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Vowel Harmony and Vowel Reduction: The Case of Swiss Italian Dialects

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Introduction

Several Swiss Italian dialects[2] display vowel harmony processes (henceforth VH) involving the etymologically final unstressed vowel -/a/ as well as other unstressed vowels in pre-tonic and post-tonic position. This paper proposes a diachronic hypothesis for the development of VH in this area, investigating if and how vowel reduction (henceforth VR) is involved.

Following some general remarks about the relation between VR and VH (§1), I introduce the VH processes exhibited by Swiss Italian dialects (§2). In §3 I consider the prosodic structure of these varieties and its interaction at the segmental level with harmony and reduction processes. In §§4-5 I advance a diachronic hypothesis for the development of VH in this area, also considering very recent VR processes. I conclude and summarize my results in §6.[3]

1 Vowel Harmony and Vowel Reduction

Some at least apparently "paradoxical" claims have been made about the interaction between VH and VR: on one hand, VR has been said to *feed* VH (§1.1); on the other, it is presented as an *alternative* to VH, i.e., languages with reduction tend *not* to have VH (§1.2).

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[2] All data were collected first-hand through personal fieldwork between 2007 and 2010 in 28 Swiss and 10 Italian villages right across the border (Italian villages will be indicated as (I)).

[3] Though mainly concerned with the role of VR here, we don't want to rule out the possible contribution of other more abstract mechanisms in the genesis of VH (see Delucchi 2012:324-327, 355-379, 388-390).

1.1 Does Vowel Reduction Feed Vowel Harmony?

A widespread conception about the development of VH maintains that harmony arises diachronically – and, for some scholars, synchronically as well – through phonologization of vowel-to-vowel coarticulation (Ohala 1994; Flemming 1997). However, recent studies have shown that these effects appear to be more robustly anticipatory, even in languages with left-to-right VH (cf. Inkelas et al. 2001 for Turkish; Manuel and Krakow 1984 for Shona and Swahili).

With regard to this point, Hyman (2002) hypothesizes that left-to-right harmony should be related to reduction, as reduction is greater in post-tonic than in pre-tonic position, whereas "[a]ll VH that does not owe its existence to reduction is anticipatory, i.e. articulatory, perceptual, and/or conceptual 'pre-planning'" (Hyman 2002:24). How would reduction feed VH? And, more fundamentally, how should we interpret "reduction" here?

Hyman refers to VH in Punu as an example, which targets the schwa realization of post-radical -/a/ but not unreduced pre-radical /a/ (Hyman 2002:12). Whether or not this process is concomitant with a significant reduction of phonetic duration in Punu (see Barnes 2006:202), we can assume that this happens in many similar cases of vowel raising and/or centralization, especially in duration-cued stress systems. If weak positions already licensed fewer contrasts and now host vowels with "significantly diminished duration," they could be "more susceptible to coarticulatory effects from neighboring strong vowels" (Barnes 2006:193) – coarticulatory effects which are considered in this case the first step toward VH. In particular, as argued by Majors (1998, 2006), stress-dependent VH systems with stressed vowels as triggers could arise from stress asymmetries in vowel-to-vowel coarticulation, the degree of this coarticulation being greater from stressed to unstressed vowels than in the opposite direction.

On the other side, contrast neutralizations in specific structural positions – phonetically driven or not, synchronically or diachronically – could lead to a reduction of the vowel inventory, representing a favorable starting point for the development of harmonic alternations as far as more abstract mechanisms are at work. In these cases, vowel frequency or analogical mechanisms, for example, might play a central role (see Delucchi 2012:330ff, 355-379, 385-389; fn. 11 in this paper).

1.2 Vowel Harmony as Alternative to Vowel Reduction

Although many of the arguments for the "reduction-then-assimilation" hypothesis are in some way crucially linked to stress-duration asymmetries between unstressed and stressed vowels, there could be a limit as to how much this asymmetry is favorable to the development of VH: overly reduced segments could be disadvantaged, both perceptually and articulatory. Coarticulation effects might be

perceptually too weak to be phonologized on a short, reduced vowel, and at the same time, the vocalic slot too weak to host a full vowel. More specifically, coarticulation processes could arise even in these situations, but they would not result in categorical, full-blown VH systems. In this sense, when pointing at many cases of low-level, gradient assimilations affecting reduced vowels as supporting the "reduction-then-assimilation hypothesis," Barnes (2006:193-194) has to specify that they are "not in fact instances of the development of full-blown word-domain vowel harmony systems from earlier non-harmonizing reduction systems."

It is perhaps from this perspective that we could interpret the results of typological surveys like the one of Schiering (2007): "in languages which have both vowel reduction and vowel harmony…, processes of the latter kind are only sporadic…or restricted to certain morphemes." Languages in which harmony spans the phonological word "have weak stress and lack segmental effects in the form of vowel reduction" (Schiering 2007:346).

