

With Regard to Syllable Contact and the Sonority Scale*
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1. Introduction

- Avoidance of coda-onset clusters with sonority rise → Syllable Contact Law (Murray & Vennemann 1983, Vennemann 1988).
- Diachronic changes (Hooper 1976, Murray & Vennemann 1983, Vennemann 1988, Ham 1998, Martínez-Gil 2003, Holt 2004, among others)
- Synchronic phenomena
 - Epenthesis and epenthesis positioning (Rose 2000, Gouskova 2001)
 - Consonant strengthening (Shin 1997, Davis 1998, Davis & Shin 1999, Gouskova 2002, 2005)
 - Syncope blocking (Urbanczyk 1996, Miglio 1998, Gouskova 2002)
 - Word order and subtraction regulation in blend formation (Bat-El 1996)
 - Allomorph selection (Hargus 1996, in press)
 - Metathesis (Gouskova 2001)
 - Regressive manner assimilation (Shin 1997, Davis & Shin 1999)

...

2. Goal and outline

2.1. Goal

2.2.1 To explore, on the basis of a quite extensive set of processes drawn from Romance languages, the nature and the effects of the SYLLABLE CONTACT constraint in Optimality Theory.

- *Processes under examination*
 - a. Regressive manner assimilation in some varieties of Catalan and in Languedocian Occitan
 - b. Alveolar fricative rhotacism in Majorcan Catalan, dialects of Sardinian and dialects of Galician
 - c. Alveolar fricative gliding in Languedocian Occitan
 - d. Onset strengthening in Catalan
 - e. Epenthesis in Catalan and Spanish
 - f. Strategy selection in word-initial consonant clusters violating the minimum sonority distance constraints in Catalan and in Portuguese (not in this talk)
 - g. Allomorph selection in Catalan and Spanish (not in this talk)

2.2.2 To discuss which sonority confluences and reversals across languages should be possible and which should not, and how these language-specific details should be accessible to the mechanism of evaluation of candidates within OT.

— *Theoretical implications*

a. Syllable Contact cannot be regarded as a single constraint which categorically bans coda-onset clusters with rising sonority, but should be broken down into a universal hierarchy of constraints targeting all possible sonority distances between adjacent heterosyllabic segments (Murray & Vennemann 1983, Bat-El 1996, Gouskova 2001, 2002, 2005, Baertsch 2002, and Baertsch & Davis 2003, 2005).

b. Although the organization of most sounds in the sonority scale is universal, the organization of some specific sounds is not so obvious and can vary across languages (→ liquids, obstruents).

2.2 Outline

Section 3 → Syllable Contact in phonological theory (OT)

Section 4 → Data (processes)

Section 5 → Motivations & theoretical implications

Section 6 → Concluding remarks

3. The Syllable Contact in phonological theory

(1) *Syllable Contact Law* (Vennemann 1988: 40)

«A syllable contact A^sB is preferable the less the consonantal strength of the offset A and the more the consonantal strength of the onset B.»

(2) *Diachronic sounds changes attributed to the Syllable Contact Law*

a. Gemination in Italian from Latin

LAB.RUM	→	<i>labbro</i>	‘lip’
FEB.REM	→	<i>febbre</i>	‘fever’
OC(U).LUM	→	<i>occhio</i>	‘eye’
SAP.IAT	→	<i>sappia</i>	‘(he/she) knows’

b. Regressive manner assimilation in Italian

<i>val + rà</i>	→	<i>varrà</i>	‘(he/she) will be valid’
<i>dol+ rà</i>	→	<i>dorrà</i>	‘(he/she) will feel pain’
<i>ven+rà</i>	→	<i>verrà</i>	‘(he/she) will come’
<i>pon+rà</i>	→	<i>porrà</i>	‘(he/she) will put’

c. Epenthesis in Spanish

<i>ven+rà</i>	→	<i>vendrá</i>	‘(he/she) will come’
<i>pon+rà</i>	→	<i>pondrá</i>	‘(he/she) will put’

(3) *Extended Syllable Contact Law* (Murray & Vennemann 1983: 520)

«The preference for a syllabic structure *A.B*, where *A* and *B* are marginal segments and *a* and *b* are the Consonantal Strength values of *A* and *B*, respectively, increases with the value of *b* minus *a*.»

(4) *Extended Syllable Contact Law* (Clements 1990: 520)

«The preference for a syllabic structure *A.B*, where *A* and *B* are segments and *a* and *b* are the sonority values of *A* and *B* respectively increases with the value of *a* minus *b*.»

(5) SYLLABLE CONTACT

«Sonority should not rise across a syllable boundary.» (See, among others, Alderete 1995, Bat-El 1996, Urbanczyk 1996, Shin 1997, Ham 1998, Miglio 1998, Davis & Shin 1999, Rose 2000, and Holt 2004)

(6) *Particular version of Syllable Contact* (Alderete 1995: 48)

«C1 < C2 by no more than one sonority interval, where C1 and C2 are adjacent and C1 is syllable-final and C2 is syllable-initial.»

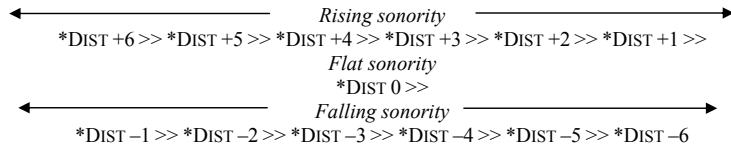
* For valuable discussion on this paper, I am grateful to Eulàlia Bonet, Pere Grimalt, Maria Rosa Lloret, John Kingston, Joan Mascaró, John J. McCarthy, Donca Steriade, and to the audience of the 13th Manchester Phonology Meeting (particularly to Robert Ladd) and the Conference on Manner Alternations in Phonology (mainly to Stuart Davis and Chiara Frigeni).

- (7) a. /hipres/ → epenthesis [hi.pe.res] ‘know’ (*[hip.res])
 b. /haracabra/ → no-epenthesis [ha.ra.cab.ra] ‘the taste’ (*[ha.ra.ca.ba.ra])

(8) *Particular version of Syllable Contact* (Bat-El 1996: 304)

- a. «CONT: The onset of a syllable must not be of greater sonority than the last segment.»
 b. «CONTSLOPE: «The greater the slope in sonority between the onset and the last segment in the immediately preceding syllable the better.»

(9) *Syllable contact as a relational hierarchy* (Gouskova 2001, 2002, 2005)¹



(10) *Matrix of consonant contacts* (adapted from Gouskova 2001, 2002, 2005)

	+7	+6	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	-6	-7
t.w	s.w	d.w	z.w	n.w	l.w	r.w	w.w	w.r	w.l	w.n	w.z	w.d	w.s	w.t	
	t.r	s.r	d.r	z.r	n.r	l.r	r.r	r.l	r.n	r.z	r.d	r.s	r.t		
		t.l	s.l	d.l	z.l	n.l	l.l	l.n	l.z	l.d	l.s	l.t			
			t.n	s.n	d.n	z.n	n.n	n.z	n.d	n.s	n.t				
				t.z	s.z	d.z	z.z	z.d	z.s	z.t					
					t.d	s.d	d.d	d.s	d.t						
						s.t	s.s	t.s							
							t.t								

← less harmonic → more harmonic

Assumed sonority scale: glides > rhotics > laterals > nasals > voiced fricatives > voiced stops > voiceless fricatives > voiceless stops

(11) *Matrix of consonant contacts* (Clements 1990: 319)

	V	G	L	N	O
V	V.V	V.G	V.L	V.N	V.O
G	G.V	G.G	SV.L	SV.N	SV.O
L	L.V	L.SV	L.L	L.N	L.O
N	N.V	N.SV	N.L	N.N	N.O
O	O.V	O.SV	O.L	O.N	O.O

← less harmonic → more harmonic

V = vowels; G = glides; L = liquids; N = nasals; O = obstruents

(12) *Assumed sonority scale: vowels > glides > liquids > nasals > obstruents*

¹ In Gouskova (2001, 2002, 2005), rising sonority transitions are represented by a positive value (i.e. '+'), while decreasing sonority transitions are represented by a negative value (i.e. '-'). In Clements's (1990) formulation, contrarily, '-' is used for rising sonority and '+' for decreasing sonority. We assume the Gouskova's notation throughout the talk.

