely with the bika 'bull', and Vago (1974) shows that below, however, Front a

* I am grateful to W. Wood for agreeing with the analysis.

¹ Follows the article, forms in italics are representations of the original.

² Esztergyom.

REMARKS AND REPLIES

- Vago, R. M. (1975) *Hungarian Generative Phonology* (1974 Doctoral dissertation, Harvard University), distributed by the Indiana University Linguistics Club, Bloomington.
 Vago, R. M. (1976) "Theoretical Implications of Hungarian Vowel Harmony," *Linguistic Inquiry* 7, 243-263.

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Another View of the Theoretical Implications of Hungarian Vowel Harmony*
 Catherine O. Ringen

1. Introduction

In a recent issue of this journal, Vago (1976) defends an abstract analysis of Hungarian vowel harmony and claims that this analysis has implications for several important issues in phonological theory. The purpose of this article is to demonstrate that Vago's analysis is incorrect and hence cannot support the theoretical implications he draws from it.

The facts pertinent to the discussion are as follows: Hungarian has fourteen surface vowels, seven long and seven short.¹

	Short			Long			
	Front		Back	Front		Back	
	[-round]	[+round]	[+round]	[-round]	[+round]	[-round]	[+round]
High	i	ū	u	í	ű		ú
Mid		ő	o	é	ó		ó
Low	e = [ɛ]		a = [ɔ]			á	

Vowels participate in front-back harmony. The vowels *i*, *í*, and *é* are neutral and occur freely with both front and back vowels: *tányér* 'plate', *művész* 'artist', *radír* 'eraser', *bika* 'bull', *példa* 'example'. There is some disagreement about the status of *e* ([ɛ]). Vago (1974; 1976) and Stong-Jensen (1973) classify this vowel as neutral. I will argue below, however, that this vowel is best viewed as a harmonic front vowel.²

Front and back harmonic vowels do not cooccur in native noncompound Hungar-

* I am grateful to G. N. Clements, K. Houlihan, A. Koutsoudas, E. Moravesik, L. Schwartz, R. Vago, and W. Wood for reading and commenting on earlier drafts of this article. Although they don't necessarily agree with everything in it, the article has benefited greatly from their helpful comments and suggestions.

¹ Following Vago (1976), I give the vowels in their orthographic representations. Throughout this article, forms enclosed in slashes (/ /) are underlying or intermediate representations, forms that are in italics are orthographic representations, and forms enclosed in square brackets ([/]) are phonetic representations.

² Esztergar (1971) also suggests that *e* is a harmonic vowel.

ian words. Suffix vowels alternate depending on the backness of the harmonic vowels in the roots.³ For example:

(2)		-nak/nek 'to'	-nál/nél 'at'	-tól/tól 'from'
	ház 'house'	ház-nak	ház-nál	ház-tól
	város 'city'	város-nak	város-nál	város-tól
	föld 'earth'	föld-nek	föld-nél	föld-től
	tömeg 'crowd'	tömeg-nek	tömeg-nél	tömeg-től

Vowels in suffixes following roots with only neutral vowels (that is, *i*, *í*, and *e*) are usually front, as illustrated by the forms in (3):

(3)	víz 'water'	víz-nek	víz-nél	víz-tól
	vér 'blood'	vér-nek	vér-nél	vér-tól

There are, however, about fifty neutral vowel roots that require back suffixes:

(4)	híd 'bridge'	híd-nak	híd-nál	híd-tól
	cél 'goal'	cél-nak	cél-nál	cél-tól

When a root has both neutral and harmonic vowels, the harmonic vowel determines the harmonic quality of the suffix vowel: *tányér-nak*, *példá-nak*.

Loanwords often violate the vowel harmony restrictions. For example, the following loanwords contain both front and back harmonic vowels: *soffőr* 'chauffeur', *József* 'Joseph', *amóba* 'amoeba', *október* 'October'. Harmonic vowels in suffixes attached to such disharmonic loanwords usually agree in backness with the last harmonic vowel in the root: *soffőr-nek*, *József-nek*, *amóbá-nak*, *október-től*. However, some loanwords, such as *Ágnes* 'Agnes' and *dzsungel* 'jungle', can have either front or back vowel suffixes. These Vago calls *doublets*: *Ágnes-nek/Ágnes-nak*, *dzsungel-ben/dzsungel-ban*.

Diminutives are formed by adding the suffix *-i* to the initial (C)VC(C) sequence of proper names. For example:

(5)	Teréz > Teri	József > Józsi	Tibor > Tibi
	Klára > Klári	Aladár > Ali	Éva > Évi

2. Vago's (1976) Analysis

Vago (1976) defends an abstract analysis of the fifty neutral vowel roots that require back vowel suffixes. That is, he posits /hi:d/ and /ca:l/ as the underlying representations of *híd* and *cél*, respectively, and assumes a rule of Absolute Neutralization that

³ Some suffixes have three alternates, for example, the suffix *hoz/hez/höz* 'toward' has the form *hoz* after back vowel stems and *hez* or *höz* after front vowel stems, depending on whether the nearest preceding vowel is round or unrounded: *házhoz*, *földhöz*, *vízhez*.

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(6) *Absolute Neutralization (AN)*

$$\begin{bmatrix} \text{V} \\ -\text{low} \\ -\text{round} \end{bmatrix} \rightarrow [-\text{back}]$$

Vago argues that root and suffix harmony are separate processes in Hungarian, and that the former is accounted for by a morpheme structure rule and that the latter is accounted for by *two* phonological rules, marked Vowel Harmony and unmarked Vowel Harmony, ordered as follows:

(7) *(Marked) Vowel Harmony (m)VH*

$$[+\text{syll}] \rightarrow [+back] / \begin{bmatrix} +\text{syll} \\ +\text{back} \end{bmatrix} C_0 \left(\begin{bmatrix} +\text{syll} \\ -\text{back} \\ -\text{round} \end{bmatrix} C_0 \right)_1 \text{ —}$$

(8) *(Unmarked) Vowel Harmony (u)VH*

$$[+\text{syll}] \rightarrow [\alpha\text{back}] / \begin{bmatrix} +\text{syll} \\ \alpha\text{back} \end{bmatrix} C_0 \text{ —}$$

(m)VH skips over neutral vowels and accounts for the backness of suffix vowels following the so-called mixed vowel roots (i.e. roots with both neutral vowels and back vowels): /ta:nye:r+tó:l/ > *tányértól*, /radi:r+nek/ > *radírnak*. (u)VH assimilates a vowel to the backness specification of the preceding vowel, accounting for suffix harmony in forms such as /ha:z+nek/ > *háznak*, /kert+na:l/ > *kertnél*, /hi:d+nek/ > *hídnak* (by AN).

