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# When diachrony meets synchrony

## Phonological change, phonological variation and Optimal Paradigms\*

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This paper has three goals. First, it aims to illustrate how the problems derived from access to intricate diachronic empirical data can sometimes be informed by a careful look at interdialectal microvariation, in that this linguistic microvariation can sometimes help to explain why a phonological process applies or has applied. Second, it intends to show how some of the machineries developed within Optimality Theory to account for synchronic surface resemblances between the members of an inflectional paradigm can be applied to account for phonological change. Third, it attempts to demonstrate how the analysis of phonological change and linguistic variation in a specific linguistic variety and across nearby linguistic varieties can provide noteworthy insights about the architecture of these machineries. Overall, we provide significant empirical evidence, drawn from Catalan, Spanish and Occitan inflection, that analogy is exclusively induced by phonological markedness, that is, for concluding that what determines or governs the direction of the pressure is not a specific morphological status of a word but rather the need to respect phonological markedness.

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## 1. Introduction

This paper aims to illustrate how the problems derived from access to intricate diachronic empirical data can sometimes be informed by a careful look at interdialectal microvariation, as well as how this linguistic microvariation can sometimes help to explain why a phonological process applies or has applied. It also seeks to further investigate the source of what is phonologically marked and what is not in a specific variety. And, last but not least, it intends to show how the analysis of phonological change and linguistic variation in a specific linguistic variety and across nearby linguistic varieties can provide noteworthy insights about the architecture of some of the machineries developed within Optimality Theory to account for surface resemblances between the members of a given paradigm. Specifically, the paper provides empirical evidence for the desirability of refining the Optimal Paradigms model (henceforth, OP model; McCarthy [2002] 2005), developed to account for surface resemblances between the members of an *inflectional paradigm*, in order to be sensitive to the internal organization of members within these paradigms. To achieve these goals, we will focus on some well-known phonological processes of Romance languages, in which paradigmatic pressures imply a reanalysis of the grammar in a given dialect and, in fact, a reinterpretation of what is phonologically marked and what is not in a given linguistic variety. The analysis of these processes, moreover, supports McCarthy's hypothesis that the direction of paradigmatic pressure within inflection is governed by phonological markedness, and that, therefore, only over-application of a process due to paradigmatic pressure within the paradigm is possible. This view diverges from previous accounts of the same data, which proposed that the direction of the paradigmatic pressure was governed by a special morphological status of the members in the paradigm.

## 2. Paradigmatic pressures in phonology

### 2.1 Paradigmatic pressures within generative phonology

Paradigmatic pressures played an important role in the Neogrammarians' work on sound change, where *exceptions to sound laws* were frequently accounted for by resorting to concepts such as analogy and contrast (see, among others, Paul 1880). In the SPE model<sup>1</sup> and in subsequent work, analogy and similar concepts were excluded from any phonological explanation: in this framework, paradigmatic influences between morphologically related words were expressed in terms of

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1. SPE is the abbreviation used to refer to Noam Chomsky and Morris Halle's *The sound pattern of English*, published in 1968.

rule ordering, the cycle and the strata (see, among others, Chomsky & Halle 1968; Mascaró 1976, and Kiparsky 1982a,b). In Optimality Theory, traditional ideas of analogy and contrast between the members of a paradigm have been revived; indeed, Optimality Theory has developed a wide assortment of submodels and refinements with the purpose of accounting for surface similarities and dissimilarities across the members of a paradigm and which are applicable to explain both synchronic alternations and sound change (see § 2.3 and Downing, Hall & Raffelsiefen 2005).

## 2.2 Overapplication and underapplication

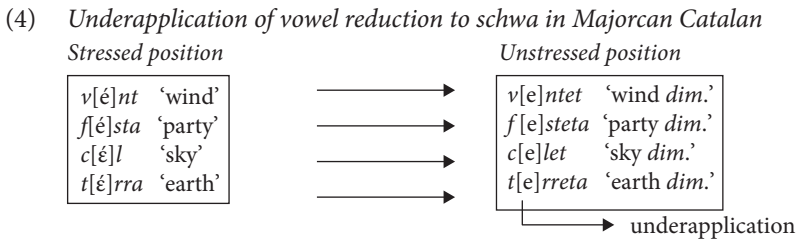
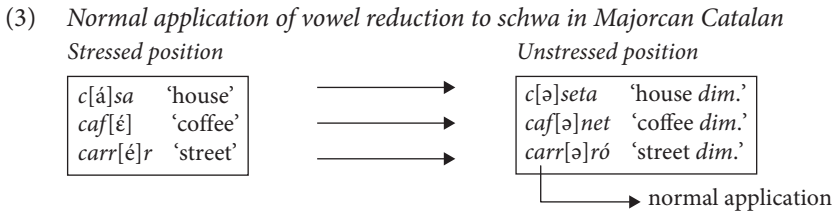
Two essential concepts when dealing with exceptions to sound laws, or, in more current terms, when dealing with cases of phonological opacity,<sup>2</sup> are *overapplication* and *underapplication*. Overapplication refers to situations where a phonological process applies even though the conditions that make it applicable are not visible. As illustrated in (1), for instance, the process of regressive place assimilation of the nasal to the following velar stop of Catalan depicted in (1b) overapplies in word-final position (2c). This is because the consonant responsible for the application of the process (i.e. the velar stop) is deleted in word-final position, that is, the context that makes it applicable has been destroyed, due to an independent process of cluster simplification of Catalan which affects word-final homorganic sequences of a nasal or liquid followed by a stop. Therefore, the process of assimilation is not surface-justified.

- (1) *Normal application of regressive place assimilation in Catalan*
- |    |            |                        |                      |
|----|------------|------------------------|----------------------|
| a. | só[n]      | '(they) are'           | → no-application     |
| b. | só[n] cars | '(they) are expensive' | → normal application |
- (Data from Mascaró 1976)
- (2) *Overapplication of regressive place assimilation in Catalan*
- |    |           |                        |                      |
|----|-----------|------------------------|----------------------|
| a. | ve[n]em   | '(we) sell 1 plur. PI' | → no-application     |
| b. | ve[n]guem | '(we) sold 1 plur. PS' | → normal application |
| c. | ve[n]     | '(I) sell 1 sing. PI'  | → overapplication    |
- (Data from Mascaró 1976)

Underapplication occurs when a (phonological) process does not apply even though the conditions that make it applicable are met. For instance, the process of vowel reduction of the low vowel /á/ and the front mid-vowels /é/ and /ɛ/ to schwa, which is found in most Eastern Catalan varieties (3), underapplies in Majorcan Catalan, as seen in (4), when the unstressed vowel belongs to a productive derivational form with an alternating stressed [é] or [é] vowel in the corresponding primitive base-stem.

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2. Phonological opacity is a term coined by Kiparsky (1971, 1973), intrinsically related to the notions of underapplication and overapplication. It refers to those cases in which a linguistic generalization is not surface-true (i.e. it fails to apply), and to those cases in which a linguistic generalization is not surface-apparent (i.e. it unexpectedly applies).

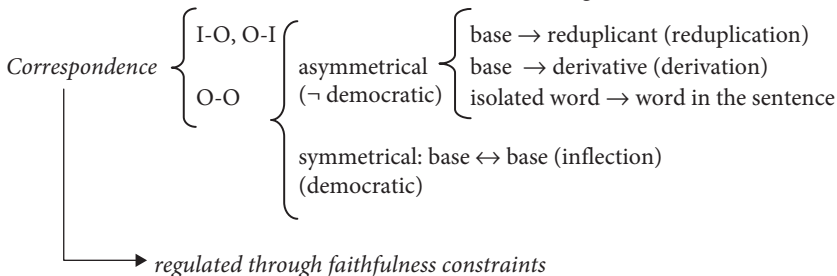


(Data from Veny 1962; Bibiloni 1998; Mascaró 2002, 2005)

### 2.3 Paradigmatic pressures within Optimality Theory

In order to account for these apparent anomalies, Optimality Theory has developed a wide range of submodels, which, apart from the classic Input to Output and Output to Input correspondence, include *Output to Output correspondence*, namely, correspondence between surface forms. On the whole, as illustrated in (5), it is assumed that the surface correspondence relation between outputs is *asymmetrical* or *non-democratic* when dealing with reduplication, derivation or the occurrence of a word in the sentence, in that there is a base or an isolated word which has priority over the others and to which the other members of the paradigm are faithful. And it is assumed that the correspondence relation between outputs is *symmetrical* or *democratic* when dealing with inflection, since in this particular case there is no single base which has priority: all the forms in the inflectional paradigm have the chance to exert pressure over all the others and also to undergo this pressure.

