

Underapplication of vowel reduction to schwa in Majorcan Catalan*

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1 Goal

In this talk I propose an interpretation for a set of anomalies in the Majorcan Catalan vowel system. This set is made up of cases where vowels exhibit atypical behaviour, in that where we would expect to find a schwa ([ə]) due to a general process of vowel reduction of the front mid vowels [é] and [ê] and the central low vowel [á] we find, against all expectations, [e].

(1)

a. Normal application of vowel reduction to [ə] in Majorcan Catalan

Stressed position	Unstressed position
c[á]sa ‘house’	c[ə]seta ‘house dim.’
caf[é] ‘coffee’	caf[ə]net ‘coffee dim.’
carr[é]r ‘street’	carr[ə]ró ‘street dim.’
cont[é]st ‘(I) answer’	cont[ə]stam ‘(we) answer’
x[é]rr ‘(I) chat’	x[ə]rrau ‘(we) chat’

b. Underapplication of vowel reduction to [ə] in Majorcan Catalan

Stressed position	Unstressed position
p[é]ix ‘fish’	p[e]ixet ‘fish dim.’
f[é]sta ‘party’	f[e]stassa ‘party augm.’
c[é]l ‘sky’	c[e]let ‘sky dim.’
p[é]ga ‘(s/he) hits’	p[e]gam ‘(we) hit’
esp[é]ra ‘(s/he) waits’	esp[e]rau ‘(you) wait’

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2 General proposal

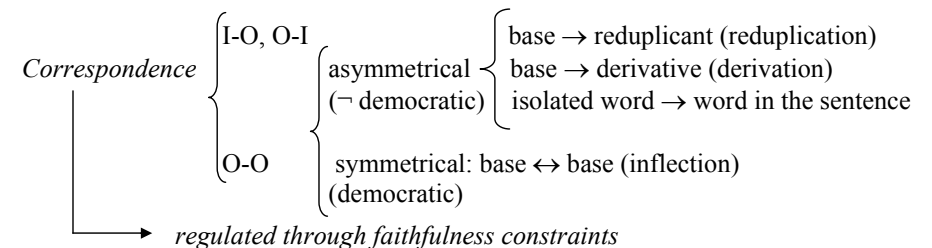
(2) *Conspiracies*

- The inclination of these vowels to become similar to the corresponding vowels which appear in the same inflectional or derivational paradigm (especially when the derivative process is productive).
- The prominence of the vowels located in certain positions within the stem.
- The influence that the flanking consonants have on these vowels.
- The need for rebalancing and divesting of idiosyncrasies the unstressed vowel system of Majorcan Catalan

3 Theoretical background

3.1 Paradigmatic pressures within OT

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



3.1.1 Paradigmatic pressures within the derivational paradigm

(4) *Transderivational Correspondence Theory* (Benua [1997] 1999)

→ *derivational paradigm*

- Output-Output faithfulness constraints (= Input-Output faithfulness constraints)
- The relation between the words subject to uniformity is expected to be asymmetrical, since there is a *base* to which the derived forms are faithful.
- The opposite direction, that is, the pressure of the derived form over the base, is proscribed by resorting to a specific constraint, coined BASE-PRIORITY.
- Precisely because of BASE-PRIORITY, under- and overapplication are predicted by this submodel: only the forms which respect the base, whether they satisfy the relevant markedness constraint or not, will satisfy BASE-PRIORITY.

3.1.2 Paradigmatic pressures within the inflectional paradigm

(5) *Optimal Paradigms model* (McCarthy [2002] 2005)

→ *inflectional paradigm*

- a. Candidates consist of entire inflectional paradigms, whose individual members are all subjected to evaluation through the standard markedness and Input-Output faithfulness constraints.
- b. The stem of each paradigm member stands in a surface correspondence with the stem in every other paradigm member.
- c. This correspondence is articulated by a set of Output-Output faithfulness constraints labeled Optimal Paradigm faithfulness constraints (OP faithfulness constraints).
- d. Paradigmatic pressure is exclusively induced by phonological markedness, that is, what determines or governs the direction of the pressure is not a specific morphological status of a word (vs. TCT; see § 3.1.1) but rather the need to respect phonological markedness.
- e. Only overapplication of a process is predicted by this submodel.
- f. Underapplication is only possible if blocked by a high-ranked markedness constraint.