(13) *Margin harmony scales* (Prince & Smolensky 1993: 127-138)

a. *Harmony scale for onsets*

ONSET / voiceless stop > ONSET / voiceless fricative > ONSET / voiced stop > ONSET / voiced fricative > ONSET / nasal > ONSET / lateral > ONSET / rhotic > ONSET / glide

b. *Harmony scale for codas*

CODA / glide > CODA / rhotic > CODA / lateral > CODA / nasal > CODA / voiced fricative > CODA / voiced stop > CODA / voiceless fricative > CODA / voiceless stop

(14) *Margin Constraint Hierarchies* (Prince & Smolensky 1993)

a. *Margin Constraint Hierarchy for onsets*

* ONSET / glide >> * ONSET / rhotic >> * ONSET / lateral >> * ONSET / nasal >> * ONSET / voiced fricative >> * ONSET / voiced stop >> * ONSET / voiceless fricative >> * ONSET / voiceless stop

b. *Margin Constraint Hierarchy for codas*

*CODA / voiceless stop >> * CODA / voiceless fricative >> * CODA / voiced stop >> * CODA / voiced fricative >> * CODA / nasal >> * CODA / lateral >> * CODA / rhotic >> * CODA / glide

(15) *Split Margin Hierarchy* (Baertsch 2002, Baertsch & Davis 2003, 2005)

*M1 / glide & *M2 / voiceless stop]_{ADJSEG} >> *M1 / glide & *M2 / voiceless fricative]_{ADJSEG} >> *M1 / glide & *M2 / voiced stop]_{ADJSEG} >> *M1 / glide & *M2 / voiced fricative]_{ADJSEG} ...

4. Data

4.1. *Regressive manner assimilation in Majorcan and Minorcan Catalan*²

(16)

a. Stop + non-sibilant consonant (RMA [RPA])

- cap fet /kap##fet/ [kaf.fét] ‘any fact’
 cap mos /kap##mɔs/ [kam.mós] ‘any bite’
 cap llit /kap##lit/ [ka.lít] ‘any bed’
 cap riu /kap##riw/ [kar.ríw] ‘any river’
 cap iot /kap##jɔt/ [kaj.jót] ‘any yacht’

b. Stop + sibilant consonant (RPA)

- cap so /kap##sɔn/ [kat.ʦsɔ]~[kat.ʦsɔ] ‘any sound’
 cap joc /kap##ʒɔg/ [kad.ʒʒɔk]~[kad.ʒʒɔk] ‘any game’

(Cf. cap /kap/ [káp] ‘any’; cap hora /kap##ɔrɔ/ [ka.pó.rɔ] ‘any hour’)

d. Stop + heterorganic stop [RPA]

- pot caure /pɔd##kawr/ [pɔk.káw.rɔ] ‘(he/she) can fall down’
 cap tros /kap##trɔs/ [kat.trós] ‘any piece’

² The Majorcan Catalan data are from Recasens ([1991] 1996), Dols (1993) and have been checked with inquiries in Pons (2004a). The Minorcan Catalan data are taken entirely from Pons (2004a).

(17)

a. Alveolar fricative + lateral, rhotic, glide [RMA [RPA]]

<i>dos llits</i>	/doz##litz/	[do.ʎíts]	‘two beds’
<i>dos rius</i>	/doz##riwz/	[dor.ríws]	‘two rivers’
<i>dos iots</i>	/doz##jotz/	[doj.jóts]	‘two yachts’

b. Alveolar fricative + sibilant [RMD]

<i>dos sons</i>	/doz##sonz/	[doʎ.tsóns]~[doʎ.tsóns]	‘two sounds’
<i>dos jocs</i>	/doz##ʒogz/	[dod.dʒófs]~[doʎ.tsóns]	‘two games’

c. Alveolar fricative + stop, non-sibilant fricative, nasal³ [MP]

<i>dos peus</i>	/doz##pewz/	[dos.péws]	‘two feet’
<i>dos fils</i>	/doz##fílz/	[dos.fíls]	‘two threads’
<i>dos nius</i>	/doz##niwz/	[doz.níws]	‘two nests’

(Cf. *dos* /doz/ [dós] ‘two’; *dos anys* /doz##anjz/ [do.zájns] ‘two hours’)

(18)

a. Nasal + lateral, glide [RMA]

<i>un llum</i>	/un#lum/	[u.ʎúm]	‘one light’ ⁴
<i>un iot</i>	/un#jot/	[uj.jót]	‘one yacht’

b. Nasal + stop, fricative, rhotic [MP]

<i>un peu</i>	/un#pew/	[um.péw]	‘one foot’
<i>un foc</i>	/un#fɔg/	[un.fɔk]	‘one fire’
<i>un riu</i>	/un#riw/	[un.ríw]	‘one river’

(Cf. *un* /un/ [un] ‘one’; *un animal* /un#əniməl/ [ü.nə.ni.mál] ‘an animal’)

(19) Lateral, rhotic, glide + consonant [MP]

<i>vol dinar</i>	/vɔl##dinar/	[vɔ].di.ná]	‘(he/she) wants to have lunch’
<i>vol iogurts</i>	/vɔl##joɣurtz/	[vɔ.ʎ.jo.ɣúrs]	‘(he/she) wants yogurts’
<i>bar petit</i>	/bar##pətit/	[bàr.pə.tít]	‘small bar’
<i>corr iardes</i>	/kor##jardəz/	[kor.jár.ðəs]	‘(I) run yards’
<i>mai pot</i>	/maj##pɔd/	[maj.pót]	‘(he/she) never can’

4.2. Regressive manner assimilation in Languedocian Occitan⁵

(20)

a. Obstruent + sonorant [RMA]

<i>ròc mòl</i>	/rɔk##mɔl/	[rɔm.mól]	‘soft rock’	(cf. <i>ròc</i> [rɔk] ‘rock’)
<i>tot l’argent</i>	/tu##l#ardʒent/	[tùllardʒén]	‘all the silver’	(cf. <i>tot</i> [tút] ‘all’)

³ The *s* can undergo an optional process of rhotacism when followed by a nasal, a voiced obstruent and, more sporadically, before a labiodental fricative (see § 4.4).

⁴ Recasens ([1991] 1996: 258) reports for these sequences a nasalized realization of the lateral resulting from the process of regressive manner assimilation.

⁵ The data from Occitan has been extracted from Teulat (1972), Alibèrt (1976), Wheeler (1988), Balaguer & Pojada (2005), and has been checked with Patrick Sauzet, Aitor Carrera and Anna Pineda.