Among similar lines, Auer (1993:8) concludes that "the spreading of vowel features across syllables is at odds with vowel reduction and centralization in non-accented syllables"; this was mirrored typologically by the fact that "no language with an overall reduction of the vocalic system in non-accented syllables…has even a marginal system of vowel harmony or tone. No language with even a marginal system of tone or vowel harmony shows more than peripheral accent-dependent reduction" (71).

2 Vowel Harmony in Swiss Italian Dialects

Swiss Italian dialects (henceforth SI dialects) belong to the northern Italo-Romance varieties and are spoken in the southern part of Switzerland. In some of these, Latin final unstressed -A – the only etymological final unstressed vowel preserved in these dialects (cf. §3.2) – underwent assimilation processes triggered mostly by the preceding stressed vowel (Delucchi 2010, 2012).

Moreover, in some dialects, anticipatory assimilation can affect pre-tonic vowels. Cases are attested where this regressive process applies across word boundaries, up to the post-tonic vowels of a preceding word (cf. §4).

For many reasons SI dialects offer an excellent laboratory for studying both the genesis of VH and its relation to VR. First of all, a great variety of VH systems can be found in this area. For example, the dialect of Claro displays total progressive VH triggered by all 7 stressed vowels /i e ɛ a ɔ o u/ and affecting the unstressed final vowel *-a* < Lat. -A ((1)) [4]. The following examples show VH in words with penultimate stress:

[4] SI dialects and nearby Italian dialects display a number of different vowel systems, both in number of phonemes (6-, 7- or 8-vowel systems, with several cases of a limited 5- or 6-vowel system for unstressed syllables) and in vowel quality (e.g. presence/lack of front rounded vowels).

(1)	a. /i/	ˈlimi (< LĪMA(M))	‘file’	e. /ɔ/	ˈrɔdɔ (< RŎTA(M))	‘wheel’
	b. /e/	ˈtere (< TĒLA(M))	‘cloth’	f. /o/	ˈgoro (< GŬLA(M))	‘throat’
	c. /ɛ/	ˈtɛrɛ (< TĔRRA(M))	‘earth’	g. /u/	ˈlunu (< LŪNA(M))	‘moon’
	d. /a/	ˈlana (< LANA(M))	‘wool’		(dialect of Claro)	

In the dialect of Sementina, this final vowel is realized as -[ɛ] after front vowels ((2a)) and as a mid-low back vowel after /ɔ/ ((2b)), whereas the original *-a* remains unchanged after stressed /o/ and /a/ ((2c)):

(2)	a. /i, e, ɛ, y, ø/	ˈlimɛ ‘file’	ˈterɛ ‘cloth’	ˈtɛrɛ ‘earth’	
		ˈlynɛ ‘moon’	ˈkøtʃɛ ‘cooked.FSG.’		
	b. /ɔ/	ˈkɔʃtɔ ‘rib’			
	c. /a, o/	ˈlana ‘wool’	ˈgora ‘throat’	(dialect of Sementina)	

Two dialects showing a very similar VH system for paroxytones can treat antepenultimate stressed words differently (cf. Delucchi 2012:324-327 for details). For instance, the post-tonic vowel -[i]- is transparent in the dialect of Claro, so we have a copy of the stressed vowel on the final one ((3)), whereas in the dialect of Gorduno, -[i]- is acting as a new harmony trigger ((4)):

(3)	a. ˈkodigo (< *CUTICA(M))	‘pigskin’	
	b. ˈpɛrtigɛ (< PERTICA(M))	‘pole’	(dialect of Claro)

(4)	a. ˈmyziki (< MUSICA(M))	‘music’	
	b. ˈpɛrtigi (< PERTICA(M))	‘pole’	(dialect of Gorduno)

Furthermore, in varieties spoken near those displaying VH, we find dialects where *-a* has been involved in other changes, such as peripheralization or centralization processes: the variety of Malesco (I) has a generalized final vowel -[ɛ] ((5a), but see also (8) concerning assimilation processes), and similarly in Prosito we consistently have a final -[ä] ((5b), cf. Delucchi 2012:254-255 for experimental evidence)):

(5) a. CVCɛ (dialect of Malesco (I))
ˈpip:**ɛ** ‘pipe’, ˈter**ɛ** ‘cloth’, ˈtɛst**ɛ** ‘head’, ˈsap:**ɛ** ‘hoe’, ˈpɔrt**ɛ** ‘door’, ˈtsjul:**ɛ** ‘onion’

b. CVCä (dialect of Prosito)
ˈʃim**ä** ‘peak’, ˈter**ä** ‘cloth’, ˈʃtrɛd**ä** ‘street’, ˈʃpal**ä** ‘shoulder’, ˈpɔrt**ä** ‘door’, ˈfjor**ä** ‘cream’, ˈvøj**ä** ‘desire’, ˈlyn**ä** ‘moon’

In other varieties, as in the dialect of Spriana (I) or Braggio, a central vowel occurs in final position without regard to the quality of the preceding vowels (cf. Delucchi 2012:269-272):

