21st Mid-Continental Phonetics & Phonology Conference
Michigan State University
September 2016

What is imported and what is not to the second-language phonology[1]

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1. Introduction

1.1 Morphologically-driven underapplication, lexical exceptions, and loanword phonology. Languages exhibit a set of phonological processes which underapply due to morphological reasons, which have lexical exceptions and which also underapply in loanword phonology. This paper is built on the observation that those processes that underapply in a given language due to morphological reasons tend to coincide with those that have more lexical exceptions and with those which exhibit a peculiar behavior in loanword phonology. Overall, a gradation can be made between the processes which are involved in these three circumstances, the processes involved in just some of them, and the processes which never are.

1.2 Intralinguistic variation and opacization. Moreover, there are two additional concomitant circumstances. The processes that underapply under the depicted situations tend to be those that do not apply consistently across the dialectal varieties of a given language (*i.e.* those that show variation across dialectal varieties), whereas the processes that never underapply tend to apply consistently in the totality of the dialectal varieties of a given language (*i.e.* they do not show variation across dialectal varieties). In a similar vein, the processes that tend to underapply are those that are likely to be not surface-true due to the interaction with other processes of the language, in contrast with those that never underapply, which are always surface-true.

1.3. Differential importation and allied issues. An intriguing facet of loanword adaptation that still requires a complete explanation is that of *differential importation*. Differential importation refers to the fact that, among the structures not allowed in the native phonology of a specific language, only a partial subset is imported to its loanword phonology (Kang 2011). It has been observed, indeed, that certain constraints against specific structures active in the native phonology of a language are more prone to be relaxed or violated than others in the loanword phonology of the same language (Holden 1976, Itô & Mester 1995, Davidson & Noyer 1997, Broselow 2009, Kang 2011). This circumstance has often been interpreted as a consequence of the degree of strength (or the degree of productivity) of native constraints: the greater the strength or productivity of the native constraint, the more likely it will be active or «visible» in loanword phonology, a hypothesis labeled *Magnetic Attraction* by Holden (1976). Or, also, as a consequence of the «natural» (Chen 1973) or the «essential» character of certain constraints within a specific language, in the sense that they «define the basic syllable canons and other central aspects of the language» (Itô & Mester 1999: 65).

[1] The Spanish Ministry of Economy and Competitiveness (FFI2013-46987-C3-1-P), the Catalan Government (2014SGR918), and the RecerCAIXA 2011 program have supported this work.

2. Hypothesis and goals

Our hypothesis is that the correlation between the circumstances depicted in § 1.1 and § 1.2 must have significant consequences on L2 phonology. The expectation, indeed, is that the processes that underapply under the mentioned conditions are those that are not transferred, *i.e.* not imported, to the second language phonology. The purpose of this paper is twofold. On the on hand, we explore in depth the effects of the correlation between morphologically-driven underapplication, lexical exceptions, loanword phonology, intralinguistic variation and opacization on the phonology of Catalan. On the other hand, on the basis of a set of experiments evaluating the second-language speech of Catalan native speakers, we prove that this correlation has, indeed, significant consequences on second-language phonology.

3. Empirical framework[2]

3.1. Deletion of posttonic *–n* and *–r* in (absolute) word-final position

Regular phonology

(1) Catalan (general)

canço[n]eta ~ canço[n]s ~cançó[∅]	carrer[ó] ~ carre[∅] ~ carre[∅]s
'song dim.'~ 'songs'~ 'song'	'street dim.' ~ 'street' ~ 'streets'

Morphologically-driven underapplication → YES (very frequent)

(2) Catalan (general)

enté[n]	'(s/he) understands'
preté[n]	'(s/he) expects'
fara[n]	'(they) will do'
cantara[n]	'(they) will sing'

(3) Insular Catalan

ma[n]	'(I) order'
reme[n]	'(I) mix '
mi[ɾ]	'(I) look at '
conside[ɾ]	'(I) consider'

Lexical exceptions → YES (several)

(4) Catalan (general)

be[n]	'well'	ace[ɾ]	'steel'
qui[n]	'which one'	ma[ɾ]	'sea'
na[n]	'midget'	co[ɾ]	'heart'
Joa[n]	'John'	moto[ɾ]	'engine'
Ferra[n]	'Fernand'	futu[ɾ]	'future'
mossè[n]	'father'	amo[ɾ]	'love'

[2] Data drawn from Bibiloni (1983, 1998); Cabré (2002, 2006, 2009), Bonet & Lloret (1998); Jiménez (1997, 1999); Lleó (1969/1970); Mascaró (1976/1978 , 1984); Pons-Moll (2004, 2007, 2015); Solà *et al.* (2002), and Wheeler (1974/1979 , 2005).

