Left is more: Rhotic metathesis in Algherese Catalan[*]

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1.   Goals

• In the light of the diachronic process of rhotic metathesis that has applied in Algherese Catalan, in this (short) paper we provide some empirical evidence for considering the *left edge of the stem* a prominent position, along the lines of Alber 2001.

• A Harmonic Serialism analysis of the data is presented, as well as a comparison with parallel OT. *a*) It is argued that the typological predictions that derive from Harmonic Serialism are more restrictive than those derived from parallel OT. Only resorting to Harmonic Serialism, indeed, long-distance metathesis can be discarded as a potential process of natural languages (Hume 2001). *b*) It is also proven how only resorting to Harmonic Serialism the two rhotic metathesis patterns found in Algherese Catalan can be accounted for in unison.

2.   Data

2.1 In Algherese Catalan, liquids (*l, r*) show a puzzling distribution that has traditionally been referred to as *liquid interchange* (Bosch & Armangué 1995).

(1) *(Diachronic) Phonological processes involving liquids*

Process	Involved segment / Context	Examples	
		Inherited words	Loanwords
A. RHOTACISM	a. *l* in intervocalic position	*oli* [ˈɔ.ɾi] 'oil' *bolet* [bu.ˈɾɛt] 'mushroom'	*coca-cola* [ˌko.ka.ˈkɔ.la] 'coke' *colino* [ko.ˈli.no] 'strainer'
	b. *l* as C₂ of a complex onset	*clau* [ˈkraw] 'key' *ungla* [ˈuŋ.gra] 'nail'	*blues* [ˈblus] 'blues' *clicar* [kliˈka] 'to click'
	c. *d* in intervocalic position	*nadal* [na.ˈral] 'Christmas'	*judo* [ˈd͡ʒu.do] 'judo'

B. LATERALIZATION	d. *r* in preconsonantal coda position	*mort* ['mɔl̪t] 'dead-*masc*' *morta* ['mɔl̪.ta] 'dead-*fem*'	*pírcing* ['pir.siŋgᵉ] 'piercing' *gorgonzola* [gor.gon.ᵗᵈzo.la] 'gorgonzola'
C. METATHESIS	e. *r* in preconsonantal coda position	*forment* [fru.'men̪t] 'wheat'	*fòrceps* ['fɔr.t͡ʃips] 'forceps'
	f. *r* as C$_2$ of a complex onset	*cabra* ['kra.ba] 'coat'	*cobra* ['ko.bra] 'cobra'

(2) *Conspiracies*

$\begin{cases} \text{/l/ banned as onset and preferred as coda} \\ \text{/ɾ/ ([ɾ], [r]) banned as coda and preferred as onset} \end{cases}$

2.2. The diachronic process of metathesis in Algherese Catalan follows two different patterns, exemplified in (3). [See Bradley 2007 and Russell & Bradley 2007 for other cases of Romance metathesis.]

(3) *Examples*

(a) *Intrasyllabic metathesis* (Scala 2003, Cabrera 2009):

→ *A rhotic in the coda followed by a consonant migrates to the onset of the same syllable*

Old Algherese	*Modern Algherese*		
es.tor.nell	es.tro.nell	[as.tru.'nel]	'starling'
for.mat.ge	fro.mat.ge	[fru.'mad͡ʒu]	'cheese'
for.ment	fro.ment	[fru.'men̪t]	'wheat'
for.mí.go.la	fro.mí.go.la	[fru.'mi.gu.ra]	'ant'
per.fum	pre.fum	[pra.'fum]	'perfume'
tur.nell	tru.nell	[tru.'nel]	'ankle'
tur.ment	tru.ment	[tru.'men̪t]	'torture'
dor.mir	dro.mir	[ru.'mi]	'to sleep'
en.dor.mis.car	en.dro.mis.car	[an.ru.mis.'ka][1]	'to doze off'

(b) *Intersyllabic metathesis* (Scala 2003, Cabrera 2009):

→ *A rhotic in a complex onset migrates to the onset of the preceding syllable*

Old Algherese	*Modern Algherese*		
ca.bra	cra.ba	['kra.ba]	'coat'
fe.brer	fre.ber	[fra.'be]	'February'
fe.brós	fre.bós	[fra.'bos]	'fevered'
pa.tró	pra.tó	[pra.'to]	'patron'
pe.bre	pre.be	['prɛ.ba]	'pepper'

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[1] Note that a complex onset made up of a voiced dental stop followed by a rhotic is forbidden in this dialect (see, among others, Bosch & Armangué 1995, Bosch 2002, Scala 2003, Cabrera 2009) and it is realized as a single trill: *pedra* [péra] 'stone'.

