

Vowel harmony, rule formats and underspecification: the dialect of Francavilla-Fontana

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0. INTRODUCTION

Vowel harmony in the Apulian (Southern Italy) dialect of Francavilla-Fontana has recently attracted attention because of the rather complex alternations resulting from it. In Calabrese (1985) an attempt was made to explain these harmony processes by way of underspecification and a new rule format. The purpose of the present paper is to show that the rule format, although interesting in itself, is inadequate from a theoretical as well as from an empirical point of view. Furthermore, it will be argued that once a model of Lexical Phonology along the lines of Kiparsky (1985) has been assumed, the data can be derived by way of quite simple autosegmental spreading operations. Third, given the relation between vowel harmony and diphthongization in the dialect, we will investigate the nature and representation of diphthongs, a relatively unexplored field of research.

The dialect referred to exhibits vowel harmony with respect to three features: [HIGH], [BACK] and [ROUND]. Height harmony is traditionally called "metaphony", a term which will be used here as well. The interaction between the harmonic features and the special status of diphthongs in this respect, a problem treated in Sezer and Wetzels (1986a,b) for Hungarian, Uygur and Yakut, is one of the topics of the present paper.

A second problem is the strange behavior of the vowel [a] with respect to [+HIGH] harmony. In an underspecification model one would expect the [a], being [+LOW] and therefore redundantly [-HIGH], to behave as the neutral vowel. However, underlying [a] is only in part neutral, and can be opaque as well. This state of affairs raises serious theoretical questions.

A third interesting aspect of the dialect is the result of [+HIGH] harmony. The stressed vowels [e] and [o], in metaphonic environments, develop into their high counterparts [i] and [u]. Stressed [ɛ] and [ɔ] in harmonic environments give rise to the diphthongs [iɛ] and [uɛ]. Unstressed [ɛ] and [ɔ] on the other hand are raised to [i] and [u]. First, we must establish the exact conditions under which these vowels diphthongize. Next, the

nature of diphthongs in the dialect has to be investigated, in particular whether they are mono- or bipositional, why the metaphonic diphthongs are rising, and how the second element [ɛ] is to be accounted for ([uɛ] suggests a kind of epenthesis).

In section 1, data on vowel harmony in Francavilla-Fontana will be presented. These data are taken from Calabrese (1985), Ribezzo (1911-'12) and Rohlfs (1956-'61). We will formalize the relevant rules and investigate the environments of their application. Section 2 contains our analysis of metaphony, and especially of metaphonic diphthongization. It will be shown that diphthongs in the dialect have various sources, but are all subject to one constraint, which is partly responsible for [iɛ] and [uɛ] as metaphonic products of [ɛ] and [ɔ]. The analysis presented in Calabrese (1985) is shown to be inadequate with regard to several aspects of the diphthongs. Vowel harmony phenomena like metaphony are not merely restricted to this dialect, but appear in many variants of Italian. The data however, and therefore the exact rules responsible for them, differ very much, even between neighboring villages. On several occasions we will mention data from other dialects and we will indicate how our analysis might be extended to cover these too. For example, two dialects might have the same rule of metaphony, but different conditions on its application. By formalizing these differences we can arrive at a more general picture of the phenomenon in the Italian linguistic area as a whole.

1. DATA

The data on the vocalic system of the dialect are not unambiguous. As to the existence of the vowels [i], [ɛ], [a], [ɔ] and [u], all sources agree. Calabrese (1985) proposes surface [e] and [o] as well, while Rohlfs (1956-'61) presents the relevant items with [ɛ] and [ɔ]. Ribezzo (1911-'12) is unclear. The oppositions [e] vs. [ɛ] and [o] vs. [ɔ] are crucial to Calabrese's analysis. They exist in most Italian dialects. We will suppose with Calabrese that the oppositions are relevant to Francavilla-Fontana as well. Perhaps the difference between the various sources is due to different diachronic stadia. We will not go into that problem here.

(1)		<i>gloss</i>		<i>gloss</i>	
	[i]:	[vɪvu]	alive	[ɛ]: [pɛssi]	fish
		[kunɪggɪu]	rabbit	[nɛi]	snow
		[vɪta]	screw	[fitɛli]	fidelity
	[ɛ]:	[pɛkura]	sheep	[a]: [mári]	sea
		[dɛnti]	tooth	[káni]	dog
		[tʃɛdda]	cell	[sándʒi]	blood

Vowel harmon

[ɔ]: [ɛ]
[ɪ]
[ɪ]
[u]: [ɪ]
[ɪ]
[ɪ]
(Rohlfs)

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position the m
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(2)

*[mɛtu]

[pɛssi]
[mónuɪ]
[kóta]

[sɛntu]
[krɛu]
[trɔu]
[kanósl]
(Rohlfs)

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(3)

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[ɔ]: [fɔrti]	strong	[o]: [kóta]	tail
[mórti]	dead	[króna]	crown
[mónuku]	monk	[tórri]	tower
[u]: [múlu]	mule		
[lúna]	moon		
[núdda]	nothing		

(Rohlf's 1956-'61)

The seven vowel system is restricted to stressed syllables. In unstressed position the mid vowels are raised to [i] and [u]. This can be demonstrated by way of the following alternations:

(2)	*[métuku]	<i>gloss</i> physician (male)	vs.	[mitikéssa]	<i>gloss</i> physician (female)
	[péssi]	fish		[piskatrití]	kind of frog
	[mónuku]	monk		[munatfiéddu]	monklike ghost
	[kóta]	tail		[kutédda]	neck
	[séntu]	vs. [sintímu]	<i>gloss</i> feel,	1.pers. sing./plur. pres.ind.	
	[kréu]	[kritiámu]	believe,	id.	
	[tróu]	[truámu]	find,	id.	
	[kanósku]	[kanuʃímu]	know,	id.	

(Rohlf's 1956-'61, Calabrese 1985)

Addition of a stressed suffix causes destressing of the originally stressed vowels of the lexical stem in the examples in (2). The destressed mid vowels surface as their high counterparts [i] and [u]. We formulate the following rule.

(3)	V	→	[+HIGH] /	[<u> </u>]
				[-STRESS]
	[αBACK]			
	[αRND]			

This is a specific case of a rather general phenomenon of unstressed vowel raising, observable in many Romance languages and dialects (cf. Standard Italian and Brazilian Portuguese, where seven stressed vowels are reduced to five: [e] and [ɔ] become [e] and [o]).

Alternations resulting from metaphony, the main topic of this paper, are given in (4).

(4)	<i>fem. sing.</i>	<i>male sing./plur.</i>	<i>fem. plur.</i>	<i>gloss</i>
	[lénta]	vs. [liéntu], [liénti]	but: [lénti]	slow (adj.)
	[frédda]	[fríddu], [fríddi]	[fréddi]	cold id.
	[gróssa]	[gruéssu], [gruéssi]	[gróssi]	big id.
	[pilósa]	[pilúsu], [pilúsi]	[pilósi]	hairy id.
	(Rohlf's 1956-'61)			

It is clear that metaphony is a rule of partial, regressive vowel harmony, triggered by a high unstressed vowel. A preceding unstressed high vowel, like in [pilósa], does not cause raising of the following vowels. The target vowels [e] and [o] are raised to [i] and [u], respectively (note the difference with the previously discussed raising rule (3), which applies to unstressed vowels only). The target vowels [ɛ] and [ɔ] diphthongize into [iɛ] and [uɛ]. The fourth column in (4) displays exceptional forms, high vowels but no metaphony of the preceding stressed vowels. We will return to this later.

