About the underlying representation of words starting in *VsC-* in Catalan and the opaque character of morphophonological alternations by prefixation[1]

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Summary

1. Uncertainty in URs
2. Goal and main argumentation
3. Underapplication of vowel reduction in words starting with *VsC-*
4. Vacillations between vowel reduction and underapplication
5. The theories about the determination and acquisition of the URs in the light of our data

1. Uncertainty in URs

The structure present in underlying representations is not challenging when productive morphophonological alternations shed light on it, and when there is a clear and systematic phonological condition in the language that justifies the differences between the underlying representation that has to be established and the corresponding surface representation. The challenge, or the uncertainty, appears in those cases in which such morphophonological alternations do not exist, when they are not fully productive, and also when alternative interpretations are possible.

1.1. (Few) Empirical evidence for vowel epenthesis in Catalan. In Catalan, vowel epenthesis has often been invoked to explain the presence of a vowel (typically [ə] in Eastern dialects and [e] in Western dialects) in those situations where its absence would entail the occurrence of a structure defying some kind of syllabic constraint (see Mascaró 1976, Wheeler 1975, DeCesaris 1987, Lloret 2002, among others). In few of these cases, though, the postulation of epenthesis is fully legitimate by truly productive morphophonological alternations, so that other

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interpretations of the vowel are available (Wheeler 2005, Lloret & Jiménez 2007).

1.1.1. Word-initial vowel epenthesis (→ uncertain, controversial)

Word-initial epenthesis has typically been adduced in words like *escriure* 'to write', *esperar* 'to wait', *estructura* 'structure', *estona* 'while' and *eslògan* 'slogan' as a strategy to avoid word-initial *sC-* clusters.

(1) Cases *escriure*, *esperar*

(1a) Realizations

escriure	[ə]*scriure*	'to write'
esperar	[ə]*sperar*	'to wait'

(1b) Prefixed forms **without** the initial vowel

inscriure	*in*[∅]*scriure*	'to register'
descriure	*de*[∅]*scriure*	'to describe'
subscriure	*subs*[∅]*scriure*	'to subscribe
prosperar	*pro*[∅]*sperar*	'to prosper'
exasperar	*exa*[∅]*sperar*	'to exasperate'

- Morphophonological alternations [ə] ~ [∅]

BUT

- These alternations are not fully productive.
- The morphological compositionality of the forms in *1b* is not transparent.
- Cf. other prefixed forms in *1c*.

(1c) Other prefixed forms **with** the initial vowel

reescriure	*re*[ə]*scriure*	'to rewrite'
sobreescriure	*sobre*[ə]*scriure*	'to overwrite'
desesperar	*des*[ə]*sperar*	'to despair'

- No morphophonological alternation [ə] ~ [∅]

AND

- This lack of alternation is fully productive.
- The morphological compositionality of the forms in *1c* is transparent.

(2) Cases *estona*, *escala*, and the like

(2a) Realizations

estona	[ə]*stona*	'while'
escala	[ə]*scala*	'scale'
estructura	[ə]*structura*	'structure'
especial	[ə]*special*	'special'
específic	[ə]*specific*	'specific'
estereotip	[ə]*stereotip*	'stereotype'
esport	[ə]*sport*	'sport'

(2b) Inexistence of prefixed forms **without** the initial vowel

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.....
.....

(2c) Prefixed forms **always with** the initial vowel

superestructura	*super*[ə]*structura*	'superstructure'
infraestructura	*infra*[ə]*structura*	'infrastructure'
superespecial	*super*[ə]*special*	'super especial'
inespecífic	*in*[ə]*specific*	'unspecific'
subestereotip	*sub*[ə]*stereotip*	'substereotype'
Interesport	*Inter*[ə]*sport*	'commercial name'
antiesportiu	*anti*[ə]*sportiu*	'unsporting'
poliesportiu	*poli*[ə]*sportiu*	'sports center'

- Absolute lack of the morphophonological alternation [ə] ~ [∅].
- This lack of alternations is fully productive.
- The morphological compositionality of the forms in *2c* is transparent.

(3) Cases *espot*, *eslògan*, and the like (loanwords)

(3a) Realizations

espot	[ə]*spot*	'spot'
eslògan	[ə]*slògan*	'slogan'
esteps	[ə]*steps*	'steps'

(3b) Inexistence of prefixed forms **without** the initial vowel

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.....
.....

(3c) Prefixed forms **with** the initial vowel

superespot	*super*[ə]*spot*	'superspot'
antieslògan	*anti*[ə]*slogan*	'antislogan'

- Absolute lack of the morphophonological alternation [ə] ~ [∅].
- This lack of alternations is fully productive.
- The morphological compositionality of the forms in *2c* is transparent.