po.b<u>r</u>e	p<u>r</u>o.be	[ˈprɔ.ba]	'poor'
tem.p<u>r</u>e	t<u>r</u>em.pe	[ˈtrem.pa]	'temper'
ten.d<u>r</u>e	t<u>r</u>en.de	[ˈtrɛn̪.da]	'tender'
co.gom.b<u>r</u>e	co.g<u>r</u>om.be	[ku.ˈgrom.ba]	'cucumber'
es.fon.d<u>r</u>ar	es.f<u>r</u>on.dar	[as.fru̯n.ˈda]	'to tumble down'
ca.te.d<u>r</u>al	ca.t<u>r</u>e.dal	[ka.tra.ˈdal]	'cathedral'
u.fà.b<u>r</u>i.ca	u.f<u>r</u>à.bi.ca	[u.ˈfra.bi.ka]	'basil'
des.t<u>r</u>al	d<u>r</u>es.tal	[ras.ˈtal]	'axe'
doc.t<u>r</u>i.na	d<u>r</u>oc.ti.na	[ru.ˈti.na][2]	'doctrine'

4. Descriptive generalizations

• The first pattern (3a) is related to the general <u>*avoidance in this dialect of preconsonantal rhotic codas (in word internal position)*</u>, which also explains the process of lateralization of this consonant in the same context (see (1)).

• The second pattern (3b) can be interpreted as a <u>*prominence effect*</u> in that a marked structure, a complex onset, is preferred in a prominent position, *i.e* the *left* edge of the stem, and not in a non-prominent position, *i.e* the *right* edge of the stem. (Note that the relevant prominent position is the left edge of the stem and not the left edge of the word (cf. *com-promitir*, **crom-pomitir* 'to com-promise'.)

• The migration cannot exceed more than one syllable (*co.gom.bre* 'cucumber', *ca.te.dral* 'cathedral' > *co.grom.be*, **cro.gom.be*; *ca.tre.dal*, **cra.te.dal*).

• Exceptionally, the rhotic can skip one syllable if this syllable has no onset. This means that the rhotic can exceed more than one syllable in order to preserve its syllabic position (*po.a.gra* 'podagra' > *pro.a.ga*, **poraga*).

• Metathesis is only allowed to syllables already containing an onset (*a.gre* 'sour' > *a.gre* **ra.gue*).

5. Analysis

5.1. *Theoretical background*

• Harmonic Serialism (HS) is a non-stratal derivational version of (classic) parallel OT (POT) that has recently been developed in order to account for different phonological phenomena (Prince & Smolensky 1993/2004, McCarthy 2000, 2008a, 2008b, 2010, and others).

• A derivational version of POT was briefly presented in Prince & Smolensky 1993/2004, but then abandoned:

> "Universal grammar must provide a function GEN that admits the candidates to be evaluated. […] We have entertained two different conceptions of GEN. The first, closer to standard generative theory, is based on serial or derivational processing: some general procedure (Do-α) 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." (Prince & Smolensky 1993/2004, p. 94-95)

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[2] See footnote 1.

(5) *POT architecture* (taken from McCarthy 2009)

input → GEN → candidates → EVAL → *output*
(**infinite** set)

(6) *HS architecture* (taken from McCarthy 2009)

input → GEN → candidates → EVAL → convergence? → yes → *output*
(**finite** set)
GEN-EVAL-GEN… loop   no
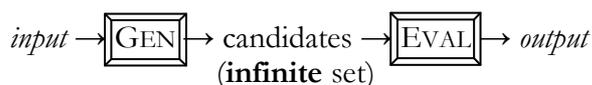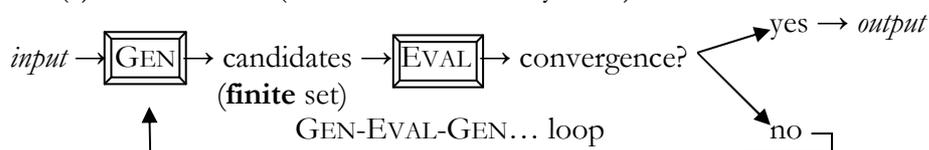
• Harmonic Serialism has two requirements:

1- Gradualness:
HS's GEN is limited to making one change at a time, so the candidates it generates differ only minimally from the most recent input. Derivations are not parallel, but gradual (*i.e.*, serial).

What does making one change at a time mean? This is an empirical issue. The most extended idea is that making one change at a time is equivalent to making one faithfulness constraint violation at a time. If this is true, then the theory of CON shapes the theory of GEN.

Given that surface forms are not in general limited to a single change, gradualness necessarily needs the GEN/EVAL/GEN... loop. This loop finishes when the winning candidate is the fully faithful parse of the latest input (*i.e.*, when the derivation has converged).