The data in (5) suggest that the triggering high vowel must be word-final as well (taken from Calabrese 1985:55).

(5)			<i>morphology</i>	<i>gloss</i>
	[pérsika]	not *[piérsika]	[pérsik]+[a]	peach
	[fémmina]	*[fímmina]	[fémmin]+[a]	woman
	[tólíka]	*[tuélíka]	[tólík]+[a]	bean
	[duméníka]	*[duminíka]	[duménik]+[a]	sunday

Of course we might stipulate that metaphony is triggered only by word-final high vowels, or else, that the penultimate high vowels in (5) are underlying nonhigh vowels, raised by rule (3), as proposed by Calabrese (1985:56). These, however, would be rather trivial solutions. The morphology of the examples in (5) points in another direction. The high vowels are part of the lexical stem ([pérsik] etc.), while the final high vowels we considered in (4) are case morphemes, the addition of which creates a derived environment. Metaphony might be a cyclic rule, subject to the Strict Cycle Condition. To check this hypothesis we consider the data in (6) (taken from Rohlf's 1956-'61).

(6)			<i>gloss</i>
	[péjfu]	not *[piéjfu]	worse (adv.)
	[spétfi]	*[spiétfi]	special (adv.)
	[krétu]	*[kriétu]	behind
	[tjékku]	*[tjiékku]	except

Vowel harmon

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(7)	[détʃi]
	[ditʃitʃ]
	[dúditʃ]
	[trititʃi]
	[sititʃi]
	[tiérsu]
	(Rohlf's)

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(8)	[arkéstu]
	[ddirra]
	[ritʃétu]
	[sótú]
	[fangót]
	[ddzilé]
	(Rohlf's)

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Italian in general has very few underived surface items. Nouns, adjectives and verbs are always derived, many adverbs as well. One syllable words, like articles, most prepositions and pronomina, are irrelevant, because metaphony requires at least two vowels. The scarce data gathered in (6) are an indication of the relevance of the cycle: final high vowels and yet no metaphony in underived items. Additional evidence comes from numerals, which can be derived and underived.

(7)	<i>gloss</i>	<i>morphology</i>	<i>gloss</i>
	[dét̃i]	ten	
	[dit̃itót̃tu]	eighteen	[dét̃i] + [ót̃tu] ten + eight
	[dúdit̃i]	twelve	[dóc] + [dét̃i] two + ten
	[trít̃it̃i]	thirteen	[tré] + [dét̃i] three + ten
	[sít̃it̃i]	sixteen	[séi] + [dét̃i] six + ten
	[tiérsu]	third	[társ] + [u]

(Rohlf's 1956-'61, Ribezzo 1911-'12)¹

In the underived item [dét̃i] metaphony does not apply. [dit̃itót̃tu] is derived, but the domain of the metaphony rule is still the underived item [ót̃tu], so the rule cannot apply here either. On the other hand, in the examples [dúdit̃i], [trít̃it̃i] and [sít̃it̃i], the domain of the metaphony rule is derived. The first vowel of these words is stressed. The second vowel, which is underlyingly stressed (see [dét̃i]), is destressed because of the stress on the first. As predicted by the Strict Cycle Condition (SCC), metaphony applies. The ordinal [tiérsu] is derived as well because of the casus morpheme. Here as well, metaphony applies.

Another check on cyclicity is the behavior of loan words.

(8)	<i>etymology</i>	<i>gloss</i>	<i>origin</i>	
	[arkést̃u]	[orkéstra]	orchestra	ital., learned
	[ddirramót̃u]	[terremót̃o]	earthquake	ital., learned
	[rit̃fét̃ta]	[rit̃fét̃ta]	recipe	ital., learned
	[sót̃u]	[sód̃o]	solid	late latin
	[fangót̃tu]	[fagót̃e]	bassoon	mediev. french
	[d̃d̃ziléppu]	[guláb]	fruit syrup	arabic

(Rohlf's 1956-'61)

The examples in (8) are readily explained if metaphony is subject to strict cyclicity. Loan words typically behave as underived items with respect to cyclic rules.

Although the evidence is limited, we think it suffices to propose that metaphony is a cyclic rule. We adopt Kiparsky's 1985 definition of the SCC.

of this paper, are

<i>gloss</i>	
slow	(adj.)
cold	id.
big	id.
hairy	id.

vowel harmony, stressed high vowel, vowels. The target note the difference lies to unstressed into [iɛ] and [uɛ]. gh vowels but no turn to this later. l must be word-

<i>gloss</i>
peach
woman
bean
sunday

ed only by word-vowels in (5) are sed by Calabrese ations. The mor-. The high vowels d high vowels we h which creates a le, subject to the consider the data

- (9) "Strict Cycle Condition (SCC)
If W is derived from a lexical entry W', where W' is nondistinct from XPAQY and distinct from XPBQY, then a rule A → B / XP_QY cannot apply until the word level."

(Kiparsky 1985:89)

Kiparsky proposes this formula to exclude the possibility, left open by the 1982 definition, of metrical and syllable structure assignment creating a derived environment. It is obvious that we need this restriction in the present case as well. Assignment of metrical structure to, for example, [dét̪i] shouldn't create a derived environment, otherwise metaphony would still apply, yielding the incorrect *[diét̪i].

Nonetheless, items like [[pérsik]a] remain problematic. The SCC allows for cyclic rules to apply at the word level in nonderived items. We still predict *[piérsika]. What might be at issue here is whether the rule is neutralizing or not. According to Mascaro's original definition of the cycle (Mascaro 1976), a rule can be cyclic only if it is a neutralization rule. Kiparsky (1982:171) claimed that it is exactly the class of obligatory neutralization rules that tends to become cyclic. Corroborating evidence on the relevance of neutralization for cyclicity has been provided by Halle and Mohanan (1985) on Vedic, and by Hermans (pers. comm.) on Lithuanian stress. From their observations emerges a model in which cyclic rules can apply to underived items, but in which the application of neutralizing cyclic rules is subject to the derived environment constraint.

With this proviso the data in (6) can be explained. As stated before, metaphony is a cyclic rule. Furthermore, it can be shown to be neutralizing. In the case of metaphonic raising, this is quite clear: the oppositions [i]~[e] and [u]~[o] are neutralized. As to metaphonic diphthongization, we must show that the diphthongs [iɛ] and [uɛ] exist independently of metaphony, that is, are not in all cases derivable. This is indeed the case.