3.2 Prominent positions and prominent segments

(6) *Prominent positions vs. non-prominent positions*

+ prominent	-prominent
Syllabic nucleus	Syllabic margin
Syllabic onset	Syllabic coda
Main metrical foot	Secondary metrical foot
Head of metrical foot	Margin of metrical foot
Stressed syllable	Unstressed syllable
Pretonic syllable	Posttonic syllable
Word-initial position	Word-final position
Stem	Affix

(After Kenstowicz 1997, Crosswhite 1999; de Lacy 2002, 2004; and, for Catalan, Cabré & Prieto 2003, 2006; Jiménez & Lloret 2008)

(7) *Prominent segments vs. non-prominent segments*

a > ε, ɔ > e, o > i, u > ə > j, w > ... > p, t, k

(After Prince & Smolensky 1993)

(8) *Structural and segmental prominence correlation*

Prominent positions ↔ Prominent segments

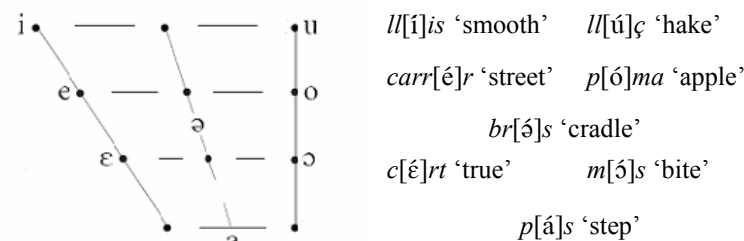
Non-prominent positions ↔ Non-prominent segments

(9) *Additional prominent position*

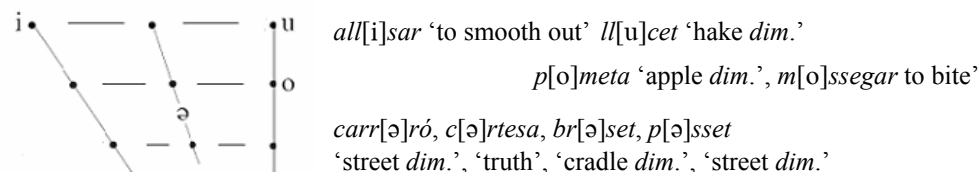
+ prominent	-prominent
Left edge of the stem	Right edge of the stem

4 Obedience in the vowel system of Majorcan Catalan

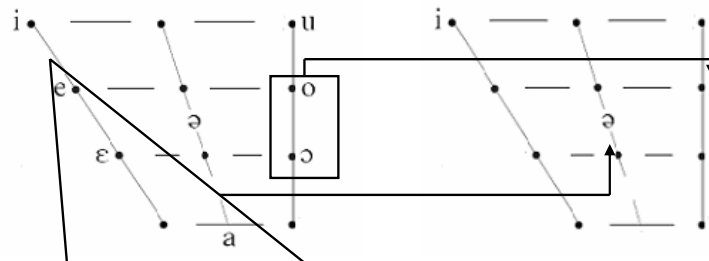
(10) *Stressed vowel system in Majorcan Catalan*



(11) *Unstressed vowel system in Majorcan Catalan*



(12) *Process of vowel reduction in Majorcan Catalan*



(13) *Harmonic scale and constraint hierarchy for margins*

- a. *Universal harmonic scale for margins* (Prince & Smolensky 1993)
M/ə > M/i,u > M/e,o > M/ε,ɔ > M/a
- b. *Constraint hierarchy for margins* (Prince & Smolensky 1993)
* M/a >> * M/ε,ɔ >> * M/e,o >> * M/i,u >> * M/ə
- c. *Sonority scale for vowels (from less to more sonority)*
ə < i,u < e,o < ε,ɔ < a

(14) *Vowel reduction process in Majorcan Catalan*

a. /fust+er+iə/ [fustəriə] cf. [fusté]	*M/a	*M/ε	*M/e	*M/ə	IDENT(F)
i. [fusteriə]			*!		
↷ ii. [fustəriə]				*	*
b. /kəfen+ət/ [kəfənət] cf. [kəfé]	*M/a	*M/ε	*M/e	*M/ə	IDENT(F)
i. [kəfenət]		*!			
↷ ii. [kəfənət]				*	*
c. /kaz+ət+ə/ [kəzətə] cf. [kázə]	*M/a	*M/ε	*M/e	*M/ə	IDENT(F)
i. [kəzətə]	*!				
↷ ii. [kəzétə]				*	*

5 Disobedience in the vowel system of Majorcan Catalan

5.1 Disobedience in derivation

(15) *Normal application vs. underapplication of vowel reduction*

BASE	PRODUCTIVE DERIVATION ¹	NON-PRODUCTIVE DERIVATION
a. <i>Stressed stem with [é] or [é] at the left edge</i>	b. <i>Unstressed stem with the vowel at the left edge</i> → unexpected [e]	c. <i>Unstressed stem with the vowel at the left edge</i> → expected [ə]
p[é]ix ‘fish’	p[e]ixet, p[e]ixot ‘fish dim., augm.’	p[ə]ixater ‘fisherman’
p[é]dra ‘stone’	p[e]dreta, p[e]drota ‘stone dim., augm.’	p[ə]drera ‘quarry’
Est[é]ve ‘Steven’	est[e]vet, est[e]vot ‘Stephan dim., augm.’	