2 - Harmonic improvement:
At each step of the derivation, the winning candidate has to be either
(a) more harmonic than the most recent input (in this case the derivation continues)
or
(b) identical to the most recent input (in this case there is convergence)

• Some **formal properties of HS** are listed below:
   - Finiteness of the candidate set
   - Finiteness of derivations
   - No *Duke-of-York* derivations (*A→B→A)
   - Restrictiveness of typological predictions

5.2 *HS analysis*

(7) *Markedness constraints*

a. *COMPLEX-ONSET/R-STEM
Assign one violation mark for every complex onset that stands at the right syllable of the stem.

b. *COMPLEX-ONSET/M-STEM
Assign one violation mark for every complex onset that stands at the middle syllable of the stem.

c.   *COMPLEX-ONSET/L-STEM
Assign one violation mark for every complex onset that stands at the left syllable of the stem.[3]

d.   NO-CODA$_{[Rhotic]}$C
Assign one violation mark for every preconsonantal rhotic parsed as a syllable coda. (Adapted from Prince & Smolensky 1993)

e.   *COMPLEX-ONSET
Assign one violation mark for every complex onset. (Adapted from Prince & Smolensky 1993)

— *Faithfulness constraint*

f.   LINEARITY
Let *input* = $i_1i_2i_3\dots i_n$ and *output* = $o_1o_2o_3\dots o_m$.
Assign one violation mark for every pair i_w and i_y if
$i_w \mathcal{R} o_x$ and $i_y \mathcal{R} o_z$, i_w precedes i_y, and o_z precedes o_x. (McCarthy & Prince 1995, McCarthy 2008)

A. Cases *formatge > fromatge* (*intrasyllabic metathesis*) (see § 3a)

(8) *Step 1*

for.matge	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. fro.mat.ge			*		*	*
b. for.mat.ge		*W	L		L	L

Ranking argument(s): **NO-CODA$_{[RHOTIC]}$C** >> *COMPL-ONS, ***COMPL-ONS/L-ST**, LIN

(9) *Step 2* → Convergence

fro.matge	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. fro.mat.ge			*		*	
b. for.mat.ge		*W	L		L	*W

Ranking argument(s): **NO-CODA$_{[RHOTIC]}$C** >> *COMPL-ONS, ***COMPL-ONS/L-ST**

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[3] These are tentative markedness constraints, which should distinguish between the different positions in the middle of the stem, that is, the second and the third syllables in four-syllable words. However, we do not have examples of this type. In previous versions of this paper, we assumed that they are universally ranked in the following way: *COMPLEX-ONSET/R-STEM >> *COMPLEX-ONSET/M-STEM >> *COMPLEX-ONSET/L-STEM. What remains to be proven, however is the ordering between *COMPLEX-ONSET/R-STEM and *COMPLEX-ONSET/M-STEM in that the final position (*i.e.* the right edge) could be considered more prominent than the middle one, and therefore the constraint targeting it should be ranked below the one targeting the middle position. Thanks to Joe Pater for pointing us this issue. In fact, in our analysis these constraints are ranked in the order *COMPL-ONS/R-ST >> *COMPL-ONS/M-ST, because of transitivity: *COMPL-ONS/R-ST >> NO-CODA$_{[RHOTIC]}$C (see 13) and NO-CODA$_{[RHOTIC]}$C >> *COMPL-ONS/M-ST (see 14 and 15). Overall, we leave this issue for future research.

B. Cases *cabra > craba* (*intersyllabic metathesis in bisyllabic words*) (see § 3b)

(10) *Step 1*

ca.bra	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. car.ba		*				*
b. ca.bra	*W	L	*W			L

Ranking argument(s): ***COMPL-ONS/R-ST** >> **NO-CODA$_{[RHOTIC]}$C**

(11) *Step 2*

car.ba	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. cra.ba			*		*	*
b. car.ba		*W	L		L	L

Ranking argument(s): **NO-CODA$_{[RHOTIC]}$C** >> *COMPL-ONS, ***COMPL-ONS / L-ST**, LIN

(12) *Step 3 →* Convergence

cra.ba	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. cra.ba			*		*	
b. car.ba		*W	L		L	*W

Ranking argument(s): **NO-CODA$_{[RHOTIC]}$C** >> *COMPL-ONS, ***COMPL-ONS / L-ST**

> ✎ The second step of the derivation of *cabra* [cases B] (*car.ba → cra.ba*) is equivalent to the first rhotic metathesis pattern [cases A] (*for.mat.ge → fro.mat.ge*).

Problem: How to control the direction of the metathesis process (and discard, for instance, a candidate such as *cabar*)? → Possible solutions: *i*) Faithfulness to word / stem-final position (à la Kramer 2003); *ii*) Relativizing the LINEARITY constraint (with an explicit reference to the rhotic); *iii*) Modifying the markedness constraint(s) responsible for the process of metathesis (with reference to the rhotic and not the complex onset, à la Alber 2001).