(5) *Asymmetrical and symmetrical paradigmatic pressures* (after McCarthy [2002] 2005; Pons 2002; Mascaró 2005; Albright 2005)



## 2.4 Analogy within inflection

The most influential model designed thus far to account for paradigmatic pressures within the inflectional paradigm is the OP model (McCarthy [2002] 2005). This model is designed to account for paradigmatic pressures within the inflectional paradigm. According to this model, candidates consist of entire inflectional paradigms, whose individual members are all subjected to evaluation through the standard markedness and Input-Output faithfulness constraints. Emulating the standard Input-Output correspondence, the stem of each paradigm member stands in a surface correspondence with the stem in every other paradigm member; this correspondence is articulated by a set of Output-Output faithfulness constraints (labeled Optimal Paradigm faithfulness constraints; henceforth, OP faithfulness constraints). We will illustrate the model with the classic example *honos ~ honoris > honor ~ honoris* from Latin, which has already been treated as the result of a paradigmatic effect in many traditional studies and more recently within the Optimality Theory framework by Kenstowicz (2002) and Albright (2005). It is well known that in pre-Classical Latin intervocalic alveolar fricatives (see 6a) underwent a systematic process of rhotacism, leaving a non-homogenous paradigm like that shown in (6b), in which the alternation *s ~ r* was found. Eventually, due to a process of paradigm leveling, the final *s* in the nominative singular form also underwent the change to *r* (see 6c). (For the sake of clarity, orthographic forms are used for examples from Latin, with only the relevant segments transcribed phonologically and phonetically.)

### (6) Latin paradigm leveling

	a. Stage I		b. Stage II		c. Stage III	
	<i>sing.</i>	<i>plur.</i>	<i>sing.</i>	<i>plur.</i>	<i>sing.</i>	<i>plur.</i>
<i>nom.</i>	honō[s]	honō[z]ēs	honō[s]	honō[r]ēs	hono[r]	honō[r]ēs
<i>acc.</i>	honō[z]em	honō[z]ēs	honō[r]em	honō[r]ēs	honō[r]em	honō[r]ēs
<i>gen.</i>	honō[z]is	honō[z]im	honō[r]is	honō[r]im	honō[r]is	honō[r]im
<i>dat.</i>	honō[z]ī	honō[z]ibus	honō[r]ī	honō[r]ibus	honō[r]ī	honō[r]ibus
<i>abl.</i>	honō[z]e	honō[z]ibus	honō[r]e	honō[r]ibus	honō[r]e	honō[r]ibus

In Optimality Theory terms, the process of rhotacism can be interpreted as an effect of the constraint \*V\_\_V/Fricative, a constraint that penalizes an intervocalic fricative (see 7a) and that belongs to the universal prominence hierarchy for consonants in intervocalic position (see 8). This hierarchy favors elements of maximum sonority in intervocalic position. The ranking of this constraint above the faithfulness constraint penalizing featural changes induced this sound change (9).

- (7) *Relevant markedness and faithfulness constraints*
- \*V\_V/ Fricative: Assign one violation mark for every fricative in intervocalic position (see Uffmann 2005, after Prince & Smolensky 1993)
  - IDENT(F): Assign one violation mark for each segment in the output which has a different featural specification than its correspondent in the output (see McCarthy & Prince 1995)
- (8) *Prominence hierarchy for consonant segments in intervocalic position*  
 \*V\_V/ Stop >> \*V\_V/ Fricative >> \*V\_V/ Nasal >> \*V\_V/ Trill >>  
 \*V\_V/ Lateral >> \*V\_V/ Tap >> \*V\_V/ Glide (see Uffmann 2005, after Prince & Smolensky 1993)
- (9) *Rhotacism in Latin*

honō/z/es	*V_V/ Fricative	IDENT(F)
↻ a. honō[r]es		*
b. honō[z]es	*!	

The change to *r* in the nominative singular form is a clear case of overapplication in that the process is not induced by markedness: no markedness constraint penalizes the *s* in *non*-intervocalic position. This is a change prompted by the pressure of the remaining members of the paradigm, in which the process is factually motivated by markedness, namely by the markedness constraint \*V\_V/ Fricative. Within the OP model, this would be formalized by resorting to an OP faithfulness constraint, according to which correspondent segments in the stem must have the same featural specification (10).

- (10) *OP faithfulness constraint motivating paradigm leveling*

OP-IDENT(F): Within the inflectional paradigm, assign one violation mark for every consonant in the base (stem) of an inflected form whose correspondent in another base has a different featural specification (see McCarthy [2001] 2005). (= The segments under *surface* correspondence within the inflectional paradigm must have the same place of specification.)

In the tableau in (11), it is shown how the fully faithful paradigm candidate, with no changes with respect to the input forms (11a), is discarded because it involves multiple violations of the high-ranked markedness constraint \*V\_V/ Fricative. The candidate with normal application of rhotacism, that is, with *rhotacism only in intervocalic position* (11b), is also discarded because it is not uniform in that the last consonant of the stem in the nominative singular form shows a different featural specification than the correspondent segment in the remaining forms of the paradigm. The winning paradigm candidate is thus the one in which there is maximum uniformity in the stem (11c).

(11) *Paradigm leveling in Latin*<sup>3</sup> (See also Kenstowicz 2002; Albright 2005)

honō/s/, honō/s/es, honō/s/em, honō/s/ēs, honō/s/is, honō/s/im, honō/s/ī, honō/s/ibus, honō/s/e, honō/s/ibus	OP-IDENT(F)	*V__V FRICATIVE	IDENT(F)
a. honō[s], honō[z]es, honō[z]em, honō[z]ēs, honō[z]is, honō[z]im, honō[z]ī, honō[z]ibus, honō[z]e, honō[z]ibus <i>fully faithful paradigm</i> → underapplication		* (x9)!	
b. honō[s], honō[r]es, honō[r]em, honō[r]ēs, honō[r]is, honō[r]im, honō[r]ī, honō[r]ibus, honō[r]e, honō[r]ibus <i>harmonic paradigm</i> <i>non-uniform</i> → normal application	* (x18)!		* (x9)
c. hono[r], honō[r]es, honō[r]em, honō[r]ēs, honō[r]is, honō[r]im, honō[r]ī, honō[r]ibus, honō[r]e, honō[r]ibus <i>uniform paradigm</i> <i>totally unfaithful</i> → overapplication			* (x10)

As noted in § 2.3, according to the OP model, the relation among the members of the paradigm is strictly symmetrical, in that all the members of each paradigm can exert pressure over all the others, regardless of their morphological

3. Between brackets we indicate the number of violations of each paradigm candidate. Note that the number of violations of the OP faithfulness constraints is computed according to the number of unfaithful mappings in a bidirectional way: for the surface correspondents *honōs* ~ *honōres*, for instance, two violations of the OP-IDENT(F) constraint are found, one of *honōs* with respect to *honōres*, and another of *honōres* with respect to *honōs*.



status.<sup>4</sup> The model, however, predicts that only *overapplication* of a process is possible. This is not an *ad hoc* stipulation, but it is derived from the architecture of the model itself. Both underapplication and overapplication motivated by paradigm leveling satisfy the OP constraints. The difference between the two is that only overapplication satisfies the markedness constraint which induces the phonological change, while underapplication satisfies the relevant faithfulness constraints. And, since the markedness constraint outranks the faithfulness constraint, given the specific process in the language (i.e. \*V\_\_V/ Fricative >> IDENT(F)), overapplication is always better because it satisfies the constraint ranked higher, that is, the markedness constraint. This can be seen in the very same tableau, in which, between the competing paradigm candidates with underapplication (11a) and overapplication (11c), the one selected as the optimal is the latter because it satisfies the high-ranked constraint \*V\_\_V/ Fricative.<sup>5</sup>

This is an interesting and important prediction of the OP model: analogy is exclusively induced by phonological markedness, that is, what determines or governs the direction of the pressure is not the specific morphological status of a word but rather the need to respect phonological markedness. Thus, the entire paradigm is attracted by an unmarked structure (see McCarthy [2002] 2005] for relevant discussion). This hypothesis will be extensively confirmed in the course of this paper (see, in particular, § 3.1.1–3.1.3).