¹ Due to space reasons, we illustrate productive derivation with diminutives and augmentatives. The same patterns are found, however, with other productive suffixes such as *-ós* (p[é]na ‘shame’ ~ p[e]nós ‘shameful’; *-ada* (p[é]dra ‘stone’ ~ p[e]drada ‘group of stones’), *-arro* (p[é]u ‘foot’ ~ p[e]uarro ‘foot augm. desp.’), *-assa* (h[é]rba ‘grass’ ~ h[e]rbassa ‘grass augm.’), etc.

t[é]rra ‘earth’	t[e]rreta, t[e]rrota ‘earth dim., augm.’	t[ə]rreste ‘terrestrial’
c[é]l ‘sky’	c[e]let, c[e]lot ‘sky dim., augm.’	c[ə]lestial ‘celestial’
m[é]rda ‘shit’	m[e]rdeta, m[e]rdota ‘shit dim., augm.’	m[ə]rder ‘mess’
d. <i>Stressed stem with [é] or [é] at the right edge</i>	e. <i>Unstressed stem with the vowel at the right edge</i> → expected [ə]	f. <i>Unstressed stem with the vowel at the right edge</i> → expected [ə]
pap[é]r ‘paper’	pap[ə]ret, pap[ə]rot ‘paper dim., augm.’	pap[ə]rera ‘paper basket’
cast[é]ll ‘castle’	cast[ə]llet, cast[ə]llot ‘castle dim., augm.’	cast[ə]ller ‘casteller’
fid[é]u ‘noodle’	fid[ə]uet, fid[ə]uot ‘noodle dim., augm.’	fid[ə]uada ‘fideua’
caf[é] ‘coffee’	caf[ə]tet, caf[ə]tot ‘coffee dim., augm.’	caf[ə]teria ‘coffee shop’

5.2 Disobedience in inflection

(16) *Normal application vs. underapplication of vowel reduction*

STRESSED-STEM VERBAL FORM	UNSTRESSED-STEM VERBAL FORM
a. <i>Stressed stem with [é] or [é] at the left edge</i>	b. <i>Unstressed stem with the vowel at the left edge</i> → unexpected [e]
p[é]ga, p[é]gues, p[é]gui, p[é]guis... ‘PI to bite’	p[e]gam, p[e]gau, p[e]garé, p[e]garies... ‘PI to bite’
esp[é]r, esp[é]res, esp[é]ra, esp[é]ri... ‘PI to wait’	esp[e]ram, esp[e]rau, esp[e]rassis, esp[e]raràs... ‘PI to wait’
cr[é]m, cr[é]mes, cr[é]ma, cr[é]mi... ‘PI to burn’	cr[e]mam, cr[e]mau, cr[e]marien... ‘PI to burn’
qu[é]d, qu[é]da, que[é]des, qu[é]dis... ‘PI to remain’	qu[e]dam, qu[e]dau, qu[e]daries, qu[e]darem ‘PI to remain’
c. <i>Stressed stem with [é] at the left edge</i>	d. <i>Unstressed stem with the vowel at the left edge</i> → expected [ə]
x[é]rr, x[é]rra, x[é]rren, x[é]rris... ‘PI to chat’	x[ə]rram, x[ə]rrau, x[ə]rraries, x[ə]rriarem... ‘PI to chat’
af[é]rr, af[é]rra, af[é]rren, af[é]rri... ‘PI to stick’	af[ə]rram, af[ə]rrau, af[ə]rraries... ‘PI to stick’
g[é]la, g[é]len, g[é]li, g[é]len... ‘PI to freeze’	g[ə]lam, g[ə]lau, g[ə]laries, g[ə]lariem... ‘PI to freeze’
p[é]rd, p[é]rdi, pe[é]rdis, p[é]rdin... ‘PI to lose’	p[ə]rdem, pe[ə]rdeu, p[ə]rdries... ‘PI to lose’
e. <i>Stressed stem with [é] at the right edge</i>	f. <i>Unstressed stem with the vowel at the right edge</i> → expected [ə]
cont[é]st, cont[é]stes, cont[é]sta... ‘PI to answer’	cont[ə]stam, cont[ə]stau, cont[ə]staria... ‘PI to answer’
acc[é]pt, acce[é]ptes, accep[é]ta... ‘PI to accept’	acc[ə]ptam, acc[ə]ptau, acc[ə]ptaria... ‘PI to accept’
consid[é]r, consid[é]res, consid[é]ra... ‘PI to consider’	consid[ə]ram, consid[ə]rau, consid[ə]raria... ‘PI to consider’
tol[é]r, tol[é]res, tol[é]ra, tol[é]ri... ‘PI to tolerate’	tol[ə]ram, tol[ə]rau, tol[ə]raria... ‘PI to tolerate’