C. Cases *catedral > catredal* (*intersyllabic metathesis in a three-syllable word*)

(13) *Step 1*

ca.te.dral	*COMPL-ONS/R-ST	NO-CODA$_{[RHOTIC]}$C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. ca.ter.dal		*				*
b. ca.te.dral	*W	L	*W			L

Ranking argument(s): ***COMPL-ONS/R-ST** >> **NO-CODA$_{[RHOTIC]}$C**

(14) *Step 2*

ca.ter.dal	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. ca.tre.dal			*	*		*
b. ca.ter.dal		*W	L	L		L

Ranking arguments: **NO-CODA[RHOTIC]C** >> *COMPL-ONS, ***COMPL-ONS/M-ST**, LIN

(15) *Step 3* → Convergence

ca.tre.dal	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. ca.tre.dal			*	*		
b. car.te.dal		*W	L	L		*W

Ranking arguments: **NO-CODA[RHOTIC]C** >> *COMPL-ONS, ***COMPL-ONS/M-ST**

*There are no examples of three-syllable words with the complex onset in the middle of the stem. These would be crucial to prove the ranking between *COMPL-ONS/M-ST and *COMPL-ONS/L-ST.

D. *Special case*: *poagra* > *pro.a.ga* 'podagra'

(16) *Step 1*

po.a.gra	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. po.ar.ga		*				*
b. po.a.gra	*W	L	*W			L

(17) *Step 2*

po.ar.ga	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. po.ra.ga						*
b. po.ar.ga		*W				L

(18) *Step 3* → Non-desired convergence

po.ra.ga	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
💣 a. po.ra.ga						
☹ b. pro.a.ga					*W	*

E. (*Very*) *Tentative analysis*

(19) *Step 1*

po.a.gra	DEP-ONSET	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	NO-CODA	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. po.ar.ga			*	*				*
b. po.a.gra		*W	L	L	*W			L

(20) *Step 2*

po.ar.ga	**DEP-ONSET**	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	**NO-CODA**	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. por.a.ga				*				*
b. po.ar.ga			*	*W				L
c. po.ra.ga	*W							

(21) *Step 3* → Convergence

por.a.ga	**DEP-ONSET**	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	**NO-CODA**	*COMPL-ONS	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	LIN
☞ a. pro.a.ga					*		*	*
b. por.a.ga				*W	L		L	L

5.3. *Parallel OT analysis*

(22) *cabra → craba*

ca.bra	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	*COMPLEX-ONS	LIN
☞ a. cra.ba				*	*	*
b. car.ba		*!				*
c. ca.bra	*!				*	

(23) *catedral → catredal*

ca.te.dral	*COMPL-ONS/R-ST	NO-CODA[RHOTIC]C	*COMPL-ONS/M-ST	*COMPL-ONS/L-ST	*COMPLEX-ONS	LIN
● a. cra.te.dal				*	*	*
☹ b. ca.tre.dal			*!		*	*
c. ca.ter.dal		*!				*
d. ca.te.dral	*!				*	

✋ With the same constraint set, a POT analysis cannot derive intersyllabic metathesis from the right edge of the stem to the preceding syllable in three-syllable words (*catedral → ca.tre.dal*). POT, indeed, incorrectly selects as the most harmonic candidate the one that shows the complex onset at the left edge of the stem (**cra.te.dal*). However, in Harmonic Serialism, derivations get stuck at a *local minimum* of harmonic improvement (McCarthy 2008a, 2009). Once the intermediate representation *ca.tre.dal* is selected as the most harmonic candidate, no harmonic improvement is possible at the next step of the derivation. This is so given that *car.te.dal*, the necessary step before *cra.te.dal*, is less harmonic than *ca.tre.dal* because NO-CODA[RHOTIC]C dominates *COMPL-ONS/M-ST, and the derivation *myopically* converges at this point.

6.   Final remarks

✋ A set of <u>prominence driven constraints</u> that disfavor a complex onset in different positions within the stem (*COMPL-ONS/R-STEM, *COMPL-ONS/M-STEM, *COMPL-ONS/L-STEM) has been proposed. The high ranking of *COMPLEX-ONSET/R-STEM triggers intersyllabic rhotic metathesis in two and three-syllable words with a complex onset at the right syllable of the stem.

✋ A POT analysis cannot account for all the facts. Moreover, it makes different typological predictions. In our HS analysis we do not predict the existence of <u>long-distance metathesis</u> because of the gradualness requirement on GEN –which confers to it a myopic nature–, but just <u>local</u> <u>metathesis</u> (between adjacent segments).

✍ Our HS analysis deeply <u>assembles</u> the <u>two metathesis patterns</u>, both intra and intersyllabic: the second step of the intersyllabic metathesis derivation corresponds to the intrasyllabic metathesis pattern itself.

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