### 3. Empirical issues

#### 3.1 Overapplication in the inflectional paradigm

##### 3.1.1 Overapplication of cluster reduction in Catalan

3.1.1.1 *Data.* In most Catalan varieties, word-final clusters made up of a lateral or a nasal followed by a homorganic stop are resolved through a process of cluster reduction which consists of the deletion of the stop consonant (12a). In some other varieties, these word-final clusters are maintained as such (12b). All varieties, however, reduce these final clusters when the plural morph *-s* follows (12c) and maintain the stop when the feminine morph *-a* follows (12d). The

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4. See, however, Albright (2002a, 2002b, 2005) for a different perspective, according to which in inflectional paradigms there is a form which has a special status, which acts as a base, and which exerts the paradigmatic pressure.

5. Underapplication can exceptionally occur when an independent constraint blocks overapplication.

process of cluster simplification in word-final position never applies in heterorganic clusters (12e), nor in clusters with significant discrepancies of manner of articulation (12f). (Although not illustrated here, final sequences of a rhotic or an alveolar sibilant followed by a homorganic stop can optionally be reduced when followed by a homorganic stop: *verd* [bér] ~ [bért] ‘green’; *gust* [gúst] ~ [gús] ‘taste’; and all varieties also delete the word-final stop consonant when followed by a word with an initial consonant: *més* [ál] *que jo* ‘higher than me’.)

(12) *Cluster reduction in adjectival forms in Catalan varieties*

- |  |  |
|--|--|
| a. <i>Some varieties</i>   | b. <i>Some varieties</i>                       |
| <i>alt</i> [ál] ‘tall <i>masc. sing.</i> ’                       | <i>alt</i> [ált] ‘tall <i>masc. sing.</i> ’    |
| <i>sant</i> [sán] ‘saint <i>masc. sing.</i> ’                    | <i>sant</i> [sánt] ‘saint <i>masc. sing.</i> ’ |
| c. <i>All varieties</i>  |  |
| <i>alts</i> [áls] ‘tall <i>masc. plur.</i> ’                     |  |
| <i>sants</i> [sáns] ‘saint <i>masc. plur.</i> ’                  |  |
| d. <i>All varieties</i>  |  |
| <i>alta</i> [áltə] ‘tall <i>fem. sing.</i> ’                     |  |
| <i>santa</i> [sántə] ‘saint <i>fem. sing.</i> ’                  |  |
| <i>altes</i> [áltəs] ‘tall <i>fem. plur.</i> ’                   |  |
| <i>santes</i> [sántəs] ‘saint <i>fem. plur.</i> ’                |  |
| e. <i>All varieties</i>  |  |
| <i>remolc(s)</i> [rəmólk(s)] ‘trailer <i>masc. sing./plur.</i> ’ |  |
| <i>calb(s)</i> [kálp(s)] ‘bald <i>masc. sing./plur.</i> ’        |  |
| <i>parc(s)</i> [párk(s)] ‘park <i>masc. sing./plur.</i> ’        |  |
| f. <i>All varieties</i>  |  |
| <i>cens</i> [séns] ‘census <i>masc. sing.</i> ’                  |  |
| <i>ferm</i> [férm] ‘firm <i>masc. sing.</i> ’                    |  |
| <i>carn</i> [kárn] ‘meat <i>masc. sing.</i> ’                    |  |

3.1.1.2 *How dialects shed light on the origin of phonological processes (1)*. Different studies, framed formerly within autosegmental phonology and more recently within Optimality Theory, have tried to provide an answer for this behavior. Most of them adapt the hypothesis, originally developed in Mascaró (1976, 1989), that there is cluster simplification provided that it does not imply the loss of too much phonological information, about either point of articulation or manner of articulation. The causes of cluster simplification, however, vary from one author to another (see, in this respect, Morales 1992, 1995; Colina 1995; Jiménez 1997, 1999; Herrick 1999). Some other authors believe that the process of reduction applies due to the lack of perceptual prominence of the stop in this context or, more specifically, due to the lack of perceptual contrast between the stop and the preceding consonant (see, in this respect, Côté 2000, 2004a, b; Pons 2004, 2006,

2007; Wheeler 2005). However, a careful look at the behavior of other Catalan dialects, which show preservation of the cluster in this context (12a) but simplification when the plural morph is added (12c), can lead to an alternative explanation of the facts: cluster simplification has its origin in the plural forms, a context in which the perceptual weakness of the stop is even more evident, in that it is flanked by two consonants (see Colomina 1996 for an analysis in this direction). This explains why simplification is triggered in *all* dialects in this context, and, due to paradigm uniformity (or analogy), the process has also been extended to word-final position. In fact, the same line of reasoning can be used when the behavior of other languages is analysed: whereas the process of cluster simplification is almost systematic in the context C\_C in many languages, it is not so common in the context C\_## (where ## stands for word-final position). Thus we have here some consistent universal implications, according to which:

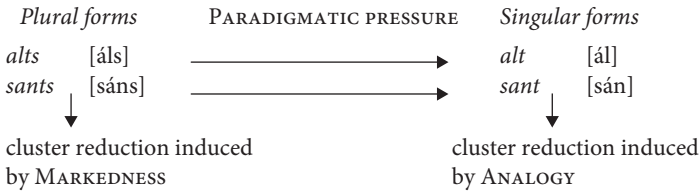
- (13) *Universal implication*
- a. If a language exhibits cluster simplification in tautosyllabic clusters of three segments, it will also exhibit cluster reduction in clusters of two segments.
  - b. No language exhibits simplification in tautosyllabic clusters of two segments and preservation in tautosyllabic clusters of three segments.

This implicational relation must have a consequence in the ranking of the contextual markedness constraints prohibiting consonant clusters, such as \*CC]σ (14a) and \*CCC]σ (17b). Given (13), the hierarchy in (15) is a fixed one, that is, it is universally constant and invariable.

- (14) *Contextual markedness constraints against consonant clusters*
- a. \*CC]σ: Assign one violation mark for every tautosyllabic cluster made up of two consonants.
  - b. \*CCC]σ: Assign one violation mark for every tautosyllabic cluster made up of three consonants.

- (15) *Universal ranking of markedness constraints against consonant clusters*  
 \*CCC]σ >> \*CC]σ

It can be interpreted, therefore, that the origin of this process is in the masculine plural forms, in which the process would be motivated by markedness reasons, in particular, to satisfy the high-ranked markedness constraint \*CCC]σ (14b). And these plural reduced forms would exert their pressure over the singular forms in the varieties with cluster reduction but would not in the varieties with cluster preservation, a circumstance which is easily explained by a different constraint ranking. (See Pons 2004: 391–396; 2006: 183–213, for an extensive analysis.)

(16) *Paradigm leveling within Catalan inflection*

Within the OP model, this circumstance can be analyzed as follows. The markedness constraint \*CCC]σ is the most relevant in the hierarchy: it determines both cluster reduction in the plural forms and the direction of paradigm leveling, in that it obstructs paradigm leveling from the singular to the plural forms (see candidate 18a in the tableau of 18). The constraints responsible for paradigm leveling are OP MAX-C (17a) and OP DEP-C (17b).

(17) *OP faithfulness constraints*

- a. OP MAX-C (OP MAX-C): Within inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form.  
(McCarthy [2001] 2005; Pons 2004, 2006 for Catalan)
- b. OP DEP-C (OP DEP-C): Within inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form.  
(McCarthy [2001] 2005; Pons 2004, 2006 for Catalan)

As illustrated in (18), the paradigm candidate with alternations in the stem (18b) is discarded by these two OP faithfulness constraints. Among the paradigm candidates with a uniform stem, the one selected as optimal is the one which satisfies the markedness constraint \*CCC]σ: it is, indeed, a case of *overapplication* and *attraction to the unmarked*. (For expository reasons, the stems will be underlined from now on.)

