# An analysis of stress-dependent harmony in Servigliano[1]

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*Abstract*

*On the base of the data in Camilli (1929), this paper gives a complete descriptive analysis of the complex system of stress-dependent harmonies of the dialect of Servigliano (Marche, Italy). Harmonic effects that affect the post-tonic, tonic, pretonic and proclitic domains are derived from a limited number of constraints. Two constraints favor autosegmental spreading in different domains and two constraints impose right-to-left directionality through positional faithfulness in two prominent positions: stressed syllables and inflectional suffixes. Changes in stressed and pretonic position are limited to gradual raising by local conjunction of two faithfulness constraints. The paper also examines cases of morphologized metaphony, low vowel opacity, the influence of proclitic secondary stress, and discusses previous analyses.*

## 1. Introduction

The Servigliano dialect is spoken in the Marche, an Italian region in the Eastern part of Central Italy. It presents a very complex and interesting set of interacting harmony patterns that have been analyzed by Kaze (1991: 62–82), Nibert (1998), and Walker (2006). All are based in the data in Camilli (1929), a very careful description of the speech of the older generation; Camilli himself was a native speaker of Servigliano. In the present work I give a more complete account of the empirical material in Camilli (1929) that has important conse-

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quences for the analysis, and I propose a system that derives the complex pattern of Servigliano harmony from the interaction of a limited number of constraints. My account is based on Camilli's descriptive statements and on all the examples found in the main part of the paper, in the texts transcribed (Camilli 1929: 232–247), and in an extensive glossary of more than 2,000 terms.[2] I have adapted the transcriptions in his particular notation to the IPA alphabet, taking into account his detailed phonetic indications (Camilli 1929: 221–223).[3]

The harmonic phonology of Servigliano can be organized descriptively in four main regressive harmonic processes. I will use the term *metaphony* to refer both to classical metaphony (raising of a stressed vowel by a final high vowel) and to the same kind of structural change affecting unstressed vowels, and *(total) harmony* to refer to total assimilation. The four harmonic processes are Posttonic Harmony, Proclitic Harmony, Tonic Metaphony, and Pretonic Metaphony. Harmony is total regressive assimilation of an unstressed vowel to a domain-final unstressed vowel; it applies either in a posttonic domain which can include enclitics (Posttonic Harmony) as in (1a), or in a proclitic domain (Proclitic Harmony), as in (1b). Metaphony regressively raises mid vowels; in Tonic Metaphony a final vowel causes raising of the stressed vowel (ɛ→e, ɔ→o, e→i, o→u, (1c)), and in Pretonic Metaphony the stressed vowel causes raising of pretonic vowels (1d). We can add a fifth special process, intrapretonic metaphony, which is discussed in Section 4.2. Throughout the paper, '-' marks a word-internal morpheme boundary and '=' a clitic boundary.

(1) a. *Posttonic Harmony*
/mett-i=tʃe=lo/ → métt-o=tʃo=lo 'put it-N there'

b. *Proclitic Harmony*
/me=sse=la=pijj-a/ → ma=ssa=la=píjj-a 'he takes-REFL it-F on me'

2. There are also a few transcriptions of Servigliano and the similar variety of Montefalcone in Neumann (1904, 1907), but they don't offer any additional evidence for the analysis, except for some minor point.

3. Camilli was an active member of the IPA, and his transciptions are accurate. My transcriptions can differ from those is found in Kaze (1991), Nibert (1998) and other works, because I have paid more attention to his phonetic indications. Notice in particular the following: [p̬, t̬, k̬] are partially voiced stops which appear after nasals as a result of voicing neutralization of [p, b, t, d, k, g] in this context; in Camilli's notation, *s* before consonant is phonetically [ʃ], *chj, ghj* correspond to [c], [ɟ], respectively, and intervocalic *gn* is always a geminate [ɲɲ].

c. *Tonic Metaphony*
/fjor-i/ → fjúr-i ‘flower-PL’

d. *Pretonic Metaphony*
/leg-imo/ → lig-ímo ‘we read’

It is clear from Camilli’s explicit descriptive statements and from the examples that appear in the description, in the texts, and in the glossary, that all are productive processes. Nevertheless, there is a limited number of exceptions to Posttonic Harmony and to Tonic Metaphony. I give information about exceptions in the text or in footnote in the corresponding sections.

The present analysis is based on the assumption that there is no need to set up different machinery for each assimilatory process, as is assumed in previous analyses. The central claim is that the basic harmonic effects of Servigliano can be derived from two constraints that favor spreading of vowel features in two domains, and a two constraints that determine leftward directionality. Although I will not discuss functional grounding in detail, it is obvious that the usual grounding arguments apply. Harmonic spreading minimizes articulatory effort and can improve the perceptibility of specific elements (Flemming 1995, Kaun 1995, 2004, Ní Chiosáin and Padgett 2001, Flemming to appear). As in other metaphonic systems, spreading favors the realization of properties of suffixal material outside the suffix (cf. the constraint IDENT-SUFF(VF) below, that maintains feature values in suffixes).

The paper is organized as follows. In Sections 2–4 I present the harmonic system of Servigliano in non-cliticized words and give a preliminary analysis. I then extend the description to proclitics and enclitics (Section 5). In Section 6 I review previous analyses, in Section 7 I examine some important remaining issues, and Section 8 draws conclusions.

As many other Romance varieties, Servigliano has a seven vowel system /a, ɛ, e, i, ɔ, o, u/ in stressed position. In unstressed position it does not allow mid open vowels, which become mid close ([−ATR]). The stressed and the unstressed vowel system are presented in (2a, b); some illustrative examples appear in (2c):

(2) VOWEL REDUCTION

a. *Stressed positon*

i u
e o
ɛ ɔ
a

b. *Unstressed positon*

i u
e o
a

| | | | |
|---|---|---|---|
| c. | merɛ́nn-a | merenn-étt-a | ‘lunch’/‘afternoon snack’ |
| | pɔ́r-a | por-étt-a | ‘poor-F.SG (prenominal)/ (postnominal)’ |
| | somɛ́n̩t̩-e | somen̩t-ató | ‘seed’/‘sower’ |
| | ʃkotɛ́ll-o | ʃkotell-á | ‘I sharpen’/‘to sharpen’ |
| | besɔ́ŋŋ-a | besoŋŋ-á | ‘need (N)’/‘need-INF’ |
| | gɔ́l-o | gol-ɔ́ | ‘I fly/he flew’[4] |
| | papát-a | papat-á | ‘potato’/‘potato field’ |
| | murmúr-o | murmur-á | ‘I murmur’/‘to murmur’ |
| | píŋŋ-u | piŋŋ-ɔ́tt-u | ‘pine tree’/‘pine cone’ |

Vowel reduction can be obtained by ranking a constraint disallowing mid open vowels (*[−low, −high, −ATR]) between a constraint requiring faithfulness to vowel features in stressed position and the constraint that requires faithfulness to vowel features in general.[5] Vowel reduction is illustrated in (3) with /gɔl-ɔ/ → [gol-ɔ́]:

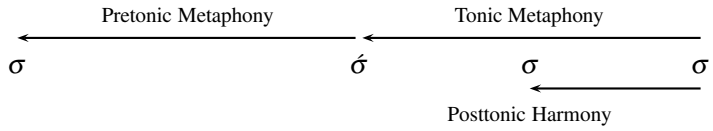
(3) /gɔl-ɔ/ → gol-ɔ́ IDENT-STR(VF) ≫ *[−low,−high,−ATR] ≫ IDENT(VF)

| /gɔl-ɔ/ | IDENT-STR(VF) | *[−low,−high,−ATR] | IDENT(VF) |
|---|---|---|---|
| ☞ gol-ɔ́ | | 1 | 1 |
| gɔl-ɔ́ | | 2W | L |
| gol-ó | 1W | L | 1 |
| gul-ɔ́ | | 1 | 2W |

## 2. Posttonic Harmony in posttonic sequences

I will start the description with harmony in non-cliticized words. In these structures, represented schematically in (4), we can get Posttonic Harmony, Tonic Metaphony, and Pretonic Metaphony.

(4)




Words in Servigliano are either oxytone, paroxytone and proparoxytone. Since Posttonic Harmony takes place in posttonic sequences, for words without en-

4. Throughout I use ‘he’ in glosses to refer to 3rd sg., which covers the denotation of English ‘he’, she’, ‘it’; the same applies to ‘him’ and to ‘his’.
5. Vowel reduction can also be obtained using positional markedness (Crosswhite 2001). The reasons for preferring positional faithfuness will become clear in Section 4.2.

clitics it appears only in proparoxytones; here the posttonic internal vowel assimilates all features of the final vowel of the word.[6] This is illustrated in (5); (5a) shows the form of the regular present indicative endings for 1st singular, /-o/, and for 3rd singular/plural, /-a/, in paroxytone forms.[7] In (5b) (first and second column) these endings cause total assimilation of the preceding root vowel. (5c) shows the typical inflective endings of nominals for masculine singular, /-u/, masculine plural, /-i/, feminine singular, /-a/, and feminine plural, /-e/. In (5d) (first and second column) the posttonic root vowel totally assimilates to these endings. Whenever possible I have included, in the third column, an example that indicates the underlying form of the assimilated posttonic root vowel.

| | | | | | |
|---|---|---|---|---|---|
| (5) | a. | píjj-o | píjj-a | | 'I take'/'he/they take(s)' |
| | b. | prɛ́dok-o | prɛ́dak-a[8] | | 'I preach' / 'he/they preache(s)' |
| | | mútʃːok-o | | mutʃːik-á | 'I bite' / 'to bite' |
| | | páʃtok-o | | paʃtek-á | 'I chew'/'to chew' |
| | | ʃpámp̆ol-o | | ʃpamp̆al-á | 'I bloom'/'to bloom' |
| | | ʒmiáo̯l-o | | ʒmiau̯l-á | 'I miaow' / 'to miaow' |
| | c. | múr-u | múr-i | | 'wall-SG/PL' |
| | | kás-a | kás-e | | 'house-SG/PL' |
| | d. | ʃtómuk-u[9] | ʃtómik-i | ʃtommek-ós-a | 'stomach-SG/PL' / 'nauseous-FEM.SG' |
| | | árvul-u | árvil-i | arvulát-a | 'tree-SG/PL' / 'tree grove' |
| | | álam-a | álem-e | | 'soul-SG/PL' |
| | | doménak-a | domének-e | | 'Sunday-SG/PL' |
| | | pjuítʃːak-a | pjuítʃːek-e | | 'splash, sprinkle-SG/PL' |
| | | ánnatr-a | | annetr-ɛ́ll-a | 'duck/duck-DIM' |
| | | tórvad-a | nt̪órvod-o | nt̪orved-á | 'turbid-F.SG' / 'I make turbid' / 'to make turbid' |

6. Exceptions are rare. I have found seven cases ([jénneru] 'son-in-law'; [fíkore] 'figs', an irregular plural, sg. [fíko]; [píola] 'jew's harp'; [tʃáula] 'retting machine'; [tʃáuli] 'cabbage-PL'; [láuro] 'laurel'; [fráula] 'strawberry') against 191 cases with harmony. In the last four cases the *au* sequence could be a diphthong, but Camilli's transcriptions (*láuro, fráula*) and the fact that he marks always stress in proparoxytones, but never in paroxytones, except to mark open [ɛ] and [ɔ], seem to indicate syllabic [u].
7. 3rd singular and 3rd plural verb forms are always identical. In the rest of the paper I always gloss these forms as 3SG or with 'he' although they can also be plural.
8. Nibert (1998), and Walker (2003, 2005) give the infinitive form [prediká] (similar to Italian *predicare*), but this form is not in Camilli (1929). In fact Neumann (1904) gives an untruncated infinitive form with [e], *predecare*, for dialects of the Marche, and Merlo (1922: 34) gives [predeká] for the dialect of Cervara (Lazio).
9. Camilli transcribes *stómmucu* with [ó] in the text, and *stòmmucu* with [ɔ́] in the Glossary, which is probably a variant pronunciation or a typographical error.