Loanword exceptional behavior → YES (quasi-systematic)

(5) Catalan

canca[n]	dossi[ér]
caima[n]	af[é/ér]
taliba[n]	amat[é/ér]
toboga[n]	someli[ér]
oranguta[n]	au-p[ɛ́r]
xama[n]	necess[ér]

Intralinguistic variation → YES

(6) Valencian varieties
carrer[ó] ~ carre[ɾ] ~ carre[ɾ]s
'street dim.' ~ 'street sg.' ~ 'street pl.'

Opacization → YES

(7) Catalan (with cluster reduction in some varieties)

pont	/pɔnt/	→	[pɔ́n]	(*[pɔ́])	'bridge'
important	/inpɔrtant/	→	[impurtán]	(*[impurtá])	'important'
verd	/bɛrd/	→	[bér]	(*[bé])	'green'

3.2. Vowel reduction of [é], [ɛ́] and [á] to [ə] in unstressed position

Regular phonology

(8) Catalan (Eastern varieties)
c[a]sa 'house'~ c[ə]seta 'house dim.'
m[é]s 'month' ~ m[ə]set 'month dim.'
m[ɛ́]l 'honey' ~ m[ə]lós 'honeyed'

Morphologically-driven underapplication → YES (frequent)

(9) Majorcan Catalan
v[e]nt 'wind' ~ v[e]ntet 'wind dim.'
esp[e]ra '(s/he) waits' ~ esp[e]ram '(we) wait'

(10) Catalan (general)

al[e]grement	'happily'
pr[e]romànic	'pre-romanesque'
tr[ɛ]nca-closques	'jigsaw puzzle'

Lexical exceptions → YES (several)

(11)

a. Catalan (general)		b. Majorcan Catalan	
class[e]	'class'	p[e]riodista	'journalist'
bas[e]	'base'	p[e]l·lícula	'movie'
cin[e]	'truncated form for cinema'	m[e]dicina	'Medicine'
Balm[e]s	'proper name'	m[e]diterrani	'Mediterranean'
Ter[e]	'truncated form for Teresa'	f[e]licitat	'happiness'
Sòcrat[e]s	'Socrates'		

(And fas[e], laring[e]; òp[e]ra, còl[e]ra; glut[e]n, cràt[e]r, tànd[e]m, íd[e]m, cànc[e]r; Renf[e], Pedralb[e]s, Londr[e]s; Qu[e]bec, R[e]ykjavik; etc.)

Loanword exceptional behaviour → YES (quasi-systematic)

(12) Catalan
vàt[e]r
mòd[e]m
v[e]det
R[e]psol
karat[e],
gàngst[e]r
cút[e]r
sid[e]car

(13) Majorcan Catalan

v[e]rbena	'open-air dance'
v[e]rmut	'vermouth'

Intralinguistic variation → YES (substantial; some varieties have the process; some others do not)

(14) Catalan (Western varieties)
c[a]sa 'house'~ c[a]seta 'house dim.'
m[é]s 'month' ~ m[e]set 'month dim.'
m[ɛ́]l 'honey' ~ m[e]lós 'honeyed'

Opacization → YES

(15) Catalan (interaction with vowel dissimilation)

oc[e]à	'ocean'
isra[e]lià	'israeli'
àr[e]a	'area'

3.3. Epenthesis in word-final clusters to avoid a violation of the SSP or the MSD constraints

Regular phonology

(16) Catalan (general)

centr[ə]	cf. centr-al	retaul[ə]	cf. retaul-et
'center'	cf. 'central'	'altarpiece'	cf. 'altarpiece dim.'
astr[ə]	cf. astral	air[ə]	cf. airós
'star'	cf. 'astral'	'air'	cf. 'airy'

