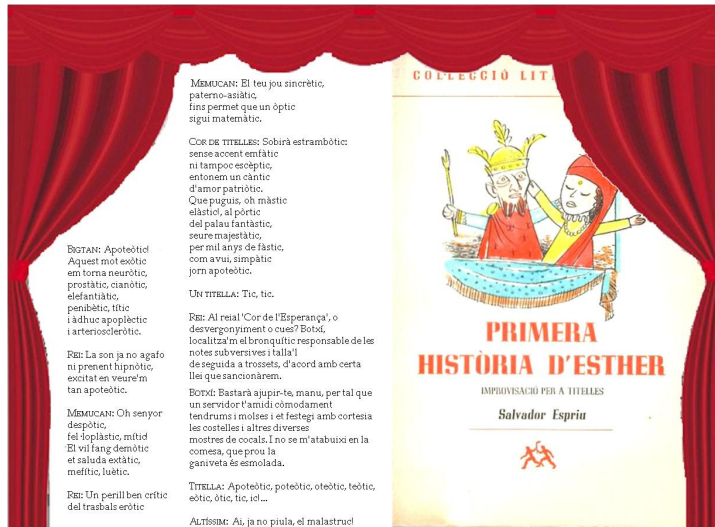


# (Un)Derived environment effects in Catalan and in other Romance languages

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**Abstract:** In this talk I will focus on some (morpho)phonological phenomena drawn from Catalan, Italian and Brazilian Portuguese that *—maybe just apparently—* only apply either in an underived or in a (specific) derived environment. The processes under evaluation are stressed-high-mid-vowel lowering and stress assignment in prestressing suffixed forms in Catalan (and Italian and Brazilian Portuguese), and *—if there is time left—* underapplication of vowel reduction in Majorcan Catalan (and in Brazilian Portuguese). I will show how intricate it is to provide a proper formalization of these phenomena under the OT orthodox machineries specifically developed to account for (un)derived environments effects (such as Comparative Markedness, OT-CC with Optimal Interleaving, etc.), as well as under HS.

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### 1. PRESTRESSING SUFFIXES IN CATALAN. BASIC PATTERNS

- In Catalan, the so called prestressing suffixes (henceforth PS) (*i.e.* *–i*, *–ic*, *–it*, *–id*, *–il*, *–im*, *–fíl*, *–fon*, *–graf*, *–metre*, *–leg*, *–log(a)*, *–metre*, *–ul*) show some intriguing patterns (Mascaró 1976, 1985) that have not yet been resolved (Mascaró 2003):

1.1. Unlike the rest of the derivational suffixes, they are unstressed (1).

(1) <i>Prestressing suffixes</i>		<i>Other derivational suffixes</i>	
CÈNtr-ic	'central'	cenTR-AL	'central'
carBÒn-ic	'carbonic'	carboN-ET	'carbon <i>dim.</i> '
CÀl-id	'warm'	caliD-Esa	'warmth'
deCÍ-metre	'decimeter'	deciM-AL	'decimal'
purPUR-i	'purple'	purpuR-ina	'metallic powder'

(NB: *Stressed syllables are indicated in capital letters.*)

1.2. The stress is always placed in the syllable immediately preceding the prestressing suffix (*i.e.* in the last syllable of the stem) (2). This is why paroxytone stems undergo stress shift to the last syllable of the stem (2a), whereas oxytone stems preserve the stress (2b).

(2a) *Stress shift*

<i>Paroxytone stems (paroxytone words after inflection)</i>		<i>Stress shift in PS words</i>	
CÀnon	‘canon’	caNÒn-ic	‘canonical’
aDÚlter	‘adulterous’	aduLTER-i	‘adultery’
ÀNgel	‘angel’	anGÈl-ic	‘angelical’
Àtom	‘atom’	aTÒmic	‘atomic’

<i>Paroxytone stems (proparoxytone words after inflection)</i>		<i>Stress shift in PS words</i>	
MÈtode	‘method’	meTÒd-ic	‘methodic’
SÒcrates	‘Sòcrates’	soCRÀt-ic	‘Socratic’
PÚRpura	‘purple’	purPUR-i	‘purplish’
SÁtira	‘satire’	saTÍr-ic	‘satirical’

(2b) *Stress preservation*

<i>Oxytone stems</i>		<i>Stress preservation in PS words</i>	
CENtre	‘center’	CÈNtr-ic	‘central’
moDEST	‘modest’	moDÈSt-ia	‘modesty’
carBÓ	‘carbon’	carBÒn-ic	‘carbonic’
CENT	‘a hundred’	CÈNt-im	‘cent’

Note how a PS can also be adjoined to a derived stem (which, due to the stressed character of “standard derivational” suffixes, are always oxytone); in these cases, the same patterns illustrated in (2b) are found (see 2c).

(2c) *PS and derived stems*

<i>Oxytone stems</i>		<i>Stress preservation in PS words</i>	
introducT-OR	‘introductory’	introducTOR-i	‘introductory’
diviS-OR	‘divisor’	diviSOR-i	‘dividing’

1.3. When the underived stem ends in a *stressed* high mid vowel ([é] or [ó]), this vowel is systematically low whenever the PS is added (3).

(3) *Vowel alternations in stressed position due to the adjunction of a PS*

<i>Stems with high mid vowels</i>		<i>Stems with low mid vowels</i>	
esf[é]r-a	‘sphaera’	esf[é]r-ic	‘spherical’
conv[é]	‘it is convenient’	conv[é]n-i	‘agreement’
mod[é]st	‘modest’	mod[é]st-ia	‘modesty’
carb[ó]	‘carbon’	carb[ó]n-ic	‘carbonic’
divis[ó]r	‘divisor’	divis[ó]r-i	‘dividing’

macarr[ó] ‘macaroni’ | macarr[ó]n-ic ‘macaronic’

→ **Vowel lowering process:** see relevant discussion about the UR in § 2.