## 3. Tonic Metaphony. Initial analysis

### *3.1. Tonic Metaphony*

A typical metaphonic process (raising of a stressed vowel by a final high vowel) obtains whenever a mid stressed vowel is followed by a high vowel. In these situation the stressed vowel raises by one degree (ɛ́→é, ɔ́→ó, é→í, ó→ú). This is illustrated in (6a) with paroxytone words. Raising can also be caused by the final vowel of a proparoxytone, in which case we have both Posttonic Harmony and Tonic Metaphony, as in the examples in (6b). The examples in (6c, d, e) show that non-mid vowels are not affected (high vowels are only vacuously affected), that harmony cannot operate rightwards, and that mid vowels are not triggers, respectively.

| | | | | |
|---|---|---|---|---|
| (6) | a. | pɛ́d-e | péd-i | ‘foot-SG/PL’ |
| | | rreppréts:-o | rreppréts:-i | ‘I take care’/‘you take care’ |
| | | tʃeréʃ-a | tʃeréʃ-u | ‘wild cherry tree (F)’/ ‘grafted cherry tree (M)’ |
| | | mɔ́rt-a | mórt-u | ‘dead-F.SG/M.SG’ |
| | | mɔ́r-e | mór-i | ‘he dies’/‘you die’ |
| | | bɔ́n-a | bón-i | ‘good-F.SG/M.PL’ |
| | | métt-e | mítt-i | ‘he puts’/‘you put’ |
| | | pés-a | pís-u | ‘heavy-F.SG/M.SG’ |
| | | kréd-o | kríd-i | ‘I think’/‘you think’ |
| | | fjór-e | fjúr-i | ‘flower-SG/PL’ |
| | | fónn-a | fúnn-u | ‘deep-F.SG/M.SG’ |
| | | bótt-e | bútt-i | ‘cask-SG/PL’ |
| | | kórm-a | kúrm-u | ‘heaped-F.SG/M.SG’ |
| | b. | prɛ́dok-o | prédik-i | ‘I preach’/‘you preach’ |
| | | pétten-e | péttin-i | ‘comb-SG/PL’ |
| | | tórvad-a | túrvud-u | ‘turbid-F.SG/M.SG’ |
| | c. | dítʃ-e | dítʃ-i | ‘he says’/‘you say’ |
| | | mút-a | mút-u | ‘very-F.SG/M.SG’ |
| | | ráp-a | ráp-i | ‘turnip-SG/PL’ |
| | d. | fín-e | *fín-i | ‘end’ |
| | | dík-o | *dík-u | ‘I say’ |
| | e. | mɔ́r-o | *mór-o | ‘I die’ |
| | | dɛ́nt-e | *dént-e | ‘tooth’ |

We can derive Posttonic Harmony and Tonic Metaphony from the interaction of constraints favoring harmony and constraint requiring faithfulness to prominent positions. A general constraint favores total harmony, i.e., identity in vowel features, and a more specific constraint favores spreading of [high] and

[ATR]. One of the constraints that derive vowel reduction (IDENT-STR(VF), Section 1), and a constraint favoring faithfulness of high vowels in suffixes will determine leftward directionality. Whereas unstressed posttonic vowels can show total harmony, stressed vowels retain their values, except that under metaphonic influence they can become [+high] and [+ATR]. This is shown graphically in (7), where vowel changes cannot cross double lines in any direction, but they can cross discontinuous-continuous lines only in one direction:

(7) Possible changes for stressed vowels under metaphony

| | | | |
|---|---|---|---|
| i | | u | high |
| e | | o | ATR |
| ɛ | | ɔ | |
| | a | | low |
| back | | round | |

Thus [+ATR] can spread from a final high vowel to /é/ and /ó/ and [+high] to /é/ and /ó/. The fact that, unlike what happens in other varieties, metaphony does not affect the low vowel /á/, can be derived from high ranking of the constraint IDENT-STRESS(low), which prohibits changes in the feature [low] in stressed position. /á/ will not be able to acquire [+high] because GEN does not generate candidates with the impossible configuration [+low, +high], and it will not become [+ATR] because the configuration [+low, +ATR] will be rejected by language-particular markedness constraints that disallow surface vowels with this feature configuration that never appears in the surface.[10] The trigger condition on metaphony (only high vowels are triggers, i.e., we dont get /mɔ́r-o/ → *[mór-o], etc. (6e)) is incorporated in the markedness constraint AGREE(+high,+ATR).[11]

10. I thank an anonimous reviewer for pointing to some problems caused by stressed /á/. The low vowel does raise in some Italian varieties (Maiden 1991) and in Asturian (Hualde 1998). The same reviewer points out that representing /a/ as back is debatable, since in Italian and many Italian dialects it is phonetically central, and in the systems which also raise /a/ metaphonically (Maiden 1991) its output is a front vowel. The characterization of /a/ as back or non-back does not have any crucial consequences for the analysis.
11. McCarthy (2009, 2011) gives convincing arguments against an analysis of autosegmental spreading base on AGREE or ALIGN, and proposes an approach based on a different constraint family, SHARE, framed within Harmonic Serialism. Although an analysis of Servigliano harmonies within Harmonic Serialism has some interesting aspects, I must leave such a possibility open for further research.

The relevant constraints are formulated in (8). AGREE$_{PT}$(VF), which will be slightly modified in (29a), favors feature identity of adjacent vowels, and IDENT-SUFF(VF) favors leftward direction of spreading.

(8) a. AGREE(+high,+ATR)
For every pair of adjacent vowels one of which is [+high,+ATR], assign one violation mark if they are not linked to the same token of [+high] and [+ATR].
*Effect: favors spreading of [+high] and [+ATR] to adjacent vowels from a [+high, +ATR] vowel.*

b. AGREE$_{PT}$(VF)
In the posttonic domain, assign one violation mark for every pair of adjacent vowels that are not linked to the same vowel feature, for any feature. [to be modified in (29)]
*Effect: favors total identity of adjacent vowels in the posttonic domain.*

c. IDENT-SUFF(VF)
Assign one violation mark for any feature in a suffixal vowel that does not have the same value as its correspondent vowel in the input.
*Effect: establishes leftward directionality from suffix.*

d. IDENT(VF)
Assign one violation mark for any feature in an output vowel that does not have the same value as its correspondent vowel in the input.
*Effect: penalizes any vowel feature change.*

I begin with those cases of Tonic Metaphony in which a stressed mid close vowel raises to high, as in /pes-u/ → [pís-u]. Raising from /ɛ/ to /e/ and from /ɔ/ to /o/ will be discussed in Section 3.3. As shown in the next tableau, the fully faithful candidate (9b) and the candidate (9c) fail because they violate AGREE(+high,+ATR). The last candidate, [pés-o] (9d), shows illicit rightward spreading. It ties with the winning candidate [pís-u], with leftward spreading, on all constraints except for IDENT-SUFF(VF), which will decide, no matter where it is ordered, in favor of the winning candidate.

(9) AGREE(+high,+ATR) ≫ IDENT(VF)

| /pes-u/ | IDENT-SUFF(VF) | AGREE(+high,+ATR) | IDENT(VF) |
|---|---|---|---|
| ☞ a. pís-u | | | 1 |
| b. pés-u | | 1W | L |
| c. pós-u | | 1W | 2W |
| d. pés-o | 1W | | 1 |

### *3.2. Posttonic Harmony*

Total assimilation in the proparoxytones examined in Section 2 is the result of AGREE$_{PT}$(VF), which favors total assimilation in the posttonic domain. With AGREE$_{PT}$(VF) ≫ IDENT(VF) candidates which show total assimilation in the posttonic domain (underlined in (10)) will be favored. IDENT-SUFF(VF) will choose under any ordering the candidate with leftward spreading.

(10) AGREE$_{PT}$(VF) ≫ IDENT(VF)

| | /mutʃːik-o/ | IDENT-SUFF(VF) | AGREE$_{PT}$(VF) | IDENT(VF) |
|---|---|---|---|---|
| ☞ | mútʃːok-o | | | 3 |
| | mútʃːik-i | 3W | | 3 |
| | mútʃːik-o | | 3W | L |

### *3.3. Gradual raising, exceptions, and morphologized metaphony*

Let us consider now the metaphonic mappings ɛ́→é, ɔ́→o. For these cases the proposed constraint hierarchy predicts the wrong metaphonic changes. A problem arises because what we get empirically is a chain shift, mid open vowels raising one degree to mid close, and mid close vowels raising one degree to high vowels. But the constraint hierarchy favors the double shifts ɛ→e→i and ɔ→o→u. Consider the mapping /mɔr-i/→ [mór-i] (6a), and what the present constraint hierarchy actually predicts ('☞ *' indicates the predicted winner and the modal operator '□' the necessary winner):

(11) /mɔr-i/ → *[múr-i]

| | /mɔr-i/ | IDENT-SUFF(VF) | AGREE(+high,+ATR) | IDENT(VF) |
|---|---|---|---|---|
| | mɔ́r-ɔ | *!*** | | **** |
| □ | mór-i | | *! | * |
| ☞ * | múr-i | | | ** |
| | mír-i | | | ***!* |

Even with two constraints, one favoring /e/→i, /o/→u and another favoring /ɛ/→e, /ɔ/→o, the mappings /ɛ/→i and /ɔ/→u will always result in more harmonic candidates. I will use the proposal by Kirchner (1996), also adopted in Walker (2005: 958–960), to account for chain shifts like these through constraint conjunction. Under this proposal, mappings like /ɛ/→i are avoided because they violate at the same time two faithfulness constraints by introducing both [+high] and [+ATR]. The constraint conjunction IDENT(high)

&IDENT(ATR) allows the observed mappings only, as shown in (12a); the constraint conjunction is defined in (12b).[12]

(12) a.

| | IDENT(high) | IDENT(ATR) | IDENT(high) &IDENT(ATR) |
|---|---|---|---|
| /é/→í | * | | |
| /ó/→ú | * | | |
| /ɛ/→é | | * | |
| /ɔ/→ó | | * | |
| /ɛ/→í | * | * | * |
| /ɔ/→ú | * | * | * |

b. IDENT(high)&IDENT(ATR) [IDENT(high&ATR)]
Assign one violation mark for any segment that violates both IDENT(high) and IDENT(ATR), i.e., for any high vowel that derives from a non-high-non-ATR vowel.

