MORE ON ALIGNMENT AS AN ALTERNATIVE TO DOMAINS:
THE SYLLABIFICATION OF CATALAN CLITICS[1]

Eulàlia Bonet

Universitat Autònoma de Barcelona

Maria-Rosa Lloret

Universitat de Barcelona

In Catalan vowel epenthesis and consonant deletion seem to have a different conditioning in simple words, in verb-clitic or clitic-verb sequences, and in clitic-clitic sequences (where an emergence of the unmarked effect with respect to syllable structure is found). In this paper, it is argued that, in spite of these domain effects, which would suggest the need for a serial analysis, all the facts concerning epenthesis and consonant deletion can be accounted for in a parallel optimality-theoretic approach. The differences in behavior are the consequence of the different ranking of morphological Alignment constraints with respect to other constraints and an Alignment constraint that makes reference to subsyllabic constituents.

1. Introduction

Catalan has fourteen pronominal clitic forms, and each of these forms can surface with several different realizations depending mostly on the phonological context. In addition, most clitics can combine with each other, and sequences can have several clitics at the same time. In (1) the variation in clitic shape is illustrated for the variety of Catalan spoken in the Barcelona area (Barceloní, from now on), which is the dialect that is examined in this paper. Given the relevance of syllable structure in determining the shape of clitics, we indicate syllable boundaries throughout.[2]

(1) a. Partitive: *tira'n* [tí.ɾən]   [n]   'throw some!'

                 en tira [ən.tí.ɾə]   [ən]   '(s/he) throws some'

                 tirar-ne [ti.ɾár.nə]   [nə]   'to throw some'

     b. 1st person pl.: *tiri'ns* [tí.ɾins]   [ns]   'throw (pol.) (to) us!'[3]

                 ens tira [əns.tí.ɾə]   [əns]   '(s/he) throws (to) us'

                 ens salva [ən.zə.sál.βə] [ənzə]   '(s/he) saves us'

                 tireu-nos [ti.ɾέwn.zə]   [nzə]   'throw (pl.) (to) us!'

                 tirem-nos [ti.ɾέm.zə]   [zə]   'let's throw ourselves'

In (1a) there is a fixed consonant, [n]; a schwa (spelled *e* when reflected in the orthography) appears in two of the examples but in different positions. In (1b) there is also a variable appearance of schwa; it can be absent, it can appear in initial position, in final position, or in both. In addition, and leaving aside the voicing alternation in the sibilant, which is due to general phonological processes of the language that are orthogonal to the paper, it can be seen that in the last example of (1b) the [n] that appears in other examples is absent. As we shall see, the appearance of schwa can be connected in some cases to problems with syllabification and thus be analyzed as epenthetic, as is the case with simple words with an epenthetic vowel. As for consonant deletion, it will be seen that some cases are related to a process of deletion that is general in Catalan. In other cases, however, both epenthesis and consonant deletion seem to be specific to clitic-verb or verb-clitic sequences, or even to clitic-clitic sequences.

In spite of its interest, the phonology of Catalan clitics is a topic that has received little attention in the literature and in most cases the attention has focused on the behavior of very few clitics in very specific contexts, which constitutes an unsurmountable problem when these accounts are extended to the rest of the system. The goal of this paper is to fill this gap arguing in favor of a parallel model of Optimality Theory (OT). Specifically, it is argued that a single constraint hierarchy can account for vowel epenthesis and consonant deletion, both in those cases where general processes of the language apply

and those cases that are apparently specific to clitics; thus there is no need for a serial approach. The "domain" effect is caused by the role played by morphological Alignment constraints, which are ranked differently in the hierarchy, and another Alignment constraint, ALIGN-R(SUB-σ), that makes reference to subsyllabic constituents.

The paper is organized as follows: section 2 provides a basic description of the pronominal clitic system of Catalan. In section 3 it is argued that the schwas that appear associated to clitics in different contexts and in different positions have to be attributed to epenthesis, rather than allomorphy. Section 4 addresses the specific problems that need to be accounted for under the epenthesis view. Section 5 contains a review of previous approaches to the phonology of Catalan pronominal clitics. Section 6 is devoted to the analysis. Finally, section 7 provides the final ranking, discusses some of the consequences of the analysis and comments on one remaining problem.

2. Basic facts about pronominalization in Catalan

2.1. Single clitics

The pronominal clitics of most dialects of Catalan appear as enclitics after an imperative, an infinitive or a gerund, and appear as proclitics before other forms of the verb (except participials, which do not admit clitics). In (2) we show the pronominal clitics of Catalan, with their pronunciations in Barceloní and their citation form. In (2), the clitics appear grouped according to their phonological (and in some cases morphological) behavior. In certain cases, the inclusion of a clitic in a specific group might seem surprising at first sight. For instance, the second person plural clitic, often spelled *us*, appears with the clitics that contain two consonants. In section 3, it is argued that the *u* is underlyingly a glide, /w/, at least in most instances. The label for each clitic has been used for convenience, and does not always reflect all the functions a clitic can have.[4]

(2) Pronominal clitics in Barceloní Catalan

CLITIC TYPE	LABEL	PRONUNCIATION	CITATION FORM
a. C-clitics	1st sing.	[əm], [mə], [m]	em
	2nd sing.	[ət], [tə], [t]	et
	3rd reflex.	[əs], [sə], [s]	es
	partitive	[ən], [nə], [n]	en
b. CC(i)-clitics	1st pl.	[ənz], [nz], [nzə], [zə], [ənzə]	ens
	2nd pl.	[uz], [əwz], [wz], [wzə], [zə], [əwzə]	us
	3rd dat. pl.	[əlzi], [lzi]	elzi
c. V-clitics	locative	[i]	hi
	neuter	[u]	ho
d. CV(z)-clitics	3rd dat. sing.	[li]	li
	3rd acc. fem. sing.	[lə], [l]	la
	3rd acc. fem. pl.	[ləz]	les
e. 3rd masc. acc. clitics	3rd acc. masc. sing.	[əl], [lu], [l]	el
	3rd acc. masc. pl.	[əlz], [luz], [lz]	els

a. C-clitics = Clitics with one consonant, and variable appearance of schwa, spelled *e*.

