

## Bibliographic Details

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## 110. Metaphony in Romance

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The term metaphony, which was first used in French (*metaphonie*) as a translation of the German word *Umlaut*, is traditionally used in Romance linguistics to refer to a process in which a vowel assimilates partially or totally to the height of a following vowel. Metaphony is one of the most characteristic phonological processes characterizing the Romance languages, and in particular Italian varieties (although not Tuscan and, therefore, standard Italian, which is based on Tuscan). For example, in many Italian dialects, high mid vowels are raised to high before a high vowel. In the same context, low mid vowels can be raised to high mid, or diphthongized. This

has resulted in numerous alternations, as in the examples /'verde ~ 'viridi/ 'green (SG~PL)', /'pede ~ 'pedi/ or /'pede ~ 'pjedi/ 'foot (SG~PL)', where the plural form shows metaphonic effects. Less commonly, a stressed low vowel may also be affected by metaphonic raising, and other changes may take place as well (cf. Maiden 1991; Calabrese 1985, 1998). The conditioning factor in the metaphonic alternations has been obscured in many dialects by the neutralization or deletion of final vowels. This has produced vowel alternations in nominal and verbal paradigms for which there is no overt trigger.

As observed by Anderson (1980: 43), the formal mechanism characterizing metaphony is not distinct from that underlying other sorts of vowel harmony (CHAPTER 91: VOWEL HARMONY: OPAQUE AND TRANSPARENT VOWELS; CHAPTER 118: TURKISH VOWEL HARMONY; CHAPTER 123: HUNGARIAN VOWEL HARMONY): it involves the spreading of a vowel feature from a given vowel to other vowels. As this term is used in Romance linguistics, however, the fundamental difference lies firstly in the feature that is spread – a height feature ([high], [low], or [ATR]; CHAPTER 21: VOWEL HEIGHT) in the case of metaphony – and secondly in the restriction on the target of the process – a stressed vowel. In “normal” vowel harmony, all vowels in a word can be targets of the harmonic process. In §2.1.3, I will consider Walker's (2005) analysis of metaphony, which accounts for the local properties of this phenomenon – i.e. for the fact that the target is a stressed vowel and the trigger a post-tonic high vowel – in a functional perceptual perspective. I will later (§4.1) briefly discuss an analysis of metaphony in terms of domain of application.

Other processes with the same restriction on a stressed target, but spreading non-height features, are found in other languages, starting from Germanic Umlaut. In this chapter I will restrict my attention to the phenomena that are traditionally referred to by the term metaphony in the Romance languages. This is an arbitrary choice from a theoretical point of view, but this delimitation will allow a tighter and more adequate exposition of facts and analysis.

## 1 Description of Italian metaphony

### 1.1 Types of vowel systems

In order to describe Italian metaphony adequately, a brief description of the vowel systems found in Italian dialects is needed. In stressed syllables, the typical system of Standard Italian (Tuscan) and many Italian dialects is the seven-vowel system in (1), which is given in (2) in terms of distinctive features (CHAPTER 17: DISTINCTIVE FEATURES; CHAPTER 19: VOWEL PLACE; CHAPTER 21: VOWEL HEIGHT).

(1) i      u  
 e      o  
 ε      ɔ  
 a

(2)

	i	e	ε	a	ɔ	o	u
high	+	–	–	–	–	–	+
low	–	–	–	+	–	–	–
back	–	–	–	+	+	+	+
round	–	–	–	–	+	+	+
ATR	+	+	–	–	–	+	+

An important issue concerning (2) involves which feature accounts for the contrast between high mid and low mid vowels. Chomsky and Halle (1968), following Bloch and Trager (1942) and Jakobson *et al.* (1952), use the feature [tense] to account for this contrast. Problems with the feature [tense] were pointed out by Catford (1977) (see also Ladefoged and Maddieson 1996). In recent years, Romance phonologists have started to employ the feature [Advanced Tongue Root] ([ATR]), which was first used to account for vocalic contrast in West African languages (Ladefoged 1964; Lindau 1975; see also Halle and Stevens 1969), and I adopt this feature in (2). Ladefoged and Maddieson (1996) argue against this trend and propose that height contrasts in mid – and high – vowels in

Germanic and Romance languages are simply due to different dislocations of the tongue body. Calabrese (2008) instead argues that these contrasts should indeed be accounted for in terms of advancement/non-advancement of the tongue root and that the apparent dislocation of the tongue body is due to the fact that the tongue is an elastic mass: thus, an advancement of the tongue root results in a slight raising and fronting of the tongue body. Evidence for this may be found in a recent ultrasound study of vowel articulations in the southern Salentino dialect of Tricase by Grimaldi *et al.* (2010), where it is shown that the difference found in this dialect between high mid / $\epsilon$ / and low mid / $e$ /, where the former is the result of metaphonic tensing before / $i$ /, is the result of tongue root advancement as shown in Figure 110.1:

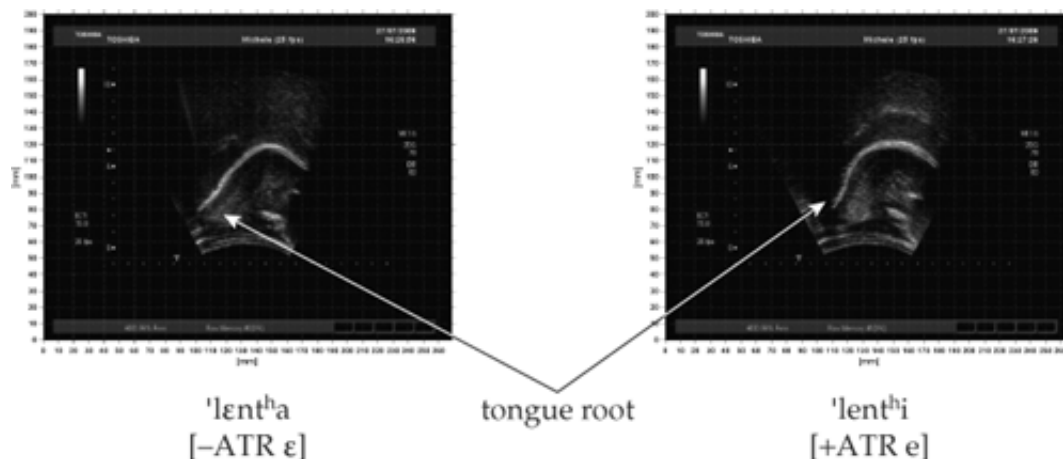


Figure 110.1 The [ $\epsilon$ ] vs. [ $e$ ] contrast in the southern Salentino dialect of Tricase

Many southern varieties have the five-vowel system in (3). It developed either through a neutralization of the [ATR] contrast in the mid vowels of (1) or through a different evolution of the Latin vowel system (Lausberg 1939; Weinrich 1958; Rohlf 1966, among others; see also Calabrese 2003).

- (3) i      u  
       e      o  
       a

The mid vowels in the five-vowel system in (3) are assumed to be underlyingly [-ATR] by Calabrese (1988, 1995) for reasons of markedness (CHAPTER 4: MARKEDNESS).<sup>1</sup> Their phonetic realization in a non-metaphonic context in dialects such as those of Salento, where we find such a system – with a F1 around 500 Hz for the front mid vowels and 510 Hz for the back ones (Grimaldi *et al.*, forthcoming) – is consistent with this phonological analysis. In many dialects their surface realization depends on syllable structure: vowels are closer (or [+ATR]) in open syllables and laxer (or [-ATR]) in closed syllables (see Trumper 1979). As mentioned below, in unstressed syllables, if the mid vowels are preserved and not changed to high, or schwa (CHAPTER 26: SCHWA), they tend to be [+ATR] across Italian dialects (see Calabrese 1985; Miglio 2005).

Further changes in some dialects, both in the north and south of Italy, have introduced the round front vowels [y ø œ] or the low front [æ]. They will not be discussed here.

In unstressed syllables, vowels are reduced in various ways across dialects, often depending on the position of the syllable with respect to the stressed vowel (pre-tonic/post-tonic). In Standard Italian (Tuscan) and many other Italian dialects, there is neutralization of the ATR opposition in mid vowels, which become [+ATR] in unstressed positions. In other dialects, they become high in this position, or schwa. Final unstressed vowels have become schwa or have been lost in a large number of dialects throughout Italy.

## 1.2 Italian metaphony

In seven-vowel systems, the typical targets of metaphony are the mid [+ATR] vowels /e o/, which raise to /i u/ when followed by a high vowel.<sup>2</sup> There is dialectal variation in the case of the mid [-ATR] vowels, where we essentially find three groups of dialects. In one group of dialects, these vowels diphthongize. In another group of dialects, they are raised to mid [+ATR] vowels. And finally, in still another group of dialects, they do not change in a metaphonic context. Typical metaphonic systems are exemplified by the dialects in (4), (5), and (6).

### (4) *The dialect of Calvello* (Gioscio 1985)<sup>3</sup>

Metaphonic alternations: /e o/ → [i u]; /ε ɔ/ → [je wo]

#### a. [+ATR] /e o/

##### i. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'sulu	'suli	'alone'
fem	'sola	'sole	
masc	'niru	'niri	'black'
fem	'nera	'nere	

##### ii. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
	ka'vrone	ka'vruni	'charcoal'
	'mese	'misi	'month'
	'verde	'virdi	'green'

##### iii. Metaphonic alternations in the present singular of verbs

	'mitti	'kurri	(2nd person)
	'mette	'korre	(3rd person)
	'put'	'run'	

#### b. [-ATR] /ε ɔ/

##### i. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'ɣrwossu	'ɣrwossi	'big'
fem	'ɣrossa	'ɣrosse	
masc	'vjekkju	'vjekkji	'old'
fem	'vεkkja	'vεkkje	

##### ii. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
	'pεre	'pjeri	'foot'
	'dεnte	'djenti	'tooth'
	'fɔrte	'fworti	'strong'

##### iii. Metaphonic alternations in the present singular of verbs

	'pjentsi	'mwɔvi	(2nd person)
	'pentsa	'mɔve	(3rd person)
	'feel'	'move'	

(5) *The dialect of Servigliano* (Camilli 1929)

Metaphonic alternations: /e o/ → [i u]; /ε ɔ/ → [e o]

## a. [+ATR] /e o/

## i. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'kurtu	'kurti	'short'
fem	'korta	'korte	

## ii. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
	'fjore	'fjuri	'flower'
	'botte	'butti	'barrel'
	'verde	'virdi	'green'

## iii. Metaphonic alternations in the present singular of verbs

	'mitti	'kridi	(2nd person)
	'mette	'krede	(3rd person)
	'put'	'believe'	

## b. [-ATR] /ε ɔ/

## i. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'veccu	'vecci	'old'
fem	'vεcca	'vεcce	
masc	'pjottsu	'pjotsi	'slow'
fem	'pjottsα	'pjɔtse	
masc	'fjeru	'fjeri	'proud'
fem	'fjera	'fjere	

## ii. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
	'pεde	'pedi	'foot'
	'dεnte	'denti	'tooth'
	'fɔrte	'forti	'strong'

## iii. Metaphonic alternations in the present singular of verbs

	'senti	'mori	(2nd person)
	'sεnte	'mɔre	(3rd person)
	'put'	'die'	

(6) *The dialect of Grado* (Walker 2005)

Metaphonic alternations: /e o/ → [i u]; no metaphony for /ε ɔ/

## a. [+ATR] /e o/

## i. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'vero	'viri	'true'
masc	'tempo	'timi	'time'
masc	'roso	'rusi	'red'
masc	'sordo	'surdi	'deaf'

## ii. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
masc	'fjor	'fjuri	'flower'
fem	a'mor	a'muri	'love'

## iii. Metaphonic alternations in the present singular of verbs

'mit-i	'kri-i	'rump-i	(2nd person)
'met-e	'kre-e	'romp-e	(3rd person)
'put'	'believe'	'break'	

## b. [-ATR] /ε ɔ/

## Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'bɛlo	'bɛli	'beautiful'
fem	'bɛla	'bɛle	
masc	'mɔrto	'mɔrti	'dead'
fem	'mɔrta	'mɔrte	

The metaphonic pattern with diphthongization is the most common one across dialects. The diphthongal outcome can vary slightly: [je je iə] from [ε]; [wo wo we we uə] from [ɔ]. The glide-initial diphthongs [je wo] are characteristic of central Italy (the variants [je we] are found in Salentino). The vowel-initial diphthongs [iə uə] are found in many southern varieties (e.g. [kurtiəddu] 'knife', [ruərmi] 'you sleep', in the dialect of Buonabitacolo (Salerno); [Savoia and Maiden 1997](#)). In some dialects, especially Sicilian ones, the /ə/ of these diphthongs is lowered to [a] (e.g. [piadi] 'feet', [tiani] 'you hold', as in the dialect of Villalba ([Rohlf 1966](#): 127).