As can be seen in the next tableau, IDENT(high&ATR) must dominate AGREE (+high,+ATR).

(13) IDENT(high&ATR) ≫ AGREE(+high,+ATR)

| /mɔr-i/ | IDENT(high&ATR) | AGREE(+high,+ATR) | IDENT(VF) |
|---|---|---|---|
| ☞ mór-i | | 1 | 1 |
| mɔ́r-i | | 2W | L |
| múr-i | 1W | L | 2W |
| mír-i | 1W | L | 4W |

The next tableau (14) shows a case in which Posttonic Harmony and Tonic Metaphony apply to the same representation, /ʃtɔ́mek-i/ → [ʃtómik-i], with total assimilation of /e/ to the final [i] and metaphonic raising of the stressed /ɔ́/ to [ó].

12. Calabrese (1985, 1995), in a rule and repair framework, obtains gradual raising through a repair mechanism called negation (excision in Calabrese 2005). Metaphony spreads [+high] and maps /ɛ/→[ɪ], /ɔ/→[ʊ]. Since [+high,−ATR] is a disallowed configuration, negation removes both feature specifications and replaces them with their opposite values, i.e., [−high,+ATR], resulting in [e], [o], respectively. For negation, see also Calabrese (2005, 2011).

(14)

| /ʃtɔ́mek-i/ | AGREE$_{PT}$ (VF) | IDENT (high&ATR) | AGREE (+high,+ATR) | IDENT (VF) |
|---|---|---|---|---|
| ☞ ʃtómik-i | | | 1 | 2 |
| ʃtɔ́mik-i | | | 2W | 1L |
| ʃtómek-i | 1W | | 1 | 1L |
| ʃtúmik-i | | 1W | L | 3W |

A few lexical items are exceptions to Tonic Metaphony: [allɛ́gr-u] 'cheerful', [morɔ́ʃ-u] 'ogre', [mmaréll-i] 'you are bitter' (cf. [mmaréll-o] 'I am bitter'), [revɔ́rvur-u] 'revolver'. Like in the case of exceptions to Posttonic Harmony (see Footnote 6), many of them are proparoxytones (6 cases without metaphony, 6 cases with metaphony); for paroxytones, I have counted 13 exceptions and 173 regular cases. Exceptions to harmony can be accounted for through indexed faithfulness constraints (Pater 2000, 2009). In the case of Tonic Metaphony, for instance, in a case like [allɛ́gr-u] the indexed constraint IDENT-STRESS-L that requires faithfulness to all vowel features and applies only to lexical items with an idiosyncratic marking L. Ordered before AGREE(+high, +ATR), it will prevent Tonic Metaphony from applying to /[allɛ́gr]$_{L}$ -u/. Notice that this predicts, in the case of proparoxytones, lexical exceptionality only for the stressed vowel, i.e., for one of the harmonic processes, Tonic Metaphony. The prediction is correct, since there are cases in which the same lexical item is an exception to Tonic Metaphony, but not to Posttonic Harmony. As we will see in Section 5.1, enclitics also trigger Tonic Metaphony and Posttonic Harmony. Pronominal enclitics can cliticize on the adverbs [ɛ́kko] 'here', [ɛ́sso] 'there-2', [ɛ́jjo] 'there-3'. When the final clitic vowel is high, it does not trigger metaphony on the stressed /ɛ́/, but it does trigger total harmony on the unstressed /o/: /ɛ́kko=li/ → [ɛ́kki=li] 'here they-M are', /ɛjjo=lu/ → [ɛ́jju=lu] 'there he-M is'.

Before I turn to pretonic vowels, the description of Servigliano metaphony should be completed with a special case. As we have seen, metaphony is triggered by high vowels only; but in a lexically limited set of cases the inflective nominal mass marker /o/, usually referred to as "neuter", triggers raising of the stressed vowel. /-o/ marks mass interpretation as opposed to plural and (count) singular interpretations. Thus in the adjective paradigm we have five items, [bón-u], [bɔ́n-a], [bón-i], [bɔ́n-e], [bón-o] 'good-M.SG/F.SG/M.PL/F.PL/MASS', [nír-u], [nér-a], [nír-i], [nér-e], [nír-o] 'black-M.SG/F.SG/M.PL/F.PL/MASS'. As the alternations in the stressed vowel show, the first four cases of each paradigm are regular, metaphony being triggered only by high vowels. But in the last example we do not get the expected [bɔ́n-o], [nér-o], but [bón-o], [nír-o] with overapplication of metaphony. Similarly, the nominal expressions [lu péʃʃ-u] 'the fish (count)' and [lo péʃʃ-o] 'fish (mass)' have, contrary to expectations,

the same vowel (we would expect either [lu péʃʃ-u], [lo pɛ́ʃʃ-o] or [lu píʃʃ-u], [lo péʃʃ-o]).[13]

For adjectives, raising by /-o/ seems to be regular ([rúʃʃo]-[rúʃʃu] 'red', [béllo]–[béllu] 'beautiful', [nír-o]–[nír-u] 'black'; no counterexamples in Camilli 1929). But at least for nouns, not all instances of the mass morpheme trigger raising: we don't get it in [tʃétʃ-o] 'chickpea plant' (cf. [tʃítʃ-u] 'chickpea') and in [ardʒénṭ-o], 'silver', [immérn-o] 'winter', [ɲɔ́ʃtr-o] 'ink', etc.[14]

It is clear that there is no way in which a mid close trigger might cause raising of a mid close vowel to a high vowel by spreading (/é/→[í] / __ … o, /ó/→[ú] / __ … o). Notice also that the mass marker /-o/ behaves regulary as trigger of Posttonic Harmony: [músol-o] 'mousseline (cotton fabric)', [baʃílok-o] 'basil', [fétok-o] 'liver', [láʃtok-o] 'elastic band', [jérok-o] 'jargon'. Another fact that is worth noticing is that in order to trigger raising, the morpheme must be both semantically mass and have the regular mass exponence /-o/. Thus the root /verd/ must have underlying /e/ in the root, as shown by [vérd-e] 'green-M/F.SG', but in the mass expression [lo vérd-e] 'the green stuff' the final /e/ does not trigger raising, and in the mass expression [lo mɛ́l-e] 'honey' [-e] triggers no raising. Similarly, if the (count) feminine singular is expressed through the marked morph /-o/, instead of the regular /-a/, no raising obtains, as in /pɛ́k-o/ 'female sheep'. Following Maiden (1991: 178, 218) we can safely conclude that in some mass nominals metaphony has been morphologized.[15] It is now a specific lexical item, the mass suffix /-o/ that triggers raising. Although I will not propose a detailed analysis of such cases of morphologized metaphony, raising of the stressed vowel can be derived, as in similar cases (see Finley 2009), by positing a lexical form for the mass suffix that includes the segmental properties of the suffix plus a floating autosement, i.e., a representation [[+back, +round, +ATR], [+high, +ATR]] from which the [high, +ATR] autosegment spreads to the stressed vowel. The constraint hierarchy should ensure that the floating [+high, +ATR], which is part of the representation of the segment /i/, associates to the stressed vowel (15b).

(15) a. [+high,+ATR] → [+high,+ATR]

nér-i nír-i

13. *Pesce* must be exceptional no matter what the height of the mid underlying vowel is, /e/ or /ɛ/. Etimologically we would expect the first.
14. In demonstratives /-o/ also fails to trigger raising: [kwíʃt-u]–[kwéʃt-o] 'this-1.M.SG/MASS', [kwíss-u]–[kwéss-o] 'this-2.M.SG/MASS', [kwíll-u]–[kwéll-o] 'that-3.M.SG/MASS'. See Maiden (1989: 182) for a discussion of the historical origin of all these exceptions.
15. Historically, "inflectional **-o** *replaced* original metaphonizing **-u**, while leaving the the metaphonic alternant intact" Maiden (1991: 178). See also Maiden (1989).

b. -[+high,+ATR] → [+high,+ATR]

nér- o  nír- o

Some truncated forms should be analyzed in a similar way. Truncation deletes all the phonological material after the stressed vowel, as in the singular nouns [aɲtʃín-u] → [aɲtʃí] 'hook', [patrón-e] → [patró] 'master'. The plural forms are derived (at least historically) from the non-truncated plurals, [aɲtʃín-i] → [aɲtʃí] 'hooks', [patrún-i] → [patrú] 'masters'. As a result, when the stressed vowel is a mid vowel the plural is marked through apparent metaphonic alternations without a trigger (16a), whereas truncated forms with other stressed vowels are invariable (16b):

(16) a.

| | | |
|---|---|---|
| paó | paú | 'peacock-SG/PL' |
| bɔ́ | bó | 'OX-SG/PL' |
| bottavɔ́ | bottavó | 'touchy person-SG/PL' |
| pɛ́ | pé | 'foot SG/PL' |
| verdó | virdú | 'deep green-M.SG/M.PL' |
| botʃentó̬ | butʃintú̬ | 'hornet-SG/PL' |

b.

| | |
|---|---|
| kontadí̬ | 'farmer-SG,PL' |
| dí | 'day-SG,PL' |
| ká | 'dog-SG,PL' |

Camilli does not discuss truncation in much detail, but some of the truncated cases clearly do not alternate with the non-truncated forms. At least in these cases the plural morpheme cannot be the usual whole segment /i/ which is not realized, it must be whatever causes the metaphonic change – in other words the plural exponent must be a floating [+high, +ATR] element that is realized on the stressed vowel, as in the case of mass nominals. This is exemplified in (17) with the alternation [bɔ́] 'ox' – [bó] 'oxen'.