(6) a. CVCə (dialect of Braggio)
faˈrinə ‘flour’, ˈterə ‘cloth’, ˈtɛrə ‘earth’, ˈlanə ‘wool’, ˈrɔdə ‘wheel’, ˈondʒə ‘nail’, ˈlynə ‘moon’, paˈgørə ‘fear’
b. CVCɨ (dialect of Spriana (I))
ˈlimɨ ‘file’, ˈsedɨ ‘silk’, ˈtɛrɨ ‘earth’, ˈlanɨ ‘wool’, ˈtɔlɨ ‘can’, ˈgutɨ ‘drop’, ˈlynɨ ‘moon’, ˈrødɨ ‘wheel’

Differences in realizations in prepausal vs. utterance-medial position are also attested, as in the dialect of Augio, which displays a final low central segment prepausally, but a full vowel assimilated to the first vowel[5] of the *following* word in utterance-internal position (phrasal regressive assimilation, cf. Delucchi 2012:129-130).

(7) a. ˈftʃam:ɐ ‘flame’ b. la ˈftʃam:**o** ˈros:ɐ / la ˈftʃam:**ɛ** ˈbɛl:ɐ / la ˈftʃam:**a** ˈkaldɐ ‘the red/nice/hot flame’ (dialect of Augio)

The dialect of Malesco (I) also displays some regressive phrasal assimilation processes: whereas we systematically have final -[ɛ] in prepausal position ((5a)), in several environments an alternation between -[ɛ]/-[a] has been established, depending on the initial vowel of the following word ((8), with examples for the article f.sg. from Lat. ILLA(M) and the adj. ‘much’ from Lat. TANTA(M)) (cf. Delucchi 2012:221, 343-351 for details).

(8)

+ $CV_{[-ant]}CV$			+ $CV_{[+ant]}CV$	
l**a** ˈlanɛ	‘the wool’	*vs.*	l**ɛ** ˈtɛrɛ	‘the earth’
l**a** ˈpomːɛ	‘the apple’		l**ɛ** ˈlimɛ	‘the file’
ˈtant**a** ˈlanɛ	‘a lot of wool’		ˈtant**ɛ** fɛˈrinɛ	‘a lot of flour’

(dialect of Malesco (I))

Important data for the diachronic analysis of VH are provided by some dialects where we can observe the first stages of harmony and/or the results of recent reduction processes. Whereas for the dialect of Spriana (I) Merlo (1951) still transcribes a final low vowel -[a], we now observe a central high vowel -[ɨ] (cf. here (6b)). The dialect of Augio, in which we see a prepausal -[ɐ], has recently developed the phrasal regressive assimilative processes we observe in (7b), not reported in older sources like Urech (1946). These last examples are particularly significant, as they show that VR and assimilatory processes can be found either in the same dialect or among dialects spoken in neighboring towns in the (Swiss) Italian area. In the next chapter I am concerned with describing this interaction, both synchronically and diachronically.

[5] Unstressed vowels can also act as a trigger in the initial syllable, as shown by examples like [ˈkeʃt*a* maˈriɐ] ‘this Maria’. We can hypothesize that the phrasal harmony in Augio represents the generalization of an originary word-internal process across word boundaries, cf. §4.

3 Prosodic Organization and Vowel Harmony in the Swiss Italian Area

3.1 Vowel Harmony, Vowel Reduction, and Rhythm

The studies of Auer (1993) and Schiering (2007), already mentioned in §1, belong to the vast bibliography on rhythm classification. In both studies, VH is listed among the significant parameters for a typological study of rhythm. According to Auer (1993:8), VH "is a phonological process relating to the morphological word in syllable-timed languages, whereas vowel reduction is a phonological process relating to the phonological word in stress-timed languages." From a diachronic perspective, Auer (1993:30-32) mentions the case of Uzbek and Khalkha, where loss or reduction of VH has concurred with the increase of reduction/centralization processes for unstressed vowels and of syllabic complexity. According to Schiering's typological survey, VH does not display a principled incompatibility with VR, but the strong stress and concomitant VR of a stress-timed rhythmical prototype are incompatible with the development of a full-blown VH system.

On the other hand, the findings of Gavaldà-Ferré (2007) on Catalan seem to provide evidence of syllable-timed languages displaying VR: Gavaldà-Ferré's study indicates that there is no significant rhythmical difference between Eastern Catalan (Barcelonì) and Western Catalan (Tortosì), despite their different degrees in VR.

If there are syllable-timed languages displaying VR, the question is how VH behaves in these cases: do we expect VH spanning the phonological word in syllable-timed languages with a reduction degree similar to Barcelonì?[6] Moreover, are there two different kinds of VR, as hypothesized by Gavaldà-Ferré (2007): one affecting speech rhythm, such as the one found in English or German, and one that does not, as in Western Catalan? And if so, how do they differ? What can SI dialects tell us about this and, more generally, about the relation between VR, VH and rhythm?