- (10)
- | | | |
|------------|--|--|
| | <i>gloss</i> | |
| [liggiéra] | square pillow | |
| [sguéʃʃa] | ugly woman | |
| -[iéri] | nominal. suffix, sing. (plur. identical) | |
| -[iénti] | nominal. suffix, sing. (plur. identical) | |
- (Rohlf's 1956-'61)

The diphthongs in (10) cannot be metaphonic. Final [a] is incapable of triggering diphthongization. The final [i]'s of the two suffixes shouldn't trigger diphthongization either, because, as will be shown, nouns having identical singular and plural forms never display metaphony in the singular.

Metaphonic diphthongs [ɛ], [ɔ] can apply to underived forms. Interesting all-vowel forms, viz. where triggered by another vowel.

- (11)
- | | |
|----|----------------------|
| | <i>sin</i> |
| a. | [mié] [sié] |
| b. | [mó] [stó] [kóf] [u] |

The examples in (11) occur regularly if the vowel. On the other hand, [a] blocks metaphony. The undiphthongized forms. The undiphthongized forms (examples from

- (12)
- | | |
|--|----------|
| | [mónuki] |
| | [kófunu] |

Alternations are

- (13)
- | | |
|--|------------|
| | [[trué]i] |
| | [[siént]i] |
| | [[kanú]ʃ] |
| | [[kritt]i] |
- (Calabr)

A comment on the reconstruction of Francavilla of the infinitive

Metaphonic diphthongization neutralizes the underlying opposition between [ɛ], [ɔ] and [iɛ], [uɛ]. The rule, being cyclic and neutralizing, cannot apply to underived items like [pɛrsik].

Interesting alternations arise also in words with proparoxytonic stress, viz. where trigger and stressed target vowel are separated from each other by another vowel (examples taken from Calabrese 1985:54).

(11)		<i>sing.</i>	<i>plur.²</i>	<i>underlying form</i>	<i>gloss</i>
	a.	[miétuku]	[miétit̪i]	[mɛtik] + [u]/[i]	physician
		[siékulu]	[siékuli]	[sɛkul] + [u]/[i]	century
	b.	[mónuku]	[muénit̪i]	[mónak] + [u]/[i]	monk
		[stómuku]	[stuémit̪i]	[stómak] + [u]/[i]	stomach
		[kófunu]	[kuéfini]	[kófán] + [u]/[i]	barrel, coffin
				([u] and [i] are the male sing./plur. case morphemes)	

The examples in (11a) show that metaphonic diphthongization applies regularly if the stressed vowel is separated from the trigger by a high vowel. On the other hand, in (11b) we note that an underlying intermediate [a] blocks metaphony in the singular and allows metaphony in the plural forms. The underlying [a] is motivated by morphologically related words (examples from Calabrese 1985:57).

(12)		<i>gloss</i>		<i>gloss</i>
	[mónuku]	monk	[munat̪iéddu]	monklike ghost
	[kófunu]	barrel, coffin	[nkufanit̪áre]	to put in a barrel

Alternations are attested as well in the verbal paradigms.

(13)			<i>gloss</i>	
	[[trué]i]	vs. [[tró]i]	find,	2./3.pers.sing.pres.ind.
		[[tró]unu]		3.pers.plur.pres.ind.
	[[siént]i]	[[sént]i]	feel,	2./3.pers.sing.pres.ind.
		[[sént]unu]		3.pers.plur.pres.ind.
	[[kanú]i]	[[kanó]i]	know,	2./3.pers.sing.pres.ind.
		[[kanósk]unu]		3.pers.plur.pres.ind.
	[[krít]i]	[[krét]i]	believe,	2./3.pers.sing.pres.ind.
		[[krét]unu]		3.pers.plur.pres.ind.
			(Calabrese 1985:10-11, Ribezzo 1911-'12)	

A comment on [tróunu] is in order. Calabrese gives [tróanu], probably a reconstruction based on a neighboring dialect. Ribezzo gives [tróunu] for Francavilla. Nonetheless, an underlying [a] might be motivated because of the infinitive [[tru]ári]. We might suppose that the suffix [anu], which

originally belonged only to one conjugation, has been extended to the other two conjugations. In that case the problem of the 3.pers.plur. forms in (13) is identical to that of [mónuku] from [mónak]+[u], for which we will put forward a solution.

Exceptional also are forms like [sénti], as opposed to [siénti]. Similar examples can be attested in noun and adjective paradigms (data from Calabrese 1985:2, 14-15 and Ribezzo 1911-'12).

(14)	a.	<i>male/fem.sing.</i>		<i>male/fem.plur.</i>	<i>gloss</i>
		[[mél]i]	vs.	[[miél]i]	honey
		[[parét]i]		[[parit]i]	wall
		[[stafón]i]		[[stafún]i]	season
	b.	[[rikkétts]a]		[[rikkitts]i]	richness
		<i>fem.plur.</i>		<i>male plur.</i>	
		[[bón]i]		[[buén]i]	good
		[[róss]i]		[[rúss]i]	red

The irregular forms (final high vowels, yet no metaphony) in the first column in (14) are not incidental. Nouns and adjectives with identical final vowels ([i], see a) for the singular and the plural, systematically never display metaphony in the singular and always in the plural. Female nouns and adjectives of the first declension (see b) never display metaphony in the plural.

Once more, we could solve this problem by postulating an underlying word-final [e] (to be raised afterwards by rule (3)), as proposed in Calabrese (1985:13). Likewise, however, there are no alternations motivating an [e]. The argument is somewhat circular: no metaphony, therefore a final nonhigh vowel, a final nonhigh vowel, therefore no metaphony. It seems more plausible to us that the metaphony rule, lexicalized as we have argued already, is even more restricted so as to apply only within certain morphological categories in which it has a morphological function as well. For example, the metaphonic diphthong in [siénti] identifies this form as the 2. pers.sing., while the absence of metaphony in [sénti] identifies it as the 3.pers.sing. The same goes for minimal pairs like [méli] and [miéli], where metaphony indicates the plural, and its absence the singular. In the pair [bóni] vs. [buéni], metaphony marks the male plural, its absence the female plural. We could equally extend this line of argument to pairs like [sónu] ("I ring") vs. [suénu] ("sound" noun). Metaphony marks the noun, its absence the verbal 1.pers.sing.

There is still another group of systematic exceptions to metaphony, but these seem to have a phonological motivation. Metaphony does not apply if trigger and target are separated from each other by an intervening [kʷ]

or [gʷ], the only the data in (15) consonants as w

(15)		<i>sing</i>
	a.	[vék. [spél [kup [tjír] [finé
	b.	[uék. [tjír] [finé
	c.	[luér [liéd [kru [prié [nué
		(Rohlf's 1

Because of [vék is blocked by a that this cannot by a palatalized [é]. Target vowels as [uε], [i] and [kʷ] or [gʷ]; rath in this environm for the example underlying [ki] stemfinal [ki], t palatalizes the p

(16) [—ki]

After adding th initial part of y diphthong [iε]. first of the two c

or [gʲ], the only two consonants, which apparently block the rule. Observe the data in (15), where we have included examples with other high consonants as well.