Morphologically-driven underapplication → YES (frequent)

(17) Balearic Catalan

com[pɾ]	'(I) buy'
en[tɾ]	'(I) enter'
ensu[kɾ]	'(I) add sugar'
co[pɾ]	'(I) earn'

Lexical exceptions → YES (some)

(18) Catalan (general)

sa[wr]	'dark yellow'	Einste[jn]
va[jr]	'made of two colors (adj.)'	Indura[jn]
cu[jr]	'leather'	Sinn Fé[jn]
ra[jl]	'rail'	

Loanword exceptional behavior → SSP (NO) / MSD (YES)

(19) Catalan

ma[jl]	***game*** [éjm]
Gma[jl]	***Doyle*** [ójl]
gaso[jl]	***Yale*** [éjl]
t[ajm]es	
K[aj]le	

Intralinguistic variation → NO

Opacization → NO

3.4. Word-final cluster simplification (homorganic lateral / nasal + stop clusters)

Regular phonology

(20) Catalan (some varieties)
sa[nt]*a* ~ *sa*[n∅]
'saint *fem.*' ~ 'saint *masc.*'
a[lt]*a* ~ *a*[l∅]
'tall *fem.*' ~ 'tall *masc.*'
ca[mp]*ament* ~ *ca*[m∅]
'camp' ~ 'countryside'

NB: An optional process of cluster simplification is also possible in final sequences of a rhotic or an alveolar sibilant followed by a stop (ver[ð]a 'green fem.' ~ ver[t/∅] 'green masc.'; vis[t]a 'seen fem.' ~ vis[t/∅] 'green fem.')

Morphologically-driven underapplication → YES (frequent)

(21) Catalan (some varieties)

reso[lt]	'solved'
mò[lt]	'milled'

(22) Eivissan

ca[nt]	'(I) sing'
sa[lt]	'(I) jump'
aca[mp]	'(I) camp'

Lexical exceptions → YES (few, not systematic)

(23) Catalan (the same varieties in 20)

vo[lt/∅]	'volt'
indu[lt/∅]	'reprieve, pardon'
tumu[lt/∅]	'tumult'
adu[lt/∅]	

Loanword exceptional behavior → YES (not systematic)

(24) Catalan
PowerPoi[nt~∅]
Pai[nt~∅]
Ka[nt~∅]
Co[lt~∅]
Go[lt~∅]

Intralinguistic variation → YES (substantial; some varieties have the process; some do not)

(25) Catalan (some insular and Valencian varieties)
sa[nt]*a* ~ *sa*[nt]
'saint *fem.*' ~ 'saint *masc*.'
a[lt]*a* ~ *a*[lt]
'tall *fem.*' ~ 'tall *masc*.'
ca[mp]*ament* ~ *ca*[mp]
'camp' ~ 'countryside'

Opacization → NO

3.5 Epenthesis in word-initial *sC*- clusters

Regular phonology

(26) Catalan
[ə]*scriure* ~ *in*[∅]*scriure* ~ *de*[∅]*scriure* 'to write' ~ 'to register' ~ 'describe'
[ə]*sperar* ~ *exa*[∅]*sperar* ~ *pro*[∅]*perar* 'to wait' ~ 'to exasperate' ~ 'to prosper'

Morphologically-driven underapplication → NO

Lexical exceptions → NO

Loanword exceptional behavior → NO

(27) Catalan
[ə]*steps*
[ə]*Sting*
[ə]*Sprite*
[ə]*Skype*
[ə]*stand*
[ə]*sport*

Intralinguistic variation → NO

3.6. Word-final obstruent devoicing

Regular phonology

(28) Catalan
llo[β]a 'wolf fem.'~ llo[p] 'wolf male'
po[ð]ia '(s/he) could'~ po[t] '(s/he) can'
ce[ɣ]a 'blind fem.'~ ce[k] 'blind masc.'

me[z]et 'month dim.' ~ me[s] 'month'