In several southern dialects, there are alternations [ε̃ i], [ɔ̃ u], where the mid [-ATR] vowels are raised to high [i u], like the mid [+ATR] /e o/. Traditionally (see [Rohlf 1966](#): 128), the metaphonic outcomes [i u] from mid [-ATR] vowels are assumed to be the result of the monophthongization of the metaphonic diphthongs. However, [Calabrese \(1985, 1998\)](#) argues that at least in some of the dialects characterized by these alternations (see the dialect of Foggia in (7) and the dialect of Teramo mentioned below) one can directly derive the outcome [i u] from [ε ɔ] without assuming a diphthongal stage followed by monophthongization.<sup>4</sup>

(7) *The dialect of Foggia* (Valente 1975)

'moʃʃa	'muʃʃu	'soft (FEM SG/MASC SG)
'kjena	'kjinu	'full (FEM SG/MASC SG)
'pɛte	'piti	'foot (SG/PL)
'grɔssa	'grussu	'big (FEM SG/MASC SG)

Groups of dialects characterized by raising of the mid [-ATR] vowels [ε ɔ] to the mid [+ATR] [e o], as in the Servigliano dialect in (5), are found scattered among dialects where these vowels are diphthongized. Thus they are found in an area between Rome and Ancona, in parts of western Abruzzo and in outcrops in northern Puglia, in southern Lazio/northern Campania, and in a small area between Basilicata and Calabria. The dialectal distribution of this type of raising, which appears in geographically non-contiguous and historically unrelated areas, seems to indicate that it may have arisen independently in the different areas.

Metaphony restricted to the mid [+ATR] vowels is mostly found in the northeast of Italy in the Veneto region, but also in some dialects of the Gargano promontory in the southeast of Italy (Maiden 1991: 114).<sup>5,6</sup>

In some dialects the low vowel /a/ can also be affected by metaphony, most commonly becoming [ɛ] or [e] (Maiden 1991: 131). In some southern dialects, the metaphonic output of [a] is a diphthong [je jɛ]. The Teramo dialect of the Abruzzo region shows an extreme case, wherein all vowels become high in metaphony: vowels /e ɛ a/ raise to [i] and /o ɔ/ raise to [u] in a metaphonic context (Maiden 1991: 167).

The final vowel /u/ lowered to [o] in many Italian dialects. In some dialects, this change occurred before metaphony became active. Hence, in these dialects, the only trigger of metaphony is /i/ (see the dialects of Romagna and Veneto; Savoia and Maiden 1997: 20). In other dialects, /u/-lowering occurred after metaphony, and thus in these dialects we find cases in which a surface final [o] (underlying /u/) triggers metaphony (e.g. Antico Romano *castiello*; Rohlf's 1966: 127). In other dialects, the situation is complicated further by the fact that there were two stages of metaphony historically: it first affected the [+ATR] mid vowels [e o] and then the [-ATR] mid vowels [ɛ ɔ] (Mancarella 1974; Maiden 1991). In some dialects, final /u/-lowering occurred between these two stages. Therefore, in these dialects metaphony of the mid [+ATR] vowels is triggered by both /i/ and underlying /u/, but that of the mid [-ATR] vowels only by [i] (see the dialects of Ischitella and Rodi in Apulia (Melillo 1926; Maiden 1987: 61; Loporcaro 1997: 339); see also Calabrese 1998).<sup>7,8</sup>

In many Italian dialects, further changes, such as reduction to schwa, deletion, or raising, have affected final vowels. In some dialects, the underlying nature of the final vowels can still be identified through alternations (see northern Salentino (Calabrese 1985) or the dialect of Calvello (4)). In many other dialects, however, these changes have totally obscured the phonological conditions for the metaphonic alternations, and metaphony has become morphologized. A dialect of this type is Arpinate, the dialect of Arpino (Parodi 1892; Calabrese 1998). Arpinate has the seven-vowel system in (1). In this dialect, the historical rule of metaphony was morphologized because of a process of vowel reduction that affected post-tonic non-low vowels and changed them into schwas. Metaphony is now a morphological process affecting the stressed vowel of a word in certain morphological categories, so that we have alternations such as the following (see §4.2 for more discussion).

(8) a. Class I/II adjectives

	<i>singular</i>	<i>plural</i>	
masc	'sulə	'sulə	'alone'
fem	'sola	'solə	
masc	'nirə	'nirə	'black'
fem	'nera	'nerə	
masc	'bwonə	'bwonə	'good'
fem	'bona	'bonə	
masc	'vjekkjə	'vjekkjə	'old'
fem	'vɛkkjə	'vɛkkjə	

b. Class III adjectives and nouns

	<i>singular</i>	<i>plural</i>	
masc	'fjorə	'fjurə	'flower'
masc	'mesə	'misə	'month'
masc/fem	'fɔrtə	'fwortə	'strong'
masc	'vɛrmə	'vjermə	'worm'

c. Metaphonic alternations in the present singular of verbs

'vidə	'kurrə	'sjentə	'mittə	'kwɔllə	(2nd person)
'vedə	'korrə	'sɛntə	'mettə	'kɔllə	(3rd person)
'see'	'run'	'feel'	'put'	'pick'	

Another change that affected the phonological status of metaphonic alternations in many southern dialects was the elimination of mid [+ATR] vowels that became [-ATR], so that there is no longer a contrast in [ATR] values in

mid vowels in stressed syllables. This change occurred in northern Salentino, which now has the vowel system in (3). The neutralization in [ATR] values rendered the old metaphony system opaque, as in (9), where the same set of phonetically mid [−ATR] vowels has two different phonological behaviors according to the metaphonic context. The additional raising of mid vowels in unstressed syllables ([ˈsentu ~ sinˈtimu] ‘feel–PRES (1 SG ~ 1 PL)’, [kaˈnɔsku ~ kanuˈfʲimɯ] ‘know–PRES (1 SG ~ 1 PL)’) complicates the situation further (see [Calabrese 1985](#) for an analysis).

(9) *Northern Salentino*

<i>singular</i>	<i>plural</i>	
ˈmesi	ˈmisi	‘month’
ˈnɔʃi	ˈnuʃi	‘nut’
ˈpeti	ˈpjɛti	‘foot’
ˈkɔri	ˈkwɛri	‘heart’

## 2 Analyses of metaphony

The major theoretical problem in characterizing Italian metaphony lies in the different phonological behavior of the mid [+ATR] and mid [−ATR] vowels. Recall that whereas mid [+ATR] vowels are consistently raised to high vowels across dialects in a metaphonic context (i.e. before high vowels), mid [−ATR] vowels may be diphthongized (4), raised to mid [+ATR] (5) or high [+ATR] (7), or even fail to undergo any change (6) in the same context. As we will see below, there is substantial agreement in the literature with respect to the basic nature of the process affecting mid [+ATR] vowels: it essentially involves height assimilation between a high vowel and the preceding stressed vowel. In contrast, there is no such agreement with regard to the nature of the process(es) affecting the mid [−ATR] vowels in a metaphonic context. On the one side, there are those who aim to achieve a unified account for metaphony and therefore propose that the same process applies to mid [+ATR] and mid [−ATR] vowels. For these scholars, the different outcomes observed in the case of the mid [−ATR] vowels are due to further phonological operations that apply to the outputs of height assimilation. On the other side, there are those who propose that an adequate account of the different outcomes observed in the case of the mid [−ATR] vowels requires the postulation of two independent processes: one of height assimilation applying to mid [+ATR] vowels, and a different one applying to mid [−ATR] vowels. In this section I will discuss the different proposals addressing the problem of the different phonological behaviors of the mid [+ATR] and mid [−ATR] vowels in a metaphonic context. A brief critical assessment of the different analyses of metaphony discussed in §2.1 and §2.2 is given in §2.3.