1.4. This vowel lowering process is responsible not only for these vocalic alternations in stressed position, which in fact are unique in the phonology of Catalan, but also for vocalic alternations in unstressed / stressed position involving both words with regular vowel reduction (with [u] and [ə] in unstressed position) (4a) and words typically considered lexical exceptions to vowel reduction (with [o] and [e] in unstressed position) (4b).

(4) *Vowel alternations in unstressed / stressed position*(4a) *Bases: words with regular vowel reduction*

<i>Stems with reduced vowels</i>		<i>Stems with low mid vowels (PS words)</i>	
àt[u]m	‘atom’	at[ó]m-ic	‘atomic’
apòst[u]l	‘apostle’	apost[ó]l-ic	‘apostolic’
mèt[u]de	‘method’	met[ó]d-ic	‘methodical’
àng[ə]l	‘angel’	ang[é]l-ic	‘angelical’
èt[ə]r	‘ether’	et[é]r-i	‘ethereal’
cadàv[ə]r	‘cadaver’	cadav[é]r-ic	‘cadaverous’

(4b) *Bases: lexical exceptions*

<i>Stems with exceptionally unreduced vowels</i>		<i>Stems with low mid vowels (PS words)</i>	
càn[o]n	‘canon’	can[ó]n-ic	‘canonical’
er[o]s	‘Eros’	er[ó]t-ic	‘erotic’
micr[o]	‘micro’	micr[ó]fon	‘microphone’
tòt[e]m	‘totem’	tot[é]m-ic	‘totemic’
cin[e]	‘cinema trunc.’	cin[é]l-fil	‘cinophile’
tel[e]	‘TV trunc.’	tel[é]l-fon	‘telephonic’

1.5. Interestingly enough, vowel lowering just affects stems in PS words. Other derived forms (denominals and other zero derivational forms), which share the same stem and in which there is a similar “restressing” effect, do not show vowel lowering (5a).

(5a) *No vowel lowering in other “derived forms with similar prosodic conditions”*

<i>Other derived words (verbal forms) (denominals with “zero” derivation)</i>	<i>Nominal bases</i>	<i>PS words</i>
num[é]ri ‘to number 3rd P sing. PS’	núm[ə]ro	num[é]r-ic
abs[é]nti ‘to be absent 3rd P sing. PS’	abs[é]nt	abs[é]n-cia
c[é]ntri ‘to center 3rd P sing. PS’	c[é]ntr	c[é]ntr-ic
cl[ó]na ‘to clone 3rd P sing. PI’	cl[ó]n	cl[ó]n-ic
adult[é]ri ‘to adulterate 3rd P sing. PS’	adúlt[ə]r	adult[é]r-i

carb[o]ni ‘carbonize. 3rd P *sing.* PS’ | carb[ó] | carb[ɔ̃]n-i

Exceptionally, though, some denominals with zero derivation can show low mid vowels.

(5b)

Some derived words (verbal forms) (denominals with zero derivation)	Nominal bases
apostr[ɔ̃]fa ‘to apostrophize 3rd P <i>sing.</i> PI’	apòstr[u]f ‘apostrophe’
cronom[ɛ̃]tra ‘to time 3rd P <i>sing.</i> PI’	cronòm[ə]tre ‘chronometer’

## 2. UNDERLYING REPRESENTATIONS AND SUBSEQUENT PHONOLOGICAL PROCESSES<sup>2</sup>

### 2.1. Vowel alternations in stressed position

(6)

Vowel alternation	UR	impossible UR	
esf[ɛ̃]r-a	esf[ɛ̃]r-ic	esf/e/r	*esf/ɛ̃/r
mod[ɛ̃]st	mod[ɛ̃]st-ia	mod/e/st	*mod/ɛ̃/st
carb[ó]	carb[ɔ̃]n-ic	carb/o/n	*carb/ɔ̃/n
macarr[ó]	macarr[ɔ̃]n-ic	macarr/o/n	*macarr/ɔ̃/n

Why?

→ impossible to derive vowel raising (i.e. /ɛ/ → [e]) through the constraint hierarchy of Catalan, unless we consider it is a case of UDEE (thus, the title of the talk).

Therefore...

→ vowel lowering process

### 2.2. Vowel alternations in unstressed (cases with regular VR) / stressed position

(7)

Vowel alternation	Possible UR (under RB)		
àt[u]m	at[ɔ̃]m-ic	àt/ɔ̃/m	àt/o/m
èt[ə]r	et[ɛ̃]r-i	et/ɛ̃/r	et/e/r

Why?

→ It is possible to derive VR of /ɔ̃/~o/ and /ɛ̃/~e/ to [u] / [ə], respectively, through the constraint hierarchy of Catalan

Therefore...

→ vowel lowering process in stressed position (if UR /o/~e/)

→ vowel quality preservation in stressed position (if UR /ɔ̃/~ɛ̃/)

ATTENTION: cases of the type *núm[ə]ro*, *num[e]ri*, *num[ɛ̃]ric*.

<sup>2</sup> For some discussion about the underlying representation of these forms framed within the SPE model, see Bonet & Lloret (1998). See also Jiménez (2002) for an explanation of this topic in descriptive terms.

### 2.3. Vowel alternations in unstressed (exceptional cases wrt VR) / stressed position

(8)

Vowel alternation	Possible UR (under RB)		
càn[o]n	can[ɔ̃]n-ic	càn/o/n	càn/ɔ̃/n
tot[e]m	tot[ɛ̃]m-ic	tot/e/m	tot/ɛ̃/m

Why?

→ It is possible to derive partial VR of /ɔ̃/ and /ɛ̃/ to [e] and [e], respectively, through the constraint hierarchy of Catalan.

Therefore...