b. CC(i)-clitics = Clitics with two adjacent consonants, and variable appearance of schwa plus variable consonant deletion.[5]

c. V-clitics = Vocalic clitics.

d. CV(z)-clitics = Clitics with one consonant, followed by a vowel representing a morpheme, and with an optional additional plural morph.

e. 3rd masc. acc. clitics = Third person masculine accusative non-reflexive clitics, with gender allomorphy (i.e., [u]).

The clitics presented in (2) can show up with some additional phonetic differences due to general phonological processes of the language. In Catalan, high vowels (/i/ and /u/) are often subject to glide formation, and this process might affect the locative clitic *hi*, the neuter clitic *ho* and the third dative clitics *li* and *elzi* (which can, therefore, appear also as [j], [w], [lj], and [(ə)lzj], respectively; cf. *ho tira* [u.tí.ɾə] '(s/he) throws it', *ho imita* [wi.mí.tə] '(s/he) imitates it'). Final devoicing and voicing assimilation apply to all obstruents in Catalan. Through these processes the /t/ of the second person singular

clitic *et* might become [d], all the instances of /z/, present in many clitics, might become [s], and the /s/ of the third person reflexive clitic *es* might be pronounced [z]; cf. *et tiro* [ət.tí.ɾu] '(I) throw you', *et dic* [əd.dík] '(I) tell you'; *ens tira* [əns.tí.ɾə] '(s/he) throws (to) us', *tirem-les* [ti.ɾɛ́m.ləs] 'let's throw them (fem.)', *es manté* [əz.mən.té] 'it is maintained'. A place assimilation might affect the /t/ of the second person singular clitic *et* and the /n/ of the partitive clitic *en*, and a manner assimilation (of stops to homorganic nasals and laterals) might also affect the /t/ of *et* (cf. *et compro* [ək.kóm.pɾu] '(I) buy you', *et necessito* [ən.nə.sə.sí.tu] '(I) need you'). In addition, Catalan has vowel reduction. In the variety being considered here, unstressed /a/, /ɛ/ and /e/ are realized as [ə], and unstressed /ɔ/ and /o/ are pronounced [u]. Differences in the spelling as *a* or *e* do not always reflect a phonological difference. This is the case of the third person accusative feminine clitics. *La* in the singular and *les* in the plural differ, phonologically and phonetically, only in the presence or absence of the plural morph ([lə] or [ləz]), not in the quality of the vowel, the feminine morph, which is always [ə] (underlyingly /a/). All these phonological processes are ignored in the rest of the paper. In all the examples we keep the shape of the clitics as constant as possible.[6]

The paper focuses especially on clitics that might pose problems for syllabification, namely, the clitics in (2a), C-clitics, and (2b), CC(i)-clitics. V-clitics in (2c), CV(z)-clitics in (2d), and third person accusative clitics, *el* and *els*, in (2e) are not central to this study because they don't pose any specific syllabic problem: V-clitics only undergo the aforementioned general phenomenon of gliding; CV(z)-clitics always surface syllabically faithful to their input because their underlying form results in an unmarked syllable structure; allomorphy is involved in the realization of *el* and *els*, but otherwise they have the same phonological behavior as clitics belonging to other groups.[7]

The distribution of the clitic forms under study is outlined in table (3). (3a) includes all the cases, except for CC(i)-clitics in enclisis when the verb does not end in a vowel. As shown in (3b), the realization of these enclitics depends on the segmental make-up of the clitic involved and the last segments of the verb (which include /w/, the second

person plural morph; /m/, the first person plural morph; other single consonants, found with certain second person singular imperative forms, and /nt/, the gerund morph). From now on, we underline the schwas that are relevant to the analysis (the ones that have a variable appearance) and cross out the consonants that are deleted, advancing the conclusion that will be drawn in section 6.3 as to what consonants are deleted in certain cases; C stands for consonant or glide.

(3) a. [ə] ~ Ø alternation only

PROCLISIS		
CLITIC TYPE	CONTEXT	REALIZATION
C-clitics	__#V	C [n]*imita* '(s/he) imitates some'
	__#C	əC [ən]*tira* '(s/he) throws some'[8]
CC(i)-clitics	__#V	əCC(i) [ənz]*obre* '(s/he) opens for us' [əlzi]*obre* '(s/he) opens for them'
	__#C	əCC(i) [əns]*tira* '(s/he) throws (to) us' [əlzi]*tira* '(s/he) throws to them'
ENCLISIS		
CLITIC TYPE	CONTEXT	REALIZATION
C-clitics	V#__	C *tiri*[n] 'throw (pol.) some!'
	C#__	Cə *tirem*[nə] 'let's throw some'
CC(i)-clitics	V#__	CC(i) *tiri*[ns] 'throw (pol.) (to) us!' *tiri*[lzi] 'throw (pol.) to them!'
	C#__	see (3b)

b. [ə] ~ Ø alternation and/or C ~ Ø alternation in CC(i)-clitics

ENCLISIS			
CONTEXT	*ens*	*elzi*	*us*
/w/#__	[ti.ɾéwn.zə] *tireu-nos* 'throw (pl.) (to) us!'	[ti.ɾéwl.zi] *tireu'lzi* 'throw (pl.) to them!'	[ti.ɾéw.w̶zə] *tireu-vos* 'throw (pl.) yourselves!'
/m/#__	[ti.ɾém.n̶zə] *tirem-nos* 'let's throw ourselves'	[ti.ɾé.məl.zi] *tirem-elzi* 'let's throw to them'	[ti.ɾé.məws] *tirem-vos* 'let's throw you (pl.)'
C#__	[fé.zəns] *fes-nos* 'do to us!'	[fé.zəl.zi] *fes-elzi* 'do to them!'	non-existing
/nt/#__	[ti.ɾán.t̶n̶zə] *tirant-nos* 'throwing (to) us'	[ti.ɾán.təl.zi] *tirant-elzi* 'throwing to them'	[ti.ɾán.təws] *tirant-vos* 'throwing (to) you'