Interim reflection:

- There is unsubstantial empirical evidence to consider the first vowel in words starting in *VsC-* (like *escriure*, *esperar*, *estructura*, *esport*, *estona*, *eslògan*) as epenthetic.

- The underlying representations proposed are frequently not fully legitimated empirically.

- The elements the analyst counts with in order to determine underlying representations are very often blurred, so that it is inevitable to resort to theoretical extrapolation (to theoretical speculation).

2. GOAL AND MAIN ARGUMENTATION

2.1. Goal

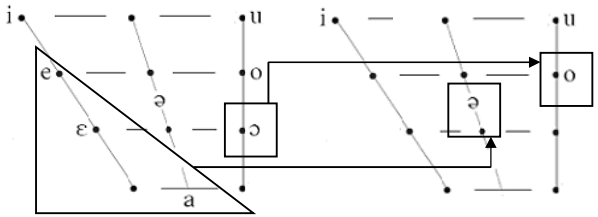
On the basis of the casuistry related to the phenomenon of underapplication of vowel reduction in Majorcan Catalan, however, we provide some empirical arguments for an underlying representation of these words starting in *VsC-* without the initial vowel, and we show how the alternations motivated by prefixation are undoubtedly opaque.

2.2. Main argumentation

2.2.1. Vowel reduction in Majorcan Catalan (dialect of Eastern Catalan)

(4) Process of vowel reduction in Majorcan Catalan

a. Stressed vowel system b. Unstressed vowel system



(4) Morphophonological alternations provoked by vowel reduction

a. Stressed position		b. Unstressed position	
c[á]*sa*	'coffee'	*c*[ə]*s*[ɔ́]*ta*	'house *dim.*'
caf[ɛ́]	'coffee'	*caf*[ə]*t*[ɔ́]*t*	'coffee *dim.*'
carr[é]*r*	'street'	*carr*[ə]*r*[ó]	'street *dim.*'
cont[é]*st*	'(I) answer'	*cont*[ə]*st*[á]*m*	'(we) answer'
tol[é]*r*	'(I) tolerate'	*tol*[ə]*r*[á]*m*	'(we) tolerate'

2.2.2. Underapplication of vowel reduction in Majorcan Catalan

The process of vowel reduction of /e/ and /ɛ/ underapplies under the following circumstances (see, among others, Veny 1962, Bibiloni 1998, Mascaró 2002, 2005; Pons-Moll 2012a, b, in press):

a) IN PRODUCTIVE DERIVED FORMS with an unstressed vowel which alternates with a stressed mid front vowel ([é] / [ɛ́]) in the stem of the primitive:

(5) Derived forms

*f**e**stassa* [e] 'party *augm.*' ~ *f**e**sta* [é] 'party'
*c**e**let* [e] 'sky *dim.*' ~ *c**e**l* [ɛ́] 'sky'

b) IN VERBAL FORMS (I conjugation) with an unstressed vowel which alternates with a stressed close mid front vowel ([é]) in another verbal form of the same inflectional paradigm:

(6) Verbal forms

*p**e**gar* [e] 'to hit' ~ *p**e**ga* [é] '(he/she) hits'
*qu**e**dam* [e] 'we stay'~ *qu**e**da* [é] '(he/she) stays'

c) IN LEARNED WORDS AND LOANWORDS with an unstressed *e* generally preceded by a labial consonant:

(7) Loanwords and learned words

*v**e**rmut* [e] 'vermouth'	*b**e**nigne* [e] 'benign'
*v**e**det* [e] 'star'	*f**e**titxisme* [e] 'fetishism'
*el P**e**ntàgon* [e]	*p**e**nicil·lina* [e] 'penicillin'

As shown in previous studies (Pons-Moll 2012a, b, in press), the lack of vowel reduction affects, indeed, the unstressed *e* in the mentioned situations, **but only** when it is located **in the initial syllable of the stem**:

- This is why we find normal application of vowel reduction in forms like the ones in (8) [see also (4)], which met the conditions in *a*, *b*, *c*.

(8) Derived forms, verbal forms and loanwords and learned words

*pap**e**ret* 'paper *dim.*', *cast**e**llet* 'castle *dim.*' [ə] Cf. *a* and (5)
*cont**e**stam* 'we answer', *tol**e**rau* 'we tolerate' [ə] Cf. *b* and (6)
*am**e**nitzar* 'to liven up', *pref**e**rent* 'preferable' [ə] Cf. *c* and (7)

[Note that the vowel is not located in the initial syllable of the stem.]