Vago argues that (m)VH and (u)VH cannot be collapsed into a single rule as in (9).

(9) *(u&m) Vowel Harmony*

$$[+\text{syll}] \rightarrow [\alpha\text{back}] / \begin{bmatrix} +\text{syll} \\ \alpha\text{back} \end{bmatrix} C_0 \left(\begin{bmatrix} +\text{syll} \\ -\text{round} \\ -\text{back} \end{bmatrix} C_0 \right)_0 \text{ —}$$

His argument is based on forms such as *József* and *október*, which take only front vowel suffixes (e.g. *Józsefnek*, **Józsefnak*). He argues that only if Vowel Harmony is split into (m)VH and (u)VH can the behavior of suffixes following a form such as *József* and its diminutive *Józsi* be accounted for. In particular, if (m)VH and (u)VH are separate rules, he argues, *József* can be marked [-context (m)VH], which will prevent (m)VH from applying to /jo:žef+nek/, but (u)VH will apply regularly to derive inflected diminutive forms such as *Józsinak* from /jo:ž+i+nek/:⁴

⁴ Actually, Vago uses [-rule X], whereas I have used [-context rule X] in summarizing his argument. Since marking a root such as *József* [-context (m)VH] will not block the application of (m)VH to suffix vowels following this root, I assume that Vago must mean to mark *József* [-context (m)VH] rather than [-context (m)VH]. For arguments against the context rule feature, see Iverson and Ringen (1976).

- | | | | | |
|------|-----------------------------|--------|------------------------------|------------|
| (10) | /jo:žɛf
[-context (m)VH] | + nek/ | /jo:ž
[-context
(m)VH] | + i + nek/ |
| | (u)VH (vacuous) | | | i |
| | (u)VH | | | a |
| | AN | | | i |
| | Józsefnek | | Józsina <i>k</i> | |

Vago proposes that the doublets (e.g. *Ágnesnek/Ágnesnak*) can be accounted for if roots such as *Ágnes* are marked as *optionally conditioning* (m)VH.

To recapitulate: Vago assumes that the fifty neutral vowel roots that govern back vowel harmony have underlying abstract back unrounded vowels. He posits two suffix harmony rules—one that assimilates a vowel to the specification for backness of the preceding vowel, (u)VH, and another that skips over neutral vowels and assimilates a vowel to the closest preceding back vowel, (m)VH; a morpheme structure condition to account for root harmony; and a rule of Absolute Neutralization.

3. Objections to Vago's Analysis

In Vago (1973), where the abstract analysis of Hungarian vowel harmony is advocated, we find the following statement:

- (11) Crothers 1971 demonstrates that, in general, it is possible to come up with non-abstract alternatives to abstract analyses. If everything else remained the same, there would be no controversy. The problem is, though, that by giving up the abstract solution we also have to give up some generalizations and the simplest account of the facts. For instance, the abstract analyses discussed in this paper can be disposed of by breaking up VH, positing extra rules, giving up generalizations about the underlying shape of a lexical item, or simply by substituting the morphological solution. (p. 597)

Ironically, however, what Vago (1976) demonstrates when he makes his abstract analysis of Hungarian vowel harmony explicit is that his analysis involves "breaking up VH, positing extra rules, giving up generalizations". In this section I will show (i) that Vago's separation of root and suffix harmony is unmotivated, (ii) that his separation of suffix harmony into two rules is unmotivated, (iii) that an abstract analysis of the fifty neutral vowel roots that govern back harmony denies rather than captures the exceptional nature of these forms, and (iv) that Vago's analysis is empirically inadequate.

3.1. Root and Suffix Harmony

Vago gives three reasons for separating root and suffix harmony. The first is as follows (1976, 247–248):

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- (12) Let us first consider the description of roots represented by *bika*. Two equally plausible solutions are available. One possibility is that the neutral vowel is abstract underlyingly: e.g. /bika/ The second solution is to admit the neutral status of *i*, *í*, *e*, and *é* at the underlying level in that these vowels are specified as [-back]: e.g. /bika/. Observe the crucial point that if this were the case [which he subsequently argues it must be/CR] VH would have to be prevented from applying within roots: /bika/ is realized as *bika* not **bike*.

But this argument depends on the *assumption* that neutral vowels can condition vowel harmony—which is, of course, not true a priori. Vago rejects the position that neutral vowels do not condition vowel harmony because, he claims, any such analysis would incorrectly predict that all-neutral-vowel roots take the underlying form of the suffix. But this is simply false. It would be possible on this analysis to posit a separate rule or rules to deal with suffixes following all-neutral-vowel roots. Forms like *bika* 'bull' could, therefore, just as well be taken to show that vowel harmony cannot be conditioned by neutral vowels, for if it were, then the vowel harmony rule would have to be split into a root harmony rule and a suffix harmony rule.⁵

Vago's second reason for the separation of root and suffix harmony is as follows (1976, 249):

- (13) There are obvious differences between harmony in suffixes and roots. Suffix harmony is manifested in alternations; phonological rules are the appropriate device to describe regular alternating patterns. Root harmony is static; morpheme structure conditions are appropriate for stating lexical generalizations.

But Vago does not tell us *why* phonological rules are more appropriate to describe regular alternating patterns and morpheme structure conditions more appropriate for stating lexical generalizations. Furthermore, there is a good reason for *not* separating root and suffix harmony: vowel harmony restrictions are the same within morphemes as across morpheme boundaries. If there is a single rule that applies both to roots and suffixes, then this fact is explained. If, on the other hand, we assume two separate processes, there is no reason to expect that the two processes will resemble one another at all, and the fact that they state identical restrictions is claimed to be accidental.