2.2. Clitic sequences

In Catalan, two or more clitics can cooccur in one and the same clitic group.[9] As can be observed in the examples in (4), a schwa appears between the consonants that belong to different clitics, independently of their status as proclitics or enclitics.

(4) a. *Se li crema*   [sə̲.li.kɾé.mə]

      'something of his/hers burns'

    b. *Ens n'imita*   [ə̲n.zə̲.ni.mí.tə]

      '(s/he) imitates some of ours'

    c. *Se'ns elzi crema*   [sə̲n.zə̲l.zi.kɾé.mə]

      'it burns on them and it affects us'

    d. *Se us n'obren*   [sə̲w.zə̲.nɔ́.βɾən]

      'some of yours (pl.) open'

    e. Vol *quedar-se-te-me'n* tres   [kə.ðár.sə̲.tə̲.mə̲n]

      '(s/he) wants to keep three, and it affects you and me somehow'

    f. *Quedem-nos-les*   [kə.ðém.zə̲.ləs]

      'let's keep them (fem.) (for ourselves)'

    g. *Quedi-se-me-la*   [ké.ði.sə̲.mə̲.lə]

      'keep (pol.) it (fem.) yourself for me'

At this point it is interesting to note that in a sequence like (4a) the schwa appears after the *s* of the third person reflexive pronoun ([sə̲]), while the schwa appears before the *s* of the reflexive clitic if it is the only proclitic and the verb starts with a consonant (cf. *es tira* [ə̲s.tí.ɾa] '(s/he) throws himself/herself'). Notice, in addition, that the presence of the schwa between clitics simplifies syllable structure, which becomes (leaving aside the final consonant of the sequence) as close as possible to the unmarked CV syllable structure; two adjacent consonants appear only when they belong to the same clitic.

3. The underlying form of clitics

From the description of the clitics of Barceloní in section 2 it could be seen that each clitic surfaces with a generally fixed consonant (or more than one consonant), while schwas might be present or not and, when they are present, they might occupy different positions. So, a first question that needs to be answered is whether the schwas are the product of a phonological "process" of epenthesis or they are present underlyingly. Under the first hypothesis, the partitive clitic has a single underlying form, /n/, and the different phonetic outputs are derived through the application of processes or constraints to be determined. Under the second hypothesis, the partitive clitic has three underlying forms, /n/, /ən/, and /nə/, and what needs to be decided then is how to choose among the three allomorphs in different contexts.[10] The choice between the two hypotheses is not immediately evident, but our conclusion will be that for Barceloní the epenthesis hypothesis is preferable, both empirically and on general grounds (since it is more restrictive).

Under the allomorphy hypothesis, there are two possibilities with respect to the choice of allomorphs. One possibility is to attribute the choice to mere stipulation and the other one is to derive the choice from independently needed constraints in the language (along the lines of the analysis of external allomorphy found, for instance, in Tranel 1996, Mascaró 1996, and Perlmutter 1998). As shown above, the choice of forms does depend on phonological factors; it could be assumed, then, that the choice of allomorph interacts with constraints related to syllabification. Under this hypothesis, the choice of /n/ in an example like [ni.mí.tə] *n'imita* '(s/he) imitates some' could be attributed to syllabification-related issues because the other options, *[ə.ni.mí.tə], with the allomorph /ən/, and *[nə.i.mí.tə], with the allomorph /nə/, lack an onset, and *[nəj.mí.tə], also with the allomorph /nə/, has a coda (absent in the actual output [ni.mí.tə]). An output like [i.mí.tən] *imita'n* 'imitate some!', with the allomorph /n/, could be favored over *[i.mí.tə.nə], with the allomorph /nə/, because the language prefers prosodic words ending in a consonant (something that will be argued for later).

However, this reasoning would not explain why, then, [i.mi.tɛ́m.nə] (*imitem-ne* 'let's imitate some'), with the final vowel of the allomorph /nə/, would be favored over a candidate like *[i.mi.tɛ́.mən], with the allomorph /ən/ (notice that both candidates have a coda and that the first lacks a final consonant). Furthermore, in an example like [ən.tí.ɾə] *en tira* '(s/he) throws some', it would be impossible to resort to syllabification factors for the choice of the allomorph /ən/ (which causes the lack of an onset and the presence of a coda) over the allomorph /nə/, given that the allomorph /nə/ would provide a much better syllabification: *[nə.tí.ɾə] (presence of onsets, lack of codas, all syllables with a CV structure). So, in these cases, the choice of one allomorph over another would have to be a mere stipulation (and also the choice of allomorph for the other C-clitics). As shown in (3a), all C-clitics have exactly the same type of outputs. The consonant is always constant: /s/ for the reflexive third person, /m/ for the first person singular, /t/ for the second person singular, and /n/ for the partitive. Such a parallel behavior would be just a coincidence under the allomorphy hypothesis.

When we take a look at clitics with two adjacent consonants, CC(i)-clitics, we also see that they behave alike, as illustrated by the comparison between the first person plural clitic *ens* and the third person dative plural clitic *elzi* (see also (3b)).