- This is why we find underapplication of vowel reduction of the second vowel and not of the first (belonging to the prefix) in prefixed forms like the ones in (9).

(9) Prefixed forms

*r**e**n**e**tet* [ə] [e] 'great grandson *dim.*'
*r**e**c**r**emar* [ə] [e] 'to burn again'
*ef**e**minat* [ə] [e] 'effeminate'

(10) Cf. Bases for the prefixed forms in (9)

*n**e**tet* [e] 'grandson *dim.*'
*cr**e**mar* [e] 'to burn'
*f**e**minisme* [e] 'feminism'

Analysis of underapplication of vowel reduction in Pons-Moll (2012a,b, in press)

- Productive derivation (cases in *a*) → output-output faithfulness constraints (TCT, Benua 1995) relativized according to the position of the vowel within the stem (Pons-Moll 2012a, in press)
- Verbal inflection (cases in *b*) → output-output faithfulness constraints (OP, McCarthy 2005) relativized according to the position of the vowel within the stem (Pons-Moll 2012a, in press)
- Learned and loanwords (cases in *c*, without vowel alternations) → contextual markedness constraint relativized according to the position of the vowel within the stem, only active in the productive phonology [loanwords and learned words; cf. *m**e**norquí* [ə] 'Minorcan' (Pons-Moll 2012b, in press)

[For the details about the formalization, see Pons-Moll (2012a,b, in press)]

Crucial and of interest…

- We find underapplication of vowel reduction of the second vowel in words like:

(11)

***Est**evet*	[ə]*st*[e]*vet*	'Stephen *dim.*'
***e**squ**e**met*	[ə]*squ*[e]*met*	'scheme *dim.*'
***e**sp**e**rau*	[ə]*sp*[e]*rau*	'(you) wait'
***e**st**e**nem*	[ə]*st*[e]*nem*	'(we) tend'
***e**sp**e**cial*	[ə]*sp*[e]*cial*	'especial'
***e**sp**e**cialista*	[ə]*sp*[e]*cialista*	'especialist'
***e**sp**e**cialitat*	[ə]*sp*[e]*cialitat*	'especiality'

[Note that the first vowel never alternates with a stressed vowel nor with [∅], and that the second vowel can show vowel alternations or not; see § 3.]

- If it is true the established generalization (underapplication is only found when the vowel is located in the initial syllable of the stem) we have **external and independent evidence** to consider that the **initial vowel** of these words (***E**stevet*, ***e**squemet*, ***e**sperau*, ***e**stenem*, ***e**special* or ***e**specialitat* [ə]) is **not part of the stem** and thus has to be considered **epenthetic**. It this vowel was part of the stem, the second vowel would not be placed in the initial syllable of the stem and, therefore, should not be affected by the phenomenon of underapplication.

- The data analyzed is relevant to test the approaches developed within Optimality Theory to account for the nature of underlying representations and their process of acquisition and learning: *Richness of the Base* (Prince & Smolensky 1993/2004: 205, 225), *Lexicon Optimization* (Prince & Smolensky 1993/2004: 225) and the *Free-ride approach to morphophonemic learning* (McCarthy 2005).

3. Underapplication of vowel reduction in words starting with *VsC-*

3.1. Data

(12) Productive derived forms and verbal forms with initial schwa + *sC*

[ə]*st*[é]*ve*	'Stephen'	[ə]*st*[e]*vet*	'Stephen *dim.*'
[ə]*squ*[é]ma	'Scheme'	[ə]*squ*[e]*met*	'scheme *dim.*'
[ə]*sp*[é]*ra*	'(s/he) waits'	[ə]*sp*[e]*r*[á]*u*	'(you) wait'
[ə]*st*[é]*n*	'(s/he) tends'	[ə]*st*[e]*nem*	'(we) tend'

(13) Loanwords and learned words with initial schwa + *sC*

[ə]*sp*[e]*cial*	'especial'	[ə]*sp*[e]*cífic*	'specific'
[ə]*sp*[e]*cialista*	'especialist'	[ə]*sp*[e]*cificador*	'specifier'
[ə]*sp*[e]*cialitat*	'especiality'	[ə]*sp*[e]*cificitat*	'specificity'
[ə]*sp*[e]*cialitzar*	'especialize'	[ə]*sp*[e]*rmatozou*	'spermatozoon'
[ə]*sp*[e]*cialment*	'especially'	[ə]*st*[e]*roide*	'asteroid'
[ə]*st*[e]*reotip*	'stereotype'	[ə]*st*[e]*roides*	'steroids'

3.2. Theoretical consequences

- The initial vowel in word-initial *VsC-* clusters behaves as «invisible» to the output-output positional faithfulness constraints alleged in Pons-Moll (2012a, b, in press) to account for underapplication of vowel reduction in derivation (***f**estassa* [e] ~ ***f**esta* [é]) and verbal inflection (***p**egam* [e] ~ ***p**ega* [é]).