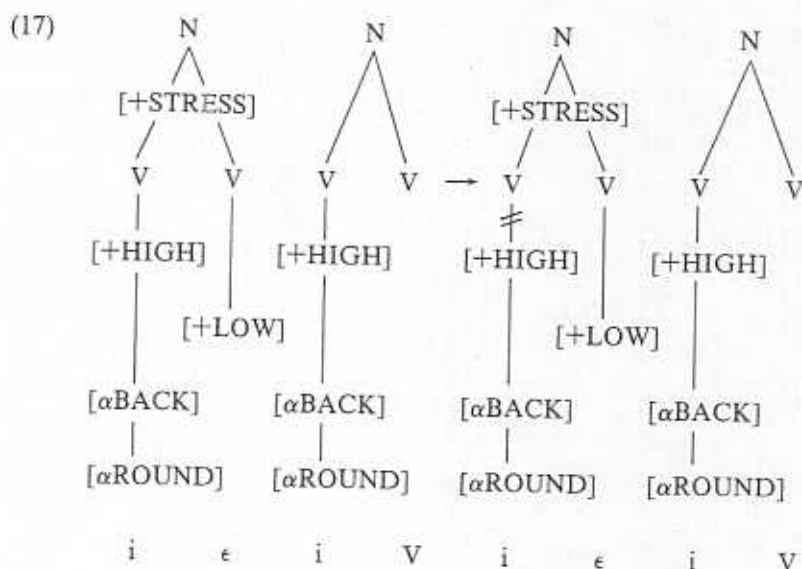
(15)	<i>sing.</i>	<i>plur.</i>	<i>morphology</i>	<i>gloss</i>
a.	[vékkʲu]	[vékkʲi]	[vékki] + [u]/[i]	old
	[spékkʲu]	[spékkʲi]	[spékki] + [u]/[i]	mirror
	[kupékkʲu]	[kupékkʲi]	[kupérki] + [u]/[i]	table-cloth
b.	[uékkʲu]	[uékkʲi]	[uékki] + [u]/[i]	eye
	[tʃírkʲu]	[tʃírkʲi]	[tʃírki] + [u]/[i]	circle
	[finúkkʲu]	[finúkkʲi]	[finúkki] + [u]/[i]	fennel
c.	[luéngu]	[luéngi]	[lóng] + [u]/[i]	long
	[liédǰu]		[liédǰ] + [u]	light
	[kruéttʃi]		[kruéttʃ] + [i]	well hook
	[priéʃfu]		[priéʃ] + [u]	pleasure
	[nuéʃfu]		[nóʃ] + [u]	our (possess.)

(Rohlf 1956-'61)

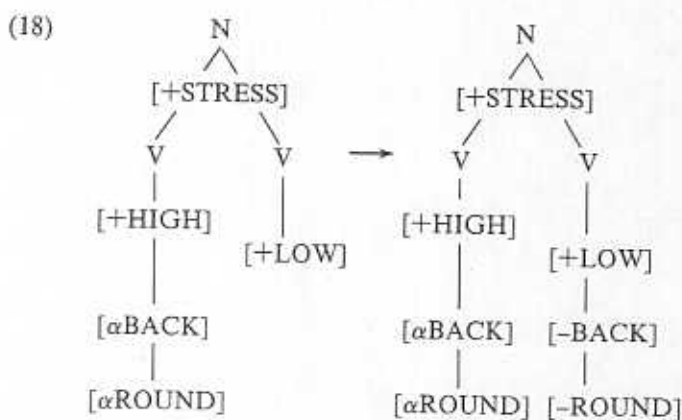
Because of [vékkʲu], etc., Calabrese (1985:27) supposes that metaphony is blocked by an intervening high consonant. The forms in (15b,c) show that this cannot be the correct generalization. Metaphony is blocked only by a palatalized velar, and even then only in the case of the target vowel [ɛ]. Target vowels [ɔ], [e] and [o] regularly undergo the rule and surface as [ue], [i] and [u], respectively. Metaphony, as such, is not blocked by [kʲ] or [gʲ]; rather, the development of the diphthong [iɛ] is problematical in this environment. We propose that a rule of dissimilation is responsible for the examples in (15a). Surface palatalized velars are derived from underlying [ki] sequences. When the case vowel [u] or [i] is added to stemfinal [ki], the unstressed prevocalic [i] consonantalizes into [j] and palatalizes the preceding velar consonant.

(16) [—ki] + [u]/[i] → [—kju/i] → [—kʲu/i]

After adding the case morpheme we obtain a diphthong [iu] or [ii], the initial part of which is identical to the initial part of the metaphonic diphthong [iɛ]. The following rule of diphthong dissimilation reduces the first of the two diphthongs.



For (17) to operate correctly, it is necessary that the second element of the metaphonic diphthong be, somehow, invisible. The rule must be able to establish the exact identity of the two glides. The feature [+HIGH] does not pose a problem because the [ε] (whether specified [-TENSE], as Calabrese supposes, or [+LOW], as we presume) will be unspecified for [HIGH]; on the [HIGH] tier both glides are adjacent. On the tiers of the features [BACK] and [ROUND], both glides are adjacent only if the specifications for the second part of the metaphonic diphthong are absent. We will consider this second part epenthetic. The V-position will be underspecified until the application of the following rule, which fills in the relevant values.



Vowel harmon

Metaphony is
Francavilla-Fo
and [ROUND]

- (19)
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|----|-----------|
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| b. | [m
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- | |
|-------|
| HIGH |
| LOW |
| BACK |
| ROUND |

Unspecified val

- (21) a. [αB

Metaphony is not the only type of vowel harmony in the dialect of Francavilla-Fontana. There is harmony as well for the features [BACK] and [ROUND].

(19)	<i>sing.</i>	<i>plur.</i>	<i>morph.</i>		<i>gloss</i>
a.	[mónuku]	[muénitʃi]	[mónak]	+ [u]/[i]	monk
	[stómuku]	[stuénitʃi]	[stómak]	+ [u]/[i]	stomach
b.	[miétuku]	[miétitʃi]	[métik]	+ [u]/[i]	physician
	[ándʒulu]	[ándʒili]	[ándʒil]	+ [u]/[i]	angel
c.	[siékulu]	[siékuli]	[sékul]	+ [u]/[i]	century

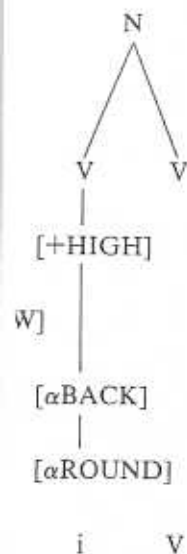
Both [-BACK] and [+ROUND] harmony apply regressively like metaphony, but unlike metaphony their application is restricted to unstressed vowels. Vowels preceding the stressed vowel are not affected, so the domain of the rule is strictly posttonic. There is a striking difference between these rules as well. Examples (19a,b) show that rounding harmony applies regardless of the underlying specification of the target vowel: [a], being [+BACK], is affected as well as [i], which is [-BACK]. The [-BACK] specification of [i] is, so to speak, "overruled". On the contrary, backness harmony respects the original specification of the target segment, as shown by (19c): the rule does not apply to underlying [+ROUND] vowels (recall that rounded front vowels do not exist in the dialect).