(5) a. *tiri'ns* [tí.ɾins]   [ns]   'throw (to) us (pol.)'

         tiri'lzi [tí.ɾil.zi]   [lzi] 'throw to them (pol.)'

     b. *ens tira* [əns.tí.ɾə]   [əns] 'throws (to) us'

         elzi tira [əl.zi.tí.ɾə]   [əlzi] 'throws to them'

     c. *tireu-nos* [ti.ɾɛ́wn.zə]   [nzə] 'throw (2nd pl.) (to) us'

         tireu'lzi [ti.ɾɛ́wl.zi]   [lzi] 'throw (2nd pl.) to them'

In (5a) the two enclitics are next to a verb ending in a vowel and they surface with no schwa; both clitics start with two adjacent consonants. In (5b) both proclitics start with a schwa. Without those schwas, the sequences could not be properly syllabified (*[nstí.ɾə], *[lzi.tí.ɾə]); in these two examples, it is also important to note that the

schwa appears exactly in the same position, before the two consonants of the clitics, not between them, for example (something like *[nəs.tí.ɾə], with the schwa between the two consonants of the clitic, would have a better syllabification). Finally, in (5c), the two enclitics surface without an initial schwa and, given the appearance of a schwa after the two consonants of the first person plural clitic ([nzə]), both clitics end up having the structure CCV. Although this type of cases will be discussed in greater depth in section 6, let us note here that the output syllabification of the sequences [ɾɛ́wn] (in *tireu-nos*) and [ɾɛ́wl] (in *tireu'lzi*) does not violate the requirements of syllable structure but contains a coda with a glide plus a sonorant consonant, something extremely rare in Catalan. Under an allomorphy hypothesis, given that there would be allomorphs of the type /ənz/ and /əlzi/ (the ones that would appear in (5b)), there would be no syllabification-related justification for not choosing them; sequences like *[ti.ɾɛ́.wəns] and *[ti.ɾɛ́.wəl.zi] would have a much better syllabification than [ti.ɾɛ́wn.zə] and [ti.ɾɛ́wl.zi], respectively (the syllabification is simpler, and a complex coda like [ns], present in *[ti.ɾɛ́.wəns] is fairly common in Catalan; cf. *nens* [nɛ́ns] 'children', *constar* [kuns.tá] 'to consist'). Here, again, the choice of /nzə/ over /ənz/ and the choice of /lzi/ over /əlzi/ would have to be stipulated, while the facts follow naturally under the epenthesis analysis to be presented. As we shall see, the analysis explains why the insertion of an epenthetic vowel improves the syllabification, even though in many cases it does not yield the syllabically optimal form.

A final point that can be made in favor of the epenthesis hypothesis is that schwa, the vowel that might be present (with different locations) or absent in clitics, is the epenthetic vowel in the dialect of Catalan under discussion. This vowel is the one that appears, for instance, in clear cases of initial epenthesis, as the ones illustrated in (6), with English clear cognates.

(6)   English example   (Barceloní) Catalan pronunciation
      slip   [ə̲z.líp]
      stop   [ə̲s.tɔ́p]

squash	[ə̱s.kwáʃ]
Springsteen	[ə̱s.pɾíŋs.tin]
Sputnik	[ə̱s.pún.nik]

The idea that the schwas that appear with clitics (and cannot be attributed to gender) are epenthetic is present, among others, in Wheeler (1979), Viaplana (1980), and Mascaró (1986).

Assuming, then, the epenthesis analysis, the underlying forms of the clitics to be assumed are the ones given in (7). We give the underlying form of all the clitics even though the analysis concentrates on C-clitics, in (7a), and CC(i)-clitics, in (7b).

(7) Underlying forms for Barceloní pronominal clitics

CLITIC TYPE	CITATION FORM	UNDERLYING REPRESENTATION
a. C-clitics	es, em, et, en	/s/, /m/, /t/, /n/
b. CC(i)-clitics	ens, elzi, us	/nz/, /l+z+i/, /wz/
c. V-clitics	hi, ho	/i/, /u/
d. CV(z)-clitics	li, la, les	/l+i/, /l+a/, /l+a+z/
e. 3rd person acc. clitics	el, els	/l/ ~ /l+u/, /l+z/ ~ /l+u+z/

Viaplana (1980) and Mascaró (1986) argue that the /i/ found in the third person dative clitics (*li*, [li], in the singular and *elzi*, [(ə)lzi], in the plural) is the dative morph; the /l/ is the morph common to all third person non-reflexive clitics, and the /z/ is the plural morph. We assume their analysis here. In the third person accusative feminine clitics, *la* and *les*, /a/ is the feminine morph.

Most underlying forms are uncontroversial, but there are two possible analyses for the underlying structure of the first and second person plural clitics, *ens* and *us*. One possibility, followed by Wheeler (1979), Viaplana (1980), Mascaró (1986), and Bonet (1991), among others, is to assume that the final /z/ of these clitics is the plural morph, and that /n/ and /w/ are allomorphs of the first and second person morphemes (which have the form /m/ and /t/, respectively, in the singular). The other possibility, assumed in this paper, is that these clitics do not have an internal morphological structure: /nz/ is an

unanalyzable form corresponding to the first person plural clitic, and /wz/ is an unanalyzable form corresponding to the second person plural clitic. This assumption is crucial when dealing with consonant deletion in the clitic group, as will be shown in section 6.3.