Vago's third argument (1976, 249) is given in (14):

- (14) There exist borrowed root morphemes that are exceptional with respect to morpheme structure conditions: e.g. *sofför* 'chauffeur' has rounded front and back vowels. However, these exceptional roots are entirely regular with respect to suffix harmony; for example, *sofför* takes front vowel suffixes.

⁵ Kiparsky (1968) argues that in Finnish, root and suffix harmony are separate processes. For demonstration that neither of his arguments is valid, see Ringen (1975).

This argument, like Kiparsky's (1968) argument for Finnish on which it is modeled, is a nonsequitur. It is perfectly possible to account for the behavior of harmonic vowels in suffixes attached to disharmonic loanwords without positing separate rules. Disharmonic loanwords can simply be marked as exceptions to the vowel harmony rule.⁶ The lexical entry for the loanword *sofför*, for example, can be assigned the rule feature [-Vowel Harmony], which indicates that this item does not obey the vowel harmony restriction. By general convention such exception features are distributed to every segment in the lexical item, thereby preventing the vowels of this item from undergoing the Vowel Harmony rule. However, the Vowel Harmony rule applies freely to vowels in suffixes attached to this item, because although a segment specified as [-rule X] does not undergo X, it is not prevented from conditioning the application of X to other segments. Vago's arguments, therefore, do not establish that "there are sound reasons for treating suffix harmony and root harmony separately" (1976, 249).

3.2. Suffix Harmony

As noted in section 2, Vago claims that (m)VH and (u)VH cannot be collapsed, because if they were, forms such as *Józsefnek* and *Józsinak* could not both be derived. But his argument depends on the neutral status of *e*.⁷ If, as I have suggested, *e* is not a neutral vowel, but rather a front harmonic vowel, then the fact that (disharmonic) loanwords such as *József* require front suffixes and that the diminutive *Józsi* requires back vowel suffixes is totally predictable: it is the backness of the last harmonic vowel in the root that determines the backness of the suffix vowels.

There are a number of indications that *e* is not a neutral vowel. First, of the fifty neutral vowel roots that require back vowel suffixes (e.g. *hid*), there are none containing *e*. Second, there are no invariable suffixes with *e*; suffixes with underlying /e/ always undergo vowel harmony. In contrast, there are invariable suffixes with the neutral vowels *i* and *é* (e.g. *-ig*, *-ik*, *-ként*, *-ért*). Third, the behavior of harmonic vowels

⁶ According to the theory of exceptions sketched in Chomsky and Halle (1968), each lexical item is either [-rule X] or [+rule X] for all rules in the grammar. A general convention distributes such features to every segment of a lexical item (not of a word). A rule *n* cannot apply to a segment marked [-rule n].

⁷ An anonymous reviewer for this journal insists that Vago's argument against collapsing (m)VH and (u)VH does not depend crucially on the neutral status of *e* because the same conclusion can be derived from the existence of roots that have doublets such as *Ágnes* and *analízis*. I can think of only two possible arguments and neither of them works. The first argument is that if (u)VH and (m)VH were collapsed, then the doublets and the diminutives of the forms with doublets could not be derived correctly by marking the forms with doublets as optionally conditioning the (collapsed) VH rule. Specifically, *analízisnél* could not be derived from /anali:zis+na:l/ and the incorrect **Ágitól* could be derived from /a:g+i+tól/. This argument is circular: Vago's account of the doublets depends crucially on there being two VH rules; hence, the fact that this analysis cannot be maintained if the VH rules are collapsed cannot be used as evidence against collapsing the rules. The second argument is that unless there are two VH rules, the doublets cannot be accounted for at all. This argument is invalid. Assuming a single VH rule (Vago's (10), my (9)), the doublets could be derived in at least two different ways: (i) a separate (optional) rule could be formulated or (ii) the forms with doublets could be marked with an exception feature, no more ad hoc than the one Vago adopts, stating that these forms are optionally exempted from certain subrules of the collapsed VH rule—namely, those that involve expansions of the material inside the ()₀.

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in suffixes that follow the so-called mixed vowel roots containing *e* indicates that *e* is a harmonic vowel. If *e* were a neutral vowel, there would be roots containing a back vowel followed by *e* that required *only* back vowel suffixes (cf. *taxi* 'taxi' *taxiban*, **taxiben*; *radírnak*, **radírnek*; *kávè* 'coffee' *kávéban*, **kávében*). But there are few, if any, such forms; roots with back vowels followed by *e* generally fall into one of two classes. Either like *József* they take only front vowel suffixes, or like *Ágnes* they take both front and back vowel suffixes. Notice what Vago's analysis entails: *All roots with back vowels followed by the putative neutral vowel e are exceptions; there are no regular forms of this type in Vago's analysis.* Either like *József* such forms are marked [-context (m)VH], or like *Ágnes* they are marked as optionally exempted from conditioning (m)VH. If, as Vago claims, *e* were a neutral vowel, there would be some forms in which it behaved like a neutral vowel; since there are none, there is only one possible conclusion: *e* is not a neutral vowel, it is a harmonic vowel. I conclude that what forms like *József* and *október* indicate is *not* as Vago suggests that suffix harmony must be accounted for by two separate rules, but rather that *e* is a harmonic vowel.⁸

3.3. The Treatment of Exceptions

Additional objections can be raised to Vago's treatment of exceptions. The first involves his treatment of the fifty neutral vowel roots that condition back vowel harmony: Vago claims that this is a closed set of exceptional forms. But to posit underlying abstract vowels is to *deny* the exceptionality of the forms and to claim that they are regular "at some deeper level". In no sense can positing abstract segments be considered an exception mechanism as Vago (1973, 600) claims it is. An abstract analysis denies that the set of neutral vowel stems requiring back vowel suffixes is exceptional, and hence such an analysis is incapable of explaining why these forms constitute a closed set and why "recently borrowed roots containing only neutral vowels take front vowel suffixes" (Vago (1974, 91)).