→ vowel lowering process in stressed position (if UR /o/~e/)

→ vowel quality preservation in stressed position (if UR /ɔ̃/~ɛ̃/)

## 3. VOWEL LOWERING. INTERPRETATIONS, DESCRIPTIVE GENERALIZATIONS AND INTERIM ANALYSES

### 3.1. A purely phonological interpretation: (high) vowel dissimilation

- Most PS suffixes contain a high front vowel ([i]) (i.e. *-i*, *-ic*, *-it*, *-id*, *-il*, *-im*, *-fil*) and some others a high back vowel ([u]) (i.e. *-ul*, *-fon* [fun]), which would enhance the vowel lowering of the /e/ and the /o/ in the stem, due to a dissimilatory effect.

(9) \*c[ɛ̃]ntr[i]c \*carb[ó]n[i]c → c[ɛ̃]ntr[i]c, carb[ɔ̃]n[i]c  
\*tel[ɛ̃]f[u]n \*micr[ó]f[u]n → tel[ɛ̃]f[u]n, micr[ɔ̃]f[u]n

- ARGUMENTS IN FAVOR (1). Other cases not involving PS suffixes show the same effects: a following [i] or [j] in the adjacent syllable (10a) or a following [j] in the same syllable (10b) favor the occurrence of low mid vowels (almost categorical pattern).

(10a) Occurrence of low mid vowels whenever a posttonic [i] or [j] follows (in the adjacent syllable)

col·l[ɛ̃]gi	confer[ɛ̃]ncia	Ant[ɔ̃]ni	cab[ɔ̃]ria
‘school’	‘lecture, speech’	‘Anthony’	‘obsession pop.’
ex[ɛ̃]rcit	d[ɛ̃]ria	cust[ɔ̃]dia	hist[ɔ̃]ria
‘army’	‘obsession pop.’	‘guard’	‘history’

(Data from Mascaró 2008, 2011 [ms.]; Wheeler 2005: 37-52, *GIEC*, personal enquiries; see Appendix-A) (NB: *PS suffixed words are, of course, excluded*)

(10b) Occurrence of low mid vowels whenever a posttonic [j] follows (in the same syl.)

nucl[ɛ̃]ic	‘nucleic’	Alc[ɔ̃]i	‘place name’
seborr[ɛ̃]ic	‘sebaceous’	alm[ɔ̃]ina	‘tip’
ol[ɛ̃]ic	‘oleic’	andr[ɔ̃]ide	‘android’

(Data from Mascaró 2008, 2011; Wheeler 2005: 37-52, *GIEC*, personal enquiries; Appendix-A)

→ Note how the [u] in *-f[u]n* and *-l[u]ga*, being high, could also have a dissimilatory effect.)

-fon	tel[é]-f[u]n	'telephone'	micr[ó]-f[u]n	'microphone'
-loga	NE		psic[ó]-l[u]g(a)	'psychologist'

Cf. inherited words: *c[ó]dul*; loanwords and the like: *[ó]NU*, *[é]du*...

- ARGUMENTS IN FAVOR (2). This tendency emerges in loanwords and learned words, which show the same patterns.

(11) Occurrence of low mid vowels in loanwords and learned words

M[é]ssi	Cr[ó]yff
L[é]iden	gas[ó]il
i[é]ti	f[ó]li
conf[é]ti	b[ó]li
espagu[é]ti	Conan D[ó]ile
f[é]rri	G[ó]ia
B[é]tis	
Ob[é]lix	
Ast[é]rix	

(Mascaró 2002, 2011 [ms.]; *GIEC*, personal enquiries)

- ARGUMENTS AGAINST. Not all PS suffixed words contain high vowels: *-graf*, *-metre*, *-leg* and, nevertheless, lowering applies:

(12) Low mid vowels with PS without high vowels

-metre	tel[é]-m[ə]tre, term[ó]-m[ə]tre, cron[ó]-m[ə]tre
-graf	tel[é]-gr[ə]f
-man	mel[ó]-m[ə]n, clept[ó]-m[ə]n
-leg	psic[ó]-l[ə]g, astr[ó]-l[ə]g

POSSIBLE DIACHRONIC EXPLANATION OF THESE FACTS. The pattern found in PS suffixed words with high (front) vowels (inducing vowel lowering and with a significant highest frequency) could have attracted the pattern of the rest of PS suffixed words without high (front) vowels.

**3.2. A purely prosodic interpretation** (Fabra 1912, 1956; Mascaró 2003, 2008, 2011 [ms.])

- Words with a marked prosodic structure (such as paroxytones ending in a *-C* and proparoxytones) tend to show low mid vowels (Fabra 1912: 459-460, 1956: 4; Mascaró 2003: 119). Note that all PS contain a final *-C*, except for *-i*.

- ARGUMENTS IN FAVOR. Most words (inherited words, loanwords, and learned words) with this prosodic structure show low mid vowels.

(13) Low mid vowels in paroxytone words ending in a *-C* / paroxytone words

p[é]tal	abd[ó]men	an[é]cdota	acr[ó]polis
'petal'	'abdomen'	'anecdote'	'Acropolis'
f[é]mur	an[ó]mal	d[é]spota	c[ó]mode
'femur'	'anomalous'	'despot'	'comfortable'

(Data from Fabra 1912: 459-460; Mascaró 2011 [ms.]; *GIEC*; see Appendix)

(NB: Words with PS and with a following [i] / [j] are, of course, excluded)

- ARGUMENTS AGAINST (1). This tendency is not categorical in the case of paroxytone words ending in a *-C*.

(14) Paroxytone non-verbal lexical elements ending in a *-C* (without posttonic *-i* and without a PS)

Words with [é]	11	Words with [ó]	4
Words with [é]	18	Words with [ó]	24
% [é]	<b>62,1</b>	% [ó]	<b>85,7</b>

(Mascaró 2011 [ms.]: 13)

- ARGUMENTS AGAINST (2). There are some exceptions in the case of proparoxytone words.