No study on rhythm has yet been performed on SI dialects, but some recent literature on Italian varieties closest to the SI ones (like Milanese) places them close to the stress-timed pole (Schmid 2004), although specifying that this pole is best represented by other northern varieties like Piemontese, Romagnolo and Emiliano. If we consider Schmid's classification and Auer's and Schiering's synchronic remarks together, the existence of full total VH systems in the SI area seems at least unexpected. As we will see in the next chapter, a possible solution for motivating this situation could be provided by a diachronic analysis of the languages' prosodic organization.[7]

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[6] See Jiménez and Lloret (2011) on VH in Catalan varieties.

[7] Cf. Filipponio and Delucchi (in prep.); see also the suggestions of Schiering (2007).

3.2 Defining Conditions for the Development of VH: Prosodic Changes and Segmental Processes in the Northern Italo-Romance Area

In a recent paper, Filipponio (2011) proposes a diachronic analysis of Northern Italo-Romance rhythmical structure, with a particular focus on Bolognese. The analysis was performed in the Control/Compensation (CC) model, a recent phonologically-driven approach to rhythm modeling, currently explored in particular by Bertinetto and colleagues (Bertinetto and Bertini 2008). Under the CC hypothesis, languages are situated along a continuum: on one extreme, we have an ideally compensating language, characterized by segmental overlap (coarticulation), with compression of unstressed syllables, and of vowels in particular. On the other extreme, we find an ideally controlling language in which all segments receive the same amount of articulatory effort, with syllable's length depending only on the number of its segments and not on its stressed/unstressed status.

Filipponio discusses two different rhythmical paths, one chosen by Bolognese, and the other by Western Lombard dialects like Milanese in their development from Proto-Romance: whereas Bolognese shows great compensatory tendencies, with the stressed syllable acting like a "gravity center" in the word structure, other Gallo-Italo-Romance varieties have developed toward a more controlling structure and presently display a prosodic structure with a considerable balance between stressed and unstressed syllables.

Our general intuition about the relation between harmony and rhythm is that VH in the SI area could develop on this more recent *controlling* type of word structure, which (crucially) was shaped by a prior *compensation* stage (see also Filipponio and Delucchi, in prep.).

During this first compensation drift, we must identify processes leading to the reduction and loss of unstressed vowels, in particular the loss of all unstressed final vowels except *-a*. In fact, in all Northern Italo-Romance dialects (with the exception of Ligurian as well as Central and Southern Venetian), Proto-Romance final unstressed vowels /i e o u/ are supposed to have passed through an initial stage of centralization in a pre-documentary phase, followed by vowel deletion (Loporcaro 2006-7): [ˈkaŋ] 'dog' (< CANE(M)), [ˈram] (sg. and pl.) 'branch, -es' (< RAMUM, RAMI) but [ˈlana] 'wool' (< LANA(M)) (dialect of Claro). We have also some examples of deletion in initial position, as in [ˈgudʒu] (< AGUCULA(M)) 'needle' or [ˈʃpartʃ] (< ASPARAGU(M)) 'asparagus' (dialect of Claro).

Syncope processes are much more difficult to date but, especially in the way they apply, can be important clues for detecting compensation or controlling strategies. While in some varieties syncope affected unstressed positions pervasively, SI dialects are more conservative. Whereas in other northern varieties, such as in Bolognese, syncope can apply whenever the consonantal strength of the new originated consonantic sequence *does not fall* (Filipponio 2011, data in (11a)

from Lepri and Vitali 2007), in SI dialects either the consonantal strength must *increase* (except for [mn], which is tolerated in some varieties, e.g. [ˈfem.ne] 'woman', dialect of Claro; see Delucchi 2012:319 for details), or *resyllabification* in V.C+/r, l/ (where C is an obstruent) must be possible ((11b)). This is another environment where we observe the stressed syllable acting not like a "gravity center," but rather as a pivot element retaining a balanced relation with the rest of the word, which in turn can be restructured as long as phonotactic constraints leading to strong favorable syllable contacts are observed (cf. Vennemann 1988). It is important to underline that, given these constraints, the punctual application of syncope in favorable environments varies from dialect to dialect (cf. the latter two forms in (11b)):

(11)	PERTICA(M)	ANIMA(M)	DOMINICA(M)	*SCATOLA(M)
	'pole'	'soul'	'Sunday'	'box'
	a. [ˈpeːrdga]	[ˈaːnma]	[ˈdmaːndga]	[ˈʃkaːtla]
	b. [ˈpɛrtigɛ]	[ˈanima]	[duˈmɛnigɛ]/[duˈmɛŋ.gɛ]	[ˈʃkatala]/[ˈʃka.tra]

Syncope processes gave rise to penultimate stressed words with either an initial open syllable, or a closed syllable for which the inventory of admissible codas is reduced to liquids, sibilants and homorganic nasals.