- The initial vowel in word-initial *VsC-* clusters is unaffected by the contextual markedness constraint against a schwa in the initial syllable of the stem alleged in Pons-Moll (2012b, in press) to account for underapplication of vowel reduction in learned words and loanwords (***b**enigne*, ***f**etitxisme*, *v**e**rmut*, *v**e**det* [e]).

- This can be taken as positive evidence that the initial vowel, realized as a schwa, is actually an epenthetic vowel. If this were not the case, the second vowel would not be affected by these constraints, because it would occupy a position other than the initial within the stem.

[For more evidence about the epenthetic character of these vowels, see § 7.1]

4. Vacillations between vowel reduction and underapplication

4.1. Data

(12) *Fluctuations*

aix[e/ə]*car*	'to lift'
empr[e/ə]*nyar*	'to get angry'
engr[e/ə]*ixar*	'to gain weight'
al[e/ə]*grar*	'to cheer up'

(13) Unexpected underapplication

ab[e]*rració*	'outrage'
am[e]*ricà*	'American'

4.1. Theoretical consequences

- Opaque character of morphophonological alternations by prefixation.
- Uncertainty of speakers about the underlying character of the first vowel in the cases where a consonantal group follows.

5. The theories about the determination and acquisition of the underlying representations in the light of our data

5.1. Richness of the Base (Prince & Smolensky 1993/2004: 205, 225)

- In the absence of morphophonological alternations that shed light into the URs, the speaker projects all potential underlying representations for every phonetic form; the grammar (*i.e.*, EVAL) is ultimately responsible for selecting the actual phonetic form in a given language, no matter which underlying representation is taken.

- Potential UR for words like *Estevet*, *esperau*, *especial* (without the alternation [ə] ~ [∅]): /əsC/ AND /∅sC/.

- PROBLEM: If we assume an underlying representation with the vowel (*i.e.* /əsC/), we obtain inexistent forms with vowel reduction to schwa of the second vowel.

- WHY: Because the output-output faithfulness constraints relativized according to the position of the vowel within the stem, adduced to explain cases like *f*[e]*stassa* or *p*[e]*gam*, or the contextual markedness constraint against a schwa in the initial syllable of the stem, adduced to explain cases such as *f*[e]*minisme*, would be innocuous (they would not have effects) for the words starting in *VsC-*, in that the vowel would not be placed in the initial syllable of the stem.

- CONSEQUENCES: Vowel reduction would erroneously apply in these cases: **Est*[ə]*vet*, **esp*[ə]*ram* and **esp*[ə]*cial*.

- OTHER CONSEQUENCES: The initial vowel could turn into [e] due to the effects of the contextual markedness constraint against a schwa in the initial syllable of the stem (this could be solved resorting to I-O faithfulness protecting the underlying schwa).

5.2. Lexicon Optimization (Prince & Smolensky 1993/2004: 225)

- In the process of language acquisition, the principle called lexicon optimization is at play. According to this principle, in the absence of morphophonological alternations, the learner projects the underlying form which is closer to the surface form.

- UR for words like *Estevet*, *esperau*, *especial* (without the alternation [ə] ~ [∅]): /əsC/.

- The same reasons adduced in § 5.1 invalidate this approach.

5.3. Free-ride in morphophonemic learning (McCarthy 2005)

- In the absence of morphophonological alternations that shed light into the URs (and also given the fact that learners have limited experience and consequently in some cases ignore the morphophonological alternations that allow them to discover URs), the speakers generalize an unfaithful mapping (*i.e.* /∅sC/ → [əsC]), deduced from those cases in which there are alternations (for instance, [ə]*scriure* ~ *in*[∅]*scriure*), to all the cases in which there are not alternations ([ə]*stevet*, [ə]*sperau*, [ə]*special*). [For more information about this proposal, see § 7.2]

- The strategy consisting of generalizing a certain unfaithful mapping, supported by external and independent morphophonological alternations, to those cases in which there are no such alternations is what McCarthy calls *free-ride* in morphophonemic learning (see also McCarthy 1981).

- The data considered in this paper should be taken as positive evidence for the last alternative: [ə]*stevet*, [ə]*sperau*, [ə]*special* are cases without the alternation [ə] ~ [∅], and this is why the question as to whether the initial vowel belongs to the stem or not arises, as does the question as to whether this vowel must listed in the lexical representation or not.