5.3 Disobedience in learned words

(17) Normal application vs. underapplication of vowel reduction

After a labial stop	After a labial nasal	After a labial fricative
<i>a. Learned words</i>		
<i>esp[e]cial</i> ‘special’	<i>am[e]ricà</i> ‘American’	<i>f[e]liç</i> ‘happy’
<i>imp[e]cable</i> ‘impeccable’	<i>comm[e]morar</i> ‘to commemorate’	<i>f[e]licitat</i> ‘happiness’
<i>p[e]culiar</i> ‘peculiar’	<i>llargm[e]tratge</i> ‘feature film’	<i>f[e]minisme</i> ‘feminism’
<i>p[e]dal</i> ‘pedal’	<i>m[e]cànic</i> ‘special’	<i>f[e]titxisme</i> ‘fetishism’
<i>p[e]l·licula</i> ‘film’	<i>m[e]dalla</i> ‘medal’	<i>f[e]udalisme</i> ‘feudalism’
<i>p[e]riodista</i> ‘journalist’	<i>m[e]dicina</i> ‘medicine’	<i>v[e]hicle</i> ‘vehicle’
<i>p[e]ssimista</i> ‘pessimist’	<i>m[e]ditar</i> ‘meditate’	<i>v[e]locitat</i> ‘velocity’
<i>p[e]tició</i> ‘special’	<i>m[e]dieval</i> ‘medieval’	<i>v[e]njança</i> ‘vengeance’
<i>b[e]nigne</i> ‘benign’	<i>m[e]lodia</i> ‘melody’	<i>v[e]rbena</i> ‘party’
<i>b[e]nzina</i> ‘gas oil’	<i>m[e]tabolisme</i> ‘metabolism’	<i>v[e]rmut</i> ‘vermouth’
<i>b[e]ngala</i> ‘flare’	<i>m[e]tàl·lic</i> ‘metallic’	<i>v[e]rtical</i> ‘vertical’
<i>b. Non-learned words</i>		
<i>p[ə]daç</i> ‘dishtowel’	<i>m[ə]nestar</i> ‘need’	<i>f[ə]ixuc</i> ‘heavy’
<i>p[ə]nedir-se</i> ‘to regret’	<i>m[ə]ntida</i> ‘lie’	<i>f[ə]rir</i> ‘to hurt’
<i>p[ə]ssigar</i> ‘to pinch’	<i>m[ə]sura</i> ‘mesure’	<i>f[ə]roç</i> ‘ferocious’
<i>b[ə]sada</i> ‘kiss’	<i>m[ə]tzina</i> ‘poison’	<i>v[ə]dell</i> ‘calf’
<i>b[ə]ssó</i> ‘twin’	<i>m[ə]ló</i> ‘melon’	<i>v[ə]llut</i> ‘velvet’
<i>b[ə]tum</i> ‘shoe plish’	<i>m[ə]norquí</i> ‘Minorcan’	<i>v[ə]í</i> ‘neighbor’

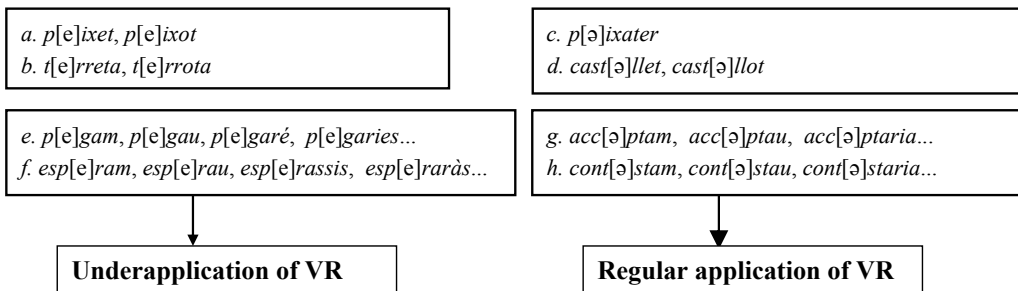
6 Generalizations & analysis

6.1 Previous accounts

Veny 1962, Bibiloni 1998, Mascaró 2002, Mascaró 2005, Wheeler 2005

→ paradigmatic effect in § 5.1 and § 5.2

(18) Asymmetries in § 5.1 and § 5.2



(19) Bibiloni (1998)

→ descriptive terms

Underapplication and normal application depends on:

a. Productivity of the process / connection between base ~ derivative

Productivity → underapplication ☹

b. Type of word

Non-learned words / + frequent words → underapplication

Learned words / – frequent words → normal application

⊗ Problems

— Condition in *b* has many exceptions:

ber[ə]nar, conf[ə]ssar, cont[ə]star, etc. → non-learned words

... when in fact it is possible to detect more general patterns behind these data.

— Therefore → loss of generalization.

— Opposite behaviour in non-alternating forms (§ see 5.3)

Non-learned words / + frequent words → normal application

Learned / – frequent words → underapplication

(20) Mascaró (2005)

→ *Optimal Paradigms model* (McCarthy 2002, 2005) for all cases (derivation and inflection)

Underapplication and normal application depends on:

a. A lexical mark responsible for the demotion, in the constraint hierarchy, of the markedness constraint favoring the schwa in unstressed position in the case of forms with underapplication.

⊗ Problems

— We must stipulate which forms bear this lexical mark and which ones do not, when in fact it is possible to detect more general patterns behind these data.

(21) Wheeler (2005)

→ *Paradigm Uniformity*

Underapplication and normal application depends on:

— Specific morphophonologically and phonetically conditioned PARADIGM UNIFORMITY constraints demanding the homogeneity of the stem across the inflectional and derivational paradigm.