Whereas unstressed vowels were reduced and ultimately lost in many environments, stressed vowels underwent an important change in vowel quantity (VQ) (see Loporcaro 2010). After the demise of Latin VQ contrasts, Northern Romance varieties developed a new VQ opposition by lexicalizing the output (with an allophonically lengthened vowel) of the Proto-Romance Open Syllable Lengthening rule: $V \rightarrow V\text{:} \; / \_ \; [+\text{stress}]]_{\sigma}$ where $]_{\sigma} \neq]_{PW}$. This process gave rise to (sub)minimal pairs of the type [ˈpaːla] 'shovel' (< PALA(M)) ~ [ˈspala] 'shoulder' (< SPAT(U)LA(M)) for penultimate stressed words (<ˈCV.CV ~ ˈCVC.CV), and [ˈpaːn] 'bread' (< PANE(M)) ~ [ˈpan] 'cloth' (< PANNU(M)) for monosyllabic stressed words (ˈCV.C(V) ~ ˈCVC.C(V) (Cremonese, data from Oneda 1965, Rossini 1975).

In the following drift towards reduction of the structural space for vowel length, VQ contrasts still occur in some dialects, both in monosyllabic and penultimate stressed words (as in Cremonese), whereas in other dialects, such as those in the SI area, we find VQ contrasts only in monosyllabic stressed words ([ˈpala] 'shovel' = [ˈʃpala] 'shoulder', but still [ˈpeːs] 'weight' (< PE(N)SU(M) ~ [ˈpes] 'fish' (< PISCE(M), dialect of Arogno). Or, eventually, the contrast is completely lost in every prosodic environment, as in the dialect of Sobrio: [ˈpala] = [ˈʃpala] and also [ˈkar] 'dear' (< CARU(M)) = [ˈkar] 'cart' (< CARRU(M)).

I now briefly summarize the main results of these changes, which can be clustered around two crucial conditions favorable for the development of VH:

A. Reduction and ultimate loss in final unstressed position of [-low] vowels provided a *single, final unstressed vowel*, morphologically relevant and pho-

netically free to develop (by assimilation, fronting, etc.).[8] In many cases this final vowel is the only carrier of a morphological number (and/or gender) distinction, i.e. feminine singular, and, as it contrasts only with zero,[9] *-a* is ideally without any functional-driven constraint on quality changes. For example: [ˈʃpala] ~ [ˈʃpal] 'shoulder/-s', [ˈbɛl] ~ [ˈbɛla] 'nice.M./FSG.' (dialect of Arogno).

B. A *rhythmic controlling strategy* was established, in which unstressed vowels – and in particular final segments – play a significant role and have a balanced relation with stressed vowels in a generally simple phonotactic structure. Several clues point to this prosodic organization, in particular the conditions for the application of *syncope* (which, together with degemination, determines a strong prevalence of open syllables in internal position synchronically, while heterosyllabic clusters correspond to good syllable contacts), and the tendency to *lose VQ contrasts*, with the asymmetry between unstressed and stressed segments, in a certain way, diminished. If a prototypical stress system is characterized by positional prominence effects on the stressed syllable (strengthening, phonological oppositions; see Hyman 2010), the drift toward the loss of VQ contrast seems to characterize a less prototypical one, a system with "weaker stress" and, we would expect, few "segmental effects in terms of reduction" (see Schiering 2007); a system whose prosodic organization, in the CC model, we would classify as a more *controlling* one.

Condition **A** was reached at the end of a "compensatory drift" by reduction processes. Condition **B** has been fulfilled only in dialects where this compensatory drift *had stopped* (see for further details Filipponio and Delucchi, in prep.). Reduction fed VH as far as it provided a single final unstressed vowel, but reduction failed to be a deterrent for VH insofar as it did not go *too far*.

4 Hypotheses for the Development of VH in the Swiss Italian Area

I would like to advance here a sketch of a developmental path that might have led to the different outcomes of final -A in the SI area presented in §2 (for a systematic analysis of alternative hypotheses, see Delucchi 2012:355-379).

As a plausible last step of the compensation tendency discussed in §3.2, we can imagine that Proto-Romance final *-a* was slightly centralized to -[ɐ], a realization now attested in the nearby Rhaeto-Romance-speaking area of Canton Graubünden (Haiman and Benincà 1992). Whereas in some varieties, like the one of Mesocco, the final vowel was involved in a prosodically conditioned alternation between a more peripheral -[ɒ] (in some cases raised to -[ɔ]) in prepausal position versus a more central -[ɐ] utterance-internally, in other varieties this final vowel might have been involved (also) in peripheralization processes in the

[8] Of course, not all CV_1CV_2 words have $V_1=V_2$. For instance, in verbal paradigms we have forms like [ˈtoki] 'I touch', with a non-etymological final vowel.

[9] Exceptions occur in varieties displaying a final *-i* as a f.pl. mark, as in many Valtellinese varieties: [urˈtigɛ] / [urˈtigi] 'nettle, -s' (dialect of Lanzada (I)).

frontward direction.[10] Different developments could have led then to:

(i) systems with a generalized final -[æ], which in some varieties has raised to -[ɛ] in utterance-internal position, e.g. Caspoggio (I): [la ˈfrytɛ l ɛ maˈryðae ##] 'the fruits are ripe';

(ii) systems that have developed different degrees of harmony, with the more peripheral variants of -[ɐ] being reanalyzed as a copy of the mid-low stressed vowels [ɛ] and [ɔ] – as can be predicted by listener misperception mechanisms (see Ohala 1994) – and with an alternation between -[æ]/-[ɐ] being established depending on the feature [±front] of the preceding stressed vowel.