An even more serious objection can be raised to Vago's treatment of the doublets. Recall that Vago suggests that "roots having doublets are optionally exempted from conditioning (m)VH" (1976, 262). Vago apparently intends to mark forms such as

⁸ Although *e* acts like a harmonic vowel in suffixes, it acts like a neutral vowel in some roots: there are native Hungarian roots in which *e* occurs with a back vowel (e.g. *betjár* 'scamp'). This ambiguous status of *e* is a result of the merger of harmonic [ɛ] with neutral [e] as [e] in Modern Standard Hungarian. The fact that root *e* and suffix *e* behave differently could be taken as evidence that root and suffix harmony are separate processes, since otherwise all roots like *betjár* must be marked as [-Vowel Harmony]. However, such separation is unnecessary since the exceptionality of *e* in roots is predictable by a rule of the form:

$$\left[\begin{array}{c} \text{V} \\ +\text{low} \\ -\text{long} \\ -\text{round} \\ -\text{back} \\ +\text{ROOT} \end{array} \right] \rightarrow [-\text{Vowel Harmony}]$$

This rule claims that all *e*'s within roots are, predictably, exempted from undergoing -Vowel Harmony.

/a:gnɛs/ with an exception feature indicating that they optionally condition the otherwise obligatory rule of (m)VH. While it is *possible* that such an exception device could be well motivated, neither Vago nor anyone else has provided such motivation. As it stands, Vago's account of the doublets depends crucially on a totally ad hoc exception mechanism.

3.4. Empirical Adequacy

The final objection to Vago's analysis is that it is empirically inadequate. Vago claims that his rules are ordered (m)VH before (u)VH and that Kiparsky's (1973b) "Elsewhere Condition" predicts their correct disjunctive application. Specifically, if (m)VH applies, then (u)VH is skipped. This application is illustrated in (15). Vago also notes that, in his analysis, vacuous application must count as application as far as the Elsewhere Condition is concerned, for if it did not incorrect outputs would result. This is illustrated in (16):

(15)	/radi:r+tõ:l/	(16)	/radi:r+na:l/	/radi:r+na:l/
	(m)VH radi:r+to:l		(m)VH (vacuous)	(vacuous)
	(u)VH (skipped)		(u)VH (skipped)	radi:r+ne:l
	radirtól		radírnál	*radírnél

Consider now the form *vár-ná-tok* 'you (pl.) would wait'. Vago (1973; 1974) argues that the underlying form of the alternating conditional suffix *na/ne/ná/né* must be /ne/.⁹ Vago (1974) also shows that the underlying form of the (indefinite) second person plural suffix is /tok/. Thus, the underlying form of *várnátok* is /va:r+ne+tok/. As can be seen, Vago's analysis makes the incorrect prediction in this case:

(17)	/va:r+ne+tok/
	(m)VH (vacuous)
	(u)VH (skipped)
	other rules ¹⁰ va:r+ne:+tok
	*várnétok

It might appear that, if the domain of disjunction were defined only with respect to a given focus, this problem would be solved. While this *modification* of the Elsewhere Condition would work in this one case, it cannot be maintained in general. For example, the English stress rule, $V \rightarrow [1 \text{ stress}] / \text{--- } C_0(VC_0^\dagger)\#$, cited by Kiparsky (1973b), would incorrectly derive **edit* if the domain of disjunctivity is assumed to be the focus. (See Howard (1975) for a fuller discussion of the problem of defining the domain of disjunctivity for the Elsewhere Condition.)

⁹ Vago (1974) shows that there is a general rule lengthening a low vowel that is immediately followed by a suffix: $\left[\begin{smallmatrix} +\text{syll} \\ +\text{low} \end{smallmatrix} \right] \rightarrow [+long] / \text{---} + [+seg]$.

¹⁰ See footnote 9 for the formulation of the relevant rule.

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Notice also that this difficulty cannot be overcome by simply reversing the order of (m)VH and (u)VH. Although *várnátok* could be correctly derived if the order of these two rules were reversed, incorrect surface forms would result in other cases. In particular, incorrect surface forms would be derived whenever a mixed vowel root was followed by a suffix containing /e/, /e:/, /a/, or /a:/ that was, in turn, followed by another harmonic vowel.

4. The Diacritic Analysis

Up to this point I have concentrated on the inadequacies of Vago's abstract analysis of Hungarian vowel harmony. I would now like to consider the argument that led Vago to conclude that an abstract solution is the only tenable analysis of Hungarian vowel harmony in the first place. Vago claims that there are three types of analyses of Hungarian vowel harmony: rule feature, diacritic, and abstract. He argues for an abstract analysis by arguing against the rule feature analysis and against the diacritic analysis. According to the rule feature analysis, which was proposed by Kiparsky (1968), all harmonic suffix vowels have underlying back vowels, and vowel harmony is a rule that fronts suffix vowels after roots containing only front vowels. Forms such as *híd* are marked with a rule feature that prevents them from conditioning vowel harmony.

Vago argues that Kiparsky's rule feature analysis is untenable because the harmonic vowels in certain suffixes cannot be analyzed as having underlying back vowels as Kiparsky's analysis requires.¹¹ In particular, certain suffixes occur as independent stems to which personal suffixes are attached; for example:

- (18) *tól-em* 'from me' *nek-em* 'to me' *nál-am* 'at me'
 tól-ed 'from you' *nek-ed* 'to you' *nál-ad* 'at you'

This is good evidence that the underlying forms of these suffixes are /to:l/, /nek/, and /na:l/, respectively. Now consider what this means for Kiparsky's rule feature analysis: if the underlying form of *nek* is /nek/, and roots such as *híd* are marked as [-context VH] as Kiparsky suggests they should be,¹² then **hídnék* and **célnék* would be derived. If these forms are *not* so marked with a rule feature, exactly the same incorrect forms would be derived. Vago thus correctly concludes that Kiparsky's rule feature analysis must be rejected.

Vago argues against the diacritic analysis of vowel harmony as follows. First, he notes that the diminutive evidence shows that Lightner's (1965) analysis of vowel harmony is untenable.¹³ In particular, according to Lightner's analysis of vowel

¹¹ This same argument is given by Stong-Jensen (1973) and Esztergar (1971).

¹² Actually, Kiparsky suggests forms like *híd* should be marked [-Vowel Harmony]; as noted in footnote 4, marking a root with a negative rule feature will not prevent the application of that rule to suffixes following that root.