PUIDENTPAL/CONJL/PHONCONTEXTS: A palatal vowel in the stem of an inflected Conjugation I verb when unstressed corresponds to a palatal vowel in the same stem when stressed, provided certain phonological conditions involving the adjacent consonants are fulfilled. (Wheeler 2005: 76)

IDENTB-PAL/_PRODAFF: A palatal vowel in a nominal stem, unstressed, before a productive affix, corresponds to a stressed palatal vowel in base. (Wheeler 2005: 76)

IDENTB-DPAL/BILAB_PRODAFF: A palatal vowel in a nominal stem, unstressed, preceded by a bilabial, before a productive affix, corresponds to a stressed palatal vowel in base. (Wheeler 2005: 76)

⊗ Problems

— Too specific and conditioned OO faithfulness constraints (without evidence in other languages), when in fact it is possible to detect more general patterns behind these data.

— Therefore → loss of generalization.

6.2 Disobedience within derivation**6.2.1 Generalizations**

Within derivation, there are *four* crucial conditions for the underapplication of vowel reduction, *none of which is sufficient on its own*.

- a. The unstressed affected vowel must have a correspondent stressed vowel in the stem of the primitive word. The first vowel of the word *petit* ‘small’, which does not alternate with any stressed vowel, undergoes regular vowel reduction to [ə] ([pətít]), whereas the first vowel of the word *ventet* ‘wind *dim.*’ does not undergo regular vowel reduction to [ə] ([ventót]) because it alternates with a stressed vowel ([vént] ‘wind’).
- b. The vowels in the alternating stressed stem must be front and mid (*i.e.* [é] and [ê]), in that the pressure does not work when the primitive has the low vowel [á] (*c[á]sa* ~ *c[ə]seta*; **c[a]seta*).
- c. The position of the vowels under surface correspondence must be at the left edge of the stem (cf. *pap[é]r* ‘paper’ ~ *pap[ə]ret* ‘paper *dim.*’, with normal application of vowel reduction to [ə], because the vowel is not at the left edge of the stem, *vs.* *p[é]ix* ‘fish’ ~ *p[e]ixet* ‘fish *dim.*’, *p[e]ixot* ‘fish *augm.*’, and, also, *Est[é]ve* ‘Stephan’ *vs.* *Est[e]vet* ‘Stephan *dim.*’ —in which the first vowel is epenthetic—, with underapplication of vowel reduction, because the vowel is located at the left edge of the stem).
- d. The derived form must be productive (*p[é]ix* ‘fish’ ~ *p[e]ixet* ‘fish *dim.*’, *p[e]ixot* ‘fish *augm.*’, with underapplication of vowel reduction, *vs.* *p[ə]ixater* ‘fisherman’, *p[ə]ixateria* ‘fish shop’, with normal application of vowel reduction; see Bibiloni 1998).

6.2.2 OT Analysis

The formalization in Optimality Theory terms of the particular cases with respect to vowel reduction would go as follows:

- a. The condition in *a* can be interpreted, as in previous accounts (see § 6.1), as a standard output-to-output faithfulness constraint effect. A constraint like O-IDENT(–post), which states that correspondent surface segments must have the same featural specification for [–post] explains the lack of reduction; BASE-

PRIORITY, on the other hand, ensures that the direction of the pressure is from the base to the derived form and not the other way round.

- b. The condition in *b* can be interpreted as the result of the activity of the context-free markedness hierarchy for margins (*i.e.* for unstressed vowels): *M/a >> *M/ε,ɔ >> *M/e,o >> *M/i,u >> *M/ə (see 6b).
- The high ranking of *M/a inhibits the possible effects of the constraint demanding homogeneity in the stem (*i.e.* O-OIDENT(-post)) when the alternating vowel is [a] (*c[á]sa* vs. *c[ə]seta*).
 - The high ranking of *M/ε, on the other hand, answers for the fact that the selected vowel in cases of paradigmatic pressure from a stem with [ɛ́] is [e] and not [ɛ] (*cel* [sɛ́l] vs. *celet* [seló́t]). The idea is that [ɛ] is too sonorous to appear in unstressed position in these dialects.

(22) *Universal constraint hierarchy for margins (stringency form)*

*M/a >> *M/a, *M/ε,ɔ >> *M/a, *M/ε,ɔ, *M/e,o >> *M/a, *M/ε,ɔ, *M/e,o, *M/i,u >> *M/a, *M/ε,ɔ, *M/e,o, *M/i,u, *M/ə²

- c. The condition in *c* can be interpreted as a prominence effect, in that in a prominent position (such as the left edge of the stem) a more prominent vowel than the schwa (*i.e.* [e]) is selected, whereas in a non-prominent position (such as the right edge of the stem), a non-prominent vowel (*i.e.* [ə]) is selected. This behavior makes evident the necessity of recognizing an additional prominent position (*i.e.* the left edge of the stem) apart from those already detected in previous studies (see 4 & 5). We propose, then, the following markedness positional constraint hierarchy according to which at the left edge of the stem, a prominent morphological position, elements of high sonority are preferred or, in other words, elements of low sonority are avoided.