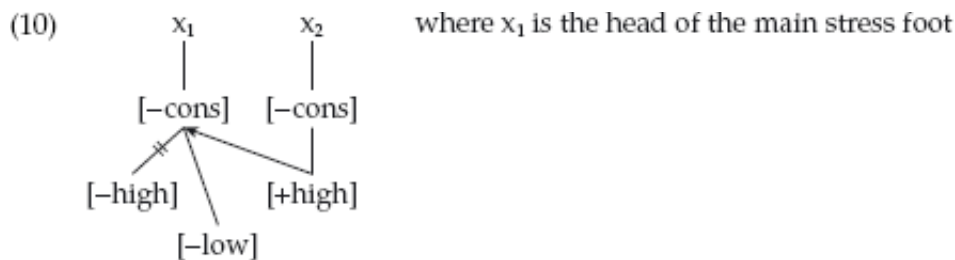
### 2.1 Metaphony as a unitary process

#### 2.1.1 The analysis of metaphony in [Calabrese \(1985, 1998\)](#)

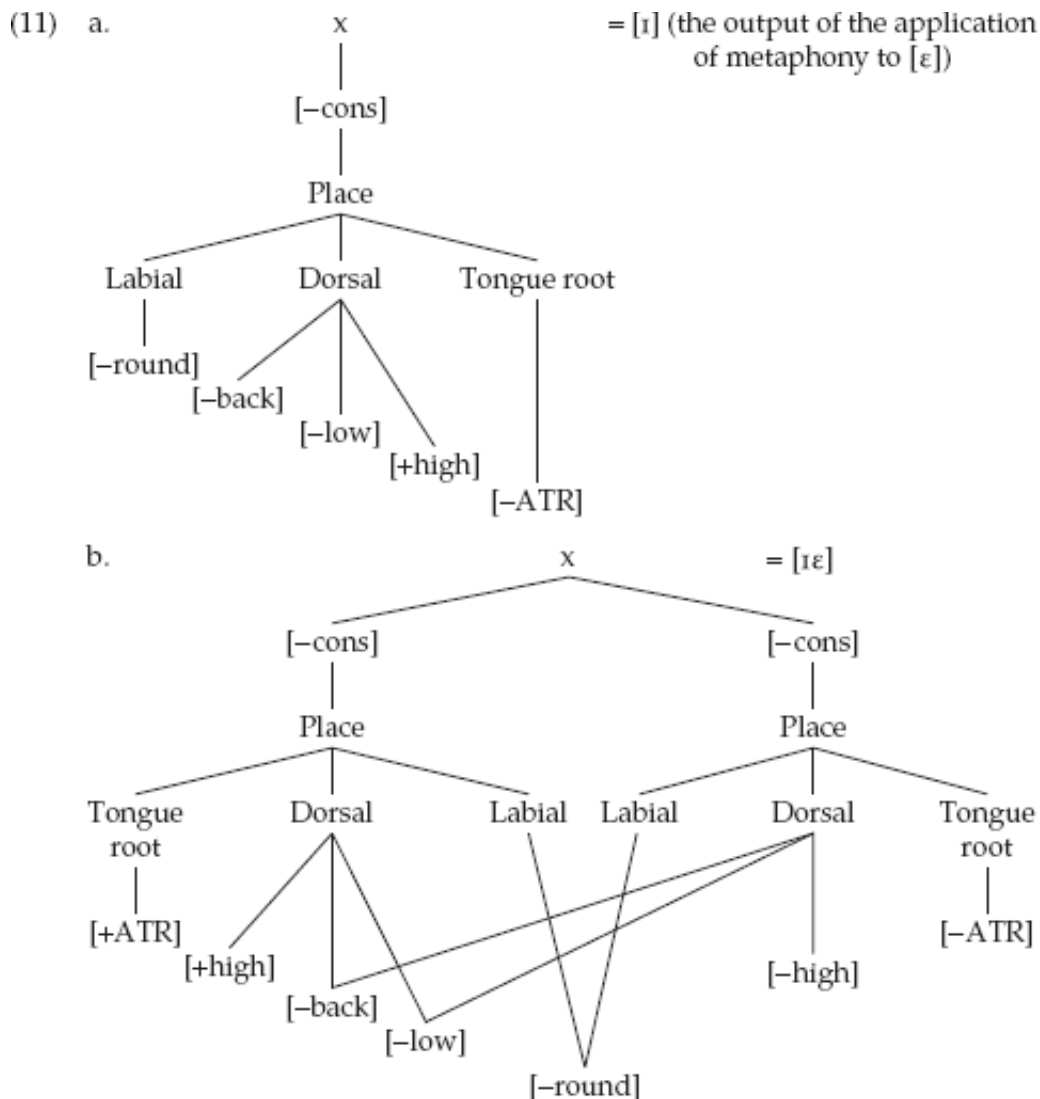
[Calabrese \(1985\)](#) was the first to analyze Italian metaphony in a generative and, more specifically, non-linear phonological framework. The dialect he studied was that of Francavilla Fontana ([Ribezzo 1912](#)) in northern Salento, where, despite some obscuring surface changes, one can easily reconstruct a metaphony system like that of Calvello in (4), with raising of stressed mid [+ATR] vowels and diphthongization of the stressed mid [−ATR] ones.

The main concern of [Calabrese \(1985\)](#) is that of achieving maximal simplicity and generality in the analysis of these processes. Proposing two different metaphony processes, one of raising applying to stressed [+ATR] mid vowels and one of diphthongization applying to stressed [−ATR] mid vowels, means for him failing to recognize that these two processes applied in exactly the same environment and therefore overlapped strikingly in their structural description. To get out of this theoretical redundancy he proposes that the same rule in (10) raises all stressed mid vowels, regardless of their [ATR] specification.





This rule directly raises mid [+ATR] vowels to high [+ATR] ones, and thus accounts for the behavior of these vowels. However, in the case of the mid [-ATR] vowels, this rule creates high [-ATR] vowels. Allowing the creation of this outcome is central to Calabrese's analysis. Although these segments can be found as surface variants of the high vowels in some dialects (see [Loporcaro 1991](#) and §2.3.1), they are consistently not phonemic in all Italian dialects ([CHAPTER 11: THE PHONEME](#)). Adopting a variant of [Kiparsky's \(1985\)](#) structure preservation, Calabrese assumes that they are disallowed by the constraint \*[+high, -ATR]. However, this constraint, instead of blocking the generation of these illicit segments as in the original version of Kiparsky's structure preservation ([CHAPTER 76: STRUCTURE PRESERVATION: THE RESILIENCE OF DISTINCTIVE INFORMATION](#)), triggers a repair adjusting them. Calabrese proposes that the repair that occurred in this case was similar to the one that often adjusts the German or French vowel [y] in non-native pronunciations of these languages by changing it into the diphthong [iu] (cf. [Trubetzkoy 1939: 135](#)), [Calabrese \(1988\)](#) calls this repair "fission" (see [Calabrese 1995, 2005](#) for further discussion of fission and for more examples). He assumes that feature constraints hold only among feature specifications dominated by the same root node, i.e. in the same feature bundle. Fission takes a feature bundle containing an illicit combination of features, and breaks it into two different feature bundles, each containing one of them. Thus the violation of the constraint is repaired. Application of the metaphony rule in (10) creates a feature bundle containing the feature specifications [+high, -ATR], in violation of the active constraint \*[+high, -ATR] (see (11a)). Application of fission to this feature bundle creates the structure in (11b), with two feature bundles - one containing the feature [+high] and the other the feature [-ATR] - which are then matched by compatible features.<sup>9</sup> This accounts for the diphthongization observed in the case of metaphony of mid [-ATR] vowels. Further changes discussed in [Calabrese \(1985, 1998\)](#) account for the conversion of the high vowel into a glide ([CHAPTER 15: GLIDES](#)) and for other dialectal outcomes.

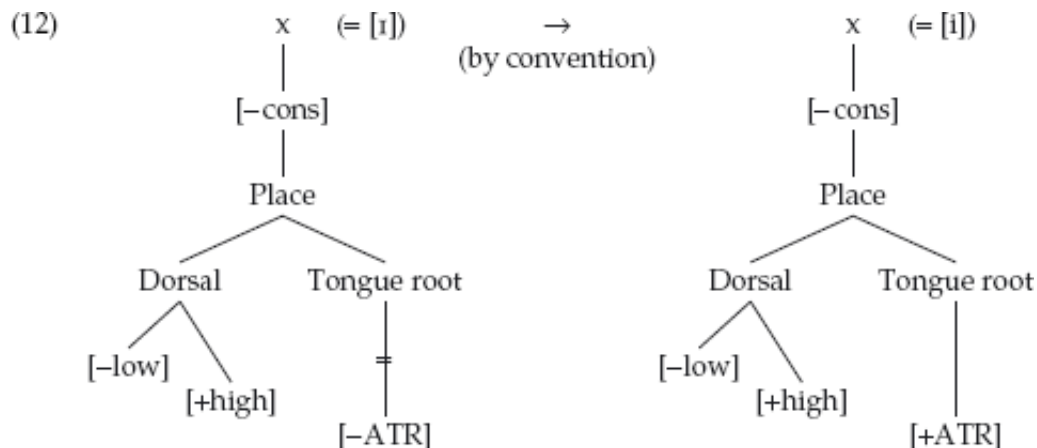


Under this analysis, the metaphony rule is unitary. Metaphony in itself does not display any variation. It is a process spreading the high feature of high vowels onto a preceding mid stressed vowel. Diphthongization instead results from an independently motivated process.

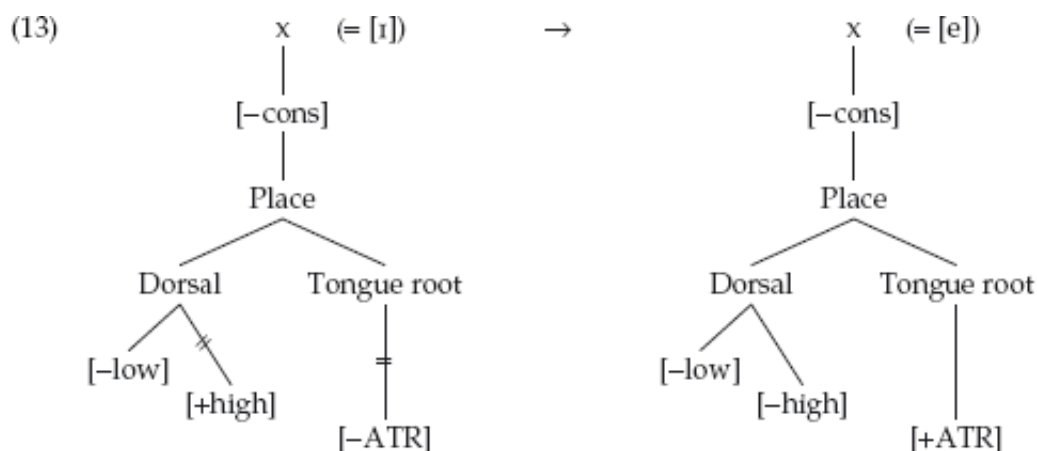
Calabrese (1985) further extends this analysis to account for the dialectal variation observed when the metaphony targets are mid [-ATR] vowels. Recall that mid [+ATR] vowels are always raised; in contrast, mid [-ATR] vowels can be diphthongized, tensed, or raised to high [+ATR] vowels, depending on the dialect. Assuming that diphthongization is an instance of fission which repairs the disallowed configuration [+high, -ATR] created by the metaphony rule leads Calabrese to propose that the tensing and raising of mid vowels in a metaphonic environment are also instances of application of other possible repairs. Thus, instead of postulating different rules of metaphony to explain this dialectal variation, Calabrese proposes that the rule of metaphony is always the same across dialects and that the variation is due to the application of different repair rules to the same disallowed configuration [+high, -ATR], created by metaphony in the case of mid [-ATR] vowels. In historical terms, he hypothesizes that the same rule of height assimilation spread across the southern Italian dialects. Each dialect reacted to the problem posed by the output of the application of this rule to the mid [-ATR] vowels in a different way.

The relevant repairs he proposes are delinking and excision. Delinking involves an operation that removes one of the feature specifications disallowed by an active marking statement. The opposite feature specification is inserted by convention. This operation accounts for metaphonic raising to high vowels. In this case the feature specification [-ATR] of the disallowed configuration [+high, -ATR] created by the metaphony rule is delinked and

the opposite feature specification [+ATR] is inserted, as shown in (12).



Excision involves removing both the feature specifications of the disallowed configuration and replacing them with their opposite specifications (see Calabrese 1995, and especially 2005, for further discussion of excision). If we assume that the rule of metaphony is the same across dialects and that the variation is due to the application of a different repair, we can hypothesize that excision is the relevant repair in southern Umbro. Thus, we have a repair like the one in (13).



That is, the [-ATR] high vowels produced by metaphony are changed into [+ATR] mid vowels.<sup>10</sup>

Calabrese (1985, 1995) accounts for metaphony systems where only mid [+ATR] vowels, but not mid [-ATR] ones, undergo metaphony (see the dialect of Grado in (6)) by postulating that there is a parametrized option that governs the interaction between rules and active constraints. If applying a rule would generate a violation of a constraint, the application of the rule could either be (i) blocked (structure preservation) or (ii) allowed to apply. Under option (ii), a repair then fixes the illicit configuration that is so produced. The dialects discussed above select this option. The dialects where metaphony does not apply to mid [-ATR] vowels select option (i): so the rule in (10) is prevented from applying to these vowels because of the active constraint \*[+high, -ATR] (see Calabrese 1998 for further discussion of this case).

I will now discuss two different accounts of Italian metaphony that essentially preserve Calabrese's hypothesis that there is a single metaphonic process raising all mid vowels to high ones and that the different treatments found in the case of the mid [-ATR] vowels are due to different processes. These are the analyses of Maiden (1991) and Walker (2005). Observe that only Walker accounts for the dialectal variation we find in the case of metaphony of the mid [-ATR] vowels. Maiden (1991) accounts only for the diphthongization observed in dialects such as that of Calvello. In this section I will also consider Nibert's (1998) analysis of metaphony in Servigliano.