With respect to *us*, the reasons to believe that it has a glide underlyingly are based on its phonological behavior in non-initial position. This clitic causes the appearance of schwa when it is preceded by a consonantal clitic ([sə̰w.zɔ́.βrən] *se us obren* '(they) open on you (pl.)' has a schwa, like [sə̰.nɔ́.βrən] *se n'obren* 'some open'), and it behaves like CC(i)-clitics in enclitic position ([ti.ɾán.tə̰ws] *tirant-vos* 'throwing (to) you (pl.)' has a schwa, like [ti.ɾán.tə̰l.zi] *tirant-elzi* 'throwing to them'). In initial position, though, *us* always surfaces with a vowel (cf. [us.tí.ɾu] *us tiro* '(I) throw (to) you (pl.)').[11] This alternation has been attributed either to the vocalization of the underlying glide in initial position (from a unique underlying form /wz/; cf. Wheeler 1979, Viaplana 1980) or to contextually-determined allomorphy (/wz/ ~ /uz/; cf. Mascaró 1986). We leave this question open and concentrate only on the cases where /wz/ causes vowel insertion or consonant deletion (that is, on *us* in non-initial position in the clitic group).

4. Questions to be answered

4.1. Syllabic motivation for epenthesis and epenthesis site

In many cases, the insertion of a schwa in the clitic group repairs an impossible syllabification in Catalan, as illustrated in (8) ((8a) with proclisis, (8b) with enclisis, and (8c) with a clitic sequence).

(8) a. /n#tiɾə/:   [ə̰n.tí.ɾə]   *[ntí.ɾə], *[n.tí.ɾə]

'(s/he) throws some'

/nz#kɾɛw/:   [ə̰ns.kɾɛ́w]   *[ns.kɾɛ́w]

'(s/he) believes us'

/l+z+i#donu/:   [ǝ̠l.zi.ðó.nu]   *[lzi.ðó.nu], *[l.zi.ðó.nu]

'(I) give to them'

b. /tiɾɛm#n/:   [ti.ɾɛ́m.nǝ̠]   *[ti.ɾɛ́.mn], *[ti.ɾɛ́mn]

'let's throw some'

/fez#m/:   [féz.mǝ̠]   *[fé.zm], *[fézm]

'do to me!'

/tiɾɛm#l+z+i/:   [ti.ɾɛ́.mǝ̠l.zi]   *[ti.ɾɛ́.ml.zi], *[ti.ɾɛ́ml.zi]

'let's throw to them'

c. /s#n#ǝgafǝ/: [sǝ̠.nǝ.ɣá.fǝ]   *[z.nǝ.ɣá.fǝ], *[znǝ.ɣá.fǝ]

'(s/he) takes some for himself/herself '

Given that syllable structure plays an important role in the analysis of epenthesis, we give in (9) the possible onsets and codas in Catalan. We exclude glides from the description in (9) because the facts are a little bit more complex and variable; we mention them only when they are relevant to the analysis. Let us only say for now that they can never cause a violation of the sonority hierarchy.

(9) Syllable structure in Catalan

   a. Onsets: • At most 2 consonants.

            • If one consonant, C: any consonant

            • If two consonants, C_1: stop (in some contexts spirantized) or [f]; C_2: [l] or [ɾ] (but *[tl], *[dl], *[ðl]).

            (cf. *gros* [gɾ́s] 'big', *cabra* [ká.βɾǝ] 'goat', *problema* [pɾu.βlέ.mǝ] 'problem', *inflar* [iɱ.flá] 'to inflate')

            (• Complex onsets with initial *s* are not allowed.)

   b. Codas: • At most 3 consonants, in word-final position. Normally, $C_3 = s$.

            (cf. *arc* [áɾk] 'arc', *porcs* [pɔ́rks] 'pigs', *Alps* [álps] 'Alps', *text* [tékst] 'text')

• At most 2 consonants, in word-medial position. Normally, C$_2$ = *s* (cf. *èxtasi* [ɛ́ks.tə.zi] 'ecstasy', *constar* [kuns.tá] 'to consist', *marxista* [mərk.sís.tə] 'marxist').

• The consonants have to appear ordered in decreasing sonority, except for *s*, which can violate the sonority scale.

Not all the cases of schwa epenthesis in the clitic group can directly be related to a general syllabification problem, but seem to be specific to the clitic group. The examples in (10) illustrate several cases of epenthesis where the absence of specific schwas in ungrammatical alternative forms would still yield an acceptable syllabification in the language, as shown by other grammatical examples.

(10) a. /tiɾaɾ#n/: [ti.ɾár.nə] 'to throw some'

*[ti.ɾárn], but [kárn] 'meat'

/feɾ#m/: [fér.mə] 'to do to me'

*[férm], but [fɛ́rm] 'firm'

/tiɾaɾ#s/: [ti.ɾár.sə] 'to throw oneself'

*[ti.ɾárs], but [kwárs] 'quartz', [kárs] 'expensive (pl.)'

/tiɾin#s/: [tí.ɾin.sə] 'throw (pol.) yourselves!'

*[tí.ɾins], but [tí.ɾins] 'throw (pol.) (to) us!', [di.ʎúns] 'Monday'

/tiɾant#s/: [ti.ɾán.sə] 'throwing (to) oneself'

*[ti.ɾáns], but [ti.ɾáns] 'straps, braces'

/tiɾɛw#n/: [ti.ɾɛ́w.nə] 'throw (pl.) some!'

*[ti.ɾɛ́wn], but [ti.ɾɛ́wn.zə] 'throw (pl.) (to) us!', [kláwn] 'clown'

/tiɾɛw#nz/: [ti.ɾɛ́w.zə] 'throw (pl.) (to) us!'