(15) Exceptions

c[é]rvola	'deer'	f[ó]rmula	'formula'
fer[é]stega	'wild'	p[ó]lvora	'powder'
ll[é]pola	'greedy fem.'	t[ó]mbola	'tombola'

(Some other exceptions: *t[ó]rtora*, *g[ó]ndola*, *esc[ó]rpora*...)

- ARGUMENTS AGAINST (3). The PS *-i* does not end in a *-C*, so that a prosodic marked structure is not created when this PS is adjoined to the stem.

(16) Vowel lowering with *-i*

adult[é]ri	'adultery'
carb[ó]ni	'chemical element'
imp[é]ri	'empire'
.....	

- Mascaró (2003: 119), though, after precluding a DEE approach (framed within Comparative Markedness (McCarthy 2003) to these data (see § 3.3), suggests, following Fabra's observations, that what it is at play here is a constraint against high mid vowels in marked stressed words (such as paroxytones and proparoxytones).

- $_{O,N} *e, *o$  ES (“no high mid vowels under **Exceptional Stress**”) is the constraint responsible for vowel lowering, and it ensures that all stressed vowels, old and new, lower in marked stress structures.

- Cases like *préssec* (see 14) and *fórmula* (see 15) have to be treated as exceptions.

- **Remaining problems:** a) almost half of the oxytone words with [é] ending in a –C (see 14: *pr[é]ssec*) should be treated as exceptional. b) the PS –i does not create an exceptional prosodic structure (see 16: *adult[é]ri*).

- Our solution: Only [e] and [o] in a *derived* (i.e. new) prosodic structure are forbidden

(17)  $\rightarrow_N$  ES  $*e, *o$  >> IDENT(ATR) >>  $_O$  ES  $*e, *o$

- Remaining problem. The PS –i does not create an exceptional prosodic structure.

POSSIBLE DIACHRONIC EXPLANATION OF THESE FACTS. The pattern found in PS suffixed words with the syllabic structure (C)VC (inducing vowel lowering and with a significantly higher frequency) could have attracted the pattern of the PS suffixed words with –i.

### 3.3. A morphoprosodic interpretation (prosodic / phonological DE)<sup>3</sup>

- Vowel lowering occurs in a prosodic derived environment, that is, whenever a (vacuous or non-vacuous) restressing process occurs, due to the adjunction of an unstressed derivational affix (Mascaró 1976; Mascaró 2003).

(18)

	Base	Restressing	Vowel lowering
a. /o/	CÀnon	caNÒn-ic	can[ó]n-ic
/e/	aDÚlter	adulTER-i	adult[é]r-i
/o/	MÈtode	meTÒd-ic	met[ó]d-ic
b. /o/	CROM	CRÒmic	cr[ó]m-ic
/e/	HoMER	hoMÈric	hom[é]r-ic

- Using Compactive Markedness (McCarthy 2003), the ranking  $_N *e, *o$  >> IDENT(ATR) >>  $_O *e, *o$  could explain the avoidance of [e] and [o] in derived structures (by restressing [stress shift], in this case) and, therefore, vowel lowering (Mascaró 2003: 116).  $\rightarrow$  “lowering of only derived stressed mid vowels”.

- ARGUMENTS AGAINST (1) (*theoretical*). It is impossible to discriminate between *old* and *new* structures as far as the quality of the vowels is concerned (Mascaró 2003: 116): the FFCs (i.e. [kánónik]) and the candidates without vowel lowering (i.e. [kənónik]) are identical wrt vowel quality.

(19)

/kánónik/	ONE WORD STRESS	$_N *e, *o$	IDENT(ATR)	$_O *e, *o$
FFC a. kánónik	*!			*
☹ b. kənónik		Satisfied!	*	*
☺ c. kənónik			**!	

(Adapted from Mascaró 2003: 116)

- The problem is even clearer in oxytone bases (*cr[ó]m*, *cr[ó]mic*), where vacuous “restressing” applies.

- ARGUMENTS AGAINST (2) (*empirical*). It is not always the case that vowel lowering occurs due to restressing (stress shift) (Mascaró 2003: 118).

(20) *Denominal verbal forms*

/e/	NÚmero	num[e]ri
	aDÚlter	adult[e]ri
/o/	Àncora	anc[o]ra
	FÒSfor	fosf[o]ra

- This is why Mascaró (2003) precludes the *prosodic* DEE approach and abandons, in fact, his own approach (in Mascaró 1976), which could be sustained, in the SPE model, thanks to the *strict cycle condition* (SCC): see (22).

- Our solution to the theoretical problem: stress is not present in the UR, so that the candidates without vowel lowering ( $*[kánónik]$ ,  $*[krómik]$ ), with a different structure than the FFC ([kanónik], [kromik]), incur in a violation of  $_N *e, *o$  (No new stressed  $*e, *o$ ) and therefore, are (happily ☺) discarded.

(22) Some history: According to Mascaró (1976), a vowel lowering rule of the type [+syl, –high, +acc]  $\rightarrow$  [–ATR] applies under certain conditions (i.e. when certain new information is added). The difference between (a) and (b) (below) is the following: in (a) the property [+acc] is underlying information (so that no crucial new information is added by any cycle), but in (b) there is a rule that assigns stress to the preceding vowel when a PS is added (so that crucial new information is added and the rule of vowel lowering can be applied). The rule of vowel lowering, moreover, applies whether or not the vowel was already stressed in another cycle, following the SCC: this explains vowel lowering in (c).

a.	b.	c.
c[é]ntre, c[é]ntri	c[é]ntric	símb[u]l $\rightarrow$ símb[ó]lic
cal[ó]r, acal[ó]ri	cal[ó]ric	

<sup>3</sup> § 3.3 and § 3.4 are presented in Mascaró (2003) as a single interpretation: for the sake of clarity, I split them into two interpretations.