### 2.1.2 The analysis of metaphony in Maiden (1991)

Maiden (1991) provides a detailed study of metaphony in its diachronic development and in its synchronic phonological and morphological aspects. In his analysis of the phonology of this sound change, Maiden treats metaphony as an assimilation in height, as proposed by Calabrese; however, he disagrees with Calabrese's account of the diphthongization process found in lower mid vowels. In his account of metaphony, Maiden assumes the framework of dependency phonology. Following dependency phonology, he proposes that vowel height in a seven-vowel system like that of the Italian dialects should be represented as in (14), where vowel space is characterized by four components: |i| (palatality or acuteness); |a| (lowness or sonority); |u| (roundness or gravity); |H| (centrality (not used here)).

$$(14) \begin{array}{ll} \{\{i\}\} & = /i/ & \{\{u\}\} & = /u/ \\ \{i;a\} & = /e/ & \{u;a\} & = /o/ \\ \{a;i\} & = /ɛ/ & \{a;u\} & = /ɔ/ \\ \{\{a\}\} & = /a/ & & \end{array}$$

(Curly brackets indicate that the segment is characterized phonologically by just that component or combination of components, and “;” symbolizes asymmetrical right-to-left “government” relationships between components.)

He then proposes that the structural change involved in metaphony is the following.

$$(15) V \rightarrow -|a|$$

According to Maiden, this rule

is to be interpreted as a demotion of the |a| component. Its causal relationship with the conditioning environment is manifested in the fact that /i/ and /u/ are  $-|a|$  (i.e. lacking the |a| component [...]). (Maiden 1991: 140)

The structural change in (15) accounts for the change of higher mid vowels to high vowels, as can be seen in (16).

$$(16) \{i;a\} (= /e/) \rightarrow \{\{i\}\} (= /i/)$$

In this case, demotion of the |a| component in {i;a} boils down to deletion. The structural change in (15), however, cannot account for the diphthongization of the lower mid vowels directly. Maiden thus postulates that there is a special “resolution” rule that changes the output of the application of (15) to lower mid vowels into a diphthong, as in (17).

$$(17) \{a;i\} (= /ɛ/) \rightarrow (\text{Resolution}) \{i\}\{i;a\} (= /ie/)$$

### 2.1.3 The analysis of metaphony in Walker (2005)

The most recent account of metaphony that preserves Calabrese's idea of the unity of this phenomenon is provided by Walker (2005). The central feature of this account, which is set in Optimality Theory (Prince and Smolensky 1993), is the attempt to identify the functional motivations behind metaphony. Walker adopts the hypothesis that the functional motivation for harmony is to extend the duration of phonetic information which is phonologically important (i.e. distinctive), but which is difficult to perceive (Steriade 1994, 1995; Flemming 1995; Kaun 1995). In “normal” vowel harmony systems, the harmony trigger belongs to a “strong” position and the harmonic improvement is achieved by maximal duration of the perceptually weak harmonic feature. In stress targeted harmonies such as metaphony, the trigger belongs to a prosodically weak position, and the improvement is achieved through association with a prosodically strong syllable rather than maximal duration.

In Walker's analysis, the functional motivation of metaphony lies in improving the perceptibility of the height properties of high vowels in unstressed syllables (CHAPTER 98: SPEECH PERCEPTION AND PHONOLOGY). According to her, high vowels in such a position are difficult to perceive because of the paucity of cues in an unstressed syllable combined with the inherent comparative weakness of high vowels. She proposes that:

in extending to the stressed syllable, the height feature of the unstressed vowel becomes affiliated with a vocalic position that has increased duration, increased amplitude and more salient pitch. Duration of the feature is also increased by virtue of its continuation across more than one syllable. (Walker 2005: 932)

Metaphony, in other words, accomplishes improved perceptibility by extending the height features to the stressed syllable. She uses the positional licensing constraint in (18) to represent the need for high vowels to be associated with a prosodically strong position.

- (18) LICENSE([+high]post-tonic, 'σ)  
 [+high] in a post-tonic syllable must be associated with a stressed syllable.

The constraint in (18) is satisfied in (19a), but not in (19b). The alternative solution in (19c), where the mid character of the stressed vowel overrides the post-tonic vowel, would result in unstressed vowel lowering. Walker eliminates this solution by assuming a preference for minimized sonority (CHAPTER 49: SONORITY) in unstressed syllables (CHAPTER 39: STRESS: PHONOTACTIC AND PHONETIC EVIDENCE).

- (19) a. *Licensing: satisfied*  
 'b i v i  
 ↙ ↘  
 [+high]
- b. *Licensing: violated*  
 'b e v i  
 |    |  
 [-high] [+high]
- c. *Licensing: satisfied (sonority minimization in unstressed syllables violated)*  
 'b e v e  
 ↙ ↘  
 [-high]

In the OT scheme Walker proposes, all height features of post-tonic high vowels ([+high], [±ATR], [−low]) in metaphonic systems require licensing. This is implemented by LICENSE(height), which subsumes (18). In all of these systems, LICENSE(height) is ranked over IDENT[high], thus forcing spreading of the feature [high]. At the same time, \* [+high, −ATR] is strictly enforced across patterns to block [+high, −ATR], as in Calabrese's analysis discussed in §2.1.1.

The dialectal variation we observe across the dialects is obtained as follows in Walker's OT analysis.

In Veneto, where metaphony applies only to [+ATR] mid vowels, the higher ranking IDENT[ATR] and IDENT[low] prevent [−ATR] vowels from being affected in metaphony. LICENSE(height) is ranked above IDENT[high]. Therefore the only allowed pattern is that in (6).

In the Pugliese dialect of Foggia (see (7)), where /ε ɔ/ raise to [i u], licensing for all height features is also capable of overriding IDENT[ATR]. Hence, in contrast to Veneto, LICENSE(height) dominates IDENT[ATR] in the dialect of Foggia.

Like Pugliese, metaphony in southern Umbro (see (5)) has the capacity to violate IDENT[ATR], but it shows gradual raising. Walker follows Kirchner (1996) in accomplishing this by local conjunction of faithfulness constraints for height features, which moderates satisfaction of height licensing (CHAPTER 62: CONSTRAINT CONJUNCTION).

(20) IDENT-IO[high] & IDENT-IO[ATR]

If a segment violates IDENT[high], it must not violate IDENT[ATR], and vice versa.

This constraint will be violated by any vowel that changes its specifications for both [high] and [ATR] in the input–output mapping. The conjunction dominates LICENSE(height), which in turn outranks the non-conjoined height faithfulness constraints, as shown in (21).

(21)

	/ɔv-u/	Id[hi]&Id[ATR]	Lic(height)	Id[ATR]	Id[hi]
a.	'novu		*	*	
b.	'ɔvu		**!		*
c.	'nuvu	*!		*	*

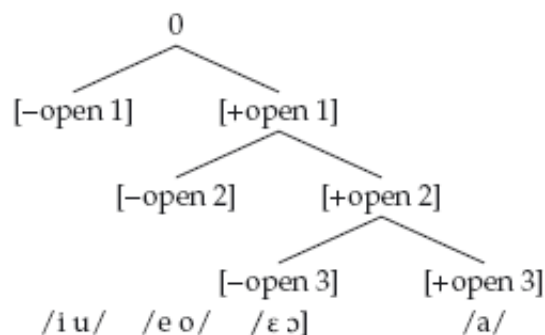
The local conjunction rules out candidate (c), in which /ɔ/ changes to [u]. This constraint is obeyed, however, in (a), in which /ɔ/ changes to [o], and in (b), which is fully faithful. Candidate (a) wins over (b), because it better obeys LICENSE(height), for which a violation mark is shown for each unlicensed height feature: (a) violates licensing for [+high] and (b) for both [+high] and [+ATR]. An alternative, [ɔvu], would be eliminated by \*[+high, –ATR].

In Calvello (see (4)), [ε ɔ] become diphthongs. As in Calabrese's analysis, diphthongization is regarded as driven by the constraint \*[+high, –ATR]. Walker assumes that in Calvello, the faithfulness conjunction, IDENT[high] & IDENT[ATR], is strictly enforced, as in southern Umbro. However, in the Calvello dialect, licensing of all height features is accomplished by affiliating [+high] with the glide portion of a diphthong. The licensing constraint requires perceptually marked structure to be associated with an element in a strong position. For Walker, association with one element of a diphthong in a strong syllable is sufficient to satisfy the constraint. Assuming that diphthongs are bisegmental, diphthongization in Calvello will violate DEP-IO for the inserted root node (McCarthy and Prince 1995). Walker therefore proposes that diphthongization patterns for [–ATR] mid vowels are distinguished from those involving step-wise raising, as in southern Umbro, by the relative ranking of DEP-IO and LICENSE(height).

#### 2.1.4 The analysis of metaphony in Nibert (1998)

A single operation for metaphony, based on Clements' (1989) model of vowel height, is also proposed by Nibert (1998), although it is restricted to the analysis of the Servigliano dialect of Italian. Clements (1989) proposes an alternative to the analysis of vowel height in terms of the binary features [high] and [low]. He argues that the vowel space is divided into height categories by a succession of binary divisions. Clements employs a single binary height feature [open], which can appear in a recursive structure such as (22), where each [αopen *n*] branch of the feature tree can be further subdivided into [+open] and [–open] branches.

(22) Recursive expansion of [open]



Servigliano has the seven-vowel inventory /i e ε a ɔ o u/. Metaphony induces a one-step raising of both the high mid vowels /e o/ and the low mid vowels /ε ɔ/. Nibert specifies the vowel height features for Servigliano in (23).

Note that this is a center–embedding structure, as opposed to the right–branching structure in (22). The choice between the center–embedding and right–branching analysis of a four–height system depends on the behavior of the mid vowels in an individual language. (22) best represents a system in which the low mid vowels pattern with the low vowel with respect to vowel height, while (23) is an appropriate specification for languages like Servigliano, in which the low mid and high mid vowels pattern together.

(23)		i	e	ɛ	a	ɔ	o	u
	open 1	–	–	–	+	–	–	–
	open 2	–	+	+	+	+	+	–
	open 3	–	–	+	+	+	–	–

Nibert shows that under this analysis of vowel height, the raising of /e o/ requires assimilation of [–open 2] from the triggering vowels. But spreading [–open 2] onto /ɛ ɔ/ yields the feature bundle [–open 1, –open 2, +open 3], which doesn't correspond to any of the available vowel qualities. In order to raise /ɛ ɔ/ in one step to /e o/, it is the feature [–open 3] that must be assimilated. Nibert argues that metaphony can spread either feature, [–open 2] or [–open 3], subject to structure preservation, which bans the spread of [–open 2] onto /ɛ ɔ/. In order to guarantee that [–open 2] and not [–open 3] spreads onto /e o/, since spread of [–open 3] would be vacuous, and would not accomplish raising, Nibert's rule must be modified to apply disjunctively, spreading [–open 2] unless spreading is blocked, in which case [–open 3] will spread.

## 2.2 Italian metaphony as two different processes

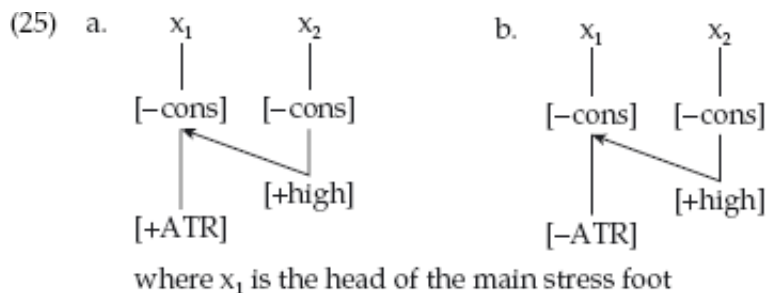
The analyses that I consider in this section reject the idea that there is a unitary metaphonic process, and propose to break metaphony into two distinct processes – one targeting the mid [+ATR] vowels and raising them to high ones and the other targeting the mid [–ATR] vowels, leading to diphthongization or tensing. These are the analyses of Sluyters (1988) and Cole (1998).