(18) *Paradigm leveling within Catalan number inflection*

/sant/, /sant+z/, /sant+ə/, /sant+ə+z/	*CCC] σ	OP MAX-C	OP DEP-C	MAX-IO
a. <san <u>t</u> , san <u>ts</u> >	*!			
b. <san <u>t</u> , san <u>s</u> >		*	*!	*
c. <san <u>s</u> , san <u>s</u> >				**

3.1.1.3 How *linguistic variation sheds light on theory* (1). So far so good. However, we have yet to explain why the feminine forms (both singular, *santa*, and plural, *santes*), with preservation of the final consonant of the stem, do not equally

exert pressure over the masculine singular ones. These cases are problematic for the analysis proposed here because feminine singular and feminine plural forms, which contain the stop at the end of the stem, could wrongly override the pressure that the masculine plural forms exert over the masculine singular ones, and thus bring about the selection of a paradigm candidate of the type ⟨sant, sant+ə, sant+s, sant+ə+s), which would be much more homogeneous than the actual one. This unwanted situation can be observed in the tableau in (19), where the paradigm candidate with the feminine forms as the attractors (19c) is wrongly selected as the optimal one.<sup>6</sup>

(19) *Wrong paradigm leveling within Catalan inflection*

/sant/, /sant+z/, /sant+ə/, /sant+ə+z/	*CCC]σ	OP MAX-C	OP DEP-C	MAX-IO
a. ⟨ <u>sant</u> , <u>sant</u> ə, <u>sants</u> , <u>sant</u> əs⟩	*!			
☹ b. ⟨ <u>san</u> , <u>san</u> ə, <u>sans</u> , <u>sant</u> əs⟩		****	****!	**
💣 c. ⟨ <u>sant</u> , <u>sant</u> ə, <u>sans</u> , <u>sant</u> əs⟩		***	***!	*

On the other hand, with this constraint ranking nothing prevents the masculine plural form from inducing overapplication of cluster reduction not only in the masculine singular forms, but also in the feminine forms, both singular and plural, as illustrated by the candidate (20d) in the following tableau.

(20) *Wrong paradigm leveling within Catalan inflection*

/sant/, /sant+z/, /sant+ə/, /sant+ə+z/	*CCC]σ	OP MAX-C	OP DEP-C	MAX-IO
a. ⟨ <u>sant</u> , <u>sant</u> ə, <u>sants</u> , <u>sant</u> əs⟩	*!			
☹ b. ⟨ <u>san</u> , <u>sant</u> ə, <u>sans</u> , <u>sant</u> əs⟩		****	****!	**
c. ⟨ <u>sant</u> , <u>sant</u> ə, <u>sans</u> , <u>sant</u> əs⟩		***	***!	*
💣 d. ⟨ <u>san</u> , <u>san</u> ə, <u>sans</u> , <u>san</u> əs⟩				****

This last contradiction has a straightforward explanation. Overapplication of simplification in the feminine forms is not possible because it implies the deletion of a consonant segment followed by a vowel, a circumstance practically unknown

6. The sad face symbol ☹ appears before the actual candidate when it is not selected as the optimal. The bomb symbol 💣 appears before a candidate which is wrongly selected as the optimal. For the computation system, see Footnote 3.

in Catalan and many other languages, which is explained by the high degree of perceptibility of consonants placed in prevocalic position. The high ranking of a (positional) faithfulness constraint like MAX-C/ \_\_V (see 21) explains the lack of overapplication of cluster reduction in these cases – see the candidate (22c) in the tableau in (22).

- (21) MAX-C [\_\_V]: Assign one violation mark for every input consonant followed by a vowel which has no correspondent in the output (see Pons 2004, 2006, after Côté 2000).<sup>7</sup>

(22) *Wrong paradigm leveling within Catalan inflection*

/sant/, /sant+z/, /sant+ə/, /sant+ə+z/	*CCC]σ	MAX-C/ __V	OP MAX-C	OP MAX-C	MAX
a. ⟨sant, santə, sants, santəs⟩	*!				
☹ b. ⟨san, santə, sans, santəs⟩			****	****!	**
☹ c. ⟨sant, santə, sans, santəs⟩			***	***!	*
d. ⟨san, sanə, sans, sanəs⟩		**!			****

Despite the introduction of this new constraint, however, the wrong paradigm candidate with no reduction in word final position is still selected as optimal (see 22c). The problem which arises in the preceding tableau is that the forms with a consonant at the right edge of the stem, justified by the positional faithfulness constraint MAX-C/ \_\_V, which can exert pressure over the masculine singular form, are much greater in number than those with no consonant at the right edge of the stem, justified by the markedness constraint \*CCC. That is, feminine forms end up having more paradigmatic power than the masculine plural form. And this is reflected in the number of violations of the OP MAX-C and OP MAX-C constraints, which is higher in the actual candidate (22b) than in the candidate with underapplication (22c).

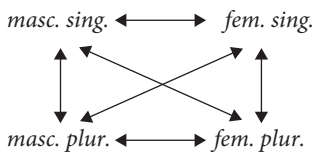
This is a consequence of the fundamental architecture of the OP model. As originally articulated, indeed, the OP model predicts *flat paradigms* with no formal distinction between categories such as singular, plural, masculine, feminine, tense, aspect, etc. The consequence of this architecture is that all the forms in a nominal or verbal paradigm have exactly the same potential of influence among themselves (see, as illustration, the diagram in 23a), regardless of

7. In order for this constraint to affect heteromorphic consonant sequences, it is necessary to assume that morphs are ordered underlyingly, just as they are at the surface.

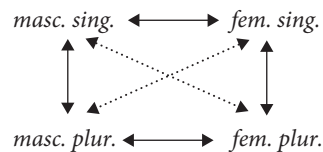
the stronger connection which may exist between the members of a paradigm that *share more grammatical properties* (i.e. gender, number, tense, etc.) (see, among others, Paul 1880; Burzio 2005), regardless of the stronger connection which may exist between the members of a paradigm that *share more phonetic and phonological properties* (see, among others, Paul 1880; Burzio 2005), and regardless of the looser connection which may exist between the members of a paradigm that have a *higher token frequency* (see, among others, Paul 1880; Bybee 1996; Burzio 2005). In order to solve these kinds of contradictions, the OP proposal can be refined in such a way that the predicted symmetrical influence illustrated in (23a) can be modified by giving more power of reciprocal influence to members which share more grammatical properties and less power of reciprocal influence to members which share fewer grammatical properties (23b). The formalization of these structured subparadigms is in fact a matter suggested but not explored in McCarthy's paper, and also highlighted as intriguing. (Some precedents of the proposal presented but with another perspective are the network model, found in Bybee 1996, among other works; lexical conservatism, found in Steriade 1997, and global distance and gradient attraction, found in Burzio 2005.)

(23) *Refinement of the OP proposal*

a. *Standard OP paradigmatic pressure*



b. *Relativized OP paradigmatic pressure*



This is what is in fact found in Pons (2004: 391–396; 2006: 183–213), who proposes to relativize the OP faithfulness constraints according to the kind of inflection, that is, to invoke intraparadigmatic faithfulness constraints for *each type of inflection* (for instance, gender and number, in the case of nominal inflection) (see 24), with the chance of ranking each of them (see 28). As these constraints only affect a specific set or “subparadigm” within the paradigm, we have labeled them *Optimal Subparadigm* faithfulness constraints:

(24) *Optimal Subparadigm faithfulness constraints*

- OPTIMAL SUBPARADIGM NUMBER MAX-C (OSPN MAX-C): Within *number* inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form (Pons 2004, 2006; after McCarthy [2001] 2005).