<i>estat normal</i>	/estat##nurmal/	[es.tàn.nur.mál]	‘regular state’	(cf. <i>estat</i> [estát] ‘state’)
<i>dètz minutas</i>	/dets##minytoz/	[dèm.mi.ný.tos]	‘ten minutes’	(cf. <i>dètz</i> [dét] ‘ten’)
<i>mièg nud</i>	/mjedʒ##nyt/	[mjen.nýt]	‘half naked’	(cf. <i>mièg</i> [mjét] ‘half’)

b. Sonorant + obstruent [MP]

<i>mòstran castèls</i>	/mɔstron##kastelz/	[mɔs.troj.kas.téls]	‘they show castles’
(cf. <i>mòstran</i> [mɔstron] ‘they show’)			
<i>ram petit</i>	/ran##petit/	[ram.pe.tít]	‘small bunch’
(cf. <i>ram</i> [rán] ‘bunch’)			
<i>mòstran sacs</i>	/mɔstron##sakz/	[mɔs.tron.sáts]	‘they show bags’
(cf. <i>mòstran</i> [mɔstron] ‘they show’)			
<i>chaval san</i>	/tʃabal##san/	[tʃa.βal.sá]	‘healthy horse’
(cf. <i>chaval</i> [tʃa.βál] ‘horse’)			

c. Stop + sibilant [RPA]

<i>jòc sabent</i>	/dʒɔg##sabent/	[(d)ʒɔt.tsa.βén]~[(d)ʒɔt.tsa.βén]	‘educated game’
<i>avèts jogat</i>	/abetz##ʒogad/	[a.βèt.dʒu.ɣát]~[a.βèt.dʒu.ɣát]	‘(you) have played’
<i>ròcs sombres</i>	/rɔkz##sumbrz/	[rɔt.tsum.bres]~[rɔt.tsum.bres]	‘dark rocks’
<i>naps gelats</i>	/napz##dʒeladz/	[nàd.dʒe.láts]~[nàd.dʒe.láts]	‘iced turnips’

4.3 Regressive manner assimilation in most Catalan varieties⁶

(21)

a. Stop + homorganic nasal, lateral

<i>cap mos</i>	/kap##mɔs/	[kam.mós]	‘any bite’
<i>pot limitar</i>	/pɔd##limitar/	[pɔl.li.mi.tá]	‘(he/she) can limit’
<i>pot nedar</i>	/pɔd##nedar/	[pɔn.nə.ðá]	‘(he/she) can swim’

b. Dental stop + labial nasal

<i>pot mirar</i>	/pɔd##mirar/	[pɔm.mi.rá]	‘(he/she) can look’
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(22) Stop + heterorganic nasal, lateral (formal style)

<i>cap nas</i>	/kap##nas/	[kab.nás]	‘any nose’
<i>cap limit</i>	/kap##limit/	[kab.lí.mit]	‘any limit’

(23) Stop + heterorganic nasal (colloquial style)

<i>cap nas</i>	/kap##nas/	[kam.nás]	‘any nose’
<i>puc nedar</i>	/puɣ##nedar/	[puɣ.nə.ðá]	‘(I) can swim’

(24) Fricative, lateral, rhotic, glide + consonant

<i>puf negra</i>	/puf##negr/	[puv.né.ɣrə]	‘black pouffe’
<i>dos músics</i>	/doz##muzikz/	[doz.mí.ziks]	‘two musicians’
<i>dos llits</i>	/doz##litz/	[doz.ʎíts]	‘two beds’

⁶ These data have been commonly described in the general studies devoted to Catalan phonology. See, for instance, Recasens ([1991] 1996) and Bonet & Lloret (1998).

<i>vol riure</i>	/bəl##riwr/	[bəl.ríw.rə]	‘(he/she) can smile’
<i>prepar webs</i>	/prəpar##webz/	[prə.par.wéps]	‘I prepare webs’
<i>mai riu</i>	/maj##riw/	[maj.ríw]	‘(he/she) never laughs’

Interim generalizations

— The emerging generalization for Majorcan and Minorcan Catalan and for Languedocian Occitan is that (potential) rising sonority transitions across syllable boundaries are avoided by total assimilation, whereas decreasing sonority transitions are maintained.

But!

- Sibilant preservation in sibilant-nasal heterosyllabic clusters
dos nius /doz##niwz/ [doz.níws] ‘two nests’ (see 17c)
- Nasal preservation in nasal-rhotic heterosyllabic clusters
un riu /un##riw/ [un.ríw] ‘one river’ (see 18b)
- Liquid preservation in liquid-glide heterosyllabic clusters
corr iardes /korr##jardəz/ [kor.jár.ðəs] ‘(I) run yards’ (see 19)

} *syllabic transitions with
sonority rise, but preservation*

— The emerging generalization for Central Catalan and Eivissan Catalan is that potential sonority rise across syllable boundaries is avoided by total assimilation or regressive manner assimilation, provided that this does not imply the loss of the point of articulation of the first consonant or the manner of articulation of a non-stop consonant (in these cases, assimilation does not apply).

4.4 Rhotacism in Majorcan Catalan⁷

(25)

a. Alveolar fricative + voiced consonant or / (Optional R)

<i>dos bous</i>	/doz##bɔwz/	[dor.bóws]~[doɪ.bóws]	‘two oxen’
<i>dos dits</i>	/doz##ditz/	[dor.díts]~[doɪ.díts]	‘two fingers’
<i>dos gots</i>	/doz##gɔtz/	[dor.góts]~[doɪ.góts]	‘two glasses’
<i>dos vins</i>	/doz##vinz/	[dor.víns]~[doɪ.víns]	‘two wines’
<i>dos mesos</i>	/doz##mezz/	[dor.mé.zus]~[doɪ.mé.zus]	‘two months’
<i>dos nius</i>	/doz##niwz/	[dor.níws]~[doɪ.níws]	‘two nests’
<i>dos focs</i>	/doz##fɔkz/	[dos.fóks]~[dor.fóks]~[doɪ.fóks]	‘two fires’

b. Alveolar fricative + voiceless stop [MP]

<i>dos pans</i>	/doz##panz/	[dos.páns]	‘two breads’
<i>dos tocs</i>	/doz##tɔkz/	[dos.tóks]	‘two knocks’
<i>dos cans</i>	/doz##kanz/	[dos.káns]	‘two dogs’

⁷ These data from Majorcan Catalan have mostly been extracted from Moll (1934), Bibiloni (1983), Dols (1993) and Recasens ([1991] 1996) and have been checked with personal inquiries in Pons (2004a). As far as the exact realization of the consonant, Moll and Recasens report an approximant [ɹ] and Bibiloni refers to the consonant as a relaxed [r].