### 2.2.1 The analysis of metaphony in Sluyters (1988)

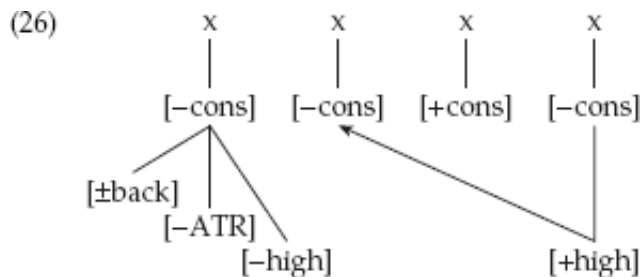
Sluyters (1988) proposes a reanalysis of Calabrese's (1985) account of metaphony in the northern Salentino dialect of Francavilla Fontana (see (9)). Assuming an underlying system as in (2) for this dialect, he adopts Calabrese's rule (10) (see §2.1.1 above) to account for height assimilation before high vowels. However, he proposes a different account of diphthongization in metaphony. Sluyters suggests that the metaphonic diphthongs /iɛ uɔ/ are characterized by a second x–slot which is contextually determined by stress and introduced by a rule like that in (24).

(24)		[+stress]	
	∅ → X /	x	—
		[–cons]	

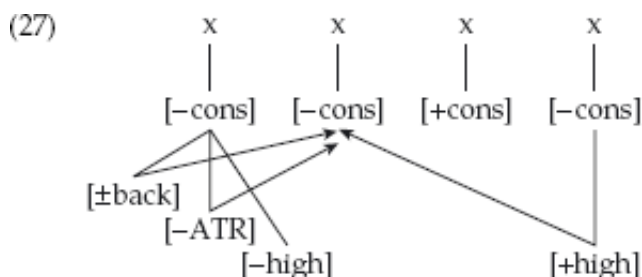
In Sluyters' analysis, Calabrese's rule (10) directly accounts for the raising observed in the case of mid [+ATR] vowels. According to Sluyters, however, (10) does not apply in the case of the mid [–ATR] vowels until after rule (24) has applied. However, the facts cannot be accounted for by simply applying (10) before and after (24). The first application of (10) would also affect mid [–ATR] vowels. It is therefore necessary to split rule (10) into two different rules: one applying to mid [+ATR] vowels and the other to mid [–ATR] vowels as in (25).



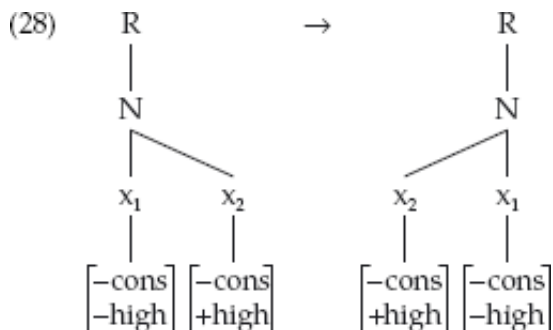
(25a) applies first. Then (24) applies. After the application of (24), rule (25b) fills in the empty  $x$ -slot with the feature [+high] as shown in (26) (tree structures are simplified).



The other features of the inserted empty vowel are filled in by spreading from the preceding vowel, according to Sluyters.



Such an analysis produces the falling diphthongs / $\epsilon j$   $\omega j$ /. In order to get the correct outputs, Sluyters assumes the rule of metathesis in (28).



Application of (28) to the outputs of (27) generates the metaphonic outcomes / $j\epsilon$   $w\omega$ /.

### 2.2.2 The analysis of metaphony in Cole (1998)

Cole (1998) argues that the vowel raisings that define metaphony systems in Italian dialects do not result from a unified operation of height assimilation. Instead, metaphony is claimed to be the product of the assimilation of the mid [+ATR] vowels / $e$   $o$ / to the high vowels [i u] within the stress foot (CHAPTER 40: THE FOOT), and a subsequent



vowel shift by which the non-high /a ɛ ɔ/ are raised one step.

Like Walker (2005), Cole views the height assimilation of the mid [+ATR] /e o/ to /i u/ in functional terms. Following Cole and Kisseberth (1994), she assumes that assimilation promotes perceptual salience by reducing or eliminating marginal contrasts between two phonetically similar segments. Small phonetic differences between the trigger and target of assimilation are resolved, and in many vowel harmony systems the target emerges as fully identical to the trigger. Thus the assimilated target provides additional or extended acoustic cues for the identification of the triggering segment.

Cole then proposes that the assimilation in height of the mid [+ATR] leaves a vacancy in the vertical dimension of the vowel space, and a vowel shift takes place to raise the lower mid [−ATR] vowels, and thereby fill the gap.<sup>11</sup> This accounts for the tensing of the mid [−ATR] vowel observed in southern Umbro.

According to Cole, diphthongization plays a role in maintaining contrast: by diphthongizing a raised low mid vowel, the surface form unambiguously identifies the contrastive category of the vowel, countering the neutralization that would otherwise result from compressing four contrastive height categories into three.

## 2.3 Brief critical assessment of analyses of metaphony discussed above

### 2.3.1 Discussion of Calabrese's analysis

I will begin with some of the criticism leveled against Calabrese's analysis of metaphony (§2.1.1). The first I consider involves the status of the configuration [+high, −ATR]. A central assumption in his analysis is that the Italian dialects do not accept the complexity of the feature configuration [+high, −ATR] – in formal terms they are characterized by an active constraint \*[+high, −ATR]. It is the activity of this constraint that triggers the application of repairs such as fission which change the high [−ATR] vowels in diphthongs. However, as Maiden (1991) puts it, “It is far from clear why innovatory diphthongs should be preferable to innovatory lax high vowels.” Calabrese assumed that the diphthongs which are the outcomes of fission are phonologically simpler than the high [−ATR] vowel that we would otherwise obtain by metaphony. In other words, the vowels [i] and [ɛ] of the diphthong [iɛ], or the vowels [u] and [ɛ] of the diphthong [uɔ], are phonologically simpler than the high lax vowels [ɪ ʊ], even though they appear in a diphthong insofar as the function of repairs is precisely that of decreasing the markedness of a system. However, Maiden's remark still has some validity.

A related criticism (cf. Maiden 1991: 133) is based on the fact that high [−ATR] vowels are actually possible on the surface in many southern Italian dialects either because of a process laxing vowels in closed syllables (cf. Lausberg 1939; Rohlf's 1966) or because of a process laxing high vowels in all positions (cf. Loporcaro 1991). Calabrese assumes that these [+high, −ATR] vowels were due to phonological processes that historically applied after metaphony. When metaphony actually applied historically, no such a vowels were allowed and they had to be repaired. In Calabrese's derivational model, such an historical sequence of events is analyzed by extrinsically ordering high vowel laxing (with the subsequent deactivation of the constraint \*[high, −ATR]) after the application of metaphony. This analysis then crucially requires a complex derivation with serially ordered rules, and it is unclear how it should be captured in non-derivational models.

Another issue is the use of repair strategies, and specifically of fission, in the analysis of metaphony. Although it is unquestionable that an operation like fission is required in phonology, cf. the sequencing of vowels like [y], [ɨ], [ã] into [iu], [ui], [an], respectively (see Calabrese 2005 for other outcomes and examples), one may doubt that it is actually fission that causes the diphthongization seen in metaphony, and in fact Cole (1998) questions the viability of fission as a general strategy to overcome feature co-occurrence constraints in assimilation systems. She observes in particular that, although the constraint [+low, +ATR] is active in languages with ATR harmony such as Yoruba or Akan and accounts for the opacity or transparency of low vowels in these systems (see Clements 1981; Archangeli and Pulleyblank 1994; Calabrese 2005), there are apparently no ATR harmony systems in which a low vowel participates in harmony, but then throws off its [+ATR] feature onto an adjacent vocalic segment, through an application of fission to the offending feature structure [+low, +ATR]. In other words, according to Cole, there are no reported cases where underlying [a] undergoes ATR harmony and surfaces as [ia], [ea], or any other diphthongal element with an initial (or final) [+ATR] element.

Observe, however, that an operation like fission appears to apply in a metaphony-like process such as /a/-breaking in Old Norse (Prokosch 1938: 110). This process is triggered by an unstressed /a/ and causes the diphthongization of a preceding stressed /e/ into [ia]. We can assume that it involves the spreading of the feature [+low], which creates the feature configuration [+low, –back], a configuration disallowed in Old Norse. The subsequent application of fission could account for the diphthong [ia] obtained in this case.

(29) e > ia hiarza < OHG herza 'heart'  
biarga < OHG bergan 'conceal'

Calabrese (1988, 1995) argues that fission can apply only to the output of locally bound assimilatory processes such as metaphony or umlaut. Further research is needed to establish whether or not this is correct.

Another issue raised by Cole (1998) with respect to Calabrese's analysis of metaphony involves the interaction between repairs and the output of the autosegmental spreading that accounts for this process. Crucially the repair must deconstruct the linked structure that is generated by this rule. Cole argues that allowing this operation of deconstruction of linked structure raises questions about the appropriateness of the autosegmental treatment of assimilation (for further discussion see Cole and Kisseberth 1994). This problem is also discussed in Calabrese (1995), where he tries to justify this operation of deconstruction.<sup>12</sup>

### 2.3.2 Discussion of Maiden's analysis

Maiden (1991) (see §2.1.2) is important for its wealth of data and for providing a clear and detailed picture of metaphony both synchronically and diachronically. In his analysis of this phenomenon, as I see it, there are two problematic aspects. First of all, the formulation of metaphony as in (15), as Maiden admits, is at variance with the widely accepted idea that assimilation processes should be analyzed as spreading of autosegments.

Secondly, there is the issue of the resolution rule in (18) which he proposes to account for the diphthongization observed when the vowels targeted by metaphony are [–ATR]. He does not discuss this rule in detail, or provide any independent motivation for it, nor does he try to account for it formally. The point is that there is no reason to assume it; it seems to be a purely ad hoc device needed only to account for the diphthongization found in the case of lower mid vowels. A reviewer of this chapter suggests an interpretation of Maiden's analysis that does not need a special resolution rule. The idea is the following: in the case of lower mid vowels demotion involves shift to the non-head position. The position that is left by the [a] component (on its way to the non-head position in the segment) is filled by the spreading [i] component. In this way, according to the reviewer, it is possible to explain why lower mid is changed to a rising diphthong. (See Calabrese 1998 for further discussion of Maiden 1991.)

### 2.3.3 Discussion of Walker's analysis

Walker's (2005) article (see §2.1.3) not only provides an excellent description of metaphony in Veneto and other Italian dialects, but also an exhaustive overview of metaphony-like phenomena from a wide range of languages. Her analysis is the first to deal successfully and convincingly with all aspects of metaphony in an OT framework. Her constraint in (18) could provide a functional basis for the metaphony rule in (10). However, this can be true only diachronically, as an account of the phonological innovation that lead to metaphonic alternations. In contrast, it is difficult to hypothesize that the constraint in (18) is operative synchronically, at least for most Italian dialects where metaphony is morphologized or obscured by subsequent phonological processes (see §1). Functional explanations by their nature must be surface-true. This is not the case in Italian metaphony.

### 2.3.4 Discussion of Nibert's analysis

Nibert's analysis of the Servigliano dialects (see §2.1.4) holds only for this dialect and cannot account for the diphthongization or the dialectal variation we observe in the case of this phenomenon (see Zetterstrand 1998 for a criticism of Clements' 1989 approach to vowel height). Furthermore, as observed by Cole (1998), Nibert's analysis cannot deal with metaphony systems in which the low vowel also participates, undergoing a one-step raising to [e]. In such a system, a different [open] feature would have to assimilate for each of the low, low mid, and high mid vowels. Under an assignment of height features as in (24), raising [a] one step would require the

assimilation of [–open 1], in addition to the assimilation of the features [–open 2] and [–open 3] required for the raising of [ɛ ɔ] and [e o], respectively. See [Cole \(1998\)](#) for further discussion of [Nibert \(1998\)](#).