(17)

| *Singular* | *Plural* | | |
|---|---|---|---|
| | -[+high,+ATR] | | [+high,+ATR][16] |
| bɔ́-Ø | bɔ́- | → | bó |

16. The constraint IDENT(high&ATR) (12b) will prevent [+high] from spreading to the stressed vowel.

## 4. Incorporating pretonic vowels

### *4.1. Pretonic Metaphony*

Pretonic vowels are also affected by harmonic changes, which are similar to the metaphonic changes of the stressed vowel examined in the preceding section. Basically, whenever the stressed vowel is high, Pretonic Metaphony causes raising of the pretonic mid vowels to high. (18a) shows cases in which a stressed high vowel triggers raising of an underlying pretonic mid close vowel. Mid open /ɛ/, /ɔ/ in pretonic position also raise to [i], [u] (18b), but I postpone the analysis of these cases to Section 7.3. The examples in (18c) show that pretonic high and low vowels do not change. Cases like [k̲ummunik-ímo], [b̲isuɲɲ-ímo], [ɲ̲inucc-ú] show that pretonic vowels whose underlying value for ATR is not determined by alternations with the vowel in stressed position are also subject to Pretonic Metaphony.

| | | | | |
|---|---|---|---|---|
| (18) | a. | leg-éte | lig-ímo | ‘you-PL tie’/‘we tie’ |
| | | kommonek-á | kummunik-ímo | ‘to communicate’/‘we communicate’ |
| | | vérd-e | vird-ú | ‘green-SG’/‘deep green-M.PL’ |
| | | rréʃʃ-o | rriʃʃ-í | ‘I go out’/‘to go out’ |
| | | tréntˑa | trint-ín-a | ‘thirty’/‘quantity about thirty’ |
| | | fjór-e | fjur-í | ‘flower’/‘to flower’ |
| | b. | kanɛ́ʃtr-a | kaniʃtr-í | ‘basket/basket-DIM’ |
| | | | cf. kaneʃtr-ɛ́ll-a | ‘kind of basket’ |
| | | pɛ́rsak-a | pirsik-í | ‘peach tree’/‘peach tree-DIM’ |
| | | besɔ́ɲɲ-a | bisuɲɲ-ímo | ‘need (N)’/‘we need’ |
| | | ɲenɔ́cc-o | ɲinucc-ú | ‘I kneel down’/‘on one’s knees’ |
| | | kap-utt-ín-a | | ‘jacket’ |
| | | | from /kap-ɔ́tt-ín-a/[17] | |
| | | boll-étt-a | bull-itt-í | ‘ticket’/‘bill’ |
| | c. | ditʃ-éte | ditʃ-ímo | ‘you-PL say’/‘we say’ |
| | | fatʃ-éte | fatʃ-ímo | ‘you-PL do’/‘we do’ |
| | | mut-éte | mut-ímo | ‘you-PL grind’/‘we grind’ |

17. Other examples with suffix /ɔtt/ are [pall-ɔ́tt-a] ‘testicle’, cf. [pall-ó] ‘ball’; [piɲɲ-ótt-u] ‘pine cone’, cf. [píɲɲ-u] ‘pine tree’; [mutʃːik-ótt-u] ‘bite’, cf. [mutʃːik-á] ‘to bite’.

In the examples in (18) only one process, Pretonic Metaphony, is active. When both Pretonic Metaphony and Tonic Metaphony are active, they interact in the following way. In derivational terms, when by Tonic Metaphony a final vowel raises a [+ATR] mid stressed vowel to high, the derived high stressed vowel causes raising by Pretonic Metaphony of pretonic vowels, as in /moʃk-étt-u/→ moʃk-ítt-u →[muʃk-ítt-u] and the other examples in (19a). But when Tonic Metaphony raises a mid open stressed vowel to [é] or [ó], pretonic vowels are not affected, as in /tʃerɛ́ʃ-u/→[tʃeréʃ-u] (→*[tʃiréʃ-u]) and the other cases in the second column of (19b). All this shows that the trigger of Pretonic Metaphony cannot be the final unstressed vowel, it has to be a surface stressed vowel that is high because it was already high underlyingly (18), or because it has become high by Tonic Metaphony (19a).[18]

| | | | | |
|---|---|---|---|---|
| (19) | a. | móʃk-e | muʃk-ítt-u | ‘fly-PL’/ ‘small fly, midge’ |
| | | tʃéll-u | tʃill-ítt-i | ‘bird.SG’/‘bird-DIM.PL’ |
| | | | from /tʃɛll-étt-i/[19] | |
| | | dolór-e | dulúr-i | ‘pain-SG/PL’ (cf. dɔ́l-e ‘to ache’) |
| | | kottór-a | kuttúr-u | ‘easy to cook-F.SG/M.SG’ (cf. kɔ́tʃ-e ‘to cook’) |
| | | kareʃtós-a | kariʃtús-u | ‘high-prize seller-F.SG/M.SG’ |
| | | beséll-u | bisill-ín-a | ‘pea’/‘pea-DIM’ |
| | b. | tʃeréʃ-a | tʃeréʃ-u | ‘wild cherry tree (F)’/‘grafted cherry tree (M)’ |
| | | tʃammɛ́ll-a | tʃammell-ótt-u | ‘ring cake’/‘special kind of *ciamella*’ |
| | | | from /tʃammɛll-ɔ́tt-u/, cf. Fn. 17 | |
| | | korvell-ará | korvéll-u | ‘sieve for corn’/sieve’ |
| | | | foreʃtér-u | ‘guest’ |
| | | | nepót-u | ‘kind of bud’ |
| | | | tremót-u | ‘earthquake’ |

18. Kaze (1989: 67–68) assumes that /á/, /ɛ́/, /ɔ́/ block (pretonic) metaphony from a final vowel. This assumption is clearly unneccessary because a final high vowel cannot be shown to be the direct trigger of raising of pretonic vowels, as demonstrated by [tʃeréʃ-u] and similar examples. Cases like [sopránu] ‘airplain’, [soménṭi] ‘seeds’, and [ɲenóccu] ‘knee’ don’t have raising because the only possible trigger, the stressed vowel, is not high.
19. Other examples with the diminutive suffix /étt/ are [tʃer-étt-a] ‘shoe wax’, [erb-étt-a] ‘parsley’, [muʃk-ítt-u] ‘small fly, midge’, [paʃkw-étt-a] ‘Epiphany’, [setatʃ:-ítt-u] ‘small sieve’, [pits:-étt-a] ‘sort of crêpe’.

The constraints in (8) derive the effects of Pretonic Metaphony in the following way: AGREE(+high,+ATR) will locate high vowels and will favor adjacent vowels agreeing in [+high] and [+ATR], and IDENT-SUFF(VF) will discard candidates with rightward spreading. This will cause pretonic raising by the stressed vowel when this is the rightmost high vowel, as in /leg-ímo/ → [lig-ímo] (18). If Tonic Metaphony raises a mid close vowel to high (19a), raising will proceed leftwards to the pretonic domain, as illustrated in the following tableau with /moʃk-ett-u/ → [muʃk-ítt-u], 'small fly, midge':

(20) UDENT-SUFF(VF), AGREE(+high,+ATR) ≫ IDENT(VF)

| | /moʃk-ett-u/ | IDENT-SUFF(VF) | AGREE (+high,+ATR) | IDENT(VF) |
|---|---|---|---|---|
| | moʃk-étt-u | | 1W | L |
| | moʃk-ítt-u | | 1W | 1L |
| ☞ | muʃk-ítt-u | | | 2 |
| | moʃk-étt-o | 1W | | 1L |

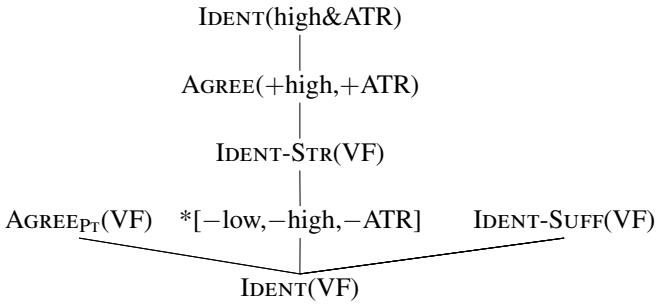
If Tonic Metaphony spreading finds a mid open vowel it will raise it to [+ATR] only, because of IDENT(high&ATR). Spreading will not proceed further left because AGREE(+high,+ATR) evaluates candidates by comparing adjacent vowels and agreement in [high] and [ATR] of non-adjacent [i] and [u] in [tʃiréʃ-u] will not favor it over [tʃeréʃ-u] (19b), the winning candidate:

(21)

| | /tʃerɛʃ-u/ | IDENT(high&ATR) | AGREE (+high,+ATR) | IDENT(VF) |
|---|---|---|---|---|
| | tʃeréʃ-u | | **!* | |
| ☞ | tʃeréʃ-u | | * | * |
| | tʃiréʃ-u | | **! | ** |
| | tʃiríʃ-u | *! | | *** |

(22) summarizes the ordering relations established so far:

(22)



### *4.2. Intrapretonic Metaphony*

The hierarchy in (22) makes an additional prediction. Consider the domain formed by the pretonic (non-proclitic) syllables and the stressed syllable, the domain that remains unaffected by total harmony, [σ … σ σ́]. As we have seen, whenever σ́ is high, whether it is high underlyingly or as a result of Posttonic Metaphony, it will cause Pretonic Metaphony, i.e., raising of preceding mid vowels. But if σ́ is not high, i.e., if it is [á], [ɛ́], [ɔ́], [é], [ó], there is no Pretonic Metaphony. Under these conditions AGREE(+high,+ATR) can let a pretonic high vowel become a trigger and raise a preceding pretonic mid vowel. The constraint IDENT-SUF(VF) will force right to left spreading in the case of alternations (23c). We thus predict pretonic changes like /e … i … á/ → [i … i … á], but no change with the opposite order, / i … e … á/ → *[i … i … á]. Walker (2006a) assumes that this process of intrapretonic metaphony is active on the base of historical changes in five lexical items (e.g., [suspirá] 'to sigh' with an [u] that could be /o/ because it derives historically form [ɔ]). This is clearly insufficient evidence, but a closer look at the material in Camilli (1929) indicates that there is indeed evidence, although not as massive as for the other harmonic processes, that intrapretonic metaphony is active, and that the prediction is borne out. Whereas we do find, in pretonic sequences, cases of a high vowel followed by a mid close vowel (underlined in 23a–c), there is no example with the reverse order; and we find many cases with only high vowels, some of which have a mid vowel followed by a high vowel in the Standard Italian source, in the case of borrowings, or in the Vulgar Latin etymon (23b). At least one case, (23c), shows synchronic alternations. All possible counterexamples appear in (23d, e); given their morphological structure, non-application in these cases can be explained if each part of a compound and prefixes like /rre/ are considered independent domains of metaphonic spreading.