### 3.4. A PURELY MORPHOLOGICAL INTERPRETATION (morphological DE)

- Vowel lowering occurs in a morphological derived environment, that is, whenever an unstressed derivational affix is adjoined to the stem, whereas it does not occur in non-derived environments.

(23)

NDE	NDE	DE
mod[e]st ‘modest’	mod[e]sta ‘modest <i>fem.</i> ’	mod[é]stia ‘modesty’
divis[o]r ‘divisor’	divis[o]ra ‘divisor <i>fem.</i> ’	divis[ó]ri ‘dividing’

- ARGUMENTS IN FAVOR: Coincidence between structures created by derivation (*mod[é]stia*) and structures present in the adaptation of loanwords and in learned words (with a general tendency to adapt *e / o* as [é] and [ó]).
- ARGUMENTS AGAINST. It is not always the case that vowel lowering occurs in a derived environment: “zero” derivation forms, as seen, do not show vowel lowering (Mascaró 2003)

(24) *Denominal verbal forms without vowel lowering*

número	num[e]ri
centre	c[e]ntri
adúlder	adult[e]ri

- Solution: Are the structures in (24b) strictly derived?

### 4. THE INTERACTION BETWEEN STRESS ASSIGNMENT, MORPH REALIZATION, AND VOWEL LOWERING VIA OT-CC/OI

**4.1. Lack of synchronic consistency in the previous interpretations.** According to our view, the interpretations exposed in § 3 are circumstances that, all together, might have diachronically lead to a specific synchronic situation. Due to the significant number of counterexamples and exceptions, though, none of the interpretations can be sustained from a strictly synchronic point of view.

**4.2. New descriptive generalizations.** In this talk I show that among these data it is possible to detect some consistencies which in principle *could* help us to make a picture of how the analysis *could* be.

- Prestressing suffixes, unlike the rest of derivational affixes, behave as most inflectional affixes, as far as stress assignment is concerned (*esFER-a*, *carbŌn-ic* vs. *carboNET*): both kinds of affixes are “invisible” to stress.

(25)

→ PS = Inflectional affixes wrt stress assignment  
 → PS ≠ Derivational affixes wrt stress assignment

- But they behave differently as for vowel lowering (*carb[ó]n-s*, *esf[é]r-a* vs. *carb[ó]n-ic*, *esf[é]r-ic*), as they do with respect to other derivational affixes (*num[é]ri*, *carb[ó]ni*, etc.).

(26)

→ PS ≠ Inflectional affixes wrt to vowel lowering  
 → PS ≠ Other derivational affixes (zero derivation) wrt vowel lowering

- Therefore: The behavior of PS with respect to stress assignment has to be considered exceptional with respect to the rest of derivational affixes, but not exceptional with respect to inflectional affixes.
- Therefore: The behavior of PS with respect to vowel lowering has to be considered as exceptional within the phonology of Catalan, and, in fact, it cannot be derived through the constraint ranking of the language.

### 4.3. Preanalysis of vowel lowering. The problems related to vowel lowering as a DEE

**4.3.1.** Constraint hierarchy to explain the distribution of stressed mid vowels in Catalan (contrasting in stressed position: s[é]ju ‘his, her, its’ ~ s[é]ju ‘(s/he) sits’; s[ó]ju ‘(you) are’ ~ s[ó]ju ‘salary’, and a large etc.):

(27) IDENT(ATR) >> \*é, \*ó >> \*é, ó

→ **CRUCIAL: MARKEDNESS CANNOT explain vowel lowering (or vowel raising)**

Therefore:

- We cannot explain the data as an instance of an orthodox DEE à la McCarthy (2007) / Wolf (2008) [See Appendix-B, for more info about these proposals.]

[Let’s take a look first to McCarthy (2007) & Wolf (2008) general proposals, go to the Appendix-B]

#### What is a DEE according to McCarthy’s and Wolf’s proposals?

In McCarthy (2007) and Wolf (2008), DEE [in our case: *esf[é]r-ic*, *carb[ó]n-ic?*] are explained through the blocking of a general process of the language (induced by M >> F<sub>2</sub>), which applies in the DE [in our case: *esf[é]r-ic*, *carb[ó]n-ic?*], **in an underived context** [in our case: *esf[é]ra*, *carb[ó]*], **through PRECEDENCE constraints of the type PREC(F<sub>1</sub>, F<sub>2</sub>) ranked above the constraint hierarchy** (i.e. PREC(F<sub>1</sub>, F<sub>2</sub>) >> M >> F<sub>2</sub>). These PRECEDENCE constraints demand that a violation of F<sub>2</sub> must be preceded by a violation of F<sub>1</sub>.

- In other words (in terms of “application of processes”), “a process (F<sub>2</sub> violation) is allowed to apply only when its application is made possible by the application of some other process (F<sub>1</sub>-violation)” (Wolf 2008: p. 252).
- Only *apparently*, then, Catalan data related to PS are instances of DEE.

(28) Explanation

→ Morphologic DE?: vowel lowering [IDENT(ATR) violation] after affixation [INSERT-affix violation]?

→ Prosodic DE: vowel lowering [IDENT(ATR) violation] after restressing [DEP(Stress) violation]?