### 2.3.5 Discussion of Sluyters' analysis

Sluyters' analysis (see §2.2.1) has several problematic aspects. Rule (24) is a rule of lengthening and applies independently of metaphony. It then predicts long vowels in all stressed syllables in non-metaphonic contexts. This is false. Lengthening in Italian dialects is restricted to open stressed syllables in penultimate position ([Rohlf's 1966](#)).<sup>13</sup> Furthermore, (24) must apply only to [–ATR] mid vowels, and not to the [+ATR] ones; otherwise it wrongly creates diphthongs in the case of the latter vowels. Rule (24) is thus simply wrong. The metathesis rule in (28) fares no better, and cannot be motivated either for Salentino or for any other dialects having metaphonic diphthongization. Furthermore, Sluyters' analysis does not account for either the tensing or the raising of mid [–ATR] vowels found in other Italian dialects.

### 2.3.6 Discussion of Cole's analysis

[Cole's \(1998\)](#) functional analysis of metaphony (see §2.2.2) faces the same problems as [Walker's \(2005\)](#): it may hold diachronically for the stage of Italian in which metaphony was introduced as a phonological innovation, but it cannot hold synchronically for most, if not all, Italian dialects where metaphony is either morphologized or obscured by subsequent phonological processes. Another problematic aspect of her account involves diphthongization as a way to maintain contrasts. According to Cole:

by diphthongizing a raised low mid vowel, the surface form unambiguously identifies the contrastive category of the vowel, countering the neutralization that would otherwise result from compressing four contrastive height categories into three. (1998: 93)

The problem is that metaphonic diphthongization of mid [–ATR] vowels also occurs in Sicilian or central Salentino dialects that have an underlying five-vowel system. Given that in these dialects there are no mid [+ATR] vowels, diphthongization cannot be explained as a way to counter the neutralization between the two sets of mid vowels.

## 3 Typological variation in metaphony as a height assimilation process

The term metaphony is also used to refer to processes of height assimilation in which features other than [+high] are spread. In this section I will survey the variation we find with respect to the features spread by metaphony across Romance.

### 3.1 *Metaphonic processes spreading [+ATR]: Sardinian metaphony*

There are Romance varieties in which we find metaphonic alternations that are better analyzed as involving the spreading of feature [+ATR], instead of [+high], of the high vowels. This is for example the case of Sardinian metaphony.<sup>14</sup> [Frigeni \(2003\)](#) discusses the following examples from Campidanese and Nuorese, the main varieties of Sardinian. Sardinian has the vowel system in (3).

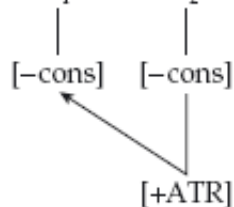
(30) *Campidanese*

a.	<i>masc sg [-u]</i>	<i>fem sg [-a]</i>	
	'lentu	'lenta	'slow'
	'veru	'vera	'true'
	'nou	'na	'new'
	'mot:u	'mota	'dead'
b.	<i>sg</i>	<i>pl</i>	
	'tempus	'tempos	'time'
	'krop:us	'krɔp:os	'body'
	'bef:u	'befos	'old (MASC)/parent'
	'ot:u	'ot:os	'vegetable garden'

(31) *Nuorese*

<i>sg</i>	<i>pl</i>	
'tempus	'tempos	'time'
'ot:u	'ot:os	'vegetable garden'
'kentus	'kentos	'hundred'

Frigeni accounts for the metaphonic alternations of these Sardinian dialects by hypothesizing the process in (32).

(32)  $x_1$   $x_2$  where  $x_1$  is the head of the main stress foot3.2 *Metaphonic processes spreading [-ATR]*

The Cantabrian dialects of Pasiego and Tudanca are traditionally described as being characterized by a centralizing metaphony (Navarro Tomás 1939; Alonso *et al.* 1950; Penny 1969). Final unstressed high vowels are regularly centralized; this process is analyzed by Hualde (1989) as insertion of [-ATR]. As Hualde discusses, centralizing metaphony propagates [-ATR] up to the stressed syllable in Tudanca and to all the syllables of the word, and even proclitics, in Pasiego. In instances of antepenultimate stress in Tudanca, intervening vowels also become [-ATR], as shown in (33b). The data in (33) and (34) compare forms ending in /-u/ (MASC SG) with counterparts ending in /-o/ (MASC) or /-os/ (PL), where the final unstressed /u/ is realized as centralized [U]. Pasiego also has raising metaphony which applies to mid vowels, as seen in (34a) vs. (34b). Thus, stressed mid and high vowels are neutralized in a metaphonic context (cf. [lixlrU] ~ [lɪmpjU]) (I use capital letters to represent the more centralized, [-ATR] alternants of the vowels. The phonetic realization of these alternants still needs to be clarified.)<sup>15, 16</sup>

(33) *Tudanca*

- |    |              |         |                                 |
|----|--------------|---------|---------------------------------|
| a. | 'pinta       | 'pIntU  | 'calf (FEM~MASC)'               |
|    | 'seka        | 'sEkU   | 'dry (FEM~MASC)'                |
|    | 'kesos       | 'kEsU   | 'cheese (PL~SG)'                |
|    | 'θurdos      | 'θUrdU  | 'left-handed (MASC PL~SG)'      |
|    | 'ohos        | 'OhU    | 'eye (MASC PL~SG)'              |
|    | se'kalo      | se'kAlU | 'to dry it (MASS) ~ to dry him' |
| b. | anti'gwIsImU |         | 'very old'                      |
|    | 'pOrtlkU     |         | 'hall'                          |
|    | o'rEgAnU     |         | 'oregano'                       |

(34) *Pasiego*

- |    |          |         |                        |
|----|----------|---------|------------------------|
| a. | ba'beros | bA'bIrU | 'bib (MASC PL~SG)'     |
|    | li'xera  | li'xIrU | 'light (FEM~MASC SG)'  |
|    | 'gordo   | 'gUrdU  | 'thick (MASS~MASC SG)' |
|    | 'floxax  | 'fIUxU  | 'loose (FEM~MASC SG)'  |
|    | ra'posos | rA'pUsU | 'fox (MASC PL~SG)'     |
| b. | 'mala    | 'mAlU   | 'bad (FEM~MASC SG)'    |
|    | 'blanku  | 'blAnkU | 'white'                |
|    | 'gatu    | 'gAtU   | 'cat'                  |

In eastern Andalusian we find another [ATR] harmony process with somewhat different properties from those of the Cantabrian Spanish dialects. In this area of southern Spain, final *-s* has been lost via aspiration: *s* > *h* >  $\emptyset$ . The singular/plural contrast is nevertheless maintained in this dialect by means of vowel quality. Thus, for instance, plural *pinos* 'pine trees' is realized with a final [-ATR] vowel [pɪnɔ], whereas its singular counterpart [pino] has a [+ATR] vowel. This [ $\pm$ ATR] distinction affects the low and mid vowels in final position and also propagates to a stressed low or mid vowel and perhaps also other vowels in the word, as in *conejo* [ko'neho] 'rabbit' vs. *conejos* [kɔneho] 'rabbits' (Navarro Tomás 1939; Alonso *et al.* 1950; Zubizarreta 1979; Sanders 1998).<sup>17, 18</sup>

- |      |        |        |                       |
|------|--------|--------|-----------------------|
| (35) | 'perro | 'pɛrɾo | 'dog (SG~PL)'         |
|      | 'beso  | 'βɛso  | 'kiss (SG~PL)'        |
|      | 'solo  | 'soɫo  | 'alone (SG~PL)'       |
|      | 'poko  | 'poɫo  | 'little, few (SG~PL)' |
|      | 'masa  | 'masa  | 'dough (SG~PL)'       |

## 4 Further theoretical issues in the treatment of metaphony

### 4.1 Words with antepenultimate stress and the formal conditions on metaphony

Words with antepenultimate stress provide evidence in support of the idea that metaphony may not be characterized as targeting a domain such as the last foot but must be simply characterized as targeting stressed vowels (CHAPTER 41: THE REPRESENTATION OF WORD STRESS). In fact, in dialects such as Neapolitan, metaphony in words with antepenultimate stress appears to apply regularly across the non-high post-tonic vowel, although this occurs only when the final vowel is /i/: [mɔnako ~ 'muonatʃi] 'monk (SG~PL)', [tʃefaro ~ 'tʃiefari] 'mullet (SG~PL)', [ka'rɔfano ~ ka'ruofani] 'carnation (SG~PL)', [fɛkato ~ 'fiekati] 'liver (SG~PL)' (Rohlf's (1966: 22). Note that these are intermediate representations; final [-o, -i] become [ə], due to a surface process of vowel reduction. However, there are also cases in which it applies before /u/: Centriche ['muɔnaku] 'monk' (Lausberg 1939: 10; Rohlf's 1966: 427).<sup>19</sup> What matters in these cases is the target of the process – the stressed vowel – and the element that appears in post-tonic position can be disregarded. This type of situation is even more clear in the Asturian dialects that are

characterized by [+high] metaphony (cf. ['nenos ~ 'ninu] 'child (MASC PL~SG)', ['tsobos ~ 'tsubu] 'wolf (MASC PL~SG)' (Hualde 1998). In these dialects, metaphony also targets /a/, which is raised to a mid vowel. In words with antepenultimate stress, metaphony can target a stressed /a/ leaving unaffected a post-tonic /a/, as illustrated in the following examples.

(36) *Lena*

'pefaru	'pafarin	'pafara	'bird ~ little bird ~ female bird'
'pempanu	'pampanos		'old and decrepit person (MASC SG~PL)'
'kendanu	'kandanos		'dry branch (SG~PL)'

If metaphony is characterized as applying to the last foot, it cannot be explained why the intermediate vowel can be skipped over by this process. The best characterization of metaphony is not in terms of domain of application, but in terms of target of application: metaphony applies to stressed vowels.<sup>20</sup>

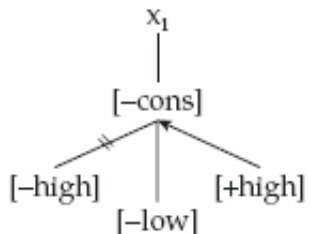
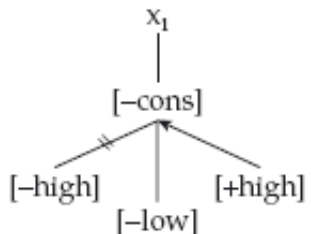
## 4.2 Metaphony and morphology

A debate that has existed for some time in connection with metaphony is the role of morphology (e.g. Maiden 1991; Hualde 1992). A central question is whether metaphony processes are conditioned by morphology, phonology, or some combination of the two. The fact is that in many Italian dialects, historical changes such as reduction to schwa, or deletion, of unstressed or final vowels can no longer be motivated synchronically through alternations. Since these historical processes removed the phonological conditions for metaphony, in these dialects the metaphonic changes affecting the stressed vowels have become the only surface markers of inflectional categories such as the masculine singular and plural of nominal class II, the plural of nominal class III, the 2nd singular of the present indicative, etc. (CHAPTER 82: FEATURAL AFFIXES; CHAPTER 103: PHONOLOGICAL SENSITIVITY TO MORPHOLOGICAL STRUCTURE). Therefore they are most adequately analyzed in terms of a morphophonological rule. An example is provided below from Arpinate (see also (8) for examples in other morphological categories in this dialect) where the marking of the 2nd person singular is obtained solely through the application of metaphony to the stressed vowel of the verbal stem.