*[ti.ɾɛ́wns], but [kláwns] 'clowns'

b. /nz#l#imitə/: [ən.zə.li.mí.tə] '(s/he) imitates him for us'

*[ənz.li.mí.tə]

/kedi#s#m#l+ə/:   [ké.ði.sə̰.mə̰.lə]   'keep (pol.) it (fem.) yourself for me'

*[ké.ði.sə̰m.lə], *[ké.ðiz.mə̰.lə]

In the examples in (10b), which contain clitic sequences, an epenthetic vowel appears systematically between non-vocalic clitics, even when it is not needed for syllabification purposes, yielding an emergence of the unmarked (TETU) effect.

A final aspect related to epenthesis that has to be accounted for is the epenthesis site. The analysis has to account for the fact that epenthesis generally occurs peripherally to the clitic group when there is only one clitic (cf. /tirɛw#n/: [ti.rɛ́w.nə̰]) 'throw (pl.) some!'; /n#tirə/: [ə̰n.tí.rə] '(s/he) throws some'), even though there are some cases of medial epenthesis (cf. /tirɛm#l+z+i/: [ti.rɛ́.mə̰l.zi] 'let's throw to them').[12]

4.2. Consonant deletion

In addition to the appearance of an epenthetic vowel, one or more consonants might be deleted when clitics are combined with verbs, especially in enclisis. Again, there are two cases to be distinguished: Cluster Simplification, a well-known process that occurs independently in the language (first case), and the deletion of specific consonants, which only takes place within the clitic group (second case). Cluster Simplification, the first case, is a process that affects stops in coda position when they are preceded by a homorganic nasal or lateral (cf. *pont* [pɔ́n] 'bridge' and *ponts* [pɔ́ns] 'bridges' vs. *pontet* [pun.tɛ́t] 'small bridge'). It is assumed to be a lexical process because it applies even when the next word starts with a vowel (a sequence like *pont antic* [pɔ̀.nən.tík] has Cluster Simplification in spite of the fact that the /t/, like the /n/ in the grammatical output, could have been resyllabified as an onset: *[pɔ̀n.tən.tík]). At least with respect to this process, clitics have to be assumed to be part of the lexical phonology, given that a verb final stop remains before a clitic as long as it can be syllabified as an onset. In a sequence like /tirant#u/ 'throwing it', for instance, the verb final /t/ can become an onset

because the clitic is a vowel: [ti.ɾán.tu]; in /tiɾant#n/, [ti.ɾán.nə̱] 'throwing some',
however, the /t/ has to remain in coda position and is deleted.[13] In the empirical material
presented in this paper, the only context in which Cluster Simplification might
potentially take place is enclisis when the verb is a gerund, given that the gerund morph
for all conjugations is /nt/.

With respect to the second case, there are four other instances of consonant deletion,
which are not related to a general process of the language. In an imperative, when the
second person plural verbal morph /w/ is concatenated with the second person plural
clitic /wz/, which starts with /w/, only one glide surfaces: /tiɾɛw#wz/ becomes
[ti.ɾɛ́w.zə̱] 'throw yourselves', with a single [w], instead of *[ti.ɾɛ́.wə̱ws] or
*[ti.ɾɛ́w.wə̱s] (but cf. *beu whisky* [bɛw.wís.ki] '(s/he) drinks whisky'). The other
cases of deletion affect the consonant /n/ in clitic groups that contain the first person
plural clitic /nz/. A case parallel to the one mentioned with /wz/ involves the first person
plural clitic in forms like /tiɾin#nz/ 'throw (pol. pl.) (to) us!', which has two adjacent
/n/; the grammatical output keeps only one of the two /n/: [tí.ɾin.zə̱], instead of
*[tí.ɾin.nə̱s] (but cf. *tenen nas* [tɛ̀.nən.nás] '(they) have a nose'). When /nz/ appears
after a verbal form which is also first person plural (with the morph /m/), the /n/ of the
clitic is deleted, as is clear from examples like /tiɾɛm#nz/ 'let's throw ourselves', which
becomes [ti.ɾɛ́m.zə̱], instead of *[ti.ɾɛ́m.nə̱s] (but cf. *tenim nas* [tə.nim.nás] '(we)
have a nose'). Finally, when it appears after a gerund morph (/nt/), one of the two /n/ is
also deleted (as well as the /t/ of the gerund, through Cluster Simplification):
/tiɾant#nz/ 'throwing (to) us' becomes [ti.ɾán.zə̱] (but cf. *pont nou* [pɔn.nɔ́w] 'new
bridge'). Notice in addition that all previous forms show an apparently unmotivated final
epenthetic schwa (cf. *caus* [káws] '(you) fall', *dilluns* 'Monday', *llums* 'lights').

4.3. Summary

The facts that have to be accounted for are summarized below:

(11) a. standard cases of epenthesis (due to syllabification problems);

b. presence of apparently unmotivated epenthesis;

c. consonant deletion (general and specific);

d. TETU effect in clitic sequences.

In addition, any proposal has to account for the epenthesis site, peripheral whenever possible.

5. Previous approaches

Except for Wheeler (1979), none of the previous analyses of Catalan pronominal clitics offers a detailed account of epenthesis and consonant deletion in cliticization. He provides an analysis within SPE, which suffers from the problems that have repeatedly been pointed out for this framework, namely that it is basically only a descriptive device; it does not explain why there is epenthesis or deletion and why they occur in specific contexts. Other less extensive works along these lines, such as Viaplana (1980), face the same problems. More recent studies incorporate syllable structure into rule-driven approaches (cf. DeCesaris 1986, Wheeler 1987). These works, however, do not take into account all the contexts in which clitics occur, and thus oversimplify the facts. Under the same type of approach, Harris (1993) discusses the behavior of the clitics /u/ (neuter) and /l+a/ (third person accusative feminine singular) with respect to the interaction of syllabification with spirantization and voicing-related processes. Under his account, clitics are initially syllabified independently of the verb. The main problem with this approach arises if non-syllabic clitics are taken into account, because it wrongly predicts that clitics have a constant shape, regardless of their position in the clitic group and the shape of the verb (the first person singular clitic /m/, for instance, should always have either a CV shape [mə] or a VC shape [əm], which is not the case).