(23) *Prominence hierarchy for vowels according to their position within the stem*

*ə/L-Stem-Edge >> *i,u/L-Stem-Edge >> *e,o/L-Stem-Edge >> *ε,ɔ/L-Stem-Edge >> *a/L-Stem-Edge

- d. The condition in *d*, finally, is a very important one in that it makes necessary a refinement of the submodel designed to account for surface resemblances between the members of a derivational paradigm. Since a different behavior is found depending on the kind of derivation (productive derivatives are more faithful to the base than non-productive derivatives), and given the fact that this is a very common pattern across languages, generated derivational paradigms should have

² For a complete justification of the stringency version of the universal constraint hierarchy for margins, see Pons & Ohannesian 2008, submitted, and Pons, submitted.

an uneven and irregular structure. In fact, a hierarchical structure is already predicted in Benua's TCT, in that the base has priority over the derived forms. But we propose an even more hierarchical structure: instead of flat paradigms, structured paradigms which contain subparadigms are generated, and therefore the OO-faithfulness constraints are relativized according to these subparadigms. In this way, the superior proximity of the productive derivative to the primitive form with respect to non-productive derivatives is explicitly formalized.³

(24) *Assumed features for vowels*

	i	e	ε	ə	a	ɔ	o	u
ATR	+	+	-	-	-	-	+	+
Low	-	-	-	-	+	-	-	-
High	+	-	-	-	-	-	-	+
Labial	-	-	-	-	-	+	+	+
Posterior	-	-	-	+	+	+	+	+

(25) *Relevant constraints*

— *Positional prominence constraints*

- a. *ə/L-Stem-Edge: Assign one violation mark for every [ə] at the left edge of the stem
- b. *M/a: Assign one violation mark for every [a] in the margin.
- c. *M/ε,ɔ: Assign one violation mark for every [ε] or [ɔ] in the margin.
- d. *M/e,o: Assign one violation mark for every [e] or [o] in the margin.

— *Transderivational correspondence constraints*

- a. OO-PARIDENT(-post): Within the derivational paradigm, assign one violation mark for each correspondent segment with a different specification for the feature [-post].
- b. OO-SUBPARIDENT(-post): Within the derivational subparadigm, assign one violation mark for each correspondent segment with a different specification for the feature [-post].

³ See Pons & Ohannesian 2008, submitted, for a detailed formalization of subparadigms within derivation based on the formal and semantic distances established between the base and the derivative forms.

(26) *Underapplication of vowel reduction in productive derivational forms with an alternating stressed [é] at the left edge of the stem*

/pedr+ə, pedr+ət+ə, pedr+er+ə/ cf. Base: [pédra]	BASE -PRIOR	*ə/L- Stem Edge	*M/e	OO-SUBPAR IDENT (-post)	*M/e, *M/i	OO- PARIDENT (-post)	IDENT(F)
☞ a. <<p[é]dra, p[e]dreta> p[ə]drera> <i>uniformity in the subparadigm</i>		*	*		*	****	*
b. <<p[é]dra, p[e]dreta>p[e]drera> <i>uniformity in the paradigm</i>			**		**!		
c. <<p[é]dra, p[ə]dreta>p[ə]drera> <i>no uniformity - normal application</i>		**		**!		****	**
d. <<p[ə]dra, p[ə]dreta>p[ə]drera> <i>pressure to the base</i>	*!	**					***

(27) *Underapplication of vowel reduction in productive derivational forms with an alternating stressed [é] at the left edge of the stem*

/terr+ə, terr+ət+ə, terr+estr/ cf. Base: [tér]	*M/e	BASE -PRIOR	*ə/L- Stem Edge	*M/e	OO-SUBPAR IDENT (-post)	*M/e, *M/i	OO- PARIDENT (-post)	IDENT (F)
☞ a. <<t[é]rra, t[e]rreta> t[ə]rreste> <i>partial uniformity in the subparadigm</i>			*	*		*	****	**
b. <<t[é]rra, t[e]rreta> t[e]rreste> <i>partial uniformity in the paradigm</i>				**		**!		**
c. <<t[é]rra, t[ə]rreta> t[ə]rreste> <i>no uniformity - normal application</i>			**		**!		****	**
d. <<t[ə]rra, t[ə]rreta> t[ə]rreste> <i>pressure to the base</i>		*!	**					***
e. <<t[é]rra, t[é]rreta> t[é]rreste> <i>no uniformity - normal application</i>	**!							
f. <<t[é]rra, t[é]rreta> t[ə]rreste> <i>total uniformity in the subparadigm</i>	*!		*				****	*

(28) *Normal application of vowel reduction in (non-)productive derivational forms with an alternating stressed [é] or [é] at the right edge of the stem*