- As proven in this paper, the second vowel of these words is affected by the output-output faithfulness constraints relativized according to the position that the vowel occupies within the stem or by the contextual markedness constraint against a schwa in the initial syllable of the stem, and this can be taken as positive evidence that the learner excludes the schwa from the stem and from UR. That is, the learner has taken a free-ride by projecting the unfaithful mapping /∅sC/ → [əsC].

- BUT: In our case, there are not consistent (or really productive) morphophonological alternations (see § 1.1.1: *escriure* ~ *inscriure*) to generalize the unfaithful mapping /∅sC/ → [əsC] to the cases without any kind of alternation (*Estevet*, *esperau*, *especial*).

- THEREFORE: We argue for a radical version of the free-ride approach in which morphophonological alternations are not strictly necessary in order to project unfaithful mappings of the type /∅sC/ → [əsC], but just the predictable character of the mapping between the underlying and the surface representation, along the lines of classical generative phonology.

6. Remaining issues

- **About the morphological edges at the surface representations**

  A set of output-output positional faithfulness constraints that make reference to morphological edges (*i.e.* initial syllable of the stem) seem to be necessary to account for the data. This means that morphological edges are visible and active in the surface representations.

- **About the opaque character of alternations by prefixation and the UR of words starting with *VCC-***

  Majorcan Catalan speakers alternate between realizations with [e] and [ə] in cases such as *empr*[ə/e]*nyar* 'to bother', *engr*[ə/e]*ixar* 'to gain weight' or *al*[ə/e]*grar* 'to make happy' and sporadically show realizations with [e] when the vowel is not the initial of the stem (*ab*[e]*rració* and *am*[e]*ricà*).

  This reveals the **opaque character** of morphophonological alternations by prefixation, in that it seems that speakers erroneously interpret these forms as prefixed (*i.e.* *ab*[e]*rració*, *am*[e]*ricà*, HISTPREF*aix*[e/ə]*car*, HISTPREF*empr*[e/ə]*nyar*, HISTPREF*engr*[e/ə]*ixar*, HISTPREF*al*[e/ə]*grar*).[2]

  This reveals the **uncertainty** of speakers about the underlying character of the first vowel in the cases where a consonantal group follows (*i.e.* *empr*[e/ə]*nyar*), *engr*[e/ə]*ixar*).

7. Appendix

More evidence for the epenthetic character of the first vowel

- Interaction between stress and epenthesis (Wheeler 2005, p. 287): (1) epenthetic vowel cannot be stressed; (2) 1, 2, 3, 6 gramatical persons of the PI verbal forms are paroxytone: 2 ***ju**res*, 3 ***ju**ra*, 6 ***ju**ren*; (3) verbs starting with *VsC-*, though, are oxytone: 2 *es**tàs***, 3 *es**tà***, 6 *es**tan***. (4) The initial vowel is therefore epenthetic.
- Interaction between stress and epenthesis in Spanish (Harris 1970): the same asrgumentations as before: *es**toy***, *es**tás***, *es**tá***, etc.
- Diminutive formation in Spanish (Harris 1979): *estudio* ~ *estudi**ecito***, selection of *–ecit(o)* diminutive allomorph only with disyllabic bases (→ /studjo/).

[2] We mark historically prefixed words with HISTPREF.

More about the free-ride approach to morphophonemic learning

"[...] it is important to show that learners can in principle acquire the grammar of the ambient language from the limited data available to them." (McCarthy 2005: 19)

"When alternation data tell the learner that some surface [B]s are derived from underlying /A/s, the learner will under certain conditions generalize by deriving *all* [B]s, *even nonalternating ones*, from /A/s. An adequate learning theory must therefore incorporate a procedure that allows nonalternating [B]s to take a «free ride» on the /A/ →[B] unfaithful map." (McCarthy 2005: 19)

"I argue that nonalternating forms are sometimes derived by unfaithful maps as well." (McCarthy 2005: 20)

Data from alternations indicate that *some* surface [B]s derive from underlying /A/s. Other evidence, some of it distributional and some involving opacity, argues that *all* surface [B]s, even the nonalternating ones, derive from underlying /A/s. I will propose a learning principle according to which learners who have discovered the /A/ →[B] unfaithful map from alternations will attempt to generalize it, projecting /A/ inputs for all surface [B]s, whether they alternate or not. (McCarthy 2005: 20)

"[...] the nonalternating [B]s attempt to take a «free ride» on the independently motivated /A/ → [B] map" (McCarthy 2005: 20)

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