- OPTIMAL SUBPARADIGM GENDER MAX-C (OSPG MAX-C): Within *gender* inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form (Pons 2004, 2006; after McCarthy [2001] 2005).
- OPTIMAL SUBPARADIGM NUMBER DEP-C (OSPN DEP-C): Within *number* inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form (Pons 2004, 2006; after McCarthy [2001] 2005).
- OPTIMAL SUBPARADIGM GENDER DEP-C (OSPN DEP-C): Within *gender* inflection, assign one violation mark for every consonant in the base (stem) of an inflected form which does not have a correspondent in the base (stem) of another inflected form (Pons 2004, 2006; after McCarthy [2001] 2005).

(25) *Constraint hierarchy*

\*CCC >> OSPN DEP-C, OSPN MAX-C >> OSPG DEP-C, OSPG MAX-C >> MAX-IO

As seen in the tableau in (26), the proposal also entails a different system of candidate generation. For each input, apart from flat paradigms, GEN generates subparadigms, and the members in these subparadigms are those evaluated by the intraparadigmatic faithfulness constraints. For instance, in a language like Catalan (with inflection for gender and number), for the input *alt* ('tall'), four subparadigms are generated, two related by gender (e.g. ⟨*alt*, *alta*⟩ ⟨'tall' *masc. sing.*, 'tall' *fem. sing.*⟩, ⟨*alts*, *altes*⟩ ⟨'tall' *masc. plur.*, 'tall' *fem. plur.*⟩) and two related by number (⟨*alt*, *alts*⟩ ⟨'tall' *masc. sing.*, 'tall' *masc. plur.*⟩, ⟨*alta*, *altes*⟩ ⟨'tall' *fem. sing.*, 'tall' *fem. plur.*⟩). The proposal, as articulated, predicts a higher pressure between members of the *same category* than between members of the *same inflectional paradigm*.<sup>8</sup> The effects of the hierarchy in (25) can be seen in the tableau in (26), where, thanks to the prominence of the intraparadigmatic faithfulness constraints related to number with respect to those related to gender, the paradigm candidate selected as optimal is that with deletion in the masculine forms and cluster preservation in the feminine forms (26d). (Due to expository reasons, standard OP faithfulness constraints are not included in the following tableau; because of stringency they are ranked below the OSP ones.)

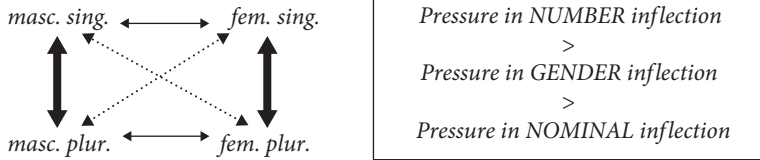
8. For the sake of brevity, we present here a very simplified account of this particular refinement of the OP model. See Ohannesian & Pons (2009) for a complete formalization of it.



(26) *Overapplication of cluster reduction in Catalan within a relativized OP model*

/alt/, /alt+s/, /alt+ə, /alt+ə+s/	*CCC]σ	MAX-C [__V]	OSPN DEP-C	OSPN MAX-C	OSPG DEP-C	OSPG MAX-C	MAX-IO
a. <<alt, alts> <sub>N</sub> <alt, altə> <sub>G</sub> <altə, altəs> <sub>N</sub> <alts, altəs> <sub>G</sub> > <sub>INFL</sub> <i>fully faithful paradigm – uniform → underapplication</i>	*						
b. <<alt, als> <sub>N</sub> <alt, altə> <sub>G</sub> <altə, altəs> <sub>N</sub> <als, altəs> <sub>G</sub> > <sub>INFL</sub> <i>normal application – non-uniform paradigm → normal application</i>			*	*!			*
c. <<al, als> <sub>N</sub> <al, alə> <sub>G</sub> <alə, aləs> <sub>N</sub> <als, aləs> <sub>G</sub> > <sub>INFL</sub> <i>fully unfaithful paradigm totally uniform → overapplication in the entire paradigm</i>		*					
d. <<al, als> <sub>N</sub> <al, altə> <sub>G</sub> <altə, altəs> <sub>N</sub> <als, altəs> <sub>G</sub> > <sub>INFL</sub> <i>uniform paradigm for number and not for gender → overapplication in the number subparadigm</i>					*	*	**
					*	*	*

This new architecture allows us to express, therefore, the closer connection that may or may not exist between members depending on their kind of inflection (see § 3.1.2, 3.1.3, 3.1.4, for more evidence of this), and, in this particular case, between members related by number (see the new diagram in 27), which is reinforced by the higher formal (phonological) similarity between the members related by number than between the members related by gender.

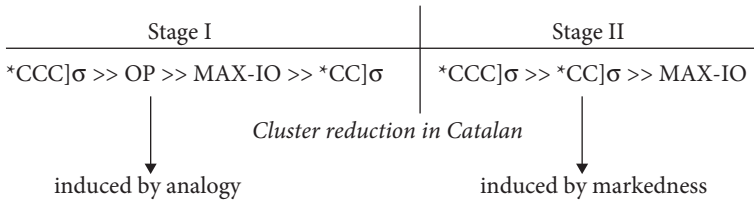
(27) *Relativized OP paradigmatic pressure*

In fact, the closer connection between members related by number with respect to members related by gender is not language-particular, but rather can be considered universal. Greenberg (1966) already detected the asymmetry between these two categories, number and gender, with the former being less marked than the latter, a circumstance which is corroborated by a set of cross-linguistically recurrent factors, namely: (a) if a language has gender distinction, it will also have number distinction, but not viceversa; (b) all languages have number distinction but not all languages have gender distinction; (c) number is more regular and automatic than gender; (d) gender shows more syncretism than number in all languages; etc. There is independent evidence, therefore, for considering the cross-linguistic tendency to the ranking OP-FAITH NUMBER >> F >> OP-FAITH GENDER, with the OP constraint inducing change in the unmarked subparadigm (the Number one), ranked higher than the OP constraint inducing change in the marked subparadigm (the Gender one). This observation, however, does not deny the existence of pressure between members related by gender but expects that if in a language members related by gender are under paradigmatic pressure those related by number will be too but not viceversa (for a complete justification and illustration of this tendency in terms of universals, see Ohannesian & Pons 2009).

3.1.1.4 *The source of what is phonologically marked.* Overall, from a strictly synchronic point of view, for the regular cases in (15a), it can be claimed that either the paradigmatic pressure is still working or that a reinterpretation of the grammar, namely, of the constraint hierarchy, has taken place. There are some empirical arguments which lend a degree of support to the latter interpretation of the facts: in the synchronic phonology of Catalan, it is possible to find cluster reduction in invariable words like *mitjançant* [midʒənsán] ‘through’, *damunt* [dəmún] ‘on, on top of, over’, *davant* [dəβán] ‘in front of’, *durant* [durán] ‘while, during’, *dalt* [dál] ‘up’, *tranquil·lament* [trəŋkiləmén] ‘calmly’, *injustament* [inʒustəmén] ‘unfairly’, and in gerund forms such as *cantant* [kəntán] ‘singing’, *estudiant* [əstudján] ‘studying’, *patint* [pətin] ‘suffering’, etc., in which there is no inflected form that exerts pressure. If paradigmatic pressure was still responsible for cluster reduction in the synchronic phonology of Catalan, we would not expect reduction in these invariable forms. Given these

facts, the hypothesis defended in this paper is as follows: Originally, cluster simplification was *only driven by markedness* in word-final clusters made up of three consonants. Cluster simplification in word-final clusters made up of two consonants was induced by paradigmatic pressure (see 28: Stage I). This paradigmatic pressure motivated the absence of word-final clusters made up of two consonants, and this circumstance (that is, the lack of word-final clusters made up of two segments) was reinterpreted by the listener as a consequence of the grammar, that is, as a consequence of the activity of the constraint \*CC]σ (see 28: Stage II). In other words, what was phonologically *unmarked* in the past in most Catalan varieties (i.e. word-final clusters of two consonants) has become *marked* in the present in some Catalan varieties, and, consequently, banned by the constraint hierarchy.