No work on Catalan clitics has been framed in Itô's (1989) directionality theory of epenthesis. However, within this framework, Palmada (1994: 117-119) interprets onset

maximization within words (cf. *suplici* [su.plí.si] 'torture') as the result of syllabic template mapping from right to left and the lack of onset maximization across words (cf. *tap lila* [tab.lí.lə], *[ta.plí.lə] 'purple cork') as a left-to-right mapping. This framework, though, fails to capture the peripherality of epenthesis, both in words without clitics (cf. /spektɾ/, [əs.pék.tɾə̱] 'spectrum') and in the clitic group (cf. [ə̱n.tí.ɾə], for /n#tiɾə/ '(s/he) throws some', vs. [ti.ɾɛ́m.nə̱], for /tiɾɛm#n/ 'let's throw some'). Therefore, such facts are calling for a different account.

To our knowledge, only Colina (1995), Jiménez and Todolí (1995), Serra (1996), and Jiménez (1997) offer an analysis of epenthesis in the pronominal clitic system of Catalan within Optimality Theory. However, unlike Wheeler's (1979) derivational analysis, none of these OT works offers a detailed analysis of all the pronominal forms and the contexts in which they occur. In Colina (1995) and Serra (1996), the analysis is fairly schematic. Colina (1995: 176-181) only provides an analysis of monoconsonantal clitics for which peripheral epenthesis repairs an impossible syllabification (case (11a)). Under her approach, cases like [ə̱n.tí.ɾə] vs. [ti.ɾɛ́m.nə̱] are accounted for as an effect of the constraints responsible for aligning the edges of a verb and a clitic: these constraints favor peripheral epenthesis by punishing any instance with epenthetic material in between (*[nə̱.tí.ɾə]). Serra (1996: 107-118) further takes into account cases in which the presence of the epenthetic schwa cannot be related to a general syllabification problem (like [ti.ɾár.nə̱], from /tiɾar#n/ 'to throw some'; case (11b)). He proposes a negative Alignment constraint banning configurations in which the right edge of a clitic coincides with the right edge of a stressed syllable. This constraint can account for cases like [ti.ɾár.nə̱], where an output without final epenthesis, *[ti.ɾárn], is discarded because the clitic is incorporated into a stressed syllable. However, this analysis does not explain forms like [tí.ɾin.sə̱], from /tiɾin#s/ 'throw (pol.) yourselves!', where the discarded form, *[tí.ɾins], shows a possible final coda and is not incorporated into a stressed syllable.

Jiménez and Todolí (1995) do not consider cases of apparently unmotivated epenthesis in sequences with a single clitic but deal with some clitic sequences (case (11d)), an issue that is discussed neither in Colina (1995) nor in Serra (1996). The kind of analysis they propose involves specific rankings operating at different domains, the clitic/verb being one of such domains and the clitic sequence being another one. This appeal to such domains, however, is untenable. Within their approach, the phonology of clitic sequences would take place independently of the characteristics and position of the verb, and, as discussed briefly with respect to Harris (1993), this would imply that, in most cases, the shape of the clitic sequence should be constant, which is not always the case. For example, in /nz#l+a+z#kedɛm/, with the output [ən.zə.ləs.kə.ðɛ́m] '(we) keep them (fem.) (for ourselves)', the sequence [ən.zə.ləs] would be obtained as the result of the syllabification of the clitic sequence (/nz#l+a+z/) independently of the verb; this approach, though, wrongly predicts the same output [ən.zə.ləs] for sequences like /kedɛm#nz#l+a+z/, *[kə.ðɛ́.mən.zə.ləs] 'let's keep them (fem.) (for ourselves)', instead of the grammatical output [kə.ðɛ́m.zə.ləs]. Jiménez (1997: 331-373), within the same domain-based approach, offers a more complete account of the pronominal clitic system (cases (11a, b, d)) based on a quite different variety, Valencian. This variety has more instances of syllabic forms underlyingly than Barceloní and epenthesis in the clitic group is usually to the right of the clitic (cf. [me.tí.ɾa] '(s/he) throws (to) me'). Because of this state of affairs, most of the problems faced when analyzing the pronominal system of Barceloní do not appear in Valencian and thus are not discussed in Jiménez (1997).

In addition to the flaws in the OT analyses just mentioned, none of them deals with the exceptional deletion of consonants within the clitic group (cf. /tiɾɛm#nz/ [ti.ɾɛ́m.zə] 'let's throw ourselves'; case (11c)). In what follows we present a unified account to all the facts summarized in (11).[14]

6. Analysis

6.1. Standard cases of epenthesis

As mentioned in (11a), in many cases epenthesis repairs an impossible syllabification. For any input that cannot be syllabified properly, GEN will provide, among many others, several faithful candidates with no epenthesis or deletion but with an illegitimate syllabification. For instance, from an underlying sequence like /tiɾɛm#n/ (with the actual pronunciation [ti.ɾɛ́m.nə̣] 'let's throw some'), one candidate will have the final /n/ as a nucleus and another one will have the /m/ as a nucleus; both candidates will fatally violate the constraint *P/C ("C may not associate to Peak (Nuc) nodes", Prince and Smolensky 1993), which is undominated in Catalan. Another illegitimate candidate will have the /mn/ cluster as a coda, violating, also fatally, the sonority related constraints. In this paper, in order not to distract the attention from more relevant issues, we collapse all the (undominated) constraints that would rule out an impossible syllabification in Catalan under the name σ-STRUC. In the tableaux that follow, examples like /tiɾɛm#n/ will be provided with a single totally faithful candidate ([ti.ɾɛ́mn]), which will show a fatal violation of σ-STRUC. The specific constraints that in each case would rule out all faithful candidates in this type of cases could be, for instance, the ones proposed in Colina (1995) or Jiménez (1997), in their analyses of syllable structure in Catalan within the OT framework. σ-STRUC, when relevant, always appears undominated in the tableaux.