(23)

| | | |
|---|---|---|
| a. | tʃiment-á | 'to insult' |
| | tʃitʃeró | 'chubby' |
| | finestr-éll-a | 'buttonhole' |
| | mukkol-ett-a | 'buckle' |
| | ʒbriʃkol-á | 'to strike' |
| | ʃʃirokk-á | 'to blow (sirocco)' |
| | sakutt-ell-étt-a | 'small bag' |
| b. | mirik-án-u | 'American' |
| | pumidɔ́r-o | 'tomato' |
| | sintinɛ́ll-a | 'sentry' |
| | tirn-itá | 'eternity' |
| | ʃ-furtun-át-e | 'unfortunate-F.PL' |
| | ntuin-á | 'to guess' |
| | suppurd-úr-a | 'burial' |

| | | |
|---|---|---|
| c. | vír-u | 'true-M.SG' |
| | vér-a | 'true-F.SG' |
| | vi̲r-i̲tá | 'truth' |
| | | cf. kwánt̬-o 'how many', |
| | | kwant̬-itá 'quantity' |
| d. | mont̬e#furt-í | 'from Monteforte' |
| | occu#vó | 'aeghitalus caudatus' |
| | | cf. óccu 'eye', vó 'oxen' |
| e. | rre#mmucc-á | 'to earth' |
| | rre#nt̬ruff-á | 'to get soaked' |
| | rre#ppujj-á | 'to go to bed' |
| | rre#ffin-á | 'to stop' |

### *4.3. Low vowel opacity*

Finally we must consider the effect of the non-undergoer vowel /a/ in the propagation of harmony. In posttonic position, in an input configuration /{ɛ́,é,ɔ́,ó} … a … {i,u}/, Posttonic Harmony will assimilate the /a/ that intervenes between an /i/ or /u/ trigger and an /ɛ́/, /ɔ́/, /é/, or /ó/ target, and a surface configuration with intervening [a] will never arise. In a configuration /{e,o} … á … {i,u}/, as I have already indicated in Section 3, tonic /á/ will remain unaffected by Tonic Metaphony, and Pretonic Metaphony will be impossible. In proclitic sequences, to be analyzed in Section 5.2, the only clitic with /a/, the accusative feminine singular /l-a/, will never be in medial position. Therefore the only remaining possible case of an intervening low vowel is a pretonic /a/. Both Kaze (1991: 67–68, 77–78), Nibert (1998: 86–91), and Walker (2006b: 10) claim that /a/ acts as a transparent vowel in such cases, a fact that would contradict the present analysis. They all present the same two examples, reproduced in (24a). Both are problematic: [bokalétt-a] and [bukalítt-u] appear without gloss in the main text in Camilli (1929: 225), and their lexical relationship cannot be determined in any precise way. The other example, the pair *boccaló, boccalú* also appears in the main text without glosses; in the Glossary the adjective *boccaló -ona* appears with the meaning 'dull'; at most we can conclude that *boccalú* is probably the plural of *boccaló*. But even if this were a genuine case, an adequate examination of the data in Camilli's paper gives quite a different picture. When no [a] intervenes, i.e., in words with a stressed [í] or [ú] no [e], [o] appear in pretonic position, when no [a] intervenes: only [a], [i], or [u] are allowed (there are more than 180 lexical items with pretonic [i], [u] before stressed [í] or [ú]). But among the cases in which an [a] appears between the stressed [í], [ú] and another pretonic vowel, there are 21 cases of unaffected [e], [o], some of which are shown in (24b). All this means that Pre-

tonic Metaphony does not have exceptions and that [a] acts as an opaque vowel that prevents harmony from spreading leftwards. Notice that opacity obtains in nonderived contexts (e.g., in monomorphemic [tresomarí]) and in derived contexts as well (e.g., /men-atʃː-ótt-u/ → [men-atʃː-útt-u]; cf. [men-á] 'to hit').

(24) a.

| | | | |
|---|---|---|---|
| bokkal-ó | 'dull-M.SG.' | bukkal-ú (probably) | 'dull-M.PL.' |
| bokalett-a | '?' | bukalitt-u | '?' |

b.

| | | | |
|---|---|---|---|
| okarín-a | 'siskin (bird)' | tresomarí | 'rosmarin' |
| noʃtaʃí-a | 'Anastasia' | leg-ar-í | 'sheaf binder' |
| men-atʃː-útt-u | 'lout, ruffian' | ʒderad-í | 'to prune' |
| kompaŋŋ-í-a | 'company' | konṭad-í | 'peasant' |
| setatʃː-ítt-u | 'strainer for tomato' | nṭreat-ú | 'wool-winder' |
| mentṣ-ar-í | 'weak wine' | tʃokkar-ítt-u | 'kind of cheese' |
| vecc-atʃ-í | 'shoot' | venardí[20] | 'Friday' |

Since AGREE(+high,+ATR) applies to adjacent segments it will never favor [i], [u] over [e, o] in the pretonic target when this is followed by [a]+[i],[u]: for the input /tʃokkar-ítt-u/ the candidate *[tʃukkar-ítt-u] will fare worse on AGREE(+high,+ATR) and IDENT(VF) than [tʃokkar-ítt-u]. Therefore the opaque character of the low vowel will be correctly derived.

## 5. Extending the analysis to clitics

Pronominal clitics, when unaffected by harmonic influences, have the form shown in (25a). I give some examples of procliticized verbal forms in (25b):

(25) a.

| | | | | | |
|---|---|---|---|---|---|
| me | te | ve | tʃe | ne | se |
| 1SG | 2SG | 2PL | 1PL/LOC | 3PART | 3REFL/IMP |
| lu | la | lo | li | le | jje |
| 3SG.M | 3SG.F | 3MASS | 3PL.M | 3PL.F | 3DAT |

20. It could also be analyzed as a polimorphemic, [venar+dí]. Notice, however, that the boundary is not a compound boundary, as in the cases in (23d, e), since other weekday names with no intervening [a] seem to allow raising: [juiddí] 'Thursday', [martiddí] Tuesday', [markurdí] 'Wednesday'.

| | | | |
|---|---|---|---|
| b. | me fá<br>'he makes me' | te ʃtrúkko<br>'I break you off' | ve pɔ́tsːa diliberá<br>'he might liberate us' |
| | tʃe fétʃe<br>'he made us' | tʃe náʃʃe<br>'he springs up there' | ne píjja<br>'he takes some' |
| | se ʃtrafórma<br>'he transforms himself' | se konn̥ta<br>'one counts' | |
| | lu kómpro<br>'I buy it' | la véde<br>'he sees her' | lo prɔ́a<br>'he tries, tastes it' |
| | li ʒbátte<br>'he beats them-M' | le pɔ́rta<br>'he carries them-F' | jje dítʃe<br>'he says to him/them' |

In the next section I extend the analysis of Sections 3, 4 to enclitic sequences and in Section 5.2 to proclitic sequences.

### *5.1. Word+enclitic sequences*

When one or more enclitics are added to a word, which happens in some verb forms, in some adverbs and in some kinship terms, the harmonic situation can in general be reduced to the cases of nominal inflection already examined, and can be derived from the same constraint hierarchy. It is now the last vowel in the clitic sequence that triggers Posttonic Harmony and Tonic Metaphony, affecting preceding clitics, inflectional vowels and the stressed vowel. Thus the final /u/ in /métt-i=lu/ 'put it-M.SG' causes total assimilation of the preceding unstressed /i/ and it raises the stressed /é/ to /í/, [mítt-u=lu]. (26) illustrates Posttonic Harmony, as triggered by a clitic, in more detail.

| | | | | |
|---|---|---|---|---|
| (26) | a. | dí<br>'say-2SG.IMP' | dí=mmi=li<br>'say them-M to me' | |
| | b. | láss-a<br>'leave-2SG.IMP' | láss-u=lu<br>'leave it' | |
| | c. | mann-éte<br>'send-2PL.IMP' | mann-éta=ma=la<br>'send it-F.SG to me' | |
| | d. | mítt-i (/mett-i/)<br>'put-2SG.IMP' | métt-a=la<br>'put it-F.SG'<br>métt-e=le<br>'put it-F.PL' | métt-o=lo<br>'put it-MASS'<br>mítt-u=lu<br>'put it-M.SG' |

| | | | |
|---|---|---|---|
| e. | mítt-i (/mett-i/) | métt-a=tʃa=la | métt-o=tʃo=lo |
| | 'put-2SG.IMP' | 'put it-F.SG there' | 'put it-MASS there' |
| | | mítt-i=tʃi=li | |
| | | 'put it-M.PL there' | |
| f. | dí | dí=tto=tʃːo=lo | |
| | 'say-INF' | 'to say it-MASS to you there' | |
| | frekk-á | frekk-á=jju=lu | |
| | 'pinch-INF' | 'to pinch it from him/them' | |

The situation shown in (26a) is rather unfrequent, because in almost all cases a verb form ends in an inflective vowel; here the irregular verb *dí* 'to say' ends in a root vowel in the infinitive and in the 2SG imperative. Within the clitic sequence /me=li/ the vowel in the first clitic totally assimilates to the last vowel of /li/. In (26b) the last inflective vowel of the verb totally assimilates to the /u/ of the clitic, and in (26c) the two unstressed vowels preceding the clitic vowel, one belonging to the verbal inflection, the other a clitic vowel, totally asismilate to the last vowel, /mann-éte=me=la/ → [mann-éta=ma=la]. In (26d, e) the underlying form of the verb is /métt-i/ (with the tonic raised by Tonic Metaphony when no clitic follows); (26d) shows a harmonic span containing a verbal inflective vowel and one clitic, and in (26e) there are two clitics after the verbal inflective vowel. Notice that in cases like /mett-i=la/ → [métt-a=la] the underlying inflective /i/ has no independent metaphonic effect on the stressed vowel whenever it is affected by the vowel of the last clitic. The last clitic vowel, however, can raise a stressed vowel, as in /métt-i=lu/ → [mítt-u=lu] and /métt-i=tʃe=li/ → [mítt-i=tʃi=li] in (26d, e). Some examples with encliticized infinitives are shown in (26f).