- NO: Vowel lowering in the DE cannot be achieved through:

(29) \*é, \*ó >> IDENT(ATR) >> \*é, ó

BECAUSE both /e, o/ and /ɛ, ɔ/ underlying vowels need to be protected

- Another (related) relevant problem: IDENT(ATR) cannot be placed as the second term of the PRECEDENCE constraints because it is always vacuously satisfied by the chains without vowel lowering (see, for instance, the tableaux in (33-36)). Consequence of this: vowel lowering cannot apply after stress assignment or after PS-affixation (see 28), in other words, it cannot be conceived as an orthodox prosodic DEE or as an orthodox morphological DEE.
- SOLUTION → additional clause to the PRECEDENCE constraints: c) the second term (F<sub>2</sub>) in the PRECEDENCE constraint has to be violated, so that vacuous satisfaction is not possible (See Kavitskaya & Staroverov 2010).
- Remaining MAJOR PROBLEM: Given the constraint ranking IDENT(ATR) >> \*é, \*ó >> \*é, ó, though, the candidate chains with vowel lowering cannot be generated, because they are not harmonically improving (see the tableaux in 33-36 and the Appendix-B, page for the requirements that chains must accomplish).
- Because of the same reason, that is, because of the “harmonic improvement” condition, moreover, also makes vowel lowering impossible within Harmonic Serialism.

**4.4. Preanalysis for stress assignment. In this case, there are no problems**

- Stress assignment *crucially* precedes PS and INFL affixation (*i.e.* PS and INFL morph insertion follow stress assignment.)
  - PREC[DEP(Stress), PS-affixation]
  - PREC[DEP(Stress), INFL-affixation]

**4.5. Some (non orthodox and somehow crazy?) attempts**

(I omit here the solution based on the modification of the conditions of violation of the PRECEDENCE constraints, suggested in Kavitskaya & Staroverov 2010; see above)

**Stress assignment precedes PS and INFL affixation** (not problematic)

→ See tableaux (33) and (34)

(30) **PREC(DEP(stress), PS-affixation):** Assign a violation-mark to a candidate for each time that:

- A PS morph is inserted (a violation of INSERT-PS), and this is not preceded by stress assignment (a violation of DEP(Stress))
- A PS morph is inserted (a violation of INSERT-PS), and this is followed by stress assignment (a violation of DEP(Stress)).

(31) **PREC(DEP(stress), INFL-affixation):** Assign a violation-mark to a candidate for each time that:

- An INFL morph is inserted (a violation of INSERT-PS), and this is not preceded by stress assignment (a violation of DEP(Stress))
- An INFL morph is inserted (a violation of INSERT-PS), and this is followed by stress assignment (a violation of DEP(Stress)).

→ Idea behind: PS and INFL are equally blind to stress assignment.

**Vowel lowering precedes PS and INFL affixation**

→ See tableau (33)

(32) **PREC(IDENT(ATR), PS-affixation):** Assign a violation-mark to a candidate for each time that:

- A PS morph is inserted (a violation of INSERT-PS), and this is not preceded by vowel lowering (a violation of IDENT(ATR))
- A PS morph is inserted (a violation of INSERT-PS), and this is followed by vowel lowering (a violation of IDENT(ATR)).

→ Idea behind: PS morphs can only be attached to stems with low vowels. Idiosyncrasy of PS.

**Other (more or less crazy) options:**

**Stress assignment precedes vowel lowering**

→ See tableau (35)

→ Idea behind: Vowel lowering occurs after stress assignment. Preference for “strong” vowels in stressed position. Similar ideas in Cabré (2009) and Kenstowicz (2010).

**Vowel lowering precedes stress assignment**

→ See tableau (36)

→ Idea behind: Stress can only be assigned to low vowels. Attraction to the “strong” vowels.

## 5. OTHER ROMANCE LANGUAGES WITH SIMILAR BEHAVIORS

### 5.1. ITALIAN AND PORTUGUESE PATTERNS

#### 5.1.1. ITALIAN

- (1) *Vowel lowering in prestressing suffixes (not identified as such by Kenstowicz)*  
(stress shift cases = Catalan)

àtomo	'atom'	atòm-ic-o	'atomic'
nùmero	'number'	numèr-ic-o	'numeric'
gènere	'kind, sort'	genèr-ic-o	'generic'
gènesi	'genesis'	genèt-ic-o	'genetic'
período	'period'	periòd-ic-o	'periodic'
simbolo	'symbol'	simbòl-ic-o	'symbolic'
schèletro	'skeleton'	schelètr-ic-o	'skelectric'
anemia	'anemia'	anèm-ic-o	'anemic'
armonia	'harmony'	armòn-ic-o	'harmonic'
ironia	'irony'	iròn-ic-o	'ironic'
melodia	'melody'	melòd-ic-o	'melodic'
parodia	'parody'	paròd-ic-o	'parodic'

- (2) *Vowel preservation in other suffixed forms*  
(zero nominaliz. and verbaliz., whenever the stress remains in the same position)  
(= Catalan)

pésce	'fish'	pscàre, péscò	'to fish'
sécco	'dry'	seccàre, sécco	'become dry'
códa	'tail'	scodàre, scódo	'remove tail'
mòla	'millstone'	molàre, mòla	'polish'
gèlo	'cold'	gelàre, gèla	'freeze'
volàre, vólo	'to fly'	vólo	'flight'
segàre, ségo	'to cut'	séga	'saw'
snodàre, snòdo	'untie'	snòdo	'solution'
pregàre, prègo	'to pray'	prègo	'request'

- (3) *Vowel lowering in other PS suffixed forms (identified as such by Kenstowicz)*  
(“non stress-attracting suffixes”; “vacuous restressing cases”)

crédere	'to believe'	crèdulo	'credulous'
depòrre	'to put down'	depòsito	'deposit'
Napoleóne	'Napolean'	Napoleònide	'descendant of Napolean'
coróna	'crown'	corònide	'coronari'
carbóne	'coal'	carbònio	'carbon'
Platóne	'Plato'	Platònico	'Platonic'
oròscopo	'horoscope'	microscòpio	'microscope'