4.5. Rhotacism in some Nuorese Sardinian⁸

(26)

a. Alveolar fricative + voiced consonant or / (R)

<i>tres boes</i>	/tres##bɔes/	[trɛr.bó.es]~[trɛr.bó.e.ze] ⁹	‘three oxen’
<i>tres domos</i>	/tres##dɔmos/	[trɛr.dó.mos]~[trɛr.dó.mɔ.zo]	‘three houses’
<i>tres gattos</i>	/tres##gattos/	[trɛr.gát.tos]~[trɛr.gát.tɔ.zo]	‘three cats’
<i>tres manos</i>	/tres##manos/	[trɛr.má.nos]~[trɛr.má.nɔ.zo]	‘three hands’
<i>tres rosas</i>	/tres##rosas/	[trɛr.ró.zas]~[trɛr.ró.za.za]	‘three roses’
<i>tres yannas</i>	/tres##jannas/	[trɛr.ján.nas]~[trɛr.ján.na.za]	‘three doors’
<i>tres ziros</i>	/tres##ziros/	[trɛr.dži.rɔs]~[trɛr.dži.rɔ.zo]	‘three turns’
<i>tres tzeccos</i>	/tres##zeccos/	[trɛr.džék.kos]~[trɛr.džék.kɔ.zo]	‘three blinds’
<i>tres zentes</i>	/tres##zentes/	[trɛr.džén.te]~[trɛr.džén.te.ze]	‘three people’
<i>tres fizos</i>	/tres##fizos/	[trɛr.fi.džos]~[trɛr.fi.džɔ.zo]	‘three sons’

b. Alveolar fricative + voiceless consonant (MP)

<i>tres panes</i>	/tres##panes/	[tres.pá.nes]~[tres.pá.ne.ze]	‘three breads’
<i>tres táulas</i>	/tres##tawlas/	[tres.táw.las]~[tres.táw.la.za]	‘three tables’
<i>tres canes</i>	/tres##kanes/	[tres.ká.nes]~[tres.ká.ne.ze]	‘three dogs’
<i>tres santos</i>	/tres##santos/	[tres.sán.tos]~[tres.sán.tɔ.zo]	‘three saints’
<i>tres thitthulas</i>	/tres##θiθulas/	[tres.θiθ.θu.las]~[tres.θi.θu.la.za]	‘three mosquitoes’
<i>tres sorres</i>	/tres##sores/	[tres.sór.res]~[tres.sór.re.ze]	‘three sisters’

4.6 Rhotacism in Galician¹⁰

(27)

a. Alveolar fricative + voiced consonant, non-sibilant fricative [Optional R]

<i>estás mal</i>	/stas##mal/	[es.tar.mál]	‘you feel bad’
<i>estás doente</i>	/stas##doente/	[es.tar.do.ɛn.te]	‘you are ill’
<i>estás facendo</i>	/stas##faθendo/	[es.tar.fa.θɛn.do]	‘you are doing’
<i>dous cintos</i>	/dows##θintos/	[dowr.θiŋ.tos]	‘two belts’

b. Alveolar fricative + voiceless consonant [MP / A]

<i>estás parvo</i>	/stas##parbo/	[es.tas.pár.βo]~[es.tah.pár.βo]	‘you are stupid’
<i>estás tolo</i>	/stas##tolo/	[es.tas.tó.lo]~[es.tah.tó.lo]	‘you are mad’

⁸ The data from Sardo-Nuorese have been extracted from Pittau (1972: 33-34) and have been checked with Lucia Molinu.

⁹ According to Lucia Molinu, *r* is realized as a «monovibrant» (p.c.).

¹⁰ Data from Galician is due to Dubert (1999) and Frexeiro (1998) and it has been checked with Sabela Labraña. According to Frexeiro (1998: 161), «É frecuente en boa parte do territorio galego, especialmente na zona suoriental, o fenómeno do rotacismo, consistente na realización do /s/ implosivo como [r] en posición interior de palabra ou por fonética sintáctica ante consonante sonora, o en menor medida perante as sordas /f/ e /θ/ ou mesmo /ʎ/.»

4.7 Gliding in Occitan

(28)

a. Alveolar fricative + voiced consonant or /f/[G]

<i>las filhas</i>	/laz#fi.ʎoz/	[laj.fi.ʎos]	‘the daughters’
<i>las femmas</i>	/laj##fennos/	[laj.fén.nos]	‘the women’
<i>los buòus</i>	/luz#bjowz/	[luj.bjòws]	‘the oxen’
<i>bonis vins</i>	/bònz#binz/	[bònij.βíns]	‘good wines’
<i>cos nud</i>	/kos#nyt/	[kòj.nýt]	‘naked body’
<i>es mòrt</i>	/es##mòrt/	[ej.mòrt]	‘(he/she) is dead’

b. Alveolar fricative + voiceless consonant [MP / A]

<i>las claus</i>	/las#klaws/	[las.kláws]~[lah.kláws]	‘the keys’
<i>las pòrtas</i>	/las#pòrtas/	[las.pór.tos]~[lah.pór.tos]	‘the doors’
<i>bonas taulas</i>	/bònas#tawlas/	[bò.nos.táw.los]~[bò.noh.táw.los]	‘good tables’

Interim generalizations

— The emerging generalization for Majorcan Catalan, Sardinian and Galician is that a decreasing or a flat sonority transition from the sibilant to the next consonant may be insufficient and may have to be augmented by increasing the sonority in the coda. Rhotacism is the strategy selected to achieve this. Potential rising sonority transitions are also avoided via rhotacism. The only context where rhotacism does not occur is before a voiceless stop.

— The emerging generalization for Occitan is that a decreasing sonority value from the sibilant to the next consonant is not enough and it has to be augmented by increasing the sonority in the coda. Potential rising sonority transitions are also avoided via gliding. The only case where gliding is not generated is before a voiceless stop.

<i>dos bous</i>	/doz##bòwz/	} potential syllabic transitions with the same degree of sonority fall	BUT	[do.i.bòws]
<i>los buòus</i>	/luz#bjowz/			[luj.bjòws]
<i>dos pous</i>	/doz##powz/			[dos.pòws]
<i>las pòrtas</i>	/las#pòrtas/			[las.pór.tos]

4.8 Strengthening and epenthesis in Catalan

(29) *Strengthening*

a. Valencian Catalan (Jiménez 1997, 1999)

<i>setze</i>	/sedz/	[séd.ðze]	‘sixteenth’
<i>dotze</i>	/dodz/	[dód.ðze]	‘twelve’

b. Majorcan and Minorcan Catalan (Pons 2003a, 2004a, 2004b)

<i>tot sol</i>	/tot##sól/	[tot.t̃sól]	‘alone’
<i>poc sol</i>	/pòk##sól/	[pòt.t̃sól]	‘few sun’
<i>dessalar</i>	/dòs##salar/	[dòt.t̃sə.lá]	‘to desalt’

c. Catalan (Bonet & Mascaró 1997)

<i>honrat</i>	/onr+a+d/	[un.rát]	‘honest’
<i>folrar</i>	/folr+a+r/	[ful.rá]	‘to cover’

d. Catalan (some varieties) (data from Lloret 2002)

<i>vendria</i>	/ben+riə/	[bən.ríə]	‘(He/She) will sell’
<i>caldria</i>	/kal+riə/	[kəl.ríə]	‘it would be necessary’
<i>temeria</i>	/tem+riə/	[təm.ríə]	‘(I) would be afraid’
<i>temeré</i>	/tem+re/	[təm.ré]	‘(I) will be afraid’
<i>planyerà</i>	/plən+ra/	[plən.rá]	‘(He/She) will complain’
<i>planyeria</i>	/plən+riə/	[plən.ríə]	‘(He/She) would complain’

(30) *Epenthesis* (data from Lloret 2002)