### *5.2. Proclitic+Word sequences*

Total harmony also affects proclitic sequences (Proclitic Harmony). In this case, the harmonic domain is limited to the proclitic sequence: the last vowel in the proclitic sequence is the trigger and it affects the rest of the sequence by causing regressive total assimilation in the rest of the clitics. When a single syllabic clitic appears, the underlying form of the vowel surfaces, as shown in (25b) above. In sequences of two or more vowels there is total assimilation to the last vowel, as illustrated in (27b); I repeat the form of single clitics from (25a) in (27a):[21]

21. Camilli notes that other proclitics like the prepositions [pe] 'for, by', [de] 'of', the complementizer [ke] 'that', and the adverb [no] 'no' also participate, optionally, in proclitic total harmony, as in [pe=lo=káll-o] or [po=lo=káll-o] 'because of the heath', [de=lu=pórk-u] or [du=lu=pórk-u] 'of the pig', [ke=la=píjj-a] or [ka=la=píjj-a] 'that he takes it-F', [no=lu=fá] or [nu=lu=fá] 'he doesn't do it-M'.

(27) a. me te tʃe ve lu la lo se li le jje ne

b.

| | | |
|---|---|---|
| te=se=rópp-e | jje=se=fá | ta=la=pág-o |
| ‘it breaks-REFL on you’ | ‘he makes-REFL to him’ | ‘I pay it-F to you’ |
| sa=la=ʃtréɲɲ-e | tʃi=li=métt-o | ti=li=dík-o |
| ‘he squeezes-REFL her’ | ‘I put it-M.PL there’ | ‘I say it-M.PL to you’ |
| su=lu=frék-a | jju=lu=métt-e | |
| ‘he pinches-REFL it-M’ | ‘he puts it-M to him’ | |
| jjo=lo=rdá | sso=lo=ɲɲótt-e | |
| ‘he gives it-MASS back to him’ | ‘he swallows-REFL it-MASS’ | |
| to=lo=dík-o | ma=ssa=la=píjj-a | |
| ‘I say it-MASS to you’ | ‘he takes-REFL it-F on me’ | |

In the first two examples in (27b) the process applies vacuously, but in the other examples the [a], [i], [o], [u] of the second clitic triggers total harmony on the preceding /e/. Since clitics with underlying /a, i, o, u/ are all 3rd person clitics and are never followed by other clitics, (nonvacuous) total harmony always operates on e-(e) . . . -{a, i, o, u} sequences. The last example shows that Proclitic Harmony also affects longer sequences, to which I will return in Section 7.1.

Thus Proclitic Harmony operates just on proclitic sequences, whereas Posttonic Harmony, as we saw in Section 2, operates on posttonic sequences including word posttonic vowels and vowels in enclitics. Proclitic Harmony does not affect word pretonic vowels; this is shown by some of the examples in (18), (19), (23) above, and by the examples in (28a); (28b) shows that the first vowel of the verb does not act as a trigger.

(28)

| | | |
|---|---|---|
| a. | peparó | ‘pepper’ |
| | baʃtonák-a | ‘carrot’ |
| | mutʃːik-á | ‘to bite’ |
| | koŋf̬ess-á | ‘to confess’ |
| | put-irí-a | ‘it could’ |
| | korvell-ará | ‘sieve for corn’ |
| b. | to=lo=dík-o | ‘I say it to you’ |
| | tʃi=li=métt-o | ‘I put them-M there’ |
| | jjo=lo=dítʃ-i | ‘you say it to him’ |
| | jje=ttun-ímo | ‘we cut him’ |
| | ne=mitt-í | ‘I/he put-PST some’ |
| | se=ditʃ-í-a | ‘IMP was saying (it was being said)’ |

This means that although Posttonic Harmony and Proclitic Harmony share the same harmonic effect, they differ in the domain of application. What I have termed Proclitic Harmony is clearly separated from the rest of the harmonic processes in Camilli's description, and all the available evidence corroborates this segregation. The constraint that causes total assimilation must therefore be restricted to two different domains, the proclitic domain and the posttonic domain, understood as containig also enclitics. The proclitic domain can include also non-pronominal clitics, as noted in Footnote 21.

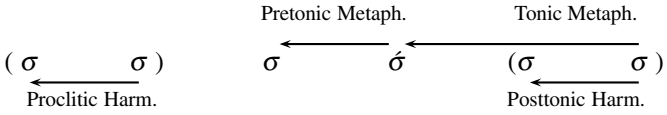
Another interesting fact that has not been noted in previous analyses, including Camilli's own description, is that some auxiliary forms act as proclitics. In the following examples the 3sg. past perfect form [a] of the auxiliary *aé* 'have' triggers total harmony on preceding pronominal clitics: /te=l=a=mann-át-a/ → [ta=l=a=mann-át-a] 'he has sent it-F to you', /me=se=l=a=maɲŋ-át-a/ → [ma=ssa=l=a=maɲŋ-át-a] 'he has eaten-REFL it-F on me'. It doesn't act as a trigger when *aé* is not an auxiliary, as in the main verb *aé*, [tʃe=l=á] 'he has it', in *aé da*+Inf. 'must', [jje=ss=a=da=fá] 'it must be done to him', or in the auxiliary forms of *èsse* 'to be', as in [lu=so=sint-ít-u] 'I have heard him', [te=ʃi=ʒvejj-át-u] 'you have waken up-REFL'.

The existence of a proclitic domain is based on the proclitic-enclitic asymmetry. Enclitics, like suffixes (as opposed to prefixes) are more coherent than proclitics with their host (Peperkamp 1997: 170–171 et seq.), hence they form a domain with the host. I will not make any specific proposal as to the exact nature of the domain constituents, since assuming that they are domains suffices; see Peperkamp (1997: 157–215) for details. Servigliano offers evidence for these two domains that are independent of harmony. First, the proclitics, but not the enclitics, can bear secondary stress, as we will see in Section 7.1. Second, the clitics in the word domain are always pronominal, whereas clitics in the proclitic domain can also be prepositions, complementizers, adverbs and auxiliary verbs (see previous discussion and Footnote 21). Finally, another argument comes from *raddoppiamento sintattico*, which geminates an intervocalic consonant after a word final stressed vowel and after the final unstressed vowels of a closed set of clitics and words which includes pronominal clitics ([patró bbónu] 'good boss', [ke ffósse] 'that it were', [a nnatá] 'at Christmas'). Gemination takes place between two clitics, between verb and enclitic, but not between proclitic and verb (gemination marked by boldface, lack of expected gemination by underlining, and verb by italics): [te=**tʃ:**o=lo=*dítʃ-e*] 'he says it to you there', [me=**tt**a=**ss**a=la=*píjj-a*] 'he takes-REFL it-F from you on me', [*dí*=**tt**o=**tʃ:**o=lo] 'say-INF it to you there', [*pijj-á*=**mm**e] 'take- INF me'.

AGREE$_{PT}$(VF), restated as in (29a), will now apply both to the posttonic domain and to to proclitic domain, as shown in (29b):

(29) a. AGREE$_{PtPc}$(VF)
In the posttonic and in the proclitic domains, assign one violation mark for every pair of adjacent vowels that are not linked to the same vowel feature, for any feature.

b.

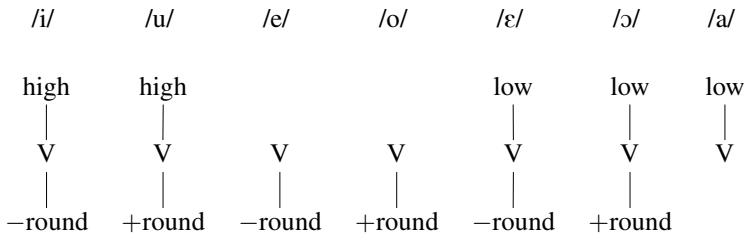



## 6. Previous analyses

There are detailed analyses of the harmony system of Servigliano in Kaze (1989: 62–82), Nibert (1998), and Walker (2003, 2006a).[22] Whether rule-based or constraint-based, all posit specific mechanisms for each harmonic process, except for the fact that Posttonic Harmony and Proclitic Harmony are derived by the same mechanisms in Nibert (1998) and Walker (2003, 2006a) (Kaze does not deal with harmony in cliticized structures).

Kaze (1989: 62–82) provides an autosegmental, rule-based analysis that uses both privative features ([high], [low]) and equipollent features ([+round], [−round]), and four rules, Atonic Vowel Reduction, Metaphony, Disassociate Conflicting features, and Postonic Vowel copying. Underlying vowels are defined as in (30):

(30) Kaze (1989: 69), underlying vowels

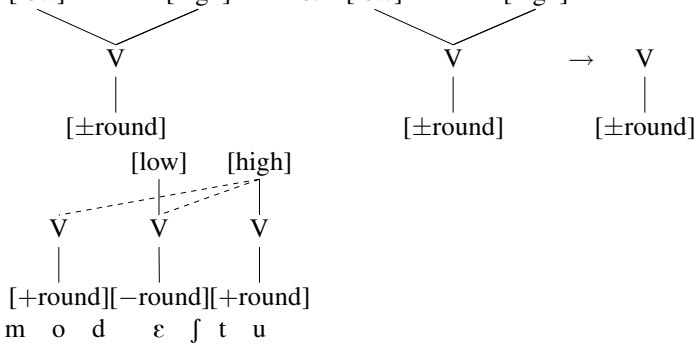



22. Other authors offer partial accounts. Dyck (1995: 77-81) deals only briefly with Tonic Metaphony and Pretonic Metaphony without addressing interactions, opacity, and other issues. There is also some discussion of Servigliano harmony in Maiden (1988, 1991, 1989), Clements and Hume (1995), Calabrese (2011), Flemming (1993), Canalis (2008, 2009).

Metaphony spreads [high] leftwards from the last high vowel (final inflective vowel or stressed vowel) and stops when it finds a [low] vowel or the right proclitic boundary. If a low vowel (i.e., /ɛ/, /ɔ/, /a/) is reached, "a conflict of features is created", because the configuration (31a) arises, and the rule "Disassociate Conflicting Features" (31b) "remedies this situation by the disassociation of both features to resolve the conflict."