Underapplication → NO

Lexical exceptions → NO

Loanword exceptional behavior → NO

(29) Catalan
pu[p], clu[p], we[p]
ready-ma[t], be[t] & breakfast, qui[t]
ga[k], air-ba[k]
Ja[s], bri[ʧ], leitmoti[f], Kie[f]

Intralinguistic variation → NO

Opacization → NO

4. CONSEQUENCES ON SECOND LANGUAGE PHONOLOGY

Experiment 1. In order to check the hypothesis pursued in this project (*i.e.* the processes that underapply under certain circumstances tend to not be transferred to the L2 phonology, while the processes that never underapply do tend to be transferred to the L2 phonology), 25 native speakers of Catalan with an intermediate / a proficiency level of English and French were recorded reading 2 texts (written in English and French), equivalent to 2/3 minutes of speech; these texts included around 118 occurrences of the phonic structures targeted by the processes depicted above. The same 25 native speakers were recorded uttering the same occurrences in isolation (in order to control / avoid phonotactic effects) and similar occurrences within sentences, and talking spontaneously for 3 minutes. The analysis of the reading-productions confirms, partially, the prediction made above, with a gradation from *quasi* compulsory phonological processes towards absolutely preventable ones:

4.1 Results for English readings

a) 84% of the cases with a word-final-voiced-obstruent-target (*red*, *deployed*, *used*, etc.) were produced with devoicing (*vs*. 16%, with voicing preservation);

b) 51% of the cases with a word-final-homorganic-cluster-target (*significant*, *understand*, *sold*, *camp*, *result*, etc.) were produced with cluster simplification (*vs*. 49%, with cluster preservation);

c) 37% of the cases with a word-final-rising-sonority-cluster-target (*assembled*, *dismantled*) or a word-final-MSD-violating-cluster-target (*remain*, *design*, etc.) were produced with epenthesis / simplification (*vs*. 63%, with cluster preservation);

d) Interestingly enough, only 36% of the cases with a word-initial-*sC*-target (*special*, *slight*, *speak*, *stand*) were produced with epenthesis (*vs*. 64%, without epenthesis);

e) 17% of the cases with a *-st*/*-rt*-cluster-target (*standard*, *replaced*, etc.) were produced with cluster simplification (vs. 83%, with cluster preservation)

f) 11% of the cases with a posttonic-word-final–*n*/–*r*—target were produced with deletion (*vs*. 89%, with preservation);

g) 0% of the cases with a word-final-sonority-plateaux-target (*architects*, *disrupt*) were produced with epenthesis / deletion (*vs*. 100%, with preservation);

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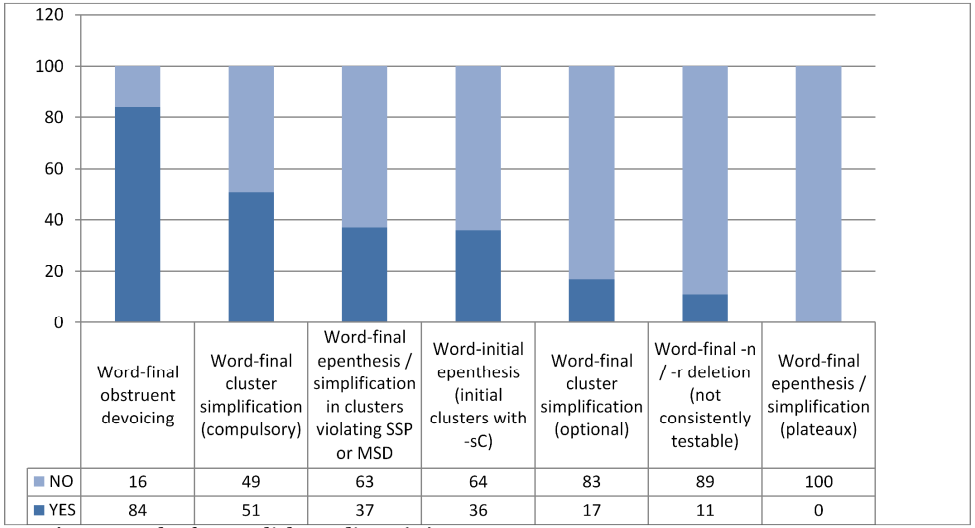