<i>vendre</i>	/ben+r/	[béŋ.drə]	‘to sell’
<i>vendrà</i>	/ben+ra/	[bəŋ.dré]	‘(He/She) will sell’
<i>vendria</i>	/ben+riə/	[bəŋ.dríə]	‘(He/She) would sell’

(Cf. *venia* [bəníə] ‘he/she sold’)

<i>caldre</i>	/kal+r/	[ká]drə]	‘to be necessary’
<i>caldrà</i>	/kal+ra/	[kə]drá]	‘it will be necessary’
<i>caldria</i>	/kal+riə/	[kə]dríə]	‘it would be necessary’

(Cf. *calia* [kəlíə] ‘it was necessary’)

<i>temeria</i>	/tem+riə/	[tə.mə.ríə]	‘(I) would be afraid’
<i>temeré</i>	/tem+re/	[tə.mə.ré]	‘(I) will be afraid’

(Cf. *temia* [təmíə] ‘he/she was afraid’)

<i>venceria</i>	/bens+riə/	[bən.sə.ríə]	‘(I) would win’
<i>venceré</i>	/bens+re/	[bən.sə.ré]	‘(I) will sell’

(Cf. *vencia* [bənsíə] ‘he/she won’)

<i>planyerà</i>	/plən+ra/	[plənə.rá]	‘(He/She) will complain’
<i>planyeria</i>	/plən+riə/	[plənə.ríə]	‘(He/She) would complain’

(Cf. *planyia* [pləníə] ‘he/she complained’)

Interim generalizations Here, sonority increase across syllable boundaries is reversed through onset strengthening, or avoided via epenthesis.

5. Motivations

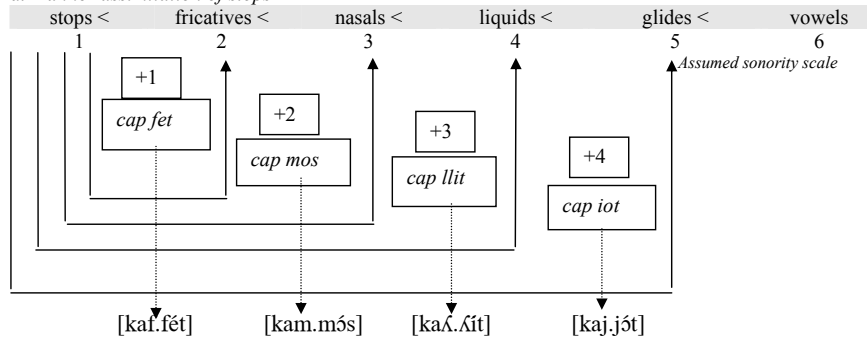
Our proposal is that the processes of regressive manner assimilation, rhotacism, gliding, onset strengthening and epenthesis are different strategies triggered to optimize syllabic contacts: potential rising sonority transitions are avoided through regressive manner assimilation, rhotacism, gliding, onset strengthening and epenthesis, and decreasing sonority transitions are also improved by increasing the sonority of the consonant in coda position (via rhotacism or gliding).

5.1. Regressive manner assimilation

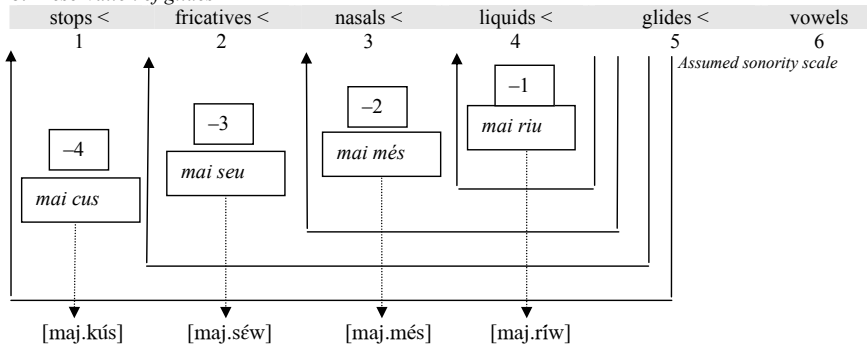
5.1.1 Regressive manner assimilation in Majorcan & Minorcan Catalan and Languedocian Occitan

(31) → Manner assimilation applies to avoid sonority rise across syllable boundaries
(illustration: Majorcan and Minorcan Catalan)

a. Manner assimilation of stops



b. Preservation of glides



- (32) a. *cap mos* [kam.mós] vs. b. *un peu* [um.péw]
 c. *dos llits* [doʎ.lítʃ] vs. d. *dos peus* [dos.péws]
 e. *un llum* [uʎ.lúm] vs. f. *mal peu* [mal.péw] (See § 4.1)

Constraint hierarchy

SYLLABLE CONTACT >> IDENT(-sonorant), IDENT(nasal), IDENT(sibilant)...

SYLLABLE CONTACT: «Sonority should not rise across a syllable boundary.»
 IDENT(-sonorant): Segments under correspondence must have the same specification for the feature [-sonorant] (McCarthy & Prince 1995)
 IDENT(nasal): Segments under correspondence must have the same specification for the feature [nasal] (McCarthy & Prince 1995)
 IDENT(sibilant): Segments under correspondence must have the same specification for the feature [sibilant] (McCarthy & Prince 1995)

a. *cap mos* /kap##mós/ [kam.mós]

/kap##mós/	SYLLCONT	IDENT(-sont)
a. [kam.mós]	*!	
b. ∅ [kam.mós]		*

b. *un peu* /un#pew/ [um.péw]

/un#pew/	SYLLCONT	IDENT(nas)
a. [up.péw]		*!
b. ∅ [um.péw]		

c. *dos llits* /doz##lítʃ/ [doʎ.lítʃ]

/doz##lítʃ/	SYLLCONT	IDENT(sib)
a. [doʎ.lítʃ]	*!	
b. ∅ [doʎ.lítʃ]		*

d. *dos peus* /doz##pewʃ/ [dos.péws]

/doz##pewʃ/	SYLLCONT	IDENT(sib)
a. [dop.péws]		*!
b. ∅ [dos.péws]		

e. *un llum* /un#lum/ [uʎ.lúm]

/un#lum/	SYLLCONT	IDENT(nas)
a. [uʎ.lúm]	*!	
b. ∅ [uʎ.lúm]		*

f. *mal peu* /mal#pew/ [mal.péw]

/mal#pew/	SYLLCONT	IDENT(lat)
a. [map.péw]		*!
b. ∅ [mal.péw]		

Manner assimilation applies because SYLLCONT is violated

There is manner preservation because SYLLCONT is satisfied

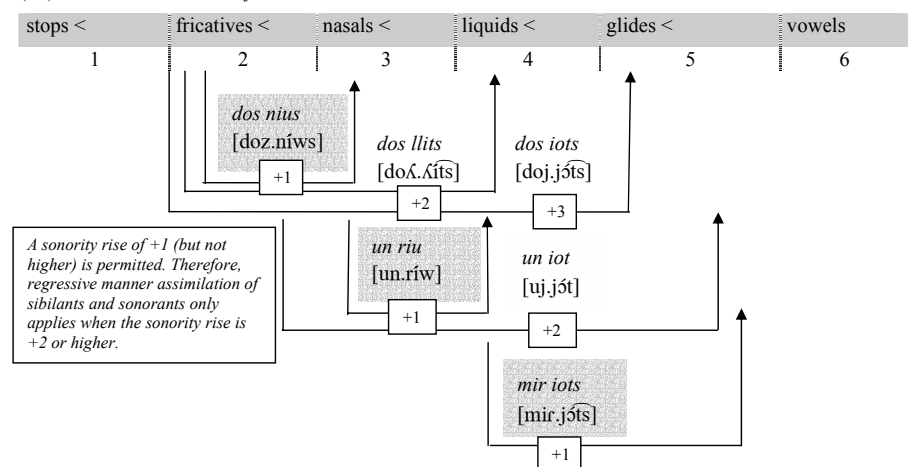
(33) Interpretation valid for the rest of cases of § 4.1 (cf. *dos iots* [doʎ.jóʃ], *un iot* [uj.jót]) BUT not for...