- (4) *Parallisms in hypocoristics, acronyms...*

Giuseppe	Pèppe	Cf. Salvatore	Tóre	Nicòla	Còla (with Faith.)
Antònio	Tòto				
fotogràfia	fòto				
ONU	[5]NU	Organizzazione delle Nazioni Unite			

### 5.1.2. Brazilian Portuguese

- (1) Difference between verbs (lost of contrast between open and closed mid vowels) and nouns (preservation of the contrast)

a. morár 'to reside' (loss of contrast)	
1 sg. m[õ]ro	1 pl. m[o]rámos
2 sg. m[õ]ras	2 pl. m[o]ráis
3 sg. m[õ]ra	
3 pl. m[õ]ran	

b. noun (contrast)		verb (loss of contrast)
dem[õ]ra	'delay'	dem[õ]ra 'delays'
esc[õ]va	'brush'	esc[õ]va 'brushes'
s[ê]rvo	'servant'	s[ê]rve 'serves'
ap[é]lo	'appeal'	ap[é]la 'appeals'

c. nouns (residual contrasts)	
p[ó]rco	m[ó]rto masc. sg.
p[õ]rco	m[õ]rtos masc. pl.
p[õ]rca	m[õ]rta fem. sg.
p[õ]rcas	m[õ]rtas fem. pl.
'pig'	'dead person'

### 5.2. KENSTOWICZ ([2010] 2011) APPROACH

→ Main argumentation: *Vocale incerta, vocale aperta*

- Kenstowicz ([2010] 2011) examines various contexts in which Italian phonology reveals a preference for open mid vowels in stressed position.

[In descriptive terms... Preference for *vocale aperta*, whenever there is...]:

a) **Stress shift [native phonology]**. Cases in which the derivational morphology requires the stress to shift onto an unstressed mid vowel in the base and the speaker must decide between an open vs. closed realization. These include stress shifts induced by suffixation (*nùmero* -> *numèrico*) as well as truncations of various sorts (*Cecilia* -> *Cèci*, *fotogràfia* -> *fòto*, *Organizzazione delle Nazioni Unite* -> *òNU*).

b) “**Restressing**” [native phonology]. The preference for open vowels appears in various scattered instances of “restressing” where the final syllable of the base falls under the control of a prestressing suffix such as *coróna* -> *corònde*.

c) **Learned words and loanwords [non-native phonology]**. Open vowels regularly appear as the adaptation of mid vowels in loanwords (à la Cabré, à la Jiménez & Lloret). These include the *voci dotte* from Latin as well as more recent loans from Western languages such as English. In these cases the {é, õ} > {ê, ó} preference overrides faithfulness to the source language even in the outermost stratum of the lexicon.

d) **Statistical preference in the lexicon**. The preference appears statistically in various contexts such as proparoxytone verbs (à la Mascaró), mid back vowel verbal roots in *-are*, and in the closed syllable created by an *sC* cluster.



[In analytical / formal terms...]:

a) Analysis in which this preference follows from the Universal Grammar constraint that aligns stressed syllables with the sonority hierarchy [for which de Lacy's (2004) stringency constraints are invoked.]  
b) In Italian, instead of stress being attracted to a more sonorous vowel, the sonority of a vowel is altered in the presence (or absence) of stress, with closed vowels changing to open in the former situation and open vowels changing to closed in the latter.

[Functional grounding...]:

a) **Phonetic motivation** for the open mid vowel preference. Duration and intensity (key correlates of stress in Italian) align well with vowel height.  
b) **Vowel dispersion motivation.** Data from two different studies of the location of stressed and unstressed vowels in F1/F2 vowel space show that unstressed mid vowels are much closer to {é,ó} than to {é, ɔ} and hence the preference for open mid vowels in stressed position is a matter of markedness rather than faithfulness. The data also reveal that the open {é, ɔ} are more separated from {a} than the closed {é,ó} are from {i,u} and hence the overall dispersion of vowels could be an additional motivation for the {é, ɔ} > {é,ó} preference.

About underapplication of vowel reduction (just some notes)

### Majorcan Catalan

Let's have a look at:

C. Pons-Moll (2013). «Underapplication of vowel reduction to schwa in Majorcan Catalan. Some evidence for the left syllable of the stem as a prominent position and for subparadigms». In: S. Kan, C. Moore-Cantwell, R. Staubs (ed.), Proceedings of the 40th Annual Meeting of the North East Linguistic Society. Graduate Linguistic Student Association, p. 121-135. [NB: Topic also presented and published (with a different focus) in the *Proceedings of Going Romance* 2009, 2011]. Available at: [http://works.bepress.com/claudia\\_pons-moll/3/](http://works.bepress.com/claudia_pons-moll/3/).

Clàudia Pons-Moll. "Loanword Phonology, Lexical Exceptions, Morphologically Driven Underapplication, and the Nature of Positionally Biased Constraints" *Catalan Journal of Linguistics. Monographic volume devoted to loanword phonology* (2012). Available at: [http://works.bepress.com/claudia\\_pons-moll/4](http://works.bepress.com/claudia_pons-moll/4).

### Brazilian Portuguese (Lee 1995)

Stressed position	Pre-stressed position
[e], [ɛ] / [ɔ], [o]	[e] / [o]

BUT:

Productive derivation		
café [e]	'coffee'	café [ɛ]zɪnha (*café [e]zɪnha) 'coffee dim.'
mulher [ɛ]	'woman'	mulher [e]zɔna (*mulher [ɛ]zɔna) 'woman dim.'
festa [ɛ]	'party'	festa [ɛ]zɪnha (*festa [ɛ]zɪnha) 'party dim.'
forró [ɔ]	'popular dance'	forró [ɔ]záo (*forró [o]záo) 'popular dance augm.'
bola [o]	'ball'	bola [ɔ]lɪnha (*bola [o]lɪnha) 'ball dim.'