Fig. 1. *Results for English readings (%)*

4.2. Results for French readings

a) 77% of the cases with a word-final-voiced-obstruent-target (*image*, *fauve*, etc.) were produced with devoicing (*vs*. 23%, with voicing preservation);
b) 12% of the cases with a word-final-rising-sonority-cluster-target (*livre*, *jungle*, *reconnaître*, *raisonable*) or a word-final-MSD-violating-cluster-target (*étoiles*) were produced with epenthesis / simplification (*vs*. 88%, with cluster preservation);
c) 0% of the cases with a posttonic-word-final–*n*/–*r*—target (*couleur*, *peur*, etc.) were produced with deletion (*vs*. 100%, with preservation);

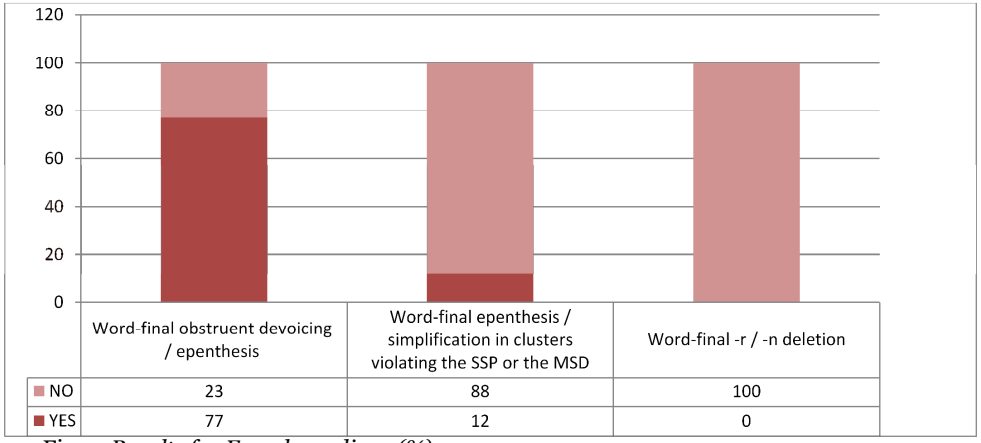


Fig. 2. *Results for French readings (%)*

4.3. Observations

- Expected correlation valid for all cases, except for word-initial epenthesis (36%, with epenthesis, vs. 64%, without). Expectation according to § 3.5 → more cases with word-initial epenthesis. This outcome might be biased by the fact that the subjects were asked to read. Indeed, the analysis of the spontaneous speech showed, instead, 93% of the cases with epenthesis (*vs*. 7%, without epenthesis).
- Word-final *–n* and *–r* deletion are not consistently testable in L2 = English and French, since the context of application is generally absent (cf. English: *former*, *number*; *London*, *construction*) or because the L2 language also shows deletion (cf. French: *dessin*, *afin*, etc.). [BUT testable in L2 = Spanish.]
- Sometimes a process different from the one triggered in the L1 phonology is triggered in the L2 phonology to repair the same structure (*i.e.* simplification instead of epenthesis in word-final clusters violating the SSP or the MSD).
- A distinction has been made between word-final rising sonority clusters and sonority *plateaux* in the case of L2 = English.

Experiment 2. A parallel experiment with 10 Catalan native speakers has been conducted with L2 = Spanish, a language without word-final devoicing, without vowel reduction and without posttonic word-final *–r* and *–n* deletion. Other phenomena, such as prevocalic word-final sibilant voicing assimilation and falling *vs*. rising diphthongs, have also been analyzed. (See Garcia 2015)