- a. *dos nius* /doz##niwʃ/ [doʎ.níws] (+1, but manner preservation)
 b. *un riu* /un#riw/ [un.ríw] (+1, but manner preservation)
 c. *vol iots* /vɔʎ##jótʃ/ [vɔʎ.jóʃ] (+1, but manner preservation)
 d. *mir iots* /mir##jótʃ/ [mir.jóʃ] (+1, but manner preservation)
 e. *corr iardes* /kor##jardəʃ/ [kor.jár.ðəs] (+1, but manner preservation)

→ Sibilant and sonorant preservation in rising sonority syllabic transitions

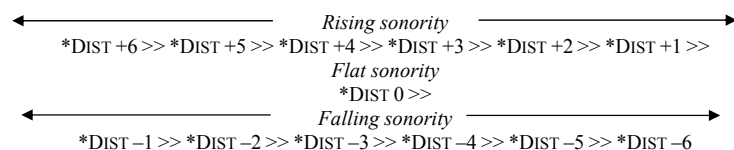
(34) What's the difference between the sequences in (32) and the sequences in (33)? (→ 35)

(35) Manner assimilation of sibilants and sonorants



A sonority rise of +1 (but not higher) is permitted. Therefore, regressive manner assimilation of sibilants and sonorants only applies when the sonority rise is +2 or higher.

(36) Syllable contact as a relational hierarchy (Gouskova 2001, 2002, 2005) (See 9)



(37) Constraint hierarchy

*DIST +2 >> IDENT(nasal), IDENT(sibilant) >> *DIST +1 >> IDENT(-sonorant)

a. *dos llits* /doz##kitz/ [doʎ.ʎíʦ]

/doz##kitz/	*DIST +2	IDENT(sib)
a. [doʎ.ʎíʦ]	*!	
b. ∅ [doʎ.ʎíʦ]		*

b. *dos rius* /doz##riwz/ [dor.riws]

/doz##riwz/	*DIST +2	IDENT(sib)
a. [dor.riws]	*!	
b. ∅ [dor.riws]		*

d. *dos nius* /doz##niwz/ [doz.níws]

/doz##niwz/	IDENT(sib)	*DIST +1
a. ∅ [doz.níws]		*
b. [don.níws]	*!	

c. *dos iots* /doz##jotz/ [doj.jóʦ]

/doz##jotz/	*DIST +3	IDENT(sib)
a. [doj.jóʦ]	*!	
b. ∅ [doj.jóʦ]		*

(38) Is that enough?

<i>un riu</i>	/un#riw/	[un.ríw]	(+1)	→ manner preservation	?!!!
<i>un llum</i>	/un#lum/	[uʎ.ʎúm]	(+1)	→ manner assimilation	?!!!

On the other hand, why not [un.ríw]?

(39) First refinement of the sonority scale

stops <	fricatives <	nasals <	trill <	liquids <	glides <	vowels
1	2	3	4	[r] [ʀ] [l]	5	6
					6	7

And therefore...

- the distance between a nasal and a trill is +1 → preservation: *un riu* [un.ríw] (see 18b)
- the distance between a nasal and a liquid is +2 → assimilation *un llum* [uʎ.ʎúm] (see 18a)

— Phonological evidence

(40) Trilling as onset strengthening in Romance languages (Bonet & Mascaró 1997)

<i>honrat</i>	/onr+a+d/	→	[un.rát]	‘honest’
<i>folrar</i>	/folr+a+r/	→	[ful.rá]	‘to cover’

And, therefore: r, l > r

(41) Assimilation of liquids in Samosir Toba Batak (Shin 1997: 169)

/marlaje/	→	[malláje]	‘to swim’
/tarsuŋgul##rohakku/	→	[tarsuŋgulrohakku]	‘my spirit awoke’

And, therefore: l > r

(43) Banned and permitted codas in Lebanese (Haddad 1984)

*híml ‘weight’ *ʔaml ‘louse’ (not enough sonority fall in the coda → banned coda)
 nímr ‘tiger’ ʔamr ‘order’ (enough sonority fall in the coda → permitted coda)

And, therefore: l > r

(See the poster «The sonority scale: categorical or gradient?» for more phonological evidence on the hierarchy r, l > r)

— Phonetic evidence

(44) Parker (2002: 233)

«Specifically, /l/ patterns as more sonorous than the flap /ɾ/ 10 times, as equivalent 7 times, and as less sonorous in 3 cases. The flap /ɾ/ in turn outranks the trill 9 times and ties with it only once. There is not a single instance in which the mean value for /ɾ/ is significantly more “sonorous” than that of /l/. I therefore posit that these three natural classes are universally ranked in order laterals > flaps > trills»

(45) Constraint hierarchy: *DIST +2 >> IDENT(nas), IDENT(sib) >> *DIST +1

(46)

a. *un llit* /un##kít/ [uŋ.ʎít]

/un##kít/	*DIST +2	IDENT(nas)
a. [uŋ.ʎít]	*!	
b. ∅ [uʎ.ʎít]		*

b. *un riu* /un#riw/ [un.ríw]

/un#riw/	*DIST +2	IDENT(nas)	*DIST +1
a. ∅ [un.ríw]			*
b. [ur.ríw]		*!	
c. [un.ríw]	*!		

(47) *Is that enough?*

corr iardes /kor̩##jardəz/ [kor.jár.ðəs] (+2, but manner preservation)

(48) Solution I: IDENT(rhotic) >> *DISTANCE +2

(49) Solution II: *Second refinement of the sonority scale*

a.

stops <	fricatives <	nasals <	trill <	liquids <	glides <	vowels
1	2	3	4	[r] [l] [ʎ]	6	7

b.

stops <	fricatives <	nasals <	trill <	< liquids & glides	< vowels
1	2	3	4	5	6

And, therefore...

— The distance between a trill and a glide is +1 → preservation: *corr iardes* [kor.jár.ðəs]

— *Phonological evidence...*

(50) Epenthesis in Catalan affects underlying sequences of a glide followed by a liquid

a.	<i>centre</i>	/sentr/	[sén.trə]	‘centre’	Violation of the SONSEQ constraint → epenthesis
	<i>pacte</i>	/pakt/	[pák.tə]	‘pact’	Violation of the SONSEQ constraint → epenthesis
b.	<i>camp</i>	/kamp/	[kámp]	‘field’	No violation of the SONSEQ constraint → no epenthesis
	<i>port</i>	/pɔrt/	[pórt]	‘harbor’	No violation of the SONSEQ constraint → no epenthesis
c.	<i>aire</i>	/ajr/	[áj.rə]	‘air’	Violation of the SONSEQ constraint? YES, according to 49b
	<i>retaula</i>	/rətawl/	[rə.táw.lə]	‘altarpiece’	Violation of the SONSEQ constraint? YES, according to 49b

5.1.2 Regressive manner assimilation in most Catalan varieties

(51) → Manner assimilation applies to avoid sonority rise across syllable boundaries, provided that the process does not imply the loss of the point of articulation of the first consonant (see 52a) or the manner of articulation of a non-stop consonant (52b) (in these cases, assimilation does not apply).