(28) *Reinterpretation of the grammar in terms of reranking*



The empirical arguments in favor of the purely phonological approach based on markedness, though, are not convincing enough, first, because some of these invariable words do not show alternations which attest the existence of a final stop at the end of the stem or the suffix, so that an underlying stem or suffix without a final stop could be assumed: this is the case, for instance, of words such as *mitjançant* [midʒənsán], *damunt* [dəmún], *durant* [durán] and the case of adverbial forms (i.e. *tranquil·lament* [trəŋkiləmén]) and gerund forms (*cantant* [kəntán] ‘singing’). The rest of the forms, though, do show alternations, although the morphological connection is mainly loose and thus opaque (*davant* [dəβán] ‘in front of’ ~ *davantera* [dəβəntéɾa] ‘lead’; *dalt* [dál] ~ *daltabaix* [dáltaβáf]). Second, because loanwords which have been recently introduced to Catalan from languages such as English or German (i.e. *Power Point*, *Paint*, *Kant*, *volt*, *bamp*, *Colt*, etc.) exhibit an extreme amount of variation between preservation and deletion of the final stop across speakers and even within the grammar of the same speaker. If the ranking \*CCC]σ >> \*CC]σ >> MAX-IO was entirely active in the synchronic phonology of Catalan we would expect systematic cluster reduction in these cases. What we can say is that we are in front of a transition period with variation in which the synchronic phonology of Catalan is being accommodated to the new ranking \*CCC]σ >> \*CC]σ >> MAX-IO.

3.1.1.5 *How dialects shed light on the origin of phonological processes (2)*. Evidence which favors this particular interpretation of the facts based on analogy is the behavior of Eivissan Catalan with regard to cluster reduction is concerned. Eivissan Catalan also shows cluster reduction in word-final position (29b), but, unexpectedly, it does not do so when the affected consonants belong to a verbal of the first conjugation in the 1 sg. PI form. In these cases, the cluster is preserved (29a).

(29) *Eivissan Catalan*

a. *1 sg. PI verbal forms*

<i>cant</i>	/kant/	[kánt]	‘(I) sing’
<i>salt</i>	/salt/	[sált]	‘(I) jump’
<i>camp</i>	/əkanp/	[əkámp]	‘(I) tend’
<i>ronc</i>	/ronk/	[róŋk]	‘(I) snore’

b. *Nominal forms*

<i>sant</i>	[sán]	‘saint’
<i>molt</i>	[mól]	‘a lot’
<i>camp</i>	[kám]	‘(I) go camping’
<i>banc</i>	[bán]~ [bánk]	‘bank’

(Data from: Pons 2004, 2006; *Corpus Oral Dialectal*)

According to the proposal outlined above, this behavior is expected, because, unlike what happens in nominal paradigms, in the verbal paradigms of the first conjugation there is no form which can exert pressure and thus induce cluster reduction. All the stems ending in a stop are followed by a vowel corresponding to some verbal inflectional mark.

(30) “Underapplication” of cluster reduction in Eivissan Catalanant

<i>cant</i>	/kant/	[kánt]	‘(I) sing’	<i>salt</i>	/salt/	[sált]	‘(I) jump’
<i>cantes</i>	/kant+ə+z/	[kántəs]	‘(you) sing’	<i>saltes</i>	/salt+ə+z/	[sáltəs]	‘(you) jump’
<i>canta</i>	/kant+ə/	[kántə]	‘(s/he) sings’	<i>salta</i>	/salt+ə/	[sáltə]	‘(s/he) jumps’
<i>cantam</i>	/kant+a+m/	[kántám]	‘(we) sing’	<i>saltam</i>	/salt+a+m/	[sáltám]	‘(we) jump’
<i>cantau</i>	/kant+a+w/	[kántáw]	‘(you) sing’	<i>saltau</i>	/salt+a+w/	[sáltáw]	‘(you) jump’
<i>canten</i>	/kant+a+n/	[kántən]	‘(they) sing’	<i>salten</i>	/salt+ə+n/	[sáltən]	‘(they) jump’

(Data from: Pons 2004, 2006; *Corpus Oral Dialectal*)

Interestingly enough, cluster preservation – or what we might improperly call here “underapplication” – of cluster reduction, although possible, is not as systematic in the verbs of the second and third conjugation. In this case, the second person of PI does not exhibit an explicit tense mark, so that the cluster created in these cases is the same as in nominal inflection (nasal/lateral + stop + s), and more variation across speakers is found. Some speakers show systematic cluster reduction (see 30a), others exhibit cluster preservation (see 30b), and yet others exhibit cluster

reduction in the third person and preservation in the first (see 30c). In speakers with cluster reduction in the whole paradigm, the constraint \*CCC]σ motivates cluster reduction in 2 *sg.* PI forms and these reduced forms exert pressure over the 1 *sg.* and the 3 *sg.* forms, just like what occurs in nominal inflection. In speakers with cluster preservation, the pressure is exerted by the forms in which the last consonant of the stem is preserved due to the high-ranked constraint MAX-C/\_V (in this case, therefore, overapplication is blocked by another markedness constraint, as also predicted in McCarthy's model; see Footnote 5). Finally, speakers with cluster reduction in the third person and preservation in the first person have the constraint penalizing identical forms in the same paradigm especially high-ranked (see Pons 2002a, 2002b, 2007, for a more complete analysis of these particular cases).

(31) *Normal, under- and overapplication of cluster reduction in Eivissan Catalan*

		a. Variety I	b. Variety II	c. Variety III
<i>romp</i>	/ɾonp/	[róm]	[rómp]	[rómp]
<i>romp</i>	/ɾonp+z/	[róms]	[róms]	[róms]
<i>romp</i>	/ɾonp/	[róm]	[rómp]	[róm]
<i>rompem</i>	/ɾonp+ə+m/	[rumpóm]	[rumpóm]	[rumpóm]
<i>rompeu</i>	/ɾonp+ə+w/	[rumpów]	[rumpów]	[rumpów]
<i>rompen</i>	/ɾonp+ə+n/	[rómpən]	[rómpən]	[rómpən]

(Data from: Alcover & Moll 1929–1933; Pons 2002a, 2002b, 2007;  
*Corpus Oral Dialectal*)

### 3.1.2 *Overapplication of depalatalization in Spanish*

3.1.2.1 *Data.* In Spanish, palatal consonants in the coda are proscribed, as the alternations in (32) show. In masculine singular forms, in which the consonant is located in coda position, depalatalization applies (32a), whereas in feminine forms, both singular and plural, in which the consonant is located in onset position, the place specification of the palatal segment is preserved (32b). Unexpectedly, however, depalatalization also applies in onset position in the plural forms, as shown in (33).

(32) *Normal application of depalatalization in Spanish*

a. MASC. SING. → Coda position	b. FEM. SING. FEM. PLUR. → Onset position
<i>doncel</i> [donθél] ‘young male noble’	<i>doncella</i> [donθéla] ‘maiden’
	<i>doncellas</i> [donθélas] ‘maiden plur.’
<i>don</i> [dón] ‘Mister’	<i>doña</i> [dóna] ‘Madam’
	<i>doñas</i> [dónas] ‘Madam plur.’

(33) *Overapplication of depalatalization in Spanish*MASC. PLUR. → *Onset position*

*donceles* [donθéles] ‘young male noble plur.’  
*done* [dónes] ‘Mister plur.’

This is a well-known process of Spanish, which has been analyzed by many scholars. In Mascaró and Lloret (2006), for instance, depalatalization in (32a) is attributed to a context-free markedness constraint (\*→CORONAL) penalizing non-coronal segments,<sup>9</sup> the effects of which are inhibited when the affected consonant is located in onset position (32b), thanks to the positional faithfulness constraint IDENTONSET(F) (see 34b). This inhibition is not found, however, in the plural forms (33), in which therefore overapplication of depalatalization occurs. These cases of overapplication are interpreted as a BASE-IDENTITY effect: that is, the plural forms (33) have a base – that of the singular forms – to which they must be faithful in terms of place. The lack of pressure in the feminine forms (33) is explained, on the other hand, by stipulating that in these cases there is no base which exerts pressure. In their analysis, therefore, the hypothesis that in inflectional paradigms the pressure is symmetrical is explicitly neglected, in that a base (i.e. the masculine singular form, which is the unmarked in the inflectional paradigm) has priority over the plural forms. The only case in which this does not happen is in pronoun forms (i.e. *él* [él] ‘he’ ~ *ellos* [élos] ‘they masc. plur.’ ~ *ella* [éla] ‘she’ ~ *ellas* [élas] ‘they fem. plur.’; *aquel* [akél] ‘that masc.’ ~ *aquellos* [akélos] ‘those masc. plur.’ ~ *aquella* [akéla] ‘that fem.’ ~ *aquellas* [akélas] ‘those fem.’), in that there is no uniformity in the number paradigm. Mascaró and Lloret (2006) argue that *el* and *aquel* cannot function as bases for *ellos* and *aquellos* because they differ in the gender marker, which is –∅ in the former and –o in the latter.