¹³ The inadequacy of Lightner's analysis has been demonstrated elsewhere. See for example, Foster (1969), Kiparsky (1968), Lightner (1972).

harmony, all vowels are unspecified for backness in the lexicon and a morpheme-sized diacritic is associated with each root. This diacritic feature is distributed to each segment in a word and, by a quasi-phonological rule, determines the specification of the phonological feature [\pm back] for the vowels in the word. Thus, for example, the underlying representation of *Tibor* would be /_[+GRAVE] t**i**bO**r**/, where capital letters indicate segments unspecified for the feature [\pm back], and [+GRAVE] is a diacritic marker associated with the root. As Vago notes, Lightner's analysis makes the wrong predictions about the inflected diminutive forms: /_[+GRAVE] t**i**b + I+kA/ > **Tibika* rather than *Tibike*. Second, Vago argues that "the phonological use of features not connected with the speech event is highly undesirable and misses the obvious generalization that vowel harmony, for the most part, is a phonetically motivated assimilation phenomenon" (1976, 249) [emphasis added]. Third, he claims that "no single diacritic feature can predict the correct harmonic shapes of the vowels in roots like *soffór*" (1976, 249).

But Vago is setting up a straw man here. The problems with Lightner's analysis are well-known and, as far as I know, no one today would defend such a use of diacritics, Lightner included.¹⁴ What is at issue is *not* whether the phonetically conditioned aspects of vowel harmony should be accounted for with a diacritic marker, but whether that *part* of vowel harmony that is *not* phonetically motivated is appropriately handled with a diacritic marker, i.e. whether the neutral vowel roots that require back vowel suffixes should be marked with a diacritic that conditions the backing of harmonic vowels in their suffixes. Vago has not shown that this is not a viable alternative analysis of Hungarian vowel harmony. For discussion of such an analysis, see Ringen (to appear).

5. Conclusion

I have shown that Vago's analysis involves an unmotivated proliferation of vowel harmony rules, that his account of the exceptional fifty neutral vowel roots is inadequate, and that his analysis makes incorrect empirical predictions. I have also shown that Vago has not demonstrated the inadequacy of a diacritic analysis of forms like *hid*. For these reasons, I conclude that (i) the question of how Hungarian vowel harmony should be characterized remains completely open and (ii) Vago has not provided support for the theoretical implications he claims to have established.

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¹⁴ For Lightner's more recent views on (Turkish) vowel harmony, see Lightner (1972).

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Some Controversial Questions Concerning the Description of Vowel Harmony*
Robert M. Vago

1. Introduction

Jensen (1978), Phelps (1978), and Ringen (1978) are welcome contributions to the debate concerning vowel harmony in Hungarian, which has significant import for the general description of vowel harmony.

The purpose of this reply is to refute the criticisms of Vago (1976) raised by these authors, and to amplify the analysis and theoretical implications proposed in my 1976 article.¹ It will be concluded that except for a possible minor revision, no major modifications need be made.

2. Root Harmony

One of the criticisms shared by Jensen, Phelps, and Ringen is that the Diminutive Evidence does not conclusively establish that the rule (or rules) of Vowel Harmony (henceforth VH) does not apply to basic root vowels. Ringen's VH rule is not conditioned by neutral vowels; neutral vowel roots trigger a separate fronting rule. The analysis is developed fully in Ringen (to appear). My evaluation of Ringen's nonabstract approach is included in Vago (to appear). Here I will react to Jensen's and Phelps's claim that VH accounts for root harmony as well as suffix harmony.²

To prevent the fronting of back vowels in mixed vowel roots like *Tibor* that have diminutive forms, Jensen and Phelps posit a focal exception feature; Jensen's feature is morpheme-sized (e.g. /tibor/), Phelps's is segment-sized (e.g. /tib o r/). In both cases, the back vowel determines harmony in suffixes and the front (neutral) vowel determines harmony in diminutives.

For mixed vowel roots like *bika* 'bull' that have no diminutive forms, Jensen and Phelps assume an abstract back vowel in the initial syllable; Jensen allows for the possibility of a focal exception feature. If one is interested in a grammar that produces the correct surface forms, then either of these analyses will do. However, if one is concerned about a grammar that, in addition to producing the correct forms, is "psychologically real", i.e. reflects the intuition of native speakers, then neither the abstract nor the exception feature analysis is acceptable.

As for the first alternative, it is bizarre to crucially base the underlying representation of a root on the occurrence or nonoccurrence of the related diminutive. A pertinent example is *isi*, which *some* school-aged children use for *iskola* 'school'; the case inflections are *isibe*, *isitól*, and so on. What should the underlying representation of

* I am indebted to Catherine Ringen for comments.

¹ For the sake of continuity and the most efficacious evaluation, it is advisable to read Vago (1976) first, Jensen's, Phelps's, and Ringen's replies next, and this rejoinder last.

² Since Jensen and Phelps are not opponents of abstract phonology, I leave this issue aside.

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iskola contain? An exception feature in case the grammar has *isi*, an abstract vowel otherwise? Closely related dialects should not be described this way. But more significantly, if native Hungarian speakers were to construct hypothetical diminutives for mixed vowel roots like *bika*, the diminutives would govern front harmony. Thus, all speakers would say *isibe* and not **isiba*. This shows that the initial neutral vowel is front underlyingly.

The second alternative is more consistent: every mixed vowel root that contains a neutral vowel in the initial syllable is a focal exception to VH. However, in that case the lexicon would contain a very large number of exceptions, since roots like *bika* are numerous. Also, in no sense do native speakers consider these roots aberrant.

Jensen and Phelps (as well as Ringen) claim that disharmonic roots like *sofför* 'chauffeur' are focal exceptions to VH. But the claim that roots like *bika* and *sofför* are both exceptional runs counter to the native intuition. While disharmonic roots are certainly felt to be "awkward" or "foreign", mixed vowel roots are felt to be just as "acceptable" or "regular" as front or back vowel roots.