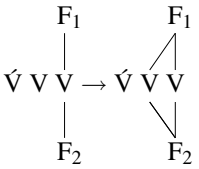
(31) Kaze (1989: 70–71; 77–78), Metaphony

a. [low] [high] b. [low] [high]




For the cases of total harmony a rule of Postonic Vowel copying, formulated as in (32), spreads all features from the last unstressed vowel in a sequence to previous unstressed positions:

(32) Kaze (1989: 80), Postonic Vowel copying




One of the features of this analyisis is that metaphony is formulated so as to cause spreading up to an underlying mid open vowel but not beyond it. Thus in /modɛʃtu/ the /ɛ/ is raised to [e] by the final [u], but spreading does not go further left and the /o/ doesn't raise to [u] (/modéʃtu/). This is accomplished through the assumption that [high] and [low] are on the same tier: as shown in (31c) above, further spreading would create a crossing lines violation. There are several problems with this solution. First, [high] and [low] must be forced to be on the same tier, which is problematic given standard assumptions about feature geometry. They can be dominated by the same node, but it is clear that in this case spreading the node would give the wrong result. Second, Disassociate Conflicting Features must be a language-particular rule, since automatic dis-

association would allow further spreading. Finally, one would expect minimal repairs for the conflicting [high, low] configuration in (31a), i.e., the elimination of [low], which would yield [i], or the elimination of [high], which would yield [ɛ]. Another problem is the use of [low] to characterize mid open [ɛ], [ɔ], already criticized by Calabrese (1995: 399). Moreover, vowel reduction, which is formulated as the elimination of [low] in unstressed position, when applied to the representations in (31) turns correctly /ɛ/ into [e] and /ɔ/ into [o], but /a/ defined as [V, low] (30) becomes something distinct from [a], namely featureless [V], presumably [ə].

Another problem is empirical. The analysis explicitly predicts transparency of [a] (Kaze 1989: 77–78), precisely because "reduced" /a/ is featureless and there is no line crossing, but as I have shown above, Section 4, [a] is clearly opaque, not transparent.

The analysis in Nibert (1998) is much more detailed and covers most of the data in Camilli (1929). It uses radical underspecification and Clement's (1989) aperture node with three hierarchically organized height features:

(33) Nibert (1998: 94), Underlying vowels

| | i,u | e,o | ɛ,ɔ | a |
|---|---|---|---|---|
| [open$_1$] | − | − | − | + |
| [open$_2$] | − | + | + | |
| [open$_3$] | − | − | + | |

She also uses four rules, which differ however from Kaze's, namely Atonic Vowel Reduction, Metaphony, Vowel Copying, and Pretonic Vowel Raising.

Vowel Copying iteratively spreads leftwards the Vowel Place node from any W-final unstressed vowel onto preceding stressless vowels, where W can be a word or a clitic. Pretonic Vowel Raising spreads a [−open$_2$] node, iteratively and leftwards, from a vowel with primary stress onto a [−open$_1$] vowel within a word. Metaphony spreads a [−open] node, iteratively and leftwards, from a final vowel in the clitic group onto a [−open$_2$] vowel with primary stress within a word. The main problem with this analysis is that in the case of Metaphony, as can be inferred from (33), when [e], [o] are affected, the spreading feature is [−open$_2$], and when [ɛ], [ɔ] are affected the spreading feature is [−open$_3$]. As formulated, the rule just spreads the general feature [open], but [−open$_3$] is chosen because "the spreading of [−open$_2$] creates the feature bundle [−open$_1$][−open$_2$][+open$_3$], which is non-occurring in (26) [=(33) above]." But the phenomenon could well be allophonic, in which case the resulting vowel would be [ɪ] or [ʊ], hence the possibility of spreading of [−open$_2$] has to be explicitly excluded. We have to exclude also the spreading of [−open$_1$], which would produce a vacuous application. In the case of [e], [o], spreading [−open$_1$] or [−open$_3$] would also produce a vacuous application. This should lead to an unnatural reformulation of the rule of Metaphony

which would have to spread [−open$_3$] if the target is [e], [o] and [−open$_2$] if the target is [ɛ], [ɔ].[23]

Another problem regards the effects of the low vowel [a]. The representation of this vowel is just [+open$_1$] (later on it will receive by redundancy [+open$_2$] and [+open$_3$]). Therefore Pretonic Vowel Raising which spreads [−open$_2$] from the stressed vowel leftwards, "is able to spread beyond [a] because it is unspecified for [open] on tier two at the moment of spreading." The model "facilitates a simple, elegant account of the transparency of [a]." But as I have shown in Section 4, it is clear that an intervening [a] is not transparent but opaque, and it is indeed difficult to see how opacity could be handled in such a model.

Finally, none of the rules predicts intrapretonic metaphony, the raising of a pretonic vowel by another following pretonic (Section 4), as in /ver-ita/ → [vir-itá] (23c): in intrapretonic metaphony two stressless vowels are involved, and raising by Metaphony has a clitic group final vowel as a trigger and a stressed vowel as a target, and Pretonic Vowel Raising has a stressed vowel as a trigger.

Walker (2006a) is a detailed handout of a talk in which Servigliano harmony is analyzed in an OT framework (there is a previous version, Walker 2003, that I will not discuss).[24] Like in Nibert's analysis, Total Harmony (=Posttonic Harmony plus Proclitic Harmony), Tonic Metaphony and Pretonic Metaphony are analyzed as three independent processes. The relevant constraints are reproduced in (34b–e). Total Harmony is based on the prominence scale in (34a) and the constraint (34b), which should be understood as penalizing every autosegment associated to *any* number of extra-weak syllables, and (34c). Since their ordering is IDENT-IO(F)-Right ≫ *V-Feature/$\sigma_{\text{XWEAK}}$, for an input like /mett-i=tʃe=la/ the last vowel must be faithful to the input and spreading will be right-to-left; the candidate [métt-a=tʃa=la] is selected because there will be a single set of vowel features associated to all three extra-weak positions.

(34) Walker (2006: 5, 7, 12)

a. Prominence scale (Italian varieties):
V/Strong ($\acute{\sigma}$) > V/Weak (Pretonic stem) > V/Extra-Weak (Posttonic, Unstressed clitic)

23. It is also unclear how Atonic Vowel Reduction works. The rule delinks the feature [−open$_3$], and mid open vowels which are [−open$_1$][+open$_2$][+open$_3$] become [−open$_1$][+open$_2$]. I cannot see how the minus value in [−open$_3$] can be gotten given the redundancy statements ((27) in Nibert 1998) that fill in feature values.

24. It should be kept in mind that some of the problems I detect in this treatment of Servigliano harmony might stem from the fact that a handout cannot give all the relevant analytical information. Unfortunately I cannot discuss the analysis of Servigliano in Walker (in press) because I only got access to a ms. version during proof correction.

b. *V-Feature/$\sigma_{\text{XWEAK}}$:
Incurs a violation for each featural autosegment associated to an extra-weak syllable.
c. IDENT-IO(F)-Right:
The rightmost association of a feature is faithful.
d. LICENSE([+high]/[+ATR]$_{\text{post-tonic}}$, $\acute{\sigma}$):
[+high] and [+ATR] in a post-tonic vowel must be associated with a stressed syllable.
e. SPREAD(+high)$\omega$:
A feature [+high] in a word must spread to all vowels in that word.

Tonic Metaphony is the result of (34d). In this case directionality of spreading is encoded in the constraint by specifying both trigger and target. Pretonic Metaphony derives from (34e); directionality is obtained by the ranking IDENT-IO(high)-R $\gg$ SPREAD(+high)$\omega$ ; this determines the mapping /delibbera/ $\rightarrow$ [dilibberá], *[delebberá] 'to set free'.

Like the preceding analyses, one mechanism is posited for Posttonic Harmony and Proclitic Harmony, one for Tonic Metaphony, and one for Pretonic Metaphony. In this case explicit arguments are presented in favor of the separate treatment of the two metaphonic changes. One of the reasons advanced is that "[a] is transparent to unstressed raising [=Pretonic Metaphony] but harmony triggered by posttonic Vs [=Tonic Metaphony] does not persist beyond [a]." More important than the fact that in one case [a] is unstressed and in the other it is stressed is that, as shown above, (Section 4), [a] is not transparent, but opaque, in both cases. Another reason for having separate processes, the fact that "Metaphony may involve feature linkage across a stem-clitic boundary but unstressed raising [=Pretonic Metaphony] does not" relies on the unjustified assumption that the boundaries, morphologic or prosodic, between proclitics and host and host and enclitic are the same. The third argument is that "Many of the minor Romance languages show metaphony only, i.e., raising that propagates only as far as the stressed vowel." But this only means that the same phenomenon can have different extensions in different varieties, it doesn't necessarily entail that the phenomena are totally distinct. Notice also that directionality of spreading is derived from independent constraints or constraint interactions for each case.

Another important problem with the analysis is the prominence scale (34a). It is true that Servigliano shows an asymmetry between pretonic word syllables on one side and posttonic syllables and syllables in proclitics on the other, but this cannot be reduced to a difference in strength. Some parallel typological differences in Romance are presented, but only bewteen word-internal pretonic and posttonic position. The crucial problem for the scale (34a) stems from pro-

clitics, which should be "extra-weak". But the only secondary stress reported for Servigliano in Camilli (1929) appears precisely in proclitics, and clitic with secondary stress can be the target of total assimilation, as we will see in detail in the next section.

Regarding the constraint LICENSE([+high]/[+ATR]$_{\text{post-tonic}}$,$\acute{\sigma}$) the facts of Servigliano harmony don't favor the "weak trigger" analysis based on LICENSE $M_{struc}$/$Pos_{strong}$ family defended in Walker (2005, 2006b), the main reason being that metaphony spreads from the final vowel, a "weak trigger" and from the stressed vowel, a "strong trigger", as well, as shown by the data in (18).

## 7. Remaining issues

The next sections are devoted to remaining empirical and analytical issues. In Section 7.1, I address the problem of the effect of secondary stress in proclitics on Pretonic Metaphony, and in Section 7.2, I analyze the particular case of possessives that cliticize on nominal kinship terms. Sectiin 7.3 is devoted to an important remaining problem, the fact that in pretonic position mid open vowels don't raise gradually but in one fell swoop.

### *7.1. Proclitic Harmony and non-primary stress*

Most of the examples used in (26), (27) to illustrate Proclitic Harmony were sequences of two proclitics, like /jje=lu=métt-e/ → [jju=lu=métt-e]. Camilli observes that in sequences of more than two proclitics harmony is controlled by the variable position of secondary stress. In sequences of three clitics, it progresses leftwards and affects also the first clitic, "provided that secondary stress doesn't fall on it, as usually happens."[25] This is illustrated with the examples in (35), where secondary stress can appear in two different positions, the forms in the first column being the preferred result. In (35a) the examples in the first column show an initial secondary stress that allows copying only from *la* and *lo* to the immediately preceding vowel. The second column shows the other possible outcome: here the secondary stress on the middle clitic does not stop leftward spreading. With four proclitics (35b), stress can fall either on the second clitic, or on the first and the third clitic. In the first case the stress prevents further spreading; in the second case the stress on the first clitic does prevent the progression of harmony, but stress on the third clitic doesn't. Harmonic spans appears underlined:

25. Translated from Camilli (1929: 224).

| | | | | |
|---|---|---|---|---|
| (35) | a. | mè=ssa=la=píjj-a | ma=ssà=la=píjj-a | 'he takes-REFL it-F on me' |
| | | tè=tʃːo=lo=dák-o | to=tʃːò=lo=dák-o | 'I give it-N to you there' |
| | b. | me=ttè=ssa=la=píjj-a | mè=tta=ssà=la=píjj-a | 'he takes-REFL it-F on me on you' |

Camilli does not give any additional information about stress in Servigliano, and all the examples are given with the same acute accent for both primary and secondary stresses, e.g., *mé tta ssá la píjja*, in his notation. Hence a temptative way to interpret his data stems from the the plausible assumption that secondary stress is more prominent whenever it is separated by a lapse of at least two syllables from the main stress, and less prominent when the lapse is only one syllable long. A secondary stress '̀' would thus stop harmonic spreading in [mè=ssa=la=píjj-a], or in [me=ttè=ssa=la=píjj-a], but a still weaker nonprimary stress '¯' would allow harmony to progress leftwards, as in [ma=ssā=la=píjj-a] or [mè=tta=ssā=la=píjj-a].