(illustration: Central Catalan)

(52) Constraint hierarchy

- a. IDENT(labial), IDENT(dorsal) >> *DISTANCE + >>> IDENT(coronal)
- b. IDENT(nasal), IDENT(sibilant) >> *DISTANCE + >>> IDENT(–sonorant)

(53) *Manner assimilation in homorganic stop + nasal / lateral clusters*

a. *cap mos* /kap##mɔs/ [kam.mós]

/kap##mɔs/	IDENT (lab)	*DIST+1	IDENT (–sont)
a. ∅ [kam.mós]			*
b. [kab.mós]		*!	

(54) *Manner preservation in heterorganic stop + nasal / lateral clusters*

cap limit /kap##limit/ [kab.lí.mit]

/kap##limit/	IDENT(lab)	*DIST+4	IDENT(–sont)
a. [kal.lí.mit]	*!		*
b. ∅ [kab.lí.mit]		*	

(55) *Manner preservation when CI = non-stop*

dos llits /doz##lítz/ [doz.lítz]

/doz##lítz/	IDENT(sib)	*DIST+3
a. ∅ [doz.lítz]		*
b. [do.lítz]	*!	

(56) *Manner assimilation when CI = dental stop*

/pɔd##mirar/	*DIST+1	IDENT(–sont)	IDENT(cor)
a. ∅ [pɔm.mi.rá]		*	*
b. [pɔd.mi.rá]	*!		

5.2. Rhotacism and gliding

(57) → Rhotacism and gliding apply to avoid potential rising sonority transitions (see 58a) and also to increase the sonority fall from the coda to the onset (see 58b).

(Illustration: Majorcan Catalan)

(58)

a. *(Potential) rising sonority*

a. Majorcan Catalan	<i>dos mesos</i> /doz##mezuz/ [doi.mé.zus] <i>dos nius</i> /doz##niwz/ [doi.níws]
b. Sardinian	<i>tres yannas</i> /tres##jannas/ [trɛr.ján.nas] <i>tres manos</i> /tres##manɔs/ [trɛr.má.nɔs]
c. Galician	<i>estás mal</i> /stas##mal/ [es.tar.mál]
d. Occitan	<i>cos nüt</i> /kɔs##nyt/ [kɔj.nýt] <i>es mòrt</i> /es##mɔrt/ [ej.mórt]

b. *(Potential) flat or falling sonority*

a. Majorcan Catalan	<i>dos bous</i> /doz##bɔwz/ [doi.bóws] <i>dos gots</i> /doz##gɔtz/ [doi.góts] <i>dos focs</i> /doz##fɔkz/ [doi.fóks]
b. Sardinian	<i>tres boes</i> /tres##bɔes/ [trɛr.bó.es] <i>tres gattos</i> /tres##gattɔs/ [trɛr.gát.tɔs] <i>tres fizos</i> /tres##fizɔs/ [trɛr.fi.ðzɔs]
c. Galician	<i>estás doente</i> /stas##doente/ [es.tar.ðo.én.te] <i>estás facendo</i> /stas##faθendo/ [es.tar.fa.θén.do]
d. Occitan	<i>los buòus</i> /luz##bjɔwz/ [luj.bjóws] <i>las femmas</i> /laj##fennos/ [laj.fén.nos]

(59) Theoretical consequences

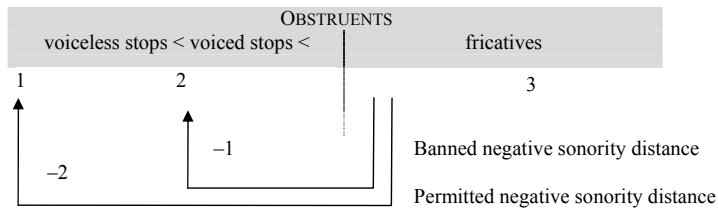
— Syllabic transitions with a flat or a falling sonority can also be improved. Therefore SYLLABLE CONTACT cannot be considered a single constraint which categorically bans transitions with sonority rise, but a hierarchy of constraints regulating both positive and negative intersyllabic distances.

Recall!

(60)

<i>dos bous</i>	/doz##bɔwz/	} potential syllabic transitions with the same degree of sonority fall	BUT	[doɪ.bóws]
<i>los buòus</i>	/luz#bjɔwz/			[luj.bjóws]
<i>dos pous</i>	/doz##powz/			[dos.póws]
<i>las pôrtas</i>	/las#pɔrtas/			[las.pór.tos]

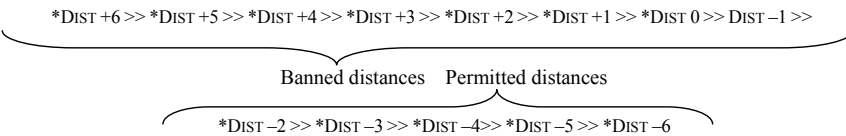
(61) Solution: Third refinement of the sonority scale



(62) See Blevins (1995: 211)

low vowels > non-low vowels > glides > liquids > nasals > voiced fricatives > voiceless fricatives > voiced stops > voiceless stops

(63)



(64) Constraint hierarchy: *DISTANCE 0 >> *DISTANCE -1 >> IDENT(sib) >> *DISTANCE -2

a. *dos focs* /doz##fɔkz/ [dor.fɔks] ‘two fires’

/doz##fɔkz/	*DIST 0	IDENT(sib)
a. [dos.fɔks]	*!	
b. ◊ [dor.fɔks]		*

b. *dos dits* /doz##ditz/ [dor.díts] ‘two fingers’

/doz##ditz/	*DIST -1	IDENT(sib)
a. [doz.díts]	*!	
b. ◊ [dor.díts]		*

c. *dos pans* /doz##panz/ [dos.páns] ‘two breads’

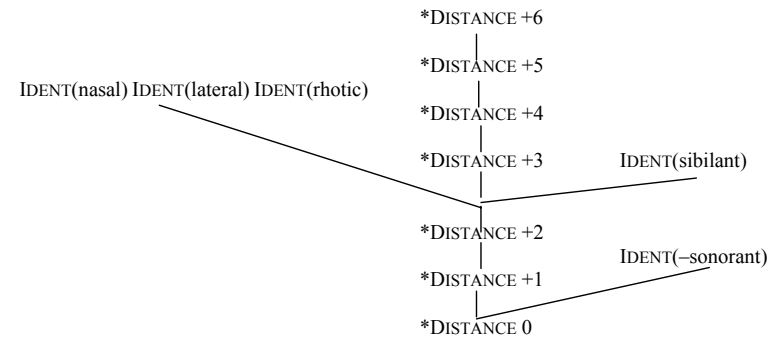
/doz##panz/	IDENT(sib)	*DIST -2
a. [dor.páns]	*!	
b. ◊ [dos.páns]		*

6. Concluding remarks

In this paper we have analyzed the nature and the effects of the SYLLABLE CONTACT constraint in Optimality Theory, departing from the observation of the phonological behaviour of Romance languages, as far as manner alternations are concerned.