In the present analysis we adopt a restricted way of underspecifying segments. Only information which is contextually redundant may be omitted from underlying specifications. Furthermore, we follow Stanley (1967), in requiring redundancy rules to be "surface true" that is to be true generalizations about the phonological system of a language or dialect. The seven vowel system has the following underlying specification.

(20)		[i]	[e]	[ɛ]	[a]	[ɔ]	[o]	[u]
	HIGH	+	-				-	+
	LOW		-	+	+	+	-	
	BACK	-	-	-	+	+		
	ROUND			-	-	+	+	+

Unspecified values are filled in by the redundancy rules in (21).

(21)	a.	[αBACK] ↔ [αROUND] / $\left[\begin{array}{c} \text{---} \\ \text{-LOW} \end{array} \right]$
------	----	--



second element of
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(except for the palatalized velars, which we have treated already) must be due to their lack of specification for the feature [HIGH]. [HIGH] on consonants in Italian is entirely predictable by means of other features on the same segment or by way of the phonological environment.

Now, if we try to spread the feature [+HIGH] from word final [u] to the preceding [a] in [[mónak]u], we would create the segment [ɤ]. This segment does not exist in the dialect. Its creation by a cyclic rule is excluded because of the SCC, which requires cyclic rules to be structure preserving. So, metaphony cannot apply to [[mónak]u]. In the postcyclic component, rounding harmony (22) will apply, turning the [a] into an [ɔ], which subsequently will be raised to [u] by the raising rule (3), for all unstressed vowels.

In [[mónak]i] we can first apply backness harmony (23), changing [a] to [ɛ]. To this [ɛ], metaphony applies, yielding [i]. This [i], being a derived high vowel, will trigger metaphony of the preceding stressed [ɔ]. The result is a diphthong [uɛ].

Schematically, we get the following sample derivations (on the formalization of diphthongization, see section 2).

(24)	input:	[[mónak]u]	[[mónak]i]
	cyclic component:		
	backness harmony (23)	---	[[mónet]i]
	metaphony	---	[[muénit]i]
	postcyclic component:		
	rounding harmony (22)	[[mónək]u]	---
	unstressed raising (3)	[[mónuk]u]	---
	output:	[mónuku]	[muenitʃi]
	input:	[[sékul]u]	[[sekul]i]
	cyclic component:		
	backness harmony (23)	---	---
	metaphony	[[siékul]u]	[[siékul]i]
	postcyclic component:		
	rounding harmony (22)	---	---
	unstressed raising (3)	---	---
	output:	[siékulu]	[siékuli]
	input:	[[métik]u]	[[métik]i]
	cyclic component:		
	backness harmony (23)	---	---
	metaphony	[[miétik]u]	[[miétit]i]
	postcyclic component:		
	rounding harmony (22)	[[miétuk]u]	---
	unstressed raising (3)	---	---
	output:	[miétuku]	[miétitʃi]

/ → [-HIGH]

[OW]

and results in [u],
[-BACK] is simultane-
ously must refer to

[STRESS]

|
V
|
[ROUND]
|
[-BACK]

[u]. As proposed
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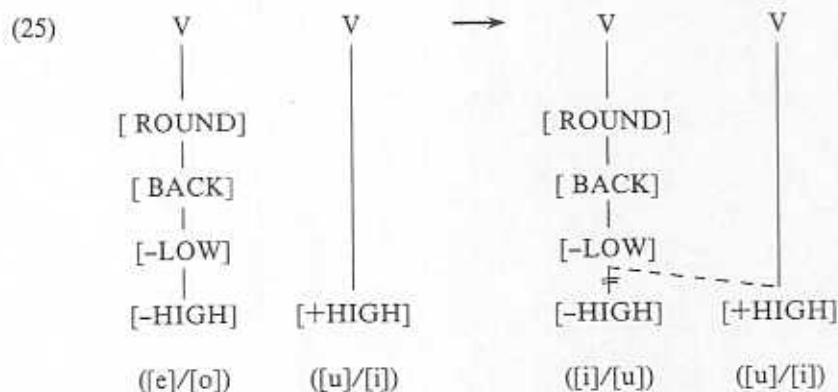
[STRESS]

|
V
|
[-BACK]

rounding harmony
operation of the propa-
gen [mónuku] and
vening [a] can act
skip V-positions:
do not intervene

2. METAPHONY: RAISING VERSUS DIPHTHONGIZATION

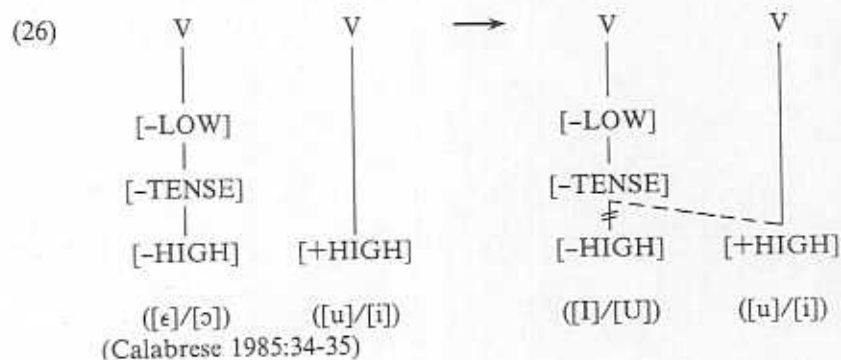
Metaphony does not pose serious problems if it is applied to the vowels [e] and [o]. It has the effect of raising them to [i] and [u]. We can consider the rule to be a standard autosegmental spreading operation on the feature [HIGH].



Delinking cum spread turns [e] and [o] into [i] and [u] respectively.

Metaphonic diphthongization of [ε] and [ɔ] is less straightforward. Of course we would like to analyze this case as essentially the same phenomenon of [+HIGH] spread. The different output must be due to the different underlying specification.

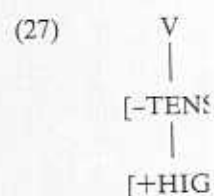
Calabrese (1985) has advanced the following formalization. Considering [ε] and [ɔ] to be nonlow lax vowels, he proposes that the application of [HIGH] spread yields the high lax vowels [ɪ] and [ʊ].



These segments do not exist in the dialect; a kind of repair mechanism,

Vowel harmony in

called "clean up
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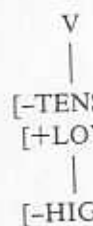
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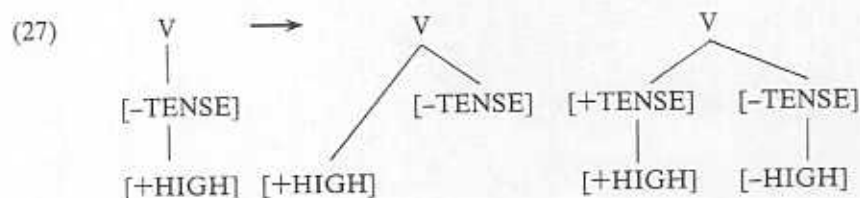
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called "clean up" has to be applied to them. The clean up in the case of the output of (26) consists of "linearization".