4.4. Results for Spanish readings

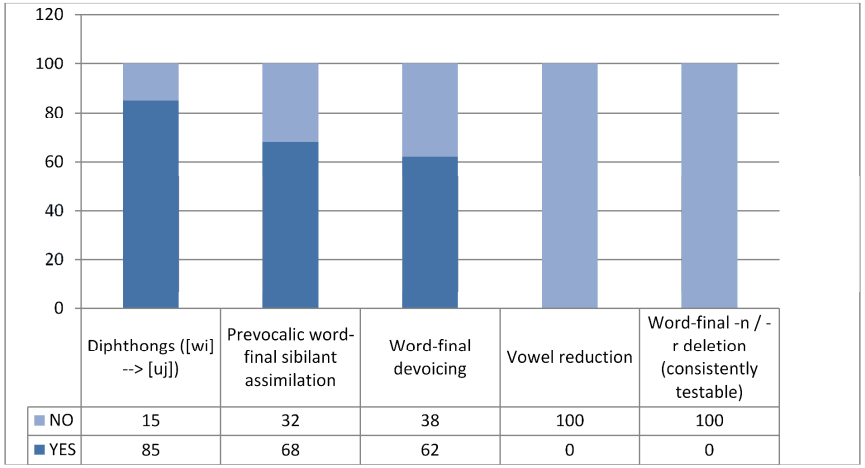


Fig. 3. *Results for Spanish readings (%)*

4.5. Some interesting results

target-word	FINAL DEVOICING	VOICING PRESERVATION	DELETION	[θ]
actitud	90%	0%	10%	0%
Madrid	60%	0%	20%	20%
soledad	60%	0%	20%	20%
ciudad	90%	0%	0%	10%
multitud	90%	0%	0%	10%
actitud	50%	0%	0%	50%
aptitud	50%	0%	0%	50%
verdad	20%	0%	80%	0%
usted	50%	0%	30%	20%
continuidad	60%	0%	30%	10%
TOTAL	62%	0%	19%	19%

Fig.4. *Word-final-voiced-obstruent-targets*

→ too many solutions problem + emergence of the unmarked

5. INTERPRETATIONAL OBSERVATIONS

5.1. The alternations in § 3.1 (*canço*[n]*eta* ~ *canço*[n]*s* ~ *cançó*[∅] 'song *dim.*' ~ 'song *pl.*' ~ 'song *sg.*'; *carrer*[ó] ~ *carre*[∅] ~ *carre*[∅]*s* 'street *dim.*' ~ 'street *sg.*' ~ 'street *pl.*') are not synchronic processes of the language, but relics of old processes; they are stored in the lexicon as allomorphs, and learned as such (see, for instance, Wheeler 2005).

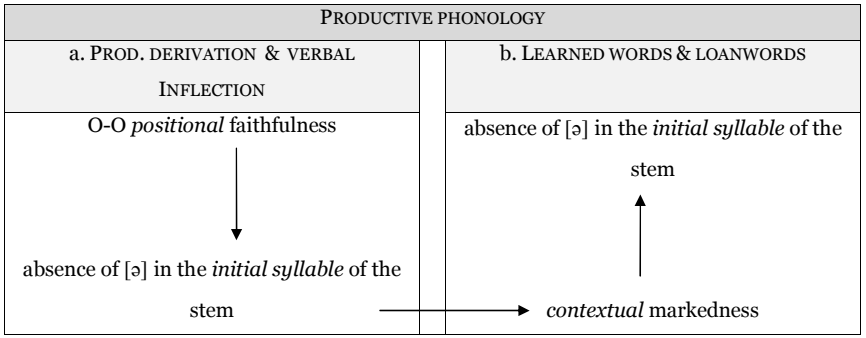
5.2. The alternations in § 3.2 (*c*[a]*sa* 'house'~ *c*[ə]*seta* 'house *dim.*', *m*[é]*s* 'month' ~ *m*[ə]*set* 'month *dim.*') are losing dramatically their productivity, especially in prominent positions, such as stem-initial position or word-final position.

5.3. The alternations in § 3.3 (*sa*[nt]*a* ~ *sa*[n] 'saint *fem.*' ~ 'street *masc.*'; *a*[lt]*a* ~ *a*[l] 'tall *fem.*' ~ 'tall *masc.*') and § 3.4 (*centr*[ə] 'center', ~ *centr*[al] 'central') show a transition stage between 5.1, 5.2 and 5.4.