/pəper, pəper+ət, pəper+er+ə/ cf. Base: [pəpə]	BASE -PRIOR	*ə/L- Stem Edge	*M/e	OO-SUBPAR IDENT (-post)	*M/e, *M/i	OO- PARIDENT (-post)	IDENT (F)
a. <<pap[é]r, pap[e]ret> pap[ə]rera> <i>uniformity in the subparadigm</i>			*!		*	****	*
b. <<pap[é]r, pap[e]ret> pap[e]rera> <i>uniformity in the paradigm</i>			**!		**		
☞ c. <<pap[é]r, pap[ə]ret> pap[ə]rera> <i>no uniformity - normal application</i>				**		****	**
d. <<pap[ə]r, pap[ə]ret> pap[ə]rera> <i>pressure to the base</i>	*!						***

6.3 Disobedience within inflection

6.3.1 Generalizations

Within verbal inflection, there are 3 crucial conditions for the underapplication of vowel reduction, *none of which is sufficient on its own*.

- The unstressed affected vowel must have a correspondent stressed vowel in the stem of another verbal form.
 - The vowel in the stressed stem must be front and mid-high (i.e. [é]), in that the pressure does not work when the primitive has [á] or [é].
 - The position of the vowels under surface correspondence must be at the left edge of the stem.
- d. → As inflectional paradigms are productive *per se*, productivity is not a factor at play here.

6.3.2 OT Analysis

- The condition on *a* can be interpreted as the result of an OP-IDENT(F) constraint (McCarthy [2002] 2005), which demands that surface correspondent segments must have the same featural specification for the features [-post] and [-ATR] (i.e. OP-IDENT(-post) & OP-IDENT(-ATR)). Overapplication of vowel reduction in stressed position is blocked by the high ranked markedness constraint *N/ə, which penalizes a segment of low sonority as a nucleus. (→ Within inflection, the direction of the pressure cannot be motivated, *a priori*, by any member of the paradigm. It is markedness the factor that governs the direction of the pressure; in this case: *N/ə; see 3d-e).

⊗ Problem with condition a! In the vowel system of Majorcan Catalan, we find [ə] in stressed position. This may be in contradiction with the invoked constraint *N/ə.

(29) *Schwa in stressed position in Majorcan Catalan*

<i>cad[ə]na</i>	‘chain’	<i>[ə]mpira</i>	‘(s/he) takes’
<i>c[ə]ba</i>	‘onion’	<i>menj[ə]l</i>	‘Eat it!’
<i>p[ə]l</i>	‘hair’	<i>menj[ə]-la</i>	‘Eat it! <i>fem. sing.</i> ’
<i>par[ə]t</i>	‘wall’	<i>comprar-m[ə]</i>	‘To buy for myself’
<i>s[ə]c</i>	‘dry’	<i>comprar-l[ə]</i>	‘To buy it <i>fem. sing.</i> ’
<i>pr[ə]n</i>	‘(s/he) takes’	...	

BUT! [ə] is not a productive phoneme anymore! As shown by...

(30) *Loanword adaptation in Majorcan Catalan*

<i>Intern[é]t</i>	‘Internet’	<i>etiqu[é]ta</i>	‘label’
<i>cass[é]t</i>	‘cassette’	<i>cacav[e]t</i>	‘peanut’
<i>carn[é]t</i>	‘identity card’	<i>ved[é]t</i>	‘cabaret star’
<i>bid[é]t</i>	‘bidet’	<i>cabar[é]t</i>	‘cabaret’
<i>xal[é]t</i>	‘villa’	<i>xicl[é]t</i>	‘chewing gum’
<i>atl[é]ta</i>	‘athlete’		

☺ Therefore...

— [ə] is permitted when underlyingly.

— [ə] is banned when derived.

b. The condition in *b*, as well as the fact that the result of the process is always [e] (and never [ɛ]), can be explained by the high ranking of the markedness constraints *M/a and *M/ɛ, which penalize these vowels in unstressed position and inhibit the possible effects of the constraint that demands uniformity in the stem.

c. The condition in *c* can be attributed to a prominence effect, in that in a prominent position (such as the left edge of the stem) a more prominent vowel than [ə] (*i.e.* [e]) is selected, whereas in a non-prominent position (such as the right edge of the stem) a non-prominent vowel (*i.e.* [ə]) is selected.

(31) Relevant constraints

— *Positional prominence constraints*

a. *ə/L-Stem-Edge: Assign one violation mark for every [ə] at the left edge of the stem
b. *M/a: Assign one violation mark for every [a] in the margin.
c. *M/ɛ,ɔ: Assign one violation mark for every [ɛ] or [ɔ] in the margin.
d. *M/e,o: Assign one violation mark for every [e] or [o] in the margin.

— *OP faithfulness constraints*

a. OP-IDENT(–ATR): Within the inflectional paradigm, assign one violation mark for each correspondent segment with a different specification for the feature [–ATR].
b. OP-IDENT(–post): Within the paradigm, assign one violation mark for each correspondent segment with a different specification for the feature [–post].