In brief, if one accepts the arguments presented above and in Vago (1976) against assuming abstract back vowels for mixed vowel roots like *Tibor* and *bika*, then the underlying and surface vowels of these roots have the same value for backness. In that case these mixed vowel roots can be analyzed as regular or exceptional. Now it is reasonable to maintain, indeed it is customarily acknowledged, that one opts for regularity over exceptionality, *unless* (a), there is independent evidence for the exception analysis, or (b), there is independent evidence against the regular analysis.

There are no arguments of which I am aware that roots like *bika* *must* be analyzed as focal exceptions.³ Nor is there any evidence that I know of against claiming that these roots are perfectly regular. Therefore, the noninitial vowels of mixed vowel roots like *bika* are not focal exceptions. As a consequence, VH does not apply to basic root vowels.⁴

As mentioned above, there is no positive evidence for allowing VH to apply to root vowels. Only disconfirming evidence exists: mixed vowel roots and disharmonic roots. I claim these roots reveal a generalization; Jensen and Phelps claim these facts are exceptions. What they have done is to show that the less restrictive theory is possible. But that is trivial and uninteresting, as long as a case can be made for the more restrictive theory.

In the more restrictive theory, root harmony is described by a morpheme structure condition. Critics, including Jensen, Phelps, and Ringen, claim that this theory misses a generalization: the morpheme structure condition duplicates VH. However, when examined more closely, there is no duplication at all: the effects are the same, or nearly the same, the contents are not. The morpheme structure condition simply states that

³ Positive evidence for allowing VH to apply to root vowels would be rule-governed alternations like *Tibor/Tibör*; these would be optional exceptions. But such forms are nonexistent.

⁴ This is not an a priori restriction, as Jensen claims: it is ex post facto.

morphemes may not have both back vowels and rounded front vowels.⁵ This negative condition is supplemented and reinforced at the word level by VH in a positive manner. Note in particular that neutral vowels are irrelevant to the morpheme structure condition; as for VH, neutral vowels may be the focus or the determinant, or they may intervene between the focus and the determinant.

It is not unusual for morpheme structure conditions and phonological rules to "conspire" to yield representations obeying some phonotactic constraint. Note that constraints on underlying representations have to be expressed in any theory that distinguishes between an underlying level and a surface level. If morpheme structure conditions are real, then they can be utilized to express generalizations about underlying representations.

Last, root harmony differs from suffix harmony in at least three respects:⁶ intramorphemic cooccurrence restrictions on vowels can be violated in roots (disharmonic roots) but not in suffixes; roots but not suffixes may be contextual exceptions; and suffix vowels alternate harmonically, (basic) root vowels do not. If root harmony and suffix harmony are different phenomena, they should be described differently.

3. Exceptions

To account for exceptions to vowel harmony, Phelps postulates two types of exception features: focal and contextual. These exception features are assigned to segments, not morphemes.

A theory that allows only morpheme-sized exception features is clearly more restrictive than a theory that allows segment-sized exception features: it makes the strong claim that the segments of a morpheme must *all* be either regular or exceptional with respect to a rule.⁷ In order to relax this restriction, it must first be proven false. The most obvious way to falsify the morpheme-sized exception feature theory would be to show that there exist morphemes of the form +ABC+, where at least two of the segments A, B, C are potential foci to a phonological rule, and where in fact the rule applies to only one of the segments.

As for exceptions to VH, root morphemes are not the best examples: the treatment of root harmony is controversial. And I know of no polysyllabic suffix, in any vowel harmony system, where VH *must* be prevented from applying to only one of the

⁵ The formal description of this condition, which Phelps wants me to provide, can be found in Vago (1974), a source Phelps consulted.

⁶ Regarding Phelps's fn. 3: I cannot find any statement on p. 260 of Vago (1976) to which Phelps's comment is relevant. If she has the sentence "Moreover, root harmony and suffix harmony have distinct exception classes" (p. 249) in mind, and this is the only statement in my 1976 article that is pertinent to Phelps's comment, then, clearly, Phelps's inference that "vowel harmony in roots is *universally* different from vowel harmony in affixes" (emphasis mine), which she attributes to me, is improper.

⁷ In claiming that it is not "necessary" to assume that exception features are morpheme-sized, Phelps implies that the less restrictive position is possible. Rather, it is necessary for Phelps to show that the more restrictive position is too narrow.

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Last, Phelps's theory of exceptions is too rich. She allows both focal and contextual exceptions for roots; in fn. 9, she allows the same for suffixes. As for suffixes, the evidence in Hungarian (Vago (1974: ms)) and, more broadly, in Uralic and Altaic languages (Vago (1973)) suggests that only focal exceptions occur. If root vowels are not foci to VH, then it seems possible to maintain a narrower set of exceptions: root exceptions are contextual and suffix exceptions are focal, at least as far as vowel harmony is concerned.¹⁰

Jensen's account of the optionally exceptional vacillating roots is simply observationally inadequate. His VH rule is the same as my (u)VH, reproduced in (7) below; all his exceptions are focal. Thus, roots like *József* are obligatorily exempted from undergoing VH; a suffix vowel, therefore, assimilates to the last (front) vowel of the root. Vacillating roots like *Ágnes* are optionally exempted from undergoing VH; this optionality results in doublet suffixes.

Two problems come immediately to mind. First, in vacillating roots VH incorrectly converts the low vowel *e* to *a* (in backing environments). For example:

- (5) a. /ágnés+nek/ → *Ágnesnek*
 [-VH]
 b. /ágnés+nek/ → **Ágnasnak*

Note that the vowel *e* must be low: it is the source of the *a/e* alternation in some suffixes (including *-nak/nek*).¹¹ A mid *e* would always show up as front by the Absolute Neutralization rule Jensen assumes.

Second, Jensen does not account for the harmonizing behavior of vacillating disharmonic roots. These roots contain a back vowel, a front rounded vowel, and a neutral vowel in the final syllable. For example, *rökamié* (*rekamié*) 'sofa bed, convertible sofa' and *föderatív* (*federatív*) or *föderális* (*federális*) 'federal' can have doublets. The same is true for foreign words like *Chevalier*, where the first vowel is pronounced as *ō*.