5.4. The alternations in § 3.5 (*i.e.*, *llo*[β]*a* 'wolf female' ~ *llo*[p] 'wolf male'; cf. *pu*[p] 'pub', *clu*[p] 'club'; (*i.e.*, [ə]*scriure* ~ *in∅scriure*) are the result of *real* processes of the language and derived, therefore, from the interaction of markedness with faithfulness constraints.

5.5. Diachronic evolution: Morphologically driven underapplication → creation of novel structures → lexical exceptions & loanword exceptionality → new grammar / phonology → transferred to second language learning / speech.

An example of "reinterpretation" of the grammar: *From positional faithfulness to contextual markedness* (Pons-Moll 2012: 147)



f[é]*sta*	→	*f*[e]*st*[á]*ssa*	*v*[e]*rmut*
esp[é]*ra*	→	*esp*[e]*r*[á]*u*	*p*[e]*l·lícula*

6. Formal interpretations

6.1. Testing the P-Map hypothesis (Steriade 1999). Underapplication under the depicted circumstances is found in those processes that imply a major perceptual change, *i.e.* those processes which imply a major cost in terms of faithfulness, taking into account the context in which they occur.

Categorical differences:

√ Word-final posttonic *–n* and *–r* deletion:
X → ∅ ERGO *underapplies*
√ Word-final devoicing:
α → β [+voiced] → [–voiced] ERGO *never underapplies*

Gradient / biased differences:

√ Word-final posttonic *–n* and *–r* deletion:
X → ∅ ERGO *underapplies*
√ Word-final cluster simplification:
X → ∅ ERGO *(under)applies*
[but in a context of segmental similarity]

√ Word-final devoicing:
α → β [+voiced] → [–voiced] ERGO *never underapplies*
√ Vowel reduction:
α → β ERGO *(under)applies*
[but more featural changes involved]

Problematic cases:

√ Word-initial epenthesis: BUT *never underapplies*
∅ → X
√ Word-final epenthesis: BUT *(under)applies*
∅ → X

6.2. Other interpretations

- Phonetic processes *vs*. morphophonological processes
- Universal processes *vs*. language-particular processes
- Naturalness, essentiality (Chen 1973, Itô & Mester 1999)
- Productivity, phonological strength, and magnetic attraction (Skousen 1972, Kiparsky 1973, Holden 1976)
- Lexical phonology (Kiparsky 1982, 1985, 1988; Mohanan, 1982, 1986; Kaisse & Hargus 1993, Hargus & Kaisse 1993)
- Diacriticization, major rules and minor rules (SPE); indexation and cophonologies (OT)
- Representational approaches (allomorphy and underspecification)
- Lexicalist approaches (Zuraw 2000)

Degree of productivity of Catalan processes

			Factors						
			Internal (accessible to the learner and the analyst)					Internal (accessible to the analyst)	
Degree of productivity		Processes	Lexical exceptions	Underapplication in loanwords	Morphologically-driven underapplication	No transference to L2	Opacization	Intralinguistic heterogeneity	Diachronic tendency to disappear
	+	Obstruent word-final devoicing. *cunyada ~ cunyat*	NO	NO	NO	NO	NO	NO	NO
		Word-initial deletion of #-Ocl/Nas+Cons (*MSD). *psicologia, mnemotècnic*	NO	NO	NO	NO	NO	NO	NO
		Epenthesis in #-sC. *prosperar ~ esperar*	NO	NO	NO	RELATIVE	NO	NO	NO
		Epenthesis in word-internal position (*SyllCont). *temo ~ temeré*	NO	not testable	NO	not testable	NO	YES	not testable
		Epenthesis in word-final position (*SSP). *central ~ centre, retaulet ~ retaule*	YES (only SV + Snt)	YES	YES	YES	not testable	NO	NO
		Word-final cluster simplification. *santa ~ sant*	YES	YES	YES	YES	NO	YES	NO
		Vowel reduction *festa ~ festiu*	YES	YES	YES	YES	YES	YES	RELATIVE
		Word-final posttonic *–n* deletion. *cançoneta ~ cançó*	YES	YES	YES	YES	YES	YES	YES
	–	Word-final posttonic *–r* deletion. *carreró ~ carrer*	YES	YES	YES	YES	YES	YES	YES

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