These different steps – harmony for the mid-low vowels, and fronting after all front vowels – are identifiable in systems like the one of Sementina (see §2 (2), here in Fig. 1, from *CVCa).

Fig. 1 VH Sementina

CiCɛ	CyCɛ	
CeCɛ	CøCɛ	CoCa
CɛCɛ		CɔCɔ
	CaCa	

Fig. 2 VH Lanzada (I)

CiCɛ	CyCɛ	
CeCe	CøCø	CoCa
CɛCɛ		CɔCɔ
	CaCa	

Fig. 3 VH Gorduno

CiCi	CyCy	
CeCe	CøCø	CoCo
CɛCɛ		CɔCɔ
	CaCa	

Several clues for a stage of fronting, either generalized or restricted to the final position after stressed front vowels, can be found in this area (Delucchi 2012) – for example, the surfacing of final front vowels in blocking environments (Loporcaro 2002, Delucchi 2010), in loanwords, in antepenultimate stressed words, and in older documentation of varieties now displaying a full system of VH (cf. for Claro – here §2, (1) – the slightly fronted final low vowel reported by Salvioni 1892-94).

From an intermediate stage like the one of Sementina, further developments toward a total left-to-right VH system are possible, as attested in the variety of Lanzada (I) (Fig. 2) and, finally, of Gorduno (Fig. 3) (see also Claro, §2, (1)).

Some SI dialects also display anticipatory assimilation processes in pre-tonic position, either between pre-tonic vowels or between a stressed trigger and a pretonic target (Delucchi 2012:333-335). For example, in the dialect of Augio we have a copy of a following stressed or unstressed vowel on the etymological pretonic *-e-*, as in [pyrˈdy] (cf. PERDERE) 'lost.MSG', [vorˈgoɲːɐ] (< VERECUNDIA(M)) 'shame', [sitiˈmana] (cf. SEPTIMU(M)) 'week'. Anticipatory assimilation of this kind seems to be limited to varieties with preservation or context-independent centralization/peripheralization of final -/a/ (as in Augio, or in Malesco (I), cf. §2, (8)), or to the few varieties with progressive VH where post-tonic, originally internal vowels ≠ /a/ undergo VH (such as in [ˈpɛrtɛgɛ] 'pool',

[10] In support of this point, it is perhaps worth mentioning the particular functional load that the stressed palatal vowel system could exert in these varieties after the occurrence of several fronting processes, with different chronologies and under different conditions, involving /u/, /ɔ/ and /a/: /u/ > /y/ (>/i/, /u/); /ɔ/ > /ø/ (</e/); /a/ > /æ/ (> /ɛ/) (see Delucchi 2012:376-377).

[ˈʃkatala] ‘box’, dialect of Monteviasco (I)). This restriction is obviously related to the strictly local nature of anticipatory assimilation, which does not allow the presence of transparent vowels, as opposed to most left-to-right VH systems (cf. §2, (3)).[11] Moreover, pretonic vowels can also act as triggers on preceding unstressed segments (cf. the previous example of [sitiˈmana]): duration asymmetries between trigger and target are not crucial, except for the restriction that stressed vowels cannot be targets. Finally, in some varieties this assimilation applies also postlexically across word boundaries (see §2, (7)). We are not dealing here with harmony processes marking word boundaries – as the left-to-right VH previously analyzed, which is typical of syllable-timed languages (Auer 1993:7-8) – but with a more recent, local, purely prosody-driven assimilation that blurs these boundaries, targeting pre-tonic vowels across words.

The different assimilation patterns we detected in the SI area seem to fit into Hyman’s distinction between left-to-right and right-to-left processes (Hyman 2002:17, 24, cf. here §1.1). The data point clearly to their different natures: on the one hand, an older, more phonologically-morphologically conditioned process, a strictly word-related lexical left-to-right VH, connected to reduction in post-tonic position (which led to a single final vowel, then slightly centralized), characterized by transparency phenomena and blocking contexts; on the other hand, a more natural, anticipatory type of assimilation, a strictly local “articulatory and/or conceptual ‘pre-planning’” process (Hyman 2002:24), with postlexical application within and, in some cases, even across word boundaries (see Delucchi 2012:343-351, 384-385).