3.1.2.2 *How linguistic variation sheds light on the theory (2)*. In our view, this behavior, with pressure from the singular to the plural forms but not to the feminine forms, can be treated without loss of generalization and, in fact, constitutes additional evidence for the need to relativize the OP constraints according to the kind of inflection, as advocated above. Indeed, the fact that *only plural forms* are subject to paradigm leveling supports the hypothesis according to which the pressure between the forms related by number is much superior to the pressure between

9. Although not illustrated in this paper, centralization also affects labial segments (*adámico* [aðámiko] ‘adamic’ ~ *Adán* [aðán] ‘Adam’). This is why the authors resort to the constraint \*→CORONAL, which in fact is a shorthand for the universal hierarchy of context-free markedness constraints against specific place features (i.e. \*DORSAL, \*LABIAL > \*CORONAL).

forms related by gender, and therefore supports the need to split the OP faithfulness constraints according to the type of inflection. As seen in the tableau in (35), the high ranking of the markedness constraint  $*\neg\text{CORONAL}]_{\sigma}$ , which penalizes a palatal segment in coda position, is responsible for the discarding of the fully faithful paradigm candidate with a member with a palatal in coda position (see 35c). The high-ranked OSP faithfulness constraint demanding homogeneity in the number subparadigm, on the other hand, is responsible for the discarding of the paradigm candidate with normal application of centralization in word final position and preservation of the palatal in plural forms (see 35d), and for the selection of the paradigm candidate with overapplication of centralization in plural forms (see the winning candidate paradigm in 38a). And, finally, the ranking of  $\text{IDENT}_{\text{ONSET}}(\text{place})$  above the OSP faithfulness constraint demanding homogeneity in the gender subparadigm explains why overapplication does not affect the feminine forms (see 35b). The particular behavior of the pronouns *él ~ ellos/aquel ~ aquellos*, without uniformity, could be analyzed in terms of phonologically conditioned allomorphy, in line with the general proposal of Mascaró (2007) (See, in this respect, Ohannesian & Pons 2009.)

(34) *Relevant constraints*

a. *Markedness constraint*

- $*\neg\text{CORONAL}]_{\sigma}$ : Assign one violation mark for every palatal segment in coda position (adapted from Mascaró and Lloret 2006)

b. *Standard I-O (positional) faithfulness constraint*

- $\text{IDENT}(\text{F})$ : Assign one violation mark for every output segment that differs from its input correspondent in place of articulation (McCarthy & Prince 1995)
- $\text{IDENT}_{\text{ONSET}}(\text{F})$ : Assign one violation mark for every output segment syllabified in the onset that differs from its input correspondent in place of articulation (McCarthy & Prince 1995; Beckmann 1998)

c. *Optimal Subparadigm faithfulness constraints*

- $\text{OPTIMAL}_{\text{SUBPARADIGM NUMBER IDENT}}(\text{place}) (\text{OSPN IDENT}(\text{place}))$ : Within number inflection, assign one violation mark for every consonant in the base (stem) of an inflected form whose correspondent in another base has a different place specification (see Pons 2004, 2006; Pons & Ohannesian 2008, after McCarthy [2001] 2005).
- $\text{OPTIMAL}_{\text{SUBPARADIGM GENDER IDENT}}(\text{place}) (\text{OSPG IDENT}(\text{place}))$ : Within gender inflection, assign one violation mark for every consonant in the base (stem) of an inflected form whose correspondent in another base has a different place specification (see Pons 2004, 2006; Pons & Ohannesian 2008, after McCarthy [2001] 2005).

In summary, paradigm leveling is, again, induced by markedness. And over-application of the relevant process, yet again, is circumscribed to the *number paradigm*.

(35) *Overapplication of depalatalization in the number subparadigm*

/donθeɹ, donθeɹ+a, donθeɹ+s, donθeɹ+a+s/	*-CORONAL]σ	OSPN IDENT(place)	IDENTONSET (place)	OSPG IDENT(place)	IDENT (place)
a. <<donθél, donθéles> <sub>N</sub> <donθél, donθéla> <sub>G</sub> <donθéla, donθélas> <sub>N</sub> <donθéles, donθélas> <sub>G</sub> > <sub>INF</sub> <i>overapplication in the number subparadigm</i>			*	**	** *
b. <<donθél, donθéles> <sub>N</sub> <donθél, donθéla> <sub>G</sub> <donθéla, donθélas> <sub>N</sub> <donθéles, donθélas> <sub>G</sub> > <sub>INF</sub> <i>overapplication in the entire paradigm</i>			*		** ** ** **
c. <<donθéɹ, donθéɹes> <sub>N</sub> <donθéɹ, donθéɹa> <sub>G</sub> <donθéɹa, donθéɹas> <sub>N</sub> <donθéɹes, donθéɹas> <sub>G</sub> > <sub>INF</sub> <i>underapplication fully-faithful set</i>	*				
d. <<donθeɹ, donθeɹes> <sub>N</sub> <donθeɹ, donθeɹa> <sub>G</sub> <donθeɹa, donθeɹas> <sub>N</sub> <donθeɹes, donθeɹas> <sub>G</sub> > <sub>INF</sub> <i>normal application – no uniformity in number</i>		**!		**	* *

3.1.3 *Overapplication of centralization in Occitan*

3.1.3.1 *Data.* Occitan shows a similar pattern to Spanish. As the alternations in (36) show, palatal and labial consonants are proscribed in coda position, both in word-final position and when followed by another consonant (in the cases shown here, the consonant corresponds to the plural morph, but the same pattern is found with any other type of consonant).

(36) *Centralization in Occitan*

a. *Masculine adjectival forms* → centralization

viè[l] ‘old masc. sing.’

viè[l]s ‘old masc. plur.’

estra[n] ‘unusual masc. sing.’

estra[n]s ‘unusual masc. plur.’

pri[n] ‘thin masc. sing.’

pri[n]s ‘thin masc. plur.’



b. *Feminine adjectival forms* → non-centralization

- viè[ʎ]a 'old fem. sing.'  
 viè[ʎ]as 'old fem. plur.'  
 estra[n]a 'unusual fem. sing.'  
 estra[n]as 'unusual fem. plur.'  
 pri[m]a 'thin fem. sing.'  
 pri[m]as 'thin fem. plur.'

(Data from Balaguer & Pojada 2005; confirmed with Rafèu Sichel)

3.1.3.2 *How linguistic variation sheds light on the theory* (3). An intradialectal look at the data would conclude that the markedness constraint responsible for the process of centralization is similar to that adduced for Spanish depalatalization, that is, a constraint penalizing non-coronal consonants in the coda. In this case, however, the centralization process is due to a markedness constraint penalizing a non-coronal consonant followed by another consonant, and the direction of the paradigm leveling is therefore from the plural to the singular forms. This is not merely an *ad hoc* interpretation or stipulation of the facts, but is grounded cross-linguistically: in Gascon, for example, the process of depalatalization also applies, but *only* in the plural forms, that is, when the palatal segment is followed by a consonant (37b), and never in word-final position (37a). Interestingly enough, on the other hand, a process of change is detected in the case of labials, which can be realized with [m] and [n] in word-final position, incipiently mirroring the Occitan patterns.