The problem is that disharmonic roots are obligatory exceptions to VH while vacillating roots are optional exceptions. The obligatory marking does not allow the derivation of the back vowel alternants of doublets, and the optional marking allows, incorrectly, assimilation to the first vowel.¹²

Inasmuch as Jensen's one-rule analysis of a set of mixed vowel roots is untenable, the theoretical points he raises (section 3) are moot.¹³

¹⁰ This theory is assumed in Vago (1973).

¹¹ The arguments for underlying front vowel suffixes are given in Jensen (1974) and Vago (1973).

¹² If mixed vowel roots do not contain initial abstract vowels, then vacillating roots like *Tihamér* (proper name), *financier*, and *Chevrolet* are also problematical. The last two roots are obviously nonnative. It would be unreasonable to claim that these have abstract vowels.

¹³ In section 3.2, Jensen wonders what I mean by "adjacent assimilation". It is obvious that for VH, adjacency refers to syllables. Furthermore, Jensen interprets my approach as a "minor rule analysis". In reality, I assume no minor rules or minor rule features. The confusion has to do with my analysis of vacillating roots, which I mark with a feature optionally exempting them (not *conditioning* them, as Ringen states in section 2) from serving as context to (m)VH: cf. Vago (1976, 262).

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Ringen voices two objections to my treatment of exceptions. The first has to do with my analysis of neutral vowel roots that govern back harmony; I call these abstract vowel roots. It is undeniable that the surface facts render these roots exceptional in some sense. Ringen states: "In no sense can positing abstract segments be considered an exception mechanism as Vago (1973, 600) claims it is." I submit though that the abstract analysis does not deny exceptionality. Exceptionality is inferred from the surface facts. Let us define an exception as a phonetic substring that matches the structural description of an obligatory rule. Let us further define an analytical device that causes the derivation of exceptional surface representations as an "exception mechanism". Now the *treatment* of (surface) exceptions is a separate problem. One possible analysis is to posit lexical exception features. Another possibility is to posit abstract underlying segments. Since these segments necessarily undergo absolute neutralization, the abstract analysis derives surface exceptions; hence, it is an exception mechanism.

Second, Ringen claims that no motivation has been advanced for an optional contextual exception feature. I posit such an exception mechanism with respect to (m)VH for vacillating roots like *Ágnes*. It is not clear if Ringen objects to contextual exceptions or optional exceptions. Relatively detailed analyses of phonological patterns are likely to yield examples of contextual exceptions. In fact, this type of exceptionality seems well established; see for example Kenstowicz and Kisseberth (1977, 114-122) and Vago (ms). Optional exceptionality is more controversial. I cannot adduce independent motivation for this type of exceptionality in this space; sufficient examples are discussed in Vago (ms). I will merely point out that if the arguments against harmonizing root vowels are accepted, then the doublets provide evidence not only for the rule of (m)VH but also for optional (contextual) exception features. Alternatively, (m)VH can be an optional rule; I return to this possibility in section 6.

4. Domain of Disjunction and Rule Application

In Vago (1976) I posit the following two rules to account for suffix harmony in Hungarian:

(6) (m)VH

$$[+syll] \rightarrow [+back] / \left[\begin{array}{c} +syll \\ +back \end{array} \right] C_0 \left(\left[\begin{array}{c} +syll \\ -back \\ -round \end{array} \right] C_0 \right) _$$

(7) (u)VH

$$[+syll] \rightarrow [\alpha back] / \left[\begin{array}{c} +syll \\ \alpha back \end{array} \right] C_0 _$$

I argue further that these rules apply disjunctively, (m)VH preceding (u)VH. I also show that the disjunctive relation prevents the application of (u)VH in case (m)VH applies vacuously.

Ringen claims that the above analysis derives a set of incorrect surface forms. To use Ringen's example, if (m)VH is checked for applicability in the well-motivated underlying representation /vár+ne+tok/ 'you (pl.) would wait', it applies vacuously to /tok/; disjunctivity prevents the application of (u)VH to /ne/; after the lengthening of morpheme-final *e* before the suffix /tok/, the incorrect form *várⁿétok is produced.

Ringen notices that a possible solution is to claim that disjunctivity is invoked if and only if both rules are applicable to the *same* focus (= segmental disjunction). Thus, in /radir+tól/, after (m)VH backs the vowel of the suffix, (u)VH cannot apply to the same vowel, but in /vár+ne+tok/, after (m)VH applies vacuously to the vowel of /tok/, (u)VH can still apply to the vowel of /ne/. But in that case, Ringen goes on, disjunctivity does not obtain in the assignment of stress in English. Thus, the rule $V \rightarrow [1 \text{ stress}] / \text{--- } C_0 (VC_0)\#$ would incorrectly stress both vowels of *edit*.

However, Ringen errs in drawing the conclusion that the domain of disjunction should be the same for the vowel harmony rules in Hungarian and for the subrules of the English stress assignment rule. In the same section, she refers to the work of Howard (1975), but apparently overlooks Howard's statement concerning the domain of disjunction if Kiparsky's "Elsewhere Condition" is accepted (p. 124): "With stress rules, the domain of disjunction *cannot* be segmental disjunction; but with non-accent rules, the domain of disjunction *must* be segmental disjunction." In this view, the shorter subrule of the English stress rule can be prevented from applying if the longer subrule has applied, but in Hungarian, (u)VH can follow (m)VH, provided that the two have different foci. Thus:

(8)	/vár+ne+tok/	
	(m)VH	o (vacuous)
	(u)VH	a
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There is yet another difference between the Hungarian and the English rules: (u)VH and (m)VH are rightward directional (the focus is to the right of the determinant), but the stress assignment rule is leftward directional (the focus is to the left of the determinant), in the sense of Howard (1972). It appears that rightward and leftward directional rules that are disjunctively related are expanded differently. In the case of leftward directional rules, the most specific (sub)rule applies first. In the case of rightward directional rules, that (sub)rule is applied first which is applicable to the *leftmost* focus in the string.¹⁴ According to this view, (u)VH backs the vowel of /ne/, and applies vacuously to the vowel of /tok/.¹⁵

¹⁴ If more than one (sub)rule can apply to the leftmost focus, then the most specific one applies. The above proposal is justified in Vago (1977).

¹⁵ It is also possible to modify (m)VH so that it disregards only those neutral vowels that belong to a root.