5 Recent Developments: Between Reduction and Vowel Harmony

Besides reduction processes that affected these varieties in the past (see §3.2), Swiss Italian and nearby Italian dialects display recent reduction processes as well, both in dialects with (i) and without (ii) progressive VH:

(i) in the dialect of Monteviasco (I), VH is endangered by VR, with the centralization and neutralization of oppositions between final unstressed vowels, especially in utterance-internal position (see Delucchi 2012:263-266 for experimental evidence):

(13)	__ ##		__]$_{PW}$ [...]$_{PW}$.	
	a. [ˈviti]	‘life’	[a ˈvitë l ɛ ˈdyry]	‘the life is hard’
	b. [ˈsøløˌ]	‘sole’	[a ˈsølə di ˈʃkarp]	‘the sole of the shoes’
	c. [ˈlyny]	‘moon’	[a ˈlynə ˈpjɛnɛ]	‘the full moon’

[11] It is possible that, compared with a more phonetic, coarticulatory-based development of VH in ˈCVCV words, a more abstract, analogical-driven process must be hypothesized for the harmonization of -/a/ in ˈCVCVCV. This is a further evidence of the more phonological-morphological nature of left-to-right VH compared to regressive VH (see further in this section).

(ii) in Sprianese (I) (cf. §2, (6b)), *-a* reduced to -[ɨ]; in other dialects we have weakening of the peripheral vowel (cf. Prosito, (5b)). These varieties do not display any kind of assimilatory process: weakening shortened unstressed vowels consistently so that VR, in a way, went too far, leading to a prosodic shape that, as predicted in §3.3, is not compatible with VH.

Preliminary acoustic analyses performed on our data provide initial indications regarding the durational properties of stressed (SV) and final unstressed vowels (UV) in prepausal vs. utterance-internal position[12] (cf. Delucchi 2012:347-348):

• There is a gradual increase in the durational ratio between UV and SV in utterance-internal position from varieties with recent strong VR processes (e.g. Spriana, §2, (6b)) to varieties with stable progressive VH (e.g. Claro, §2, (1)): from 54% (Spriana), to 62% (Monteviasco), up to 86% (Claro). (The duration of stressed vowels does not show a significant difference between varieties.)

• There is a similar gradual increase in the durational compression ratio of UV from prepausal to utterance-internal position (UV utterance-internal/UV prepausal): from 51% (Spriana) to 67% (Monteviasco), up to 82% (Claro).

For Monteviasco, qualitative and durational reduction pattern together, endangering the old left-to-right VH. Similar reduction tendencies are affecting dialects like Sprianese, where durational pressures in particular seem to prevent any development of assimilation processes.

Finally, we have to consider the case of Augio: it is plausible that the prepausal realization of -[ɐ] – already attested for Augio in older sources and definitely longer than the final central -[ɨ] of Sprianese – corresponds to the vowel we can postulate before peripheralization or VH applied (cf. the current Rhaeto-Romance outcome). Now these further developments seem to be prevented because of recent compensatory tendencies – such as those affecting Sprianese, Monteviaschese etc. – which, when limited, are still compatible with the overapplication (across word boundaries) of anticipatory processes.

6 Conclusion

In this paper I considered the interaction of VH and VR in the SI area. Through a synchronic and diachronic analysis of the interplay between prosodic structure and VR processes, we identified two favorable conditions for the development of VH in this area. VR has fed VH insofar as it provided a single final vowel *-a*, probably slightly centralized, at the end of a compensatory phase (Condition A); the following shift to a more controlling prosodic strategy provided the necessary balanced relation between stressed and unstressed vowels for the development of

[12] Analyses were performed with Praat on CVCV words, 2 speakers for each variety. For each vowel (7- or 8-vowel system) we analyzed stressed and unstressed segments of 20 words (10 words in isolation, 10 words in utterance-medial position). For details, see Delucchi (2012:347).

stable VH systems (Condition B) (§3).

After pointing out the possible role of peripheralization processes in the development of VH, we described the different nature of progressive and regressive assimilation processes presently attested in the SI area, especially with respect to locality, domain of application and relation with VR (§4).

Finally, we observed recent reduction processes, possibly effects of new compensatory tendencies, that seem to affect unstressed vowels by centralizing and, crucially, by severely weakening and shortening them (§5). At this point, peripheralization of the final vowel and development of left-to-right VH is prevented, old systems of VH can be "endangered," and the only new assimilatory processes attested belong to the more natural, anticipatory tendencies.

References

Auer, Peter. 1993. Is a Rhythm-Based Typology Possible? A Study of the Role of Prosody in Phonological Typology. *KontRI Working Papers*, University of Konstanz.

Barnes, Jonathan. 2006. *Strength and Weakness at the Interface. Positional Neutralization in Phonetics and Phonology*. Berlin-New York: Mouton de Gruyter.

Bertinetto, Pier Marco, and Chiara Bertini. 2008. On Modeling the Rhythm of Natural Languages. *Speech Prosody 2008*, Campinas, Brazil.

Delucchi, Rachele. 2010. Outcomes of Lat. -A in Swiss Italian Dialects. Paper presented at UC Berkeley Phonology Lab Phorum, September 26, 2010.

Delucchi, Rachele. 2012. Esiti di -A finale e armonia vocalica. I dialetti della Svizzera italiana in prospettiva romanza e generale. Ph.D. Thesis, University of Zurich.