### *7.2. Posttonic Harmony in enclitic possessives*

Possessives have the stressed and the clitic forms shown in (36). Notice that *nostru* and *vostru* have gender and number agreement inflection, and like *só* 'their', lack clitic forms.

| (36) | *Stressed* | *Enclitic* | |
|---|---|---|---|
| | mé | mu, ma | 'my' |
| | tó | tu, ta | 'your-SG' |
| | só | su, sa | 'his' |
| | nóʃtru, nɔ́ʃtra, etc. | — | 'our' |
| | vóʃtru, vɔ́ʃtra, etc. | — | 'your-PL' |
| | só | — | 'their' |

Stressed forms appear in postnominal position preceded by the definite article: [l-u somár-u mé] 'my donkey', [l-e váŋg-e nɔ́ʃtr-e] 'our spades', etc. Unstressed enclitic forms appear only with some kinship terms, and trigger total harmony:[26]

26. The other examples in Camilli (1929) are *fijju* 'son', *fijja* 'daughter', *mamma* 'mother', *maritu* 'husband', *quinatu* 'brother-in-law', which behave like those in (37a), and *patre* 'father', which can show an allomorphic variant when it appears with the enclitic, *pardu* or *párdutu* 'your father'. Another allomorphic form appears in *sòrda* 'your sister', a variant of *sòrata*.

(37) a. nónn-u nónn-u=su nónn-u=tu
‘grandfather/his grandf./your grandf.’
nɔ́nn-a nɔ́nn-a=sa nɔ́nn-a=ta
‘grandmother/his grandm./your grandm.’
frát-u frát-u=mu frát-u=tu
‘brother/my brother/your brother’
sɔ́r-a sɔ́r-a=ma sɔ́r-a=ta
‘sister/my sister/your sister’
b. tsí-u tsí=su tsí=tu
‘uncle/his uncle/your uncle’
tsí-a tsí=sa tsí=ta
‘aunt/his aunt/your aunt’
c. mójj-e mójj-a=ma mójj-a=ta
‘wife/my wife/your wife’
mátr-e mátr-a=ta
‘mother/your mother’

The encliticized forms in (37a) could be compatible with an analysis with rightward spreading from the gender vowel of the noun to the clitic, i.e., /nɔ́nn-u–sV/ → [nónn-u=su], /nónn-a–sV/ → [nɔ́nn-a=sa]. But the examples in (37b) are incompatible with rightward spreading and they show that the surface vowel of the enclitics, [u] and [a], is underlying. Therefore, enclitic possessives should not be analyzed as invariable like their correspondent stressed forms *mé, tó, só*, but as gender-inflected forms agreeing with their head, just like stressed forms like *nostru* and *vostru*. Since they appear only with singular kinship nouns and a mass kinship term with a possessive like *frát-o=mo does not make sense, the only inflective forms are masc.sg. and fem.sg.: /m-u/, /m-a/; /t-u/, /t-a/; /s-u/, /s-a/. This analysis is confirmed by the examples in (37c). In (37a) the gender vowels of the noun are the unmarked /-u/ for the masculine and the unmarked /a/ for the feminine, and they coincide with the gender vowel of the agreeing possessive. But in (37c) the gender of the feminine noun is represented by the marked morph [-e] and it is therefore subject to Posttonic Harmony triggered by the inflective vowel of the enclitic, /mójj-e=ma/ becoming [mójj-a=ma], etc.

### *7.3. Fell-swoop mappings ɛ→i, ɔ →u in pretonic vowels*

As already mentioned in Section 4, there is an asymmetry in the structural changes of the two targets of metaphonic raising, stressed vowels in Tonic Metaphony and pretonic vowels in Pretonic Metaphony. Whereas in stressed position there is a one-step raising from underlying mid open vowels, i.e., /ɛ/→e and /ɔ /→o, and from underlying mid close vowels, i.e., /e/→i and /o/→u, in pretonic position, in addition to /e/→i and /o/→u we get the fell-

swoop mappings /ɛ/→i and /ɔ/→u. An input like the oxytone infinitive /ʃtɛnn-i/ results in [ʃtinn-í] and not in *[ʃtenn-í] as predicted so far. The examples in (38) show that this kind of mapping is general. The cases in (38a) in particular show all the possible alternations: no effect in the first column, Tonic Metaphony with one degree closure in the second, vowel reduction in the third, and the two degree closure in the last column.

(38) a.

| | | | |
|---|---|---|---|
| pɔ́r-a<br>F.SG(prenom.)<br>'poor'[27] | pór-u<br>M.SG(prenom.) | por-étt-a<br>F.SG(postnom.) | pur-ítt-u<br>M.SG(postnom.) |
| vɔ́jj-o<br>1SG.PRS.IND<br>'want' | vó-i<br>2SG.PRS.IND | vol-éte<br>2PL.PRS.IND | vul-ímo<br>1PL.PRS.IND |
| vɛ́ŋg-o<br>1SG.PRS.IND<br>'come' | vénn-i<br>IMP.2SG | ven-éte<br>2PL.PRS.IND | vin-ímo<br>1PL.PRS.IND |

b.

| | | | |
|---|---|---|---|
| dɔ́rm-o<br>1SG.PRS.IND<br>'sleep' | dórm-i<br>2SG.PRS.IND | | durm-í<br>INF |
| pɛ́rsek-e<br>'peach tree-PL' | pérsuk-u<br>'peach-SG' | | pirsik-í<br>'peach tree-DIM.SG' |
| kanɛ́ʃtr-a<br>'basket' | | kaneʃtr-ɛ́ll-a<br>'basket-DIM' | kaniʃtr-í<br>'kind of basket' |
| bbesɔ́ɲɲ-a<br>'need (N)' | | bbesoɲɲ-á<br>'to need' | bbisuɲɲ-ímo<br>'we need' |
| mɔ́r-e<br>3SG.PRS.IND<br>'die' | mór-i<br>2SG.PRS.IND | | mur-í<br>INF |
| ʃtɛ́nn-e<br>3SG.PRS.IND<br>'extend' | | ʃtenn-ɛ́nno<br>GER | ʃtinn-í<br>INF |

In derivational terms, vowel reduction, with the effect ɛ→e, ɔ→o, feeds metaphony whose effect is e→i, o→u, whereas the opposite ordering would give the wrong mappings ɛ→e→*n/a*, ɔ→o→*n/a*. The problem we face is that stressed vowels prefer the one degree mappings and unstressed vowels prefer the fell-

27. The first two forms appear in prenominal position, as in [pɔ́ra dɔ́nna] 'poor woman', and the other two in postnominal or predicate position, as in [ɛ́ra pju ppuríttu] 'he was poorer'.

swoop mappings: /pɔr-u/ → [pór-u], but /pɔr-itt-u/ → [pur-ítt-u]. Although this problem deserves further research, an obvious solution is to restrict the constraint IDENT(high&ATR), that forces gradual raising, to stressed vowels. As shown in (39b), the modified conjoined constraint (39a) prevents the mid open vowel in the verbal root /dɔrm/ 'sleep' from raising to [ú] in the 2SG.PRS, resulting in [dórm-i], but when it is unstressed, as in the INF [durm-í], the fell-swoop raising is allowed.

(39) a. ID-STRESS(high&ATR):
Assign one violation mark for any stressed vowel that violates both IDENT(high) and IDENT(ATR), i.e., for any stressed high vowel that derives from a non-high-non-ATR vowel.

b. /dɔrm-i/ (2SG.PRS) → dórm-i, /dɔrm-i/ (INF) → durm-í

| /dɔrm-i/$_{2SG.PRS}$ | ID-STRESS(high&ATR) | AGREE(+high,+ATR) |
|---|---|---|
| dɔ́rm-i | | ****! |
| ☞ dórm-i | | *** |
| dúrm-i | *! | ** |
| /dɔrm-i/$_{INF}$ | | |
| dɔrm-í | | ***!* |
| dorm-í | | ***! |
| ☞ durm-í | | ** |

## 8. Conclusions and prospects

I have presented a thorough description of the harmony system of Servigliano drawn from the data in Camilli (1929) and I have shown how it can be derived from a limited number of constraints. Two constraints favor autosegmental spreading in different domains and a two other constraints impose right-to-left directionality. A conjunction of two faithfulness constraints limits changes in stressed position to gradual raising and allows general raising to high in unstressed position. This derives total harmony in the case of Posttonic Harmony and Proclitic Harmony, and the correct metaphonic raising in the case of Tonic Metaphony, Pretonic Metaphony, and Intrapretonic Metaphony, as well as low vowel opacity. Although the constraint hierarchy proposed correctly derives all the empirical material in Camilli (1929), there are several questions that deserve attention in further reaearch. I have concluded that there are two domains for AGREE$_{PrPc}$(VF), but one question that remains is in which precise terms these domans should be defined. One possible line of research is to assume structures like ($_{Pph}$ X ($_{PWd}$ ) ) for proclisis and ($_{PWd}$ ($_{PWd}$ W ) Y ) for enclisis, the domain of AGREE$_{PrPc}$(VF) being defined as X in the first case and WZ in the second case. Although the facts of Servigliano harmony don't favor the "weak

trigger" analysis based on LICENSE $M_{struc}$/$Pos_{strong}$ family, the type of analysis proposed here should be contrasted with similar cases of stress-dependent harmony, such as those examined in Maiden (1989), Kaze (1989), Hualde (1989), Dyck (1995), Majors (1998), and Walker (2005) to draw general conclusions. The cases of gradual versus fell swoop raising examined in Section 7.3 are of theoretical interest and also deserve further attention.

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