(37) *Centralization in Gascon* (Aitor Carrera p.c.)a. *Masculine singular adjectival forms* → no centralization

- ba[n] 'toilet masc. sing.'  
 hi[ʎ] 'thread masc. sing.'  
 pri[m] ~ pri[n] 'thin masc. sing.'

b. *Masculine plural adjectival forms* → centralization

- ba[n]s 'toilet masc. plur.'  
 hi[l]s 'thread masc. plur.'  
 pri[n]s 'thin masc. plur.'

The situation is similar to that depicted in § 3.1.1: the fact that two related systems, Occitan and Gascon, exhibit centralization of labials and palatals when followed by a consonant, whereas just one exhibits centralization as well as variation in word-final position, suggests indeed that the origin of the process is in the plural forms, that is, when the affected consonants are followed by a consonant, and that a process of change, similar to that seen in Occitan, is applying in the case of labials in Gascon. This picture reveals a novel universal implication (38), which must transcend into the hierarchy of contextual markedness constraints (39c).

(38) *Universal implication*

If in a language palatal segments are prohibited in word-final position, they will also be prohibited when followed by another consonant, but not vice versa.

(39) *Universal ranking of the contextual markedness constraints against palatal segments*

- a.  $\neg$ CORONAL] $\sigma$ : Assign one violation mark for every non-coronal segment in the coda.
- b.  $\neg$ CORONAL C: Assign one violation mark for every non-coronal segment followed by another consonant.
- c. \*CORONAL C >> \*CORONAL] $\sigma$

The tableau in (40) illustrates the direction of things in Occitan. Paradigm leveling is again induced by markedness, in this case, by the constraint against a non-coronal segment followed by another consonant. And overapplication of the relevant process is, yet again, only triggered within the *number paradigm* (compare 40a vs. 40b).

(40) *Centralization in Occitan*

/vjéʎ, vjéʎs, vjéʎo, vjéʎos/	* $\neg$ CORONAL]C	OSPN IDENT(place)	IDENT ONSET(place)	OSPG IDENT(place)	IDENT (place)
a. $\langle$ (vjéʎ, vjéʎs) <sub>N</sub> $\langle$ vjéʎ, vjéʎo $\rangle$ <sub>G</sub> $\langle$ viéʎo, viéʎos $\rangle$ <sub>N</sub> $\langle$ vjéʎs, vjéʎos $\rangle$ <sub>G</sub> $\rangle$ <sub>INF</sub> <i>overapplication in the number subparadigm</i>				*	** *
b. $\langle$ (vjéʎ, vjéʎs) <sub>N</sub> $\langle$ vjéʎ, vjéʎo $\rangle$ <sub>G</sub> $\langle$ viéʎo, viéʎos $\rangle$ <sub>N</sub> $\langle$ vjéʎs, vjéʎos $\rangle$ <sub>G</sub> $\rangle$ <sub>INF</sub> <i>overapplication in the entire paradigm</i>			* ** *!		** ** ** **
c. $\langle$ (vjéʎ, vjéʎs) <sub>N</sub> $\langle$ vjéʎ, vjéʎo $\rangle$ <sub>G</sub> $\langle$ viéʎo, viéʎos $\rangle$ <sub>N</sub> $\langle$ vjéʎs, vjéʎos $\rangle$ <sub>G</sub> $\rangle$ <sub>INF</sub> <i>underapplication fully-faithful set</i>	*!			*	*
d. $\langle$ (vjéʎ, vjéʎs) <sub>N</sub> $\langle$ vjéʎ, vjéʎo $\rangle$ <sub>G</sub> $\langle$ viéʎo, viéʎos $\rangle$ <sub>N</sub> $\langle$ vjéʎs, vjéʎos $\rangle$ <sub>G</sub> $\rangle$ <sub>INF</sub> <i>normal application – no uniformity in number</i>		**!		*	* *

### 3.1.4 Overapplication of centralization in Alguerese Catalan

3.1.4.1 *Data.* In Alguerese Catalan, word-final palatal nasals and laterals undergo a process of depalatalization when followed by another consonant and also in word-final position (41a,b). This process of depalatalization also applies when a word-final prepalatal sibilant precedes a word with an initial consonant (41). In this case, however, the process does not apply in word-final position (42a).

#### (41) Palatal lateral and nasals in Alguerese Catalan

- |    |                     |               |  |               |
|----|---------------------|---------------|--|---------------|
| a. | <i>any</i>          | /aɲ/          | [án]                                   | ‘year’        |
| b. | <i>anys</i>         | /aɲ+z/        | [áns]                                  | ‘years’       |
| c. | <i>any passat</i>   | /aɲ##pas+a+d/ | [àm pasát]                             | ‘last year’   |
|    |                     |               | (cf. <i>anyet</i> [aɲét] ‘small year’) |               |
| d. | <i>aquell</i>       | /akeʎ/        | [akél]                                 | ‘that’        |
| e. | <i>aquells</i>      | /akeʎ+z/      | [akéls]                                | ‘those’       |
| f. | <i>aquell palau</i> | /akeʎ##paraw/ | [akèl paráw]                           | ‘that palace’ |
|    |                     |               | (cf. <i>aquella</i> [akéʎa] ‘that’)    |               |

#### (42) Palatal sibilants in Alguerese Catalan

- |    |                     |               |              |               |
|----|---------------------|---------------|--------------|---------------|
| a. | <i>aqueix</i>       | /akeʃ/        | [akéʃ]       | ‘this’        |
| b. | <i>aqueixos</i>     | /akeʃ+z/      | [akéʃus]     | ‘these’       |
| c. | <i>aqueix palau</i> | /akeʃ##paraw/ | [akès paráw] | ‘this palace’ |

(Data from Kuen 1932)

3.1.4.2 *How linguistic variation sheds light on the theory (4).* In our view, the discrepant behavior between the cases in (41) and (42) calls for, once more, an interpretation of the facts based on analogy induced by phonological markedness, and furthermore supports the predictions made above. In the cases shown in (41), the plural forms exhibit depalatalization, and so do the singular correspondent forms; in the cases shown in (42), by contrast, the plural forms do not exhibit depalatalization – because a vowel follows the palatal sibilant – and neither do the singular correspondent forms (Serra 1996; Pons 2005). This account of the facts, moreover, is consistently corroborated by the data reported in historical grammars about this dialect: depalatalization was recorded when the palatal consonants were followed by another consonant, but not in word-final position (see Palomba 1906: 49, 51–79; Kuen 1932: 46–47). Everything indicates, therefore, that the origin of this process lies in the plural forms.<sup>10</sup>

10. In Jiménez & Lloret (2006) it is argued that the fact that the same analogical process has not operated in the cases of a final labial nasal or stop (i.e. *fums* [fúns] but *fum* [fúm], without pressure; *amics* [amíts] but *amic* [amík], without pressure) somehow invalidates this hypothesis. It is clear that analogy does not work in a systematic way (recall in this regard the examples of Gascon, in which the pressure is incipiently operating in the case of labial nasals, but not in the case of palatals).

#### 4. Concluding remarks

Paradigmatic pressures do not work in a homogeneous or symmetric way. As already noted by many scholars, factors such as the degree of phonological similarity, the degree of semantic closeness, the degree of productivity between the members of a paradigm, or the number of grammatical properties which these members share are directly correlated with the degree of phonological pressure exerted between them. In this paper we have focused on this latter factor. We have seen that the Optimal Paradigms model can be straightforwardly refined in such a way that the predicted symmetrical influence between the members of an inflectional paradigm can be modified by giving more power of reciprocal influence to members which share more grammatical properties and less power of reciprocal influence to members which share fewer grammatical properties. On the basis of the analysis of a set of processes drawn from Catalan, Spanish, and Occitan nominal inflection, we have detected a higher connection not only between members which share more grammatical properties but also between members related by number with respect to those related by gender.

Other important results of the paper are the confirmation of McCarthy's prediction that phonological markedness governs the direction of the paradigmatic pressure and that only overapplication of a process due to paradigmatic pressure is possible within the inflectional paradigm.

We have confirmed, overall, the claim with which we started this paper. A careful look at phonological change and microvariation across nearby linguistic varieties can provide really valuable information into the architecture of some of the formal mechanisms which account for analogy.

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