(37) *Metaphonic alternations in the present singular of verbs*

'vedə	'korrə	'səntə	'mettə	'kɔʎʎə
'vidə	'kurr	'sjəntə	'mittə	'kwɔʎʎə
'vedə	'korrə	'səntə	'mettə	'kɔʎʎə
'see'	'run'	'feel'	'put'	'pick'

For the dialects in which metaphony is morphologized, Calabrese (1998) proposes the rule in (38), which must be specified as applying in morphological contexts such as the masculine singular and plural of nominal class II, in the plural of nominal class III, in the 2nd singular of the present indicative, etc.

(38)  where  $x_1$  is the head of the main stress foot

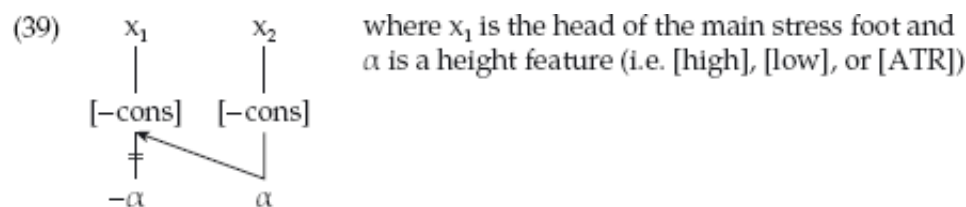
In the account developed above, metaphony was originally a phonologically motivated innovation that later became morphologized. However, an alternative view of how "morphological" metaphony developed is proposed by Devoto (1974). He assumes that, when in a language the exponence of inflectional categories is obscured or lost because of phonological processes, speakers of the language may react to the loss of morphological

information by introducing alternative morphological realizations for these categories. Italian metaphony, according to him, then originated in order to realize morphologically the inflectional features whose exponence was threatened by the phonetic erosion of inflectional endings. This was done by marking the height features of the endings onto the stressed vowels. Under such an approach, metaphony is a morphologically motivated innovation. The presence of dialects that display metaphonic alternations and fully preserved inflectional endings – see for example the dialect of Servigliano in (5), which did not undergo changes neutralizing final vowels – shows that this idea is too strong (see Maiden 1991: 212 for more discussion). A recent contribution that argues for the relevance of morphology in the origin of metaphony is Finley (2009) on *Lena*, who labels metaphony as a type of “morphemic harmony” (see also Kurisu 2001, who analyzes umlaut as a kind of “morpheme realization”).

A more nuanced position on the role of morphology in metaphony is taken by Maiden (1991), who argues that morphological conditioning does play a role in the development of at least some metaphonic processes. This is the case of the phenomenon that he calls “hypermetaphony.” In many Italian dialects where we observe the usual metaphonic alternations in the nominal system, we find – or at least we can reconstruct – a different metaphony pattern in the verbal system. Thus, in Arpinate, metaphony in the verbal system, but not in the nominal one, also affects the low vowel /a/, e.g. [ˈparlə] vs. [ˈpjerlə] ‘speak (1sc~2sc)’. Another example of hypermetaphony comes from the Alpine dialects of Loco and Intragna in Canton Ticino (Maiden 1991: 180). In these dialects, the regular reflex of metaphony of the low mid back vowel /ɔ/ was /wo/ (which was in a later stage of the language monophthongized into the mid front rounded vowel /œ/). However, we find that the metaphonic reflex of /ɔ/ in verbs is not the expected /œ/, but instead /u/, which is the metaphonic output of /o/.

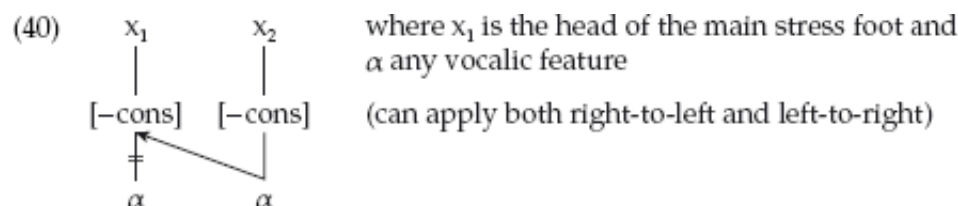
## 5 Conclusion

A generalization that can be drawn from the previous discussion of metaphony in Romance is that we are dealing with the same formal process, which can be roughly described as in (39), where  $\alpha$  is a height feature, i.e. one of [high], [low], and [ATR]. This process in Romance applies right-to-left.



It is an open issue whether or not the process in (39) can be motivated in functional terms, as in Walker's (2005) or Cole's (1998) analyses discussed in §2. A functional motivation is perhaps possible if (39) is considered to be diachronically an historical innovation. However, it is not possible synchronically, at least for most Italian dialects, where metaphony is morphologized or obscured by subsequent phonological processes. Functional explanations by their nature must be surface-true. This is not the case in Italian metaphony.

Other metaphony-like processes, however, are also possible, and can involve the features [back] (e.g. in Old High German *i*-umlaut: /ˈkalb/ ‘calf’ ~ /ˈkelbir/ ‘calves’, /ˈgast/ ‘guest’ ~ /ˈgesti/ ‘guests’ (Prokosch 1938: 112) and [round] (e.g. in Old Norse *u*-umlaut: /mDgr/ < *magus* ‘son’, /ɒ/ < *ahu* ‘water’, /røkkʀ/ < Proto-Germanic \*rekwes, /tryggr/ < Gothic *triggws* (Prokosch 1938: 109–110). Therefore, one could propose that metaphony is a subcase of a more general, parametrized local harmony process spreading any vocalic feature – i.e. one of [high], [low], [back], [round], [ATR] – onto a stressed vowel.



Walker (2005) argues that there is an asymmetry between height features such as [high] and [low] and features such as [back] and [round]. Only the latter, but not the former, according to her, appear to be spread by harmony processes targeting all vowels in a word. Given this observation, Walker proposes that only height features are spread by a process like (40), and hence only (39) should be possible. But then it is unclear how to analyze Germanic umlaut, where the more general (40) seems to be involved. Future research will address this issue.

## ACKNOWLEDGMENT

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## Notes

- 1 Calabrese (1988, 1995) argues that mid [+ATR] vowels are more marked than the [−ATR] ones. Evidence for this is the fact that the presence of the former in a vowel system tends to require the presence of the latter.
- 2 In some dialects only /i/ triggers the change. This issue will be discussed later.
- 3 The examples from this dialect are given in intermediate forms. There is a low-level process that neutralizes unstressed vowels to [ə] in the final position of a phonological word so that there are alternations such as the following: /sandə/ ‘saint’ vs. /sandu pjetrə/ ‘St Peter’; /kwirə/ ‘that’ vs. /kwiru kanə/ ‘that dog’ (see Gioscio 1985; Kaze 1991).
- 4 Obviously, if there is no synchronic evidence for diphthongization, and subsequent monophthongization, this is the best synchronic analysis. The issue is whether or not this is also correct diachronically. Specifically, it must be determined if the situation we find in dialects like that of Foggia is the outcome of a single innovatory change where mid [−ATR] vowels became directly [+high] in a metaphonic context or if it is the outcome of the sequencing of two different innovatory changes: first metaphonic diphthongization and then later monophthongization, a course of events that may then be synchronically re-analyzed into a single rule of raising. Historical research on this topic is needed. Observe in any case that the phenomenon of hypermetaphony (see §4.2), where mid [−ATR] vowels were raised to high in verbs but not in nouns where they were diphthongized, argues for the possibility of a single innovatory change in which these vowels become directly high, without passing through a diphthongal stage.
- 5 There is also a small number of dialects where only the mid [−ATR] vowels and not the [+ATR] ones are affected in a metaphonic context where they undergo diphthongization (see Maiden 1991: 129 for a historical explanation of this dialectally unusual pattern).
- 6 Maiden (1991) proposes, contra Rohlf (1966), that metaphony can be sensitive to syllable structure and that there are dialects in which it applies in open syllables but not in closed syllables. However, the data he uses are not very robust (see Calabrese 1998: 33 for a possible account of such a situation).
- 7 The situation is complicated still further by cases in which final /o/ was raised to /u/ after the application of metaphony, so that there are instances of surface [u] that do not trigger metaphony. Dyck (1995) tries to account for the behavior of metaphony triggers restricting them only to high vowels that stand in contrast with a mid vowel (see also Campos–Astorkiza 2007).
- 8 Note that in Italian dialects, the post-tonic non-final high vowels that can be found in words with antepenultimate stress (cf. Latin *femina* ‘female’) were often lowered (i.e. *femena* (cf. Rohlf 1966: 139), and do not trigger metaphony. In the varieties in which this lowering did not occur, these high vowels may trigger metaphony (*pjecura* ‘sheep’, *dwonnula* ‘ferret’ (Aprigliano; Rohlf 1966: 514, 246).
- 9 See Calabrese (1995, 2005) for discussion of the linear order of the fissioned bundles.
- 10 Calabrese (1985) uses excision to account for the metaphonic raising of /a/ to a mid vowel [ɛ ɔ]. The application of the metaphony rule to /a/ creates the disallowed configuration [+high, +low] which by excision



becomes [–high, –low].

11 Vowel shift is governed by two principles, according to Cole. One prohibits the neutralization of contrastive height categories, while the other one requires the preservation of the relative underlying height of raised vowels (see [Cole 1998](#) for more discussion).

12 For discussion of some of the problems facing the repair operation of excision see [Calabrese \(2005: 284–299\)](#).

13 On the other hand, metaphonic diphthongization, as shown in [Calabrese \(1985, 1988\)](#), is not restricted to such an environment. It applies both in closed syllables and in stressed syllables of all types in antepenultimate position.

14 See also southern Salentino, discussed in §1.1, for another example of this type of metaphony (see also [Grimaldi 2003](#)).

15 Pre-tonic vowels in Pasiego are raised to high when preceding a stressed high vowel. It is an open issue whether or not pre-tonic raising and metaphony are instances of the same process.

16 As observed by [Penny \(1978\)](#) and [Hualde \(1998\)](#), in Tudanca non-high vowels, including /a/, are also raised in a metaphonic context. However, the outputs of the application of raising metaphony to the mid vowels are distinct from /i u/.

17 A harmony process similar to that of eastern Andalusian is found in the Sicilian dialects of Villalba and Mussomeli analyzed by [Cruschina \(2008\)](#). In this dialect final high vowels become [–ATR]. This [–ATR] feature is then spread right-to-left to all other vowels of the word. /a/ is opaque and blocks the spreading.

18 An unusual metaphony system where all vowel features are spread and realized as a second member of a diphthong is reported by [Marotta and Savoia \(1991: 25\)](#) for Davoli where we have sample cases such as: /'pilu/ → ['piulu], 'hair', /'tʃidɔ/ → ['tʃiedɔ] 'star'.

19 In many, perhaps most, Italian dialects the phonological conditions for the application of metaphony in words with antepenultimate stress are obscured by schwa-reduction of post-tonic vowels [mɔnəkə ~ muonəkə] (Campobasso; [Rohlf 1966: 22](#)) or regressive total harmony between post-tonic vowels ['mɔnuku ~ 'mwenitʃi] 'monk-(SG~PL)', [kɔfunu ~ 'kwefini] 'barrel (SG~PL)', ['mjetucu ~ 'mjetitʃi] 'physician-(SG~PL)' (Francavilla Fontana; [Ribezzo 1912](#); [Calabrese 1985](#)). Metaphony is constrained by a further condition in many dialects: it applies only between adjacent vowels, so there is no metaphony in ['kɔfanu ~ 'kɔfani] 'chest (SG~PL)', ['mɔnaku ~ 'mɔnaki] 'monk (SG~PL)' (Aprigliano; [Rohlf 1966: 189, 427](#)).