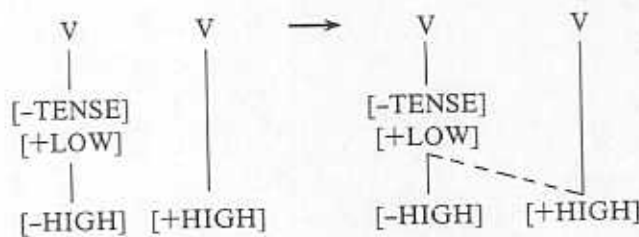
The two conflicting features, [-TENSE] and [+HIGH], are linearized. After filling in the missing values, we obtain the diphthongs [ie] and [uo]. [uo] is subsequently changed to [ue] by a rule of rounding dissimilation.

In itself, Calabrese's analysis is attractive because it enables us to describe metaphony as a simple rule of autosegmental spreading, not only in the case of the target vowels [e] and [o], but also in the case of [ε] and [ɔ].

Nonetheless, it raises questions. In the first place, we observed earlier that metaphony is a cyclic rule. The SCC, because of structure preservation, prohibits the creation of the segments [I] and [U] in the cyclic component. Furthermore, one would expect the repair mechanism to be the expression of a universal format, a kind of automatic rule. This is certainly not the case. Even within the group of Italian dialects a large number of them do not resort to diphthongization. The format is dialect specific. Third, the ordering of the conflicting features within the diphthong ([+HIGH] [-TENSE] and not [-TENSE] [+HIGH]) is not explained.

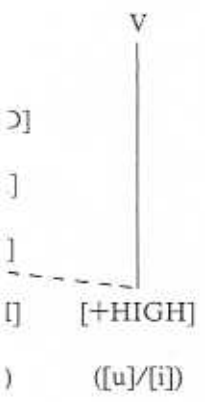
The analysis contains a good deal of arbitrariness as well. This becomes clear when we consider the proparoxytones, [mónak]+[u]/[i] etc. The derivation proceeds as follows (cf. Calabrese 1985:57-60).

(28) [[mónak] + u]

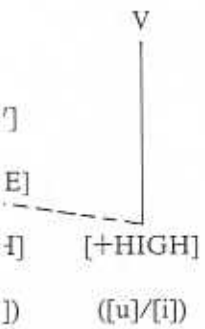


After this first step we obtain a problematic configuration: [+HIGH] conflicts with both [+LOW] on universal and [-TENSE] on language specific grounds. The solution in this case is not linearization, but a second

plied to the vowels
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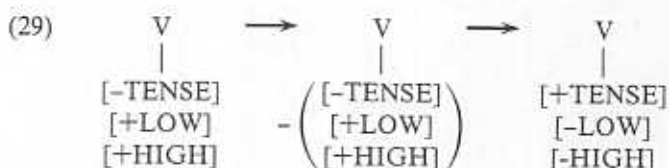


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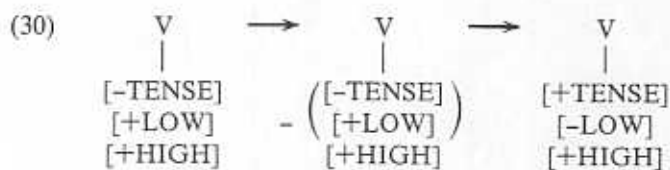


repair mechanism,

type of clean up, called "negation": the conflicting feature values are turned into their opposites.



With concomitant spreading of [+ROUND] we arrive at the intermediate representation *[mónoku]. The [o], being [-HIGH], will not trigger metaphony of the preceding stressed vowel. In the case of [[mónak]i], we reach the same problematical configuration. However, here only two features are reversed.



Simultaneous spreading of [-BACK] leads to the intermediate form [mónitʃi], in which the derived penultimate [i] will cause diphthongization of the preceding [ɔ].

Observe that no less than three clean up mechanisms and three stipulations on their application are needed. First, we must stipulate linearization or negation. Then, if negation, we must mention the number of features. Still, we cannot explain all data. Consider [dúditʃi] from [dó]+[détʃi]. After the first [+HIGH] spread, from the final [i] to the [ɛ], the result is a high lax vowel. According to the analysis, we would get linearization, that is, diphthongization: [dúdiɛtʃi]. Not a single Italian dialect, however, displays diphthongization of unstressed vowels. The relevant generalization is exactly that diphthongization is limited to stressed vowels. This necessitates a third stipulation, mentioning [STRESS]. In this way the analysis is robbed of most of its explanatory power. In our view, a reanalysis of diphthongization is in order.

Metaphony is not the only source of diphthongs in the dialect of Francavilla-Fontana. Lexical items can contain diphthongs, which may be rising or falling. All pairs of vowels may combine to form a diphthong, provided that at least one of them is high. The high vowel will be interpreted as a glide. In the case of two high vowels, usually the first one becomes a glide, while the second remains a full vowel. Note that in this case preference is given to, for example, the rising diphthong [iú] over its falling

counterpart |
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is created in t

- (31)
- | |
|---------|
| [láuru |
| [krái] |
| [uárra |
| [iárta] |
| [ʃi] |
| [iõnnu |
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In addition to
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- (32) *Vulgar*
[ʃklus̄]
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Vocalization

- (33) *Vulgar*
[fálke(̄)
[fálsu(̄)
[kélsu(̄)
[kálke(̄)
[kálk(s̄)
(Rohl

Instead of the
rising [uá] and
[i] metathesis,
There must be
after vocalizati

counterpart [ju]. Unattested are the combinations [uɔ] and [ɔu] (again there seems to be an argument against Calabrese's analysis in which [uɔ] is created in the course of the derivation).

(31)		<i>gloss</i>		<i>gloss</i>
	[láuru]	bat	[kutʃéuli]	easy to cook
	[krái]	tomorrow	[béiri]	drink (verb)
	[uárra]	war	[kruédáda]	straw basket
	[iárta]	high	[liggiéra]	square pillow
	[ʃi]	eggs	[iúttsa]	faeces
	[iónnula]	catapult	[juítia]	thursday
	(Rohlfs 1956-'61, Ribezzo 1911-'12)			

In addition to these lexical diphthongs, there are diphthongs created by two rules of [ɪ] vocalization. We distinguish onset [ɪ] and coda [ɪ]. Onset [ɪ] vocalizes after a tautosyllabic consonant; the result is [j]. This process is known in virtually all Italian dialects. Since the rule does not depend on the quality of the surrounding segments, synchronic alternations are not attestable.

(32)	<i>Vulgar Latin</i>	<i>Franc.-Fontana</i>	<i>gloss</i>
	[ʃklus]	[uékku]	eye
	[bláŋku]	[iáŋku]	white
	(Rohlfs 1956-'61)		

Whether the rule is synchronic or diachronic is irrelevant to our analysis. Relevant is the observation that the on-glide diphthongs it creates surface as such.

Vocalization of coda [ɪ] produces [w], but now look at the data in (33).