Filipponio, Lorenzo, and Rachele Delucchi. In preparation. On a Possible Origin of Vowel Harmony in Formerly Stressed-Timed Languages. Ms., University of Zurich.

Filipponio, Lorenzo. 2011. Rhythmus als Auslöser eines phonologischen Wandels: das Beispiel der Mundart von Bologna. Paper presented at Deutscher Italianistentag, Regensburg, March 4-6, 2010.

Flemming, Edward S. 1997. Phonetic Detail in Phonology: Towards a Unified Account of Assimilation and Coarticulation. In K. Suzuki and D. Elzinga, eds., *Proceedings of the 1995 Southwestern Workshop in Optimality Theory*

(SWOT), University of Arizona.

Gavaldà-Ferré, Nuria. 2007. Vowel Reduction and Catalan Speech Rhythm. M.A. Thesis, University College London.

Haiman, John, and Paola Benincà. 1992. *The Rhaeto-Romance Languages*. London: Routledge.

Hyman, Larry M. 2002. Is There a Right-to-Left Bias in Vowel Harmony? Paper presented at the IX International Phonology Meeting, Wien, November 1, 2002.

Hyman, Larry M. 2010. Do All Languages Have Word Accent? Or: What's so Great about Being Universal? UC Berkeley Phonology Lab Annual Report, 297-315.

Inkelas, S., J. Barnes, J. Godd, D. Kavitskaya, O. Orgun, R. Sprouse and A. Yu. 2001. Stress and Vowel-to-Vowel Coarticulation in Turkish. Paper presented at the annual meeting of LSA, Washington D.C., January 2001.

Jiménez, Jesús, and Maria-Rosa Lloret. 2011. Harmonia vocàlica: parametres y variació. *Estudis Romànics* 33:53-80.

Lepri, Luigi, and Daniele Vitali. 2007. *Dizionario bolognese-italiano, italiano-bolognese*. Bologna: Pendragon.

Loporcaro, Michele. 2002. Unveiling a Masked Change: Behind Vowel Harmony in the Dialect of Claro. In D. Restle and D. Zaefferer, eds., *Sounds and Systems. Studies in Structure and Change. A Festschrift for Theo Vennemann*, 75-90, Berlin-New York: Mouton de Gruyter.

Loporcaro, Michele. 2006-7. I dialetti dell'Appennino tosco-emiliano e il destino delle atone finali nell'(italo)romanzo settentrionale. *L'Italia dialettale* 66-67: 69-122.

Loporcaro, Michele. 2010. Syllable, Segment and Prosody. In M. Maiden, J.C. Smith and A. Ledgeway, eds., *The Cambridge History of the Romance Languages*, vol. 1, *Structures*, 50-108, Cambridge: CUP.

Majors, Tivoli. 1998. Stress Dependent Harmony: Phonetic Origin and Phonological Analysis. Ph.D. Thesis, University of Texas, Austin.

Majors, Tivoli. 2006. The Development of Stress-Dependent Harmony. *Southwest Journal of Linguistics* 25:61-83.

Manuel, Sharon Y., and Rena A. Krakow. 1984. Universal and Language Particular Aspects of Vowel-to-Vowel Coarticulation. *Status Report on Speech Research*, SR-77/78, Haskins Laboratory, 69-78.

Merlo, Clemente. 1951. Profilo fonetico dei dialetti della Valtellina. *Akademie der Wissenschaften und Literatur – Abhandlungen der Geistes- und Sozialwissenschaftlichen Klasse* 15:1369-98.

Ohala, John. 1994. Towards a Universal, Phonetically-Based, Theory of Vowel Harmony. *ICSLP 94*, Yokohama, Japan, 491-494.

Oneda, Romano. 1965. L'opposizione di quantità vocalica e il dialetto cremonese. Strenna dell'ADAFA, Cremona, 23-34.

Rossini, Giorgio. 1975. *Capitoli di morfologia e sintassi del dialetto cremonese*. Firenze: La Nuova Italia.

Salvioni, Carlo. 1892-94. L'influenza della tonica nella determinazione dell'atona finale in qualche parlata della valle del Ticino. *Archivio glottologico italiano* 13:355-360.

Schiering, René. 2007. The Phonological Basis of Linguistic Rhythm: Cross-linguistic Data and Diachronic Interpretation. *Sprachtypol. Univ. Forsch. (STUF)* 60(4):337-359.

Schmid, Stephan. 2004. Une approche phonétique de l'isochronie dans quelques dialects italo-romans. In T. Meisenburg and M. Selig, eds., *Nouveaux departs en phonologie: les conceptions sub- et suprasegmentales,* 109-124 Tübingen: Narr.

Urech, Jakob. 1946. *Beitrag zur Kenntnis der Mundart der Val Calanca*. Biel: Schüler.

Vennemann, Theo. 1988. *Preference Laws for Syllable Structure and the Explanation of Sound Change*. Berlin: Mouton de Gruyter.

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