20 Note that under such an analysis we still have to account for why the non-contrastive feature [–high] of the post-tonic vowel does not interfere with the metaphonic spreading process: either it must be underspecified or one must assume that the metaphony rule accesses only contrastive features, as in [Calabrese's \(1995\)](#) re-analysis of underspecification theory (see also [Nevins 2010](#)).

## REFERENCES

- Alonso, Dámaso, Josefina Canellada & Alonso Zamora Vicente. 1950. Vocales andaluzas. *Nueva Revista de Filología Hispánica* (4) . 209–230.
- Anderson, Stephen R. 1980. Problems and perspectives in the description of vowel harmony. In Robert M. Vago (ed.) *Issues in vowel harmony*, 1–48. Amsterdam: John Benjamins.
- Archangeli, Diana & Douglas Pulleyblank. 1994. *Grounded phonology*. Cambridge, MA: MIT Press.
- Bloch, Bernard & George Trager. 1942. *Outlines of linguistic analysis*. Baltimore: Waverly Press.
- Calabrese, Andrea. 1985. Metaphony in Salentino. *Rivista di Grammatica Generativa* (9–10) . 1–140.

- Calabrese, Andrea. 1988. *Towards a theory of phonological alphabets*. Ph.D. dissertation, MIT.
- Calabrese, Andrea. 1995. A constraint-based theory of phonological markedness and simplification procedures. *Linguistic Inquiry* (26) . 373–463.
- Calabrese, Andrea. 1998. Metaphony revisited. *Rivista di Linguistica* (10) . 7–68.
- Calabrese, Andrea. 2003. On the evolution of the short high vowel of Latin into Romance. In Ana T. Perez-Leroux & Yves Roberge (eds.) *Romance linguistics: Theory and acquisition*, 63–94. Amsterdam & Philadelphia: John Benjamins.
- Calabrese, Andrea. 2005. *Markedness and economy in a derivational model of phonology*. Berlin & New York: Mouton de Gruyter.
- Calabrese, Andrea. 2008. On the Feature [ATR] (and [Tense]) in the Romance languages. In Roberta Maschi, Nicoletta Pennello & Piera Rizzolati (eds.) *Miscellanea in onore di Laura Vanelli*, 103–115. Udine: Forum Editrice Universitaria.
- Camilli, Amerindo. 1929. Il dialetto di Servigliano. *Archivum Romanicum* (13) . 220–271.
- Campos-Astorkiza, Rebeka. 2007. *Minimal contrast and the phonology-phonetics interaction*. Ph.D. dissertation, University of Southern California.
- Catford, J. C. 1977. *Fundamental problems in phonetics*. Edinburgh: Edinburgh University Press.
- Clements, G. N. 1981. Akan vowel harmony: A non-linear analysis. *Harvard Studies in Phonology* (2) . 108–177.
- Clements, G. N. 1989. *On the representation of vowel height*. Unpublished ms., Cornell University.
- Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English*. New York: Harper & Row.
- Cole, Jennifer. 1998. Deconstructing metaphony. *Rivista di Linguistica* (10) . 69–98.
- Cole, Jennifer & Charles W. Kisseberth. 1994. An Optimal Domains Theory of vowel harmony. *Studies in the Linguistic Sciences* (24) . 101–114.
- Cruschina, Silvio. 2008. *Il vocalismo della sicilia centrale: Il tratto [ATR], metafonosi e armonia vocalica*. Unpublished ms., Cambridge University.
- Devoto, Giacomo. 1974. *Il linguaggio d'Italia*. Milan: Rizzoli.
- Dyck, Carrie. 1995. *Constraining the phonology-phonetics interface, with exemplification from Spanish and Italian dialects*. Ph.D. dissertation, University of Toronto.
- Finley, Sara. 2009. Morphemic harmony as featural correspondence. *Lingua* (119) . 478–501.
- Flemming, Edward. 1995. *Auditory representations in phonology*. Ph.D. dissertation, University of California, Los Angeles.
- Frigeni, Chiara. 2003. Metaphony in Campidanian Sardinian: A domain-based analysis. *Toronto Working Papers in Linguistics* (20) . 63–91.
- Gioscio, Joseph. 1985. *Il dialetto Lucano di Calvello*. Stuttgart: Steiner.
- Grimaldi, Mirko. 2003. *Nuove ricerche sul vocalismo tonico del Salento meridionale*. Alessandria: Edizioni dell'Orso.
- Grimaldi, Mirko, Andrea Calabrese, Francesco Zagona, Luigina Garrappa & Bianca Sisinni. 2010. Articulatory

- grounding of southern Salentino harmony processes. In *Proceedings of the 11th Annual Conference of the International Speech Communication Association (Interspeech)*, 1561–1564. Makuhari, Japan: ISCA.
- Halle, Morris & Kenneth N. Stevens. 1969. On the feature “advanced tongue root.” *MIT Research Laboratory of Electronics Quarterly Progress Report* (94) . 209–215.
- Hualde, José Ignacio. 1989. Autosegmental and metrical spreading in the vowel–harmony systems of northwestern Spain. *Linguistics* (27) . 773–805.
- Hualde, José Ignacio. 1992. Metaphony and count/mass morphology in Asturian and Cantabrian dialects. In Christiane Laeufer & Terrell Morgan (eds.) *Theoretical analysis in Romance linguistics*, 99–114. Amsterdam: John Benjamins.
- Hualde, José Ignacio. 1998. Asturian and Cantabrian metaphony. *Rivista di Linguistica* (10) . 99–108.
- Jakobson, Roman, C. Gunnar M. Fant & Morris Halle. 1952. *Preliminaries to speech analysis: The distinctive features and their correlates*. Cambridge, MA: MIT Press.
- Kaun, Abigail. 1995. *The typology of rounding harmony: An optimality theoretic approach*. Ph.D. dissertation, University of California, Los Angeles.
- Kaze, Jeffrey W. 1991. Metaphony and two models for the description of vowel systems. *Phonology* (8) . 163–170.
- Kiparsky, Paul. 1985. Some consequences of Lexical Phonology. *Phonology Yearbook* (2) . 85–138.
- Kirchner, Robert. 1996. Synchronic chain shifts in Optimality Theory. *Linguistic Inquiry* (27) . 341–350.
- Kurusu, Kazutaka. 2001. *The phonology of morpheme realization*. Ph.D. dissertation, University of California, Santa Cruz.
- Ladefoged, Peter. 1964. *A phonetic study of West African languages*. Cambridge: Cambridge University Press.
- Ladefoged, Peter & Ian Maddieson. 1996. *The sounds of the world's languages*. Oxford & Malden, MA: Blackwell.
- Lausberg, Heinrich. 1939. *Die Mundarten Südlukaniens*. Zeitschrift für Romanischen Philologie: Beiheft 90.
- Lindau, Mona. 1975. *[Features] for vowels*. Ph.D. dissertation, University of California, Los Angeles.
- Loporcaro, Michele. 1991. The natural phonological process [V, +high] → [+Tense] and the vowel system of some southern Italian dialects. *Folia Linguistica* (15) . 3–4.
- Loporcaro, Michele. 1997. *Puglia and Salento*. In Maiden & Parry (1997). 338–348.
- Maiden, Martin. 1987. New perspectives on the genesis of Italian metaphony. *Transactions of the Philological Society* (85) . 38–73.
- Maiden, Martin. 1991. *Interactive morphonology: Metaphony in Italy*. New York: Routledge.
- Maiden, Martin & Mair Parry (eds.) 1997. *The dialects of Italy*. London: Routledge.
- Mancarella, Giovann–Battista. 1974. Origine e diffusione della metafonía nel Salento. *Atti del XIV Congresso di Linguistica e Filologia Romanze* (3) . 117–124.
- Marotta, Giovanna & Leonardo Savoia. 1991. Diffusione vocalica in un dialetto Calabrese. Alcuni parametric fonologici. In E. Magno Caldognetto & Paola Beninca (eds.) *L'interfaccia fra fonologia e fonetica*, 19–43. Padua: Unipress.
- McCarthy, John J. & Alan Prince. 1995. Faithfulness and reduplicative identity. In Jill N. Beckman, Laura Walsh

- Dickey & Suzanne Urbanczyk (eds.) *Papers in Optimality Theory*, 249–384. Amherst: GLSA.
- Melillo, G. 1926. *I dialetti del Gargano: Saggio fonetico*. Pisa: Simoncini.
- Miglio, Viola. 2005. *Markedness and faithfulness in vowel systems*. New York: Routledge.
- Navarro Tomás, Tomás. 1939. *Manual de la pronunciación española*. Madrid: Consejo Superior de Investigaciones Científicas.
- Nevins, Andrew. 2010. *Locality in vowel harmony*. Cambridge, MA: MIT Press.
- Nibert, Holly. 1998. Processes of vowel harmony in the Servigliano dialect of Italian: A comparison of two non-linear proposals for the representation of vowel height. *Probus* (10) . 67–101.
- Parodi, Ernesto. 1892. Il dialetto di Arpino. *Archivio Glottologico Italiano* (13) . 299–308.
- Penny, Ralph J. 1969. *El habla pasiega: Ensayo de dialectología montañesa*. London: Tamesis Books.
- Penny, Ralph J. 1978. *Estudio estructural del habla de Tudanca*. Tübingen: Niemeyer.
- Prince, Alan & Paul Smolensky. 1993. *Optimality Theory: Constraint interaction in generative grammar*. Unpublished ms., Rutgers University & University of Colorado, Boulder. Published 2004, Malden, MA & Oxford: Blackwell.
- Prokosch, Eduard. 1938. *A comparative Germanic grammar*. Baltimore: Linguistic Society of America.
- Ribezzo, Francesco. 1912. Il dialetto apulo-salentino di Francavilla Fontana. *Martina Franca*.
- Rohlf, Gerhard. 1966. *Grammatica storica della lingua italiana e dei suoi dialetti: Fonetica*. Turin: Einaudi.
- Sanders, Benjamin P. 1998. The Eastern Andalusian vowel system: Form and S structure. *Rivista di Linguistica* (10) . 109–135.
- Savoia, Leonardo & Martin Maiden. 1997. *Metaphony*. In Maiden & Parry (1997). 15–25.
- Sluyters, Willebrord. 1988. Vowel harmony, rule formats and underspecification: The dialect of Francavilla-Fontana. In Harry van der Hulst & Norval Smith (eds.) *Features, segmental structure and harmony processes, part II*, 161–184. Dordrecht: Foris.
- Steriade, Donca. 1994. *Positional neutralization and the expression of contrast*. Unpublished ms., University of California, Los Angeles.
- Steriade, Donca. 1995. Underspecification and markedness. In John A. Goldsmith (ed.) *The handbook of phonological theory*, 114–174. Cambridge, MA & Oxford: Blackwell.
- Trubetzkoy, Nikolai S. 1939. *Grundzüge der Phonologie*. Göttingen: van der Hoeck & Ruprecht. Translated 1969 by Christiane A. M. Baltaxe as *Principles of phonology*. Berkeley & Los Angeles: University of California Press.
- Trumper, John. 1979. La zona Lausberg ed il problema della frammentazione linguistica. In Federico Albano Leoni (ed.) *I dialetti e le lingue delle minoranze di fronte all'italiano*, (vol. 1) , 267–303. Rome: Bulzoni.
- Valente, Vincenzo. 1975. *Puglia*. Pisa: Pacini.
- Walker, Rachel. 2005. Weak triggers in vowel harmony. *Natural Language and Linguistic Theory* (23) . 917–989.
- Weinrich, Harald. 1958. *Phonologischen Studien zur romanischen Sprachgeschichte*. Münster: Aschendorff.
- Zetterstrand, Sylvia. 1998. *The phonological representation of vowel height*. Ph.D. dissertation, Harvard University.

Zubizarreta, Maria Luisa. 1979. Vowel harmony in Andalusian Spanish. *MIT Working Papers in Linguistics* (1) . 1–11.

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