(33)	<i>Vulgar Latin</i>	<i>Franc.-Fontana</i>	<i>gloss</i>	
	[fálke(m)]	[fuátʃi]	'Orion'	*[fáutʃi]
	[fálsu(s)]	[fuázu]	false	*[fáuzu]
	[kélsu(s)]	[dzuézu]	mulberry tree	*[dzéuzu]
	[kálke(m)]	[kuátʃi]	lime	*[káutʃi]
	[kálk(s)]	[kuátʃi]	kick (noun)	*[káutʃi]
	(Rohlfs 1956-'61)			

Instead of the expected falling diphthongs (see the last column) we note rising [uá] and [ué]. These diphthongs cannot be attributed to a rule of [ɪ] metathesis, say [al] → [la], because onset [ɪ] always vocalizes into [j]. There must have been a rule of diphthong internal metathesis, applying after vocalization [ɪ] → [w].

Coda [ɪ] vocalization is conditioned by the following consonant, which must be a [t] or [s]. If it is [k] or [d], coda [ɪ] develops into [r]. Therefore we get the following, admittedly scarce, synchronic alternations.

(34)	<i>stem</i>		<i>gloss</i>		<i>gloss</i>
	[kalk]	[kuátʃi]	lime	vs. [karkára]	limekiln
	[kalk]	[kuátʃi]	kick	[karkáŋŋu]	heel

This evidence, together with the observation that metaphonic diphthongs are, counter to our expectations, rising, brings us to the generalization that all derived diphthongs in the dialect are rising.

The same kind of metathesis is known in other dialects. It is also possible for metaphonic diphthongs to be falling, like in the dialect of Bisceglie (De Gregorio 1939). From this state of affairs it can be inferred that the rising character of the metaphonic diphthongs in Francavilla must not be attributed to metaphony, but is independently motivated. We might think it to be a consequence of the very reduced syllable inventory of the dialect. In the coda only one consonant is allowed. Since the high vowel of a falling diphthong will be interpreted as a glide, and subsequently considered to be part of the coda, falling diphthongs in closed syllables would create coda's of two segments. Moreover, for whatever reason, there has been a (diachronic) tendency to avoid falling diphthongs by way of monophthongization or consonantalization of the glide. For example, Latin [táuru] in Italian dialects becomes [tóro] or [távuru].

The data in (32) and (33) furthermore indicate that diphthongs, at least in this dialect, are linked to two timing slots on the CV tier. There is no reason to suppose that [ɪ] vocalization has any effect on the number of timing slots. If diphthongs resulting from [ɪ] vocalization and those resulting from metaphony are subject to one and the same rule, or constraint (namely that they must be rising), it becomes highly probable that metaphonic diphthongs are bipositional as well.

We also observe that metaphonic diphthongs appear only in stressed syllables. Compare metaphony with unstressed raising (3).

(35)	<i>stem</i>		<i>gloss</i>		<i>gloss</i>
	[mónak]	[mónuku]	monk		
		[muénitʃi]	monks	vs. [munatʃiéddu]	monklike ghost
	[pét]	[péti]	foot		
		[piéti]	feet		
	[détʃi]		ten	vs. [dúditʃi]	twelve

Both rules add a feature [+HIGH] to their target vowels. Still, the result is entirely dependent on stress. If stressed, [ɛ] and [ɔ] diphthongize, if

unstressed, the linked to two most Italian d limited to stre the rule, becau pretonic vowel

Cross-dialect double V is m reduce diphtho syllable. As a r in open and cl are dialects wi the dialects of [uɔ] from [ɔ]. no dialect whic

The second diphthongs wi There are a fe dently of syllab originally meta but only in oɔ 243). Once ag diphthongs in

These predic in which diph vowel. Comple Instead, we p consists of two

We believe that the partic way related to of stress. The to all derived a constraint o view of the evic crucially hinge of its inherent same.

A third asp has already be the second se unexpected. W universal cons

unstressed, they are raised to [i] and [u]. Considering a diphthong to be linked to two timing slots, we are able to explain this distribution. In most Italian dialects, the possibility of two tautosyllabic V-positions is limited to stressed syllables. Including stress causes no complication of the rule, because we must stipulate anyhow that metaphony does not affect pretonic vowels.

Cross-dialectically, this hypothesis implies two correct predictions. The double V is marked in closed syllables, so we predict that when dialects reduce diphthongs to monophthongs, this will happen first in the closed syllable. As a matter of fact, there are dialects with metaphonic diphthongs in open and closed syllables (the one examined here, for example). There are dialects with metaphonic diphthongs exclusively in open syllables. In the dialects of the border zone between Tuscany and Umbria, metaphonic [uo] from [ɔ] appears only in open syllables (Schürr 1970:40). There is no dialect which has metaphonic diphthongs only in closed syllables.

The second prediction is that generalization of originally metaphonic diphthongs will primarily affect the open syllables. This too is correct. There are a few dialects which have generalized the diphthongs independently of syllable structure (the Palermo dialect, for example). Elsewhere, originally metaphonic diphthongs appear also before final nonhigh vowels, but only in open syllables, like in Northern Apulia (see Stehl 1980:242-243). Once again, there is not a single dialect that has generalized the diphthongs in closed syllables.

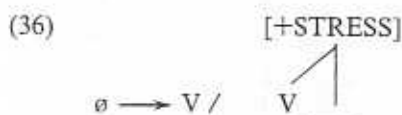
These predictions cannot be made by an analysis like that of Calabrese, in which diphthongs are considered monopositional – a kind of complex vowel. Complex segments are marked independently of syllable structure. Instead, we propose that diphthongs are complex nuclei: a diphthong consists of two vowels linked to one and the same syllable nucleus.

We believe we have adduced convincing enough evidence to conclude that the particular nature of metaphonic diphthongs is only in a very limited way related to metaphony itself. The two positions result from the presence of stress. The rising character follows from a rule or constraint applying to all derived diphthongs. We must choose between stipulating this as a constraint or formulating a rule of diphthong internal metathesis. In view of the evidence presented in (34), we propose a metathesis rule. Nothing crucially hinges on this, however. If one were to avoid metathesis because of its inherent complications, the analysis would essentially remain the same.

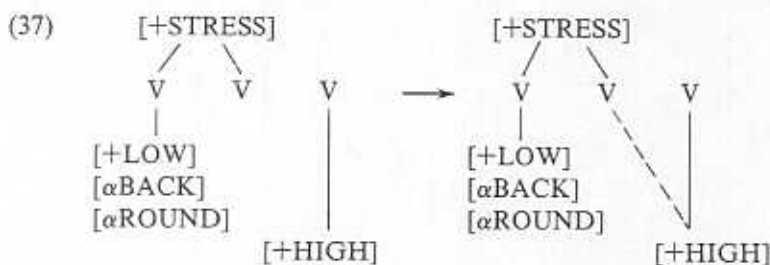
A third aspect of the metaphonic diphthongs, the second segment [ɛ], has already been touched upon. We may add that neither the quality of the second segment, nor its epenthetic nature as such, is completely unexpected. We think the quality of the second part to be the result of universal considerations: [-BACK] and [-ROUND] are the universally

unmarked values for both features. Cross-dialectally too, this choice is motivated. Dialects display [iɛ] and [uɔ] as metaphonic diphthongs, or [iɛ] and [uɛ]. The combination [iɔ] and [uɔ] never occurs. That is to say, the [+BACK], [+ROUND] second part is never generalized. Furthermore, certain Italian dialects have postlexical diphthongization rules, leading to alternations between [ɔ] and [ɛu] (see Rohlf's (1938) for examples). So [ɛu], or [uɛ] for that matter, as a product of [ɔ] is possible even in the case of a synchronically fully productive rule. The same goes for the Spanish diphthong [ue] from [ɔ] (Harris (1985) and Garcia-Bellido (1986)).