— The analysis of *regressive manner assimilation* appears to be theoretically relevant. In Majorcan and Minorcan Catalan, rising sonority transitions are generally avoided. However, a certain degree of sonority rise is permitted, mainly when specific consonants (*i.e.* sibilants and nasals) are placed in coda position. This pattern undoubtedly corroborates the need for splitting SYLLABLE CONTACT into a hierarchy of constraints targeting the permissible sonority distances across syllable boundaries (see Gouskova 2005); the effects of the constraints in the hierarchy are mediated by the intervention of the faithfulness constraints that regulate featural changes of manner:

Constraint ranking for Minorcan and for non-rhotacist varieties of Majorcan



The low ranking of the faithfulness constraint IDENT(-sonorant) expresses the reduced perceptibility of stops in relation to sibilants and sonorants, an asymmetry which has other consequences in the phonology of Catalan and other languages (see, in this respect, Recasens [1991] 1996, Jiménez 1997, 1999, Pons 2004a, Steriade 2001). This constraint hierarchy, on the other hand, explains the matrix of permissible and impermissible transyllabic consonant contacts of (65).

Majorcan and Minorcan permissible and impermissible transyllabic contacts¹¹

Onset	6	5	4	3	2	1	
Coda	V	G/L	T	N	F	S	V: vowels G/L: glides / liquids T: trill N: nasals F: fricatives S: stops
6	V	0	-1	-2	-3	-4	-5
5	G/L	+1	0	-1	-2	-3	-4
4	T	+2	+1	0	-1	-2	-3
3	N	+3	-2	+1	0	-1	-2
2	F	+4	+3	+2	+1	0	-1
1	S	+5	+4	+3	+2	+1	0

Banned sonority distance for non-sibilant obstruents

Banned sonority distance for all consonants

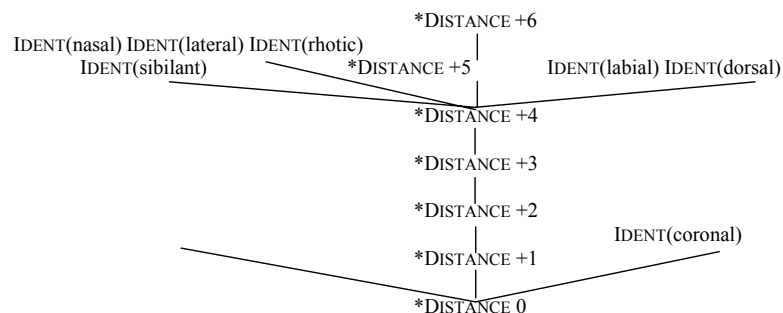
Permissible sonority distance for all consonants

Gouskova's approach to SYLLABLE CONTACT based on *partial stratum* appears to be a satisfactory mechanism to account for regressive manner assimilation in Majorcan and Minorcan Catalan: the process, indeed, is sensitive to the absolute distance between heterosyllabic segments, independently of the type of consonants placed in coda and onset position.

— The asymmetric phonological behaviour of trills with respect to the rest of liquids as far as regressive manner assimilation and onset strengthening are concerned leads to interesting predictions about the exact position of these sounds in the sonority scale: trills are less sonorous than other liquids, to the extent that they do not trigger manner assimilation of nasals, while laterals do, and to the extent that trills are preferred to flaps in a nasal-rhotic heterosyllabic contact. As pointed out by Rice (2005: 31), based on evidence from phonological processes of neutralization, epenthesis and assimilation, «there is not a fixed relationship between [l/ and /r/], but which patterns as phonologically marked is determined on a language-particular basis».

— In most Catalan dialects, regressive manner assimilation just affects stops and it is avoided when it implies the loss of a non-coronal place of articulation. This corroborates again the poor perceptibility of stops in relation to the rest of consonants, as well as the unmarkedness of coronal segments with respect to labial and dorsal segments, which is expressed by the well-known hierarchy IDENT(labial), IDENT(dorsal) >> IDENT(coronal).

Constraint hierarchy for most varieties of Catalan

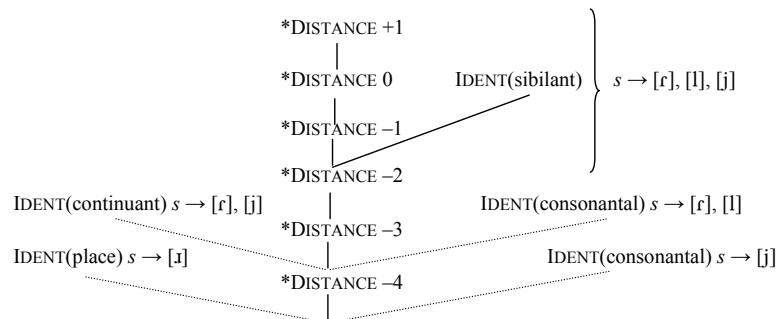


— The analysis of rhotacism and gliding also has relevant theoretical implications.

Firstly, it indicates that falling and flat sonority transitions are also susceptible to improvement: this fact supports the claim that SYLLABLE CONTACT is not a single constraint categorically banning rising

¹¹ This matrix corresponds to those varieties of Majorcan where rhotacism does not apply.

sonority but a hierarchy of constraints targeting positive, flat or negative sonority distances across a syllable boundary. Indeed, in Majorcan Catalan, Sardinian, Occitan and Galician, negative sonority transitions of -2 or lower are permitted, but not of higher sonority (*i.e.* -1, 0, +1, +2...). The subhierarchy { *DISTANCE +6 >> ... >> *DISTANCE 0 >> *DISTANCE -1 } must therefore dominate IDENT(sibilant). The intervention of the faithfulness constraints IDENT(place), IDENT(continuant) and IDENT(consonantal) determines the type of consonant resulting from the process of coda weakening.



Secondly, the fact that these phenomena apply before sonorants, fricatives and voiced stops, but not before voiceless stops, may indicate that the sonority of voiceless stops is lower than the sonority of voiced stops, as been proposed for other languages (see Steriade 1982, Davis 1990, Alderete 1995 and Blevins 1995).

In this paper we have opted, as previous studies, for a very schematic and idealized version of the sonority scale, with regular intervals: indeed, the sonority distance between contiguous consonants in the scale is believed to be the identical. However, in a more realistic version of the sonority scale the distance between different consonants probably should differ. In fact, once we incorporate a distinction between two kinds of consonants or once we consider an additional class of consonants not existent in the language under evaluation, we alter the relative sonority distance established between consonants. In this paper we have not considered, for instance, the unvoiced glottal approximant, which, according to Parker's (2002) study, has its own interval in between nasals and voiced fricatives in the sonority scale: if we take into account this consonant, we increment the sonority distance between voiced fricatives and nasals and we alter the relative sonority distance established between these two consonants and other pairs of consonants.

Another remark that should be made is that languages may differ in the position that certain consonants occupy in the sonority scale to some extent, and also in the way in which they exploit the sonority intervals. It is interesting, in this respect, the discussion of Rice (2005) about the sonority differences between liquids and that of Parker (2002) about the sonority differences between voiced and unvoiced fricatives: both authors conclude that the sonority rank between these classes is not universally fixed and may differ from one language to another. What needs more study is whether these slight variations in the sonority scale are a licit mechanism to account for phonological variation across languages in the OT framework.

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