(32) *Underapplication of vowel reduction in inflected forms with an alternating stressed [é] at the left edge of the stem*

/sper/, /sper+ə+z/, /sper+ə/, /sper+a+m/, /sper+a+w/, /sper+ə+n/	*N/ə	*ə/L-Stem Edge	*M/e	OP IDENT (–post)	OP IDENT (–ATR)	*M/e, *M/i	IDENT (F)
☞ a. <<esp[é]r, esp[é]res, esp[é]ra, esp[e]ram, esp[e]rau, esp[é]ren>> <i>underapplication</i>			**			**	
c. <<esp[é]r, esp[é]res, esp[é]ra, esp[ə]ram, esp[ə]rau, esp[é]ren>> <i>normal application</i>		**		*(x8)	*(x8)!		**
c. <<esp[ə]r, esp[ə]res, esp[ə]ra, esp[ə]ram, esp[ə]rau, esp[ə]ren>> <i>overapplication</i>	****!						*****

(33) *Normal application of vowel reduction in inflectional forms with an alternating stressed [é] or [ɛ] at the right edge of the stem*

/kontest/, /kontest+ə+z/, /kontest+ə/, /kontest +a+m/, /kontest+a+w/, /kontest+ə+n/	*N/ə	*ə/L-Stem Edge	*M/e	OP IDENT (–post)	OP IDENT (–ATR)	*M/e, *M/i	IDENT (F)
a. <<cont[é]st, cont[é]stes, cont[é]sta, cont[e]stam, cont[e]stau, cont[é]sten>> <i>underapplication</i>			**!			**	
☞ b. <<cont[é]st, cont[é]stes, cont[é]sta, cont[ə]stam, cont[ə]stau, cont[é]sten>> <i>normal application</i>				*(x8)	*(x8)		**
c. <<cont[ə]st, cont[ə]stes, cont[ə]sta, cont[ə]stam, cont[ə]stau, cont[ə]sten>> <i>overapplication</i>	****!						*****

(34) *Normal application of vowel reduction in inflectional forms with an alternating stressed [é] at the left edge of the stem*

/ʃerr/, /ʃerr+ə+z/, /ʃerr+ə/, /ʃerr+a+m/, /ʃerr+a+w/, /ʃerr+ə+n/	*M/ɛ	*N/ə	*ə/L-Stem Edge	*M/e	OP IDENT (–post)	OP IDENT (–ATR)	*M/e, *M/i	IDENT (F)
a. <<x[é]rr, x[é]rres, x[é]rra, x[e]rram, x[e]rrau, x[é]rren>>				**		*(x8)	**!	**
☞ b. <<x[é]rr, x[é]rres, x[é]rra, x[ə]rram, x[ə]rrau, x[é]rren>>			**		*(x8)			**
c. <<x[é]rr, x[é]rres, x[é]rra, x[ɛ]rram, x[ɛ]rrau, x[é]rren>>	**!							
d. <<x[ə]rr, x[ə]rres, x[ə]rra, x[ə]rram, x[ə]rrau, x[ə]rren>>		****!						*****

7 Theoretical and empirical implications

7.1 The asymmetry between forms with a vowel at the left edge and forms with a vowel at the right edge advocates the need for recognizing an additional prominent position (*i.e.* the left edge of the stem), and the subsequent prominence hierarchy for vowels according to their position within the stem, apart from those already detected in previous studies (Crosswhite 1999, 2004; Cabré & Prieto 2003; Cabré & Prieto 2006; Lloret & Jiménez 2008):

(35) *Prominence hierarchy for vowels according to their position within the stem*

*ə/L-Stem-Edge >> *i,u/L-Stem-Edge >> *e,o/L-Stem-Edge >> *ε,ɔ/L-Stem-Edge >> *a/L-Stem-Edge,

7.2 The asymmetry between productive and non-productive derived forms demands an uneven and hierarchical structure for the paradigm candidates generated, so that the members in it can be unequally affected by the O-O Faithfulness constraints (Ohannesian & Pons 2008, in press).

[Ohannesian & Pons 2008 is an attempt to deal with the problem of inclusion within paradigms. It is shown how the Optimal Paradigms model (McCarthy [2001] 2005) and the Transderivational Correspondence Theory (Benua [1997] 1999) can be extended to apply not only within flat paradigms but also within paradigms with an internal uneven structure, in such a way that specific morphological categories, such as Number and Gender, or the productivity of a given derivative process are explicit in the formal machinery of the theory.]

7.3 The fact that labials favor [e] (see § 5.3) can be interpreted as a coarticulation effect.

7.4 The high ranking of *N/ó in Majorcan Catalan is not an *ad hoc* stipulation: it formally expresses the fact that the phonemic character of the schwa is becoming a relic, a circumstance which is additionally corroborated by the fact that loanwords with a stressed *e* are systematically realized with [é]: *Intern[é]t*.

7.5 Loanwords and productive derivation exhibit, as seen, [e]; this suggests that the asymmetric unstressed vowel system of Majorcan Catalan ([i] [u]; [] [o]; [ə]) is progressively becoming symmetric ([i] [u]; [e] [o]; [ə]).

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