The preceding observations lead us to the following analysis. The second V position of diphthongs is contextually determined by stress. The feature values it takes are predictable as well. We propose first a rule introducing the empty V.



After application of (36) to the underlying segments [ɛ] and [ɔ], we obtain a double V, of which the second one is empty. To this empty V, metaphony, that is, spreading of [+HIGH], applies.



The output of (37) is subject to the rule of diphthong internal metathesis (38). The features [+LOW] and [+HIGH] are delinked from their V slots and are subsequently spread to the other V slot of the complex nucleus. We suppose that this kind of metathesis is possible because [LOW] and [HIGH] are features having their own tiers. They are related by way of another tier, to which we will refer as the 'Vertical Position' (VP) tier, following Wetzels (1986:339).

(38)

VP

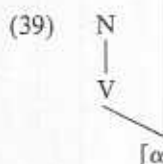
[+]

The output
[-ROUND]
the first V is

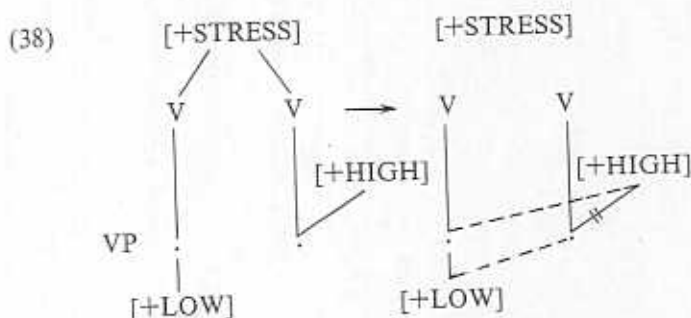
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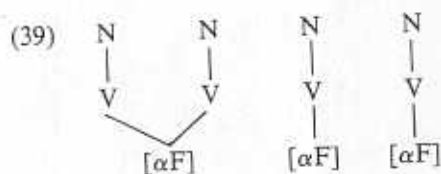
By (39) the j
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(recall that [+
and NuFiP a
our analysis.



The output of (38) is subject to rule (18) that fills in [-BACK] and [-ROUND] on the second V. Of course, the underlying specification of the first V is maintained, in the case of [ɔ], [+BACK +ROUND]; in the case of [ɛ], [-BACK -ROUND].

If the configuration resulting after V insertion (36) does not find itself in a metaphonic context, then the second V will remain empty. At the end of the derivation, the feature values of the first V will be spread by virtue of a mechanism which, in De Haas (1988), has been put forward to account for vowel coalescence. This mechanism is an elaboration of the Nuclear Fusion Principle (NuFuP) proposed in Wetzels (1986). The mechanism collapses the matrices of all tautosyllabic vowels, provided that they do not contain conflicting feature specifications. The result is a long homorganic vowel, to be shortened in closed syllables.

Metathesis (38) presupposes another mechanism as well. The association line of the feature [+HIGH], between trigger and target of the metaphony rule, must be erased, leaving both segments [+HIGH]. This operation can be seen as a consequence of the Nuclear Fission Principle (NuFiP, see Wetzels 1986).



By (39) the joint matrix of two heteronuclear vowels is split up into two identical nonlinked matrices. We need a principle like (39) to be able to metathesize the feature [+HIGH] in (38) from the second V to the first (recall that [+HIGH] originated from a spreading rule). Of course, if NuFuP and NuFiP are universal formats, they do not bring any extra costs to our analysis. Two sample derivations are given in (40).

(40)	[lént] + [u]/[i]	[gróss] + [u]/[i]
V insertion (36)	εV	ɔV
metaphony (37)	$\begin{array}{c} \epsilon V \quad \quad V \\ \quad \quad \quad \\ \quad \quad \quad [+HIGH] \end{array}$	$\begin{array}{c} \text{ɔV} \quad \quad V \\ \quad \quad \quad \\ \quad \quad \quad [+HIGH] \end{array}$
NuFiP (39)	$\begin{array}{cc} V & V \\ & \\ [+HIGH] & [+HIGH] \end{array}$	$\begin{array}{cc} V & V \\ & \\ [+HIGH] & [+HIGH] \end{array}$
metathesis (38)	$\begin{array}{c} iV \\ \\ [+LOW] \end{array}$	$\begin{array}{c} uV \\ \\ [+LOW] \end{array}$
feature filling (18)	iε	ue
output	[liént] + [u]/[i]	[gruéss] + [u]/[i]

We conclude that the relatively complex data of vowel harmony in Francavilla-Fontana can be explained by the normal autosegmental spreading rules. What matters is the interaction of the relevant rules and the way in which they are conditioned. Once it is clear that metaphony and backness harmony are cyclic, and rounding harmony is postcyclic, the apparently strange alternations presented in (11) follow automatically. No complex machinery is needed to derive them, provided that the SCC is amended in the sense of Halle and Mohanan (1986) and Hermans (forthcoming).

More complicated is the account of metaphonic diphthongization. We have demonstrated the need for three language specific rules (apart from the spreading rules referring to the features [+HIGH], [-BACK] and [-ROUND]); V insertion (36), metathesis (38) and feature filling (18), of which the last one has universal justification as well. Rules (36) and (38) were shown to be independently motivated in the dialect. Our analysis does not make use of intermediate representations, in which segments appear that neither exist underlyingly, nor in surface items. It remains within the limits dictated by the amended SCC, and therefore is able to explain much more data than covered by Calabrese's analysis. With regard to special rule formats, the highly language specific formats of Calabrese (1985) can be dispensed with. We only need two principles, NuFuP and NuFiP, the relevance of which has been demonstrated independently of the dialect studied in this paper.

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At several points we have indicated how the analysis might be extended to other dialects displaying this kind of phenomena. For example, one and the same rule may be differently conditioned. In many Calabrian dialects metaphony is not a cyclic but a postcyclic rule. Elsewhere, metaphonic diphthongs are falling, which means that the metathesis rule is not present there. The reduction of unstressed vowels is dialect specific too. In Francavilla-Fontana there are only three unstressed vowels, in Tuscany five. Other dialects admit only one or two unstressed vowels. Here again, the phenomenon, unstressed vowel reduction, is extremely common, but its elaboration is dialect specific.

NOTES

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1. The only exception to the rule is underived [uéttu], where we would expect [éttu]. Given the existence of forms like [ditjótту], we propose to consider [uéttu] an exception, probably a loan from a neighboring dialect.
 2. We choose not to treat the rule of affricatization/palatalization, which is responsible for the consonant alternations [k]~[tʃ]. It does not intervene in the harmony processes discussed in this paper.

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Vowel ha

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1. INTRODUCTION

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