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In any case, there is no problem of empirical inadequacy with (m)VH and (u)VH in the grammar.

5. Neutral Vowels

Ringen presents three arguments against considering *e* to be a neutral vowel. These arguments purport to show that *e* patterns differently from the "genuinely" neutral vowels *i*, *í*, and *é*. The conclusion is that *e* is a harmonic vowel.

The first argument is that neutral vowel roots that govern back harmony contain *i*, *í*, and *é*, but not *e*. In the abstract analysis, the underlying vowels of these roots are back, not neutral. At any rate, this "gap" has a historical explanation. All but two of the abstract vowel roots contain /i/ or /í/; the two that contain /ɛ/ are secondary developments. When the fronting of unrounded back vowels is supposed to have taken place, Hungarian is presumed to have had /i/ but not /ɛ/; long /í/ comes from /i/ by the loss of final reduced vowels with concomitant compensatory lengthening.

The second argument is that invariable suffixes contain *i* and *é*, but not *e*.¹⁶ But there is a principled reason why *e* always alternates. In the abstract analysis, there are no exceptional front vowel invariable suffixes; suffixes with *i* and *é* undergo VH and the alternants with *í* and *é* are fronted by the Absolute Neutralization rule. In this system an invariable *e* would have to be derived from /ɛ/, since /e/ alternates with *a*. However, there is no independent justification for /ɛ/.

The third argument is that almost all, if not all, mixed vowel roots containing *e* in the final syllable, unlike those containing *i*, *í*, or *é*, are either optional or obligatory contextual exceptions. But this is a specious argument, since if *e* is a harmonic vowel, then *all* roots containing *e* and a back vowel are focal exceptions, a disastrous consequence.

In brief, while it is true that the harmonizing behavior of *e* differs in some respects from that of *i*, *í*, and *é*, the conclusion that *e* is a harmonic vowel is not warranted. It seems to me that the proper conclusion to draw is that the criterion for neutral vowel status is not harmonizing behavior, but rather cooccurrence with mutually exclusive harmonic sets. Another criterion might be possible occurrence between the focus and the determinant of the assimilation process. In both regards, *e* is a neutral vowel.

6. Loanwords

There are indications that adjacent assimilation is preferred after mixed vowel roots that contain a final *e* or *é* or more than one neutral vowel in the final syllables. Newer loanwords like *bankett* 'banquet', *kabaré* 'cabaret', and *aszpirin* 'aspirin' vacillate, with preference for front vowels, by and large. As Ringen observes, roots containing a back vowel followed by *e* in the final syllable generally govern front harmony exclusively, or

¹⁶ In fact, *í* does not occur underlyingly either.

vacillate between front and back harmony. Roots like *bázis* 'base', which contain a single occurrence of *i* or *í* after a back vowel, always or nearly always govern back harmony exclusively. Older roots (native or borrowed) like *tányér* 'plate' and *kávét* 'coffee' govern back harmony exclusively.

The above facts seem to indicate that (m)VH is becoming optional under certain conditions. The motivation for this change seems to be preference for the more natural adjacent assimilation. The explanation for the fact that a single occurrence of *i* or *í* resists adjacent assimilation, most of the time, may very well be found in the distribution of neutral vowels in mixed vowel roots. The older layer of the vocabulary contains numerous roots of the shape back vowel followed by a single *i* or *í*. A switch in the harmonizing behavior of these roots would involve extensive "relearning". Also, the quintessential neutral vowel in back/front vowel harmony systems is front, high, and unrounded; this vowel is kept truly neutral. Perhaps these facts explain why the back harmony character of abstract vowel roots is stable.

Phelps is right in claiming that older borrowings should be more assimilated to the native phonology than newer borrowings. But comparing the pattern of *József* to that of *Ágnes* is not reasonable: exceptional patterning should not be compared to general patterning.

If (m)VH is obligatory, then, among older loans, *József*, *november*, and *október* behave *exceptionally*.¹⁷ Other loans, like *kávét*, are entirely regular; that is, they govern back harmony. When compared to the vacillating newer loans, which are optionally exceptional, the older ones are indeed more assimilated.

If (m)VH is optional, then we have a different picture. Roots like *kávét* are relics, i.e. exceptions. The change from obligatory to optional application of (m)VH (not including a single final *i* or *í* in the root) affects primarily new additions to the vocabulary. In this light, relative degree of assimilation is not the appropriate comparison to make between older and newer loanwords. Rather, the native vocabulary and older borrowings resist an innovation, hardly an atypical example.

7. Conclusion

I have suggested that under certain conditions (m)VH might be an optional rule in the present state of Hungarian. The harmonizing characteristics of recent loanwords (and, incidentally, foreign and nonsense words) seem to support this revision. Otherwise, I have found none of the arguments presented by Jensen, Phelps, and Ringen compelling enough to retract the analyses and conclusions proposed in Vago (1976).

One final comment about basic research methodology. I adhere to the position that in making claims about the structure of a language one advances the most restrictive, most general theory until contradictory empirical evidence is unearthed. I believe many

¹⁷ As pointed out in Vago (1976, fn. 19), *József* used to govern back harmony. This change from back harmonic class to front (in some dialects) is isolated, as far as I can tell. A possible motivation is adjacent assimilation.

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¹⁸ There is also the independent

of the theoretical controversies and debates concerning the analysis of individual languages we witness on the pages of reputable publications can be laid to rest by this basic principle. Accordingly, as far as the Hungarian vowel harmony system is concerned, the strongest and still observationally adequate theory dictates that the independent or pronominal forms of case suffixes and the truncated diminutives be taken as evidence for the harmonic class of nonsuppletive case suffixes and untruncated nouns;¹⁸ that the Diminutive Evidence be generalized to all mixed vowel roots with an initial neutral vowel; that exceptions may not refer to the subrules of a rule schema; and that exceptions may not be segment-sized. A theory short of these claims reduces otherwise general and regular sound patterns to mere happenstance.

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¹⁸ There exist suppletive relations. For example, the suppressive case suffix *-onlónlen* 'on top of' has the independent form *raji- (rajtam)* 'on top of me', etc.; the diminutive of the proper name *György* is *Gyuri*.