Non-productive derivation  
s[e]la 'chair' ~ s[e]lɪm 'saddle'  
abric[o] 'apricot' ~ abric[o]teiro 'apricot tree'

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#### Appendix-A: Data

(10a); p. 5: more data

est[é]ril	mat[é]ria	el[ó]gi	mem[ó]ria
d[é]bil	Val[é]ncia	[ó]li	n[ó]ja
inc[é]ndi		[ó]rdi	b[ó]ja
n[é]ci		p[ó]di	
mist[é]ri			
in[é]dit			
obs[é]qui			

(Data from Mascaró 2008, 2011; Wheeler 2005: 37-52, *GIEC*)

(10b); p. 5: more data

aster[ó]ide  
b[ó]ira  
cof[ó]i  
est[ó]ic

(Data from Mascaró 2008, 2011; Wheeler 2005: 37-52, *GIEC*)

(13); p. 7: more data

[é]ter	aut[ó]nom	[é]mfasi	d[ó]mino
--------	-----------	----------	----------

	ll[ó]brec	etc[é]tera	hip[ó]tesi
	hidr[ó]gen	g[é]nere	n[ó]mada
	pr[ó]leg	g[é]nesi	n[ó]mina
	pr[ó]sper	m[é]tode	[ó]rfena
		r[é]plica	pr[ó]rroga
			s[ó]mines
			pr[ó]stata

(Data from Fabra 1912: 459-460; Mascaró 2011; *GIEC*; see Appendix)

#### Appendix-B: Theoretical framework

- OPTIMAL INTERLEAVING (Wolf 2008). The basics (simplified).
  - a) Morphological spell-out (morpheme realization) occurs in the phonological component of the grammar.
  - b) A correspondence relation is established between morphemes and morphs. This correspondence relation is regularized through faithfulness constraints of the type MAX-M and DEP-M.
  - c) Morpheme realization is, thus, one of the operations that GEN performs, so derivational steps that realize morphemes are interleaved among steps that perform phonological operations.
  - d) Concomitantly, constraints on morpheme realization are interleaved among phonological constraints in the ranking that EVAL applies.
  - e) Spell-out can occur at any location in the phonological representation.
- CANDIDATE CHAINS (McCarthy 2007). The basics (simplified).
  - a) A candidate chain associated with an input /in/ in a language with the constraint hierarchy H is an ordered *n*-tuple of forms C = <f<sub>0</sub>, f<sub>1</sub>, ..., f<sub>n</sub>> that meets the following 3 conditions:
    - **Faithful initial form:** f<sub>0</sub> is a faithful parse of /in/. (Specifically, it's the faithful parse of /in/ that's most harmonic according to H.)
    - **Gradual divergence:** In every pair of immediately successive forms in C, <..., f<sub>i</sub>, f<sub>i+1</sub>, ...> (0 ≤ i < n), f<sub>i+1</sub> has all of f<sub>i</sub>'s unfaithful mappings, plus one.
    - **Harmonic improvement:** In every pair of immediately successive forms in C, <..., f<sub>i</sub>, f<sub>i+1</sub>, ...> (0 ≤ i < n), f<sub>i+1</sub> is more harmonic than f<sub>i</sub> according to EVAL<sub>H</sub>.

→ There are various alternative ways of formulating the gradual divergence requirement (*i.e.* in terms of faithfulness, phonological operations, or even perceptual similarity). In this paper, in terms of faithfulness and operations.

→ Important precursor to OT-CC: Prince & Smolensky (2004: 94-95): "some general procedure (Do-*a*) is allowed to make a certain single modification to the input, producing the candidate set of all possible outcomes of such modification. This is then evaluated; and the process continues with the output so determined... There are constraints inherent in the

limitation to a single operation and in the requirement that each operation in the sequence improve Harmony.”

### Appendix-C: Translation

BIGTHANA: Apotheotic!  
A word that's so exotic  
That it makes me feel neurotic  
Diabetic, cyanotic,  
Elephantiac,  
Prostatic, paralytic,  
And even apoplectic  
And arteriosclerotic.

KING: I never get a wink of sleep  
Though helped by a hypnotic,  
Excited as I am to see  
Myself apotheotic.

MEMUCAN: Oh noble lord despotic,  
Thermoplastic, mythic!  
The filthy scum demotic  
Salute you now ecstatic,  
Zymotic and mephitic.  
KING: A peril hypercritic  
Of experience erotic.

MEMUCAN: Your gentle yoke syncretic,  
paterno-Asiatic,  
lets a student of the optic  
follow courses mathematic.

CHORUS OF MARIONETTES: Oh monarch estrambòtic,  
In a tone that's not bombastic  
Nor in any way dyspeptic,  
We sing a song romantic  
Of a love that's patriotic.  
Oh may you, great elastic  
Mastic, sit majestic  
In your citadel fantastic  
A millennium nauseatic,  
As on this sympathetic  
Day apotheotic.

A MARIONETTE: Tick, tick.

KING: Do I detect a touch of insolence in the royal Choir of the Band of Hope, or was that a coda specially written for the occasion?  
Executioner, locate the bronchitic responsible for those subversive notes and chop him instantly into little pieces, in accordance with a certain law which we hereby promulgate.

MARIONETTE: An absent-minded abject worm crawls before you pleading for clemency. If the bowels of autocratic compassion could be moved to let fall one life-giving word of pardon, I'll grovel like tape-worm droppings and offer you eternal obeisance.

EXECUTIONER: All you need do, you poor fish, is bend down so that yours truly can measure up the gristly bits and the fatty bits and tickle—very politely—your ribs and other salient portions of your anatomy. And don't excite me while I'm doing the job, because the chopper's quite sharp.

MARIONETTE: Apotheotic, potheotic, otheotic, theotic, eotic, otic, tic, ic!...

MOST HIGH: Not a squeak left, poor bugger!

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