In all the cases where epenthesis due to syllabification problems takes place, the optimal candidate violates the correspondence constraint DEP(ENDENCE) ("Every element of S_2 has a correspondent in S_1", McCarthy and Prince 1995).[15] The most important fact that needs to be accounted for is the peripheral position of the epenthetic vowel (cf. /n#tiɾə/, [ən.tí.ɾə] '(s/he) throws some' vs. /tiɾɛm#n/, [ti.ɾɛ́m.nə̣] 'let's throw some'). As assumed in the OT works mentioned above, the constraints that determine this peripheral position are the morphological Alignment constraints ALIGN(V-CL) and ALIGN(CL-V), that we define as follows:

(14) a.   ALIGN(V-CL): Align the right edge of V(erb)[–tense] with the left edge of a pronominal clitic.

b.   ALIGN(CL-V): Align the left edge of V(erb)[+tense] with the right edge of a pronominal clitic.

These two constraints account for the position of clitics with respect to the verb; they will be enclitics after an infinitive, a gerund and an imperative, and proclitics otherwise. In the rest of the paper, given that we do not have evidence for a different ranking of the two alignment constraints, we collapse ALIGN(V-CL) and ALIGN(CL-V) under the name ALIGN(CL/V) (AL(CL/V)).

The tableaux below show how the interaction of ALIGN(CL/V) with the markedness constraints related to syllable structure ONS(ET) and NO-CODA accounts for the peripherality of epenthesis, both in enclisis, (13), and in proclisis, (14).[16] The low ranking of the constraint DEP is justified in section 6.4, devoted to clitic sequences. For the time being we exclude from the tableaux candidates with deletion of a consonant, which are discussed in section 6.3.[17]

(13) /tiɾɛm#n/: [ti.ɾɛ́m.nə̰] 'let's throw some'

/tiɾɛm#n/	σ-STRUC	AL(CL/V)	NO-CODA	DEP
a. ti.ɾɛ́mn	*!		*	
b. ti.ɾɛ́.mə̰n		*!	*	*
c. ti.ɾɛ́.mə̰.nə̰		*!		**
☞ d. ti.ɾɛ́m.nə̰			*	*

This tableau shows that AL(CL/V) >> NO-CODA

(14) /n#tiɾə/: [ə̱n.tí.ɾə] '(s/he) throws some'

/n#tiɾə/	σ-STRUC	AL(CL/V)	ONS	NO-CODA	DEP
a. ntí.ɾə	*!				
☞ b. ə̱n.tí.ɾə			*	*	*
c. nə̱.tí.ɾə		*!			*

This tableau shows that AL(CL/V) >> ONS and NO-CODA

The tableau in (14) provides an additional argument against the allomorphy approach, discussed in section 3. If the partitive clitic had three allomorphs /n/, /ən/ and /nə/, a constraint like ALIGN(CL/V) would be irrelevant because the three allomorphs would satisfy it (the edge of the clitic would always be adjacent to the edge of the verb); so, the choice would be left to the phonological constraints, but these would always favor *[nə̱.tí.ɾə] over [ə̱n.tí.ɾə], given that *[nə̱.tí.ɾə] has a perfect syllabification (with only CV syllables), while [ə̱n.tí.ɾə] violates two syllable-related constraints, ONSET and NO-CODA.

In the case of CC(i)-proclitics, like /nz/, the very highly ranked constraint (IO)-CONT(IGUITY) determines the choice of [ə̱ns.tí.ɾə] over *[nə̱s.tí.ɾə] (from /nz#tiɾə/ '(s/he) throws (to) us'), in spite of the fact that the optimal candidate violates the syllabic constraint ONSET and *COMPL(EX)^C(ODA), among others (see also Jiménez and Todolí 1995).[18] CONTIGUITY is also responsible for the peripherality of epenthesis in single words like [ə̱s.pék.tɾə̱], from /spektɾ/ 'spectrum' (see also Colina 1995).

(15) /nz#tiɾə/: [ə̱ns.tí.ɾə] '(s/he) throws (to) us'

/nz#tiɾə/	σ-STRUC	CONT	AL(CL/V)	ONS	*COMPL^C	DEP
a. nstí.ɾə	*!					
☞ b. ə̱ns.tí.ɾə				*	*	*
c. nə̱s.tí.ɾə		*!				*
d. ə̱n.zə̱.tí.ɾə			*!	*		* *

This tableau shows that CONT >> ONS and *COMPL^C

Notice that the same constraints predict cases like /nz#imitə/, [ən.zi.mí.tə] (vs. *[nə̣.zi.mí.tə]) '(s/he) imitates us', where the verb starts with a vowel.

In some cases, the high ranking of ALIGN(CL/V) determines the choice of an optimal candidate that not only violates *COMPLEX^CODA, but forces the appearance of a complex coda with a glide followed by a liquid, which is, as mentioned earlier, a very unusual type of coda in Catalan, even though it does not violate the sonority scale.

(16) /tiɾɛw#l+z+i/: [ti.ɾɛ́wl.zi] 'throw (pl.) to them!'

/tiɾɛw#l+z+i/	σ-STRUC	AL(CL/V)	*COMPL^C	DEP
☞ a. ti.ɾɛ́wl.zi			*	
b. ti.ɾɛ́.wə̣l.zi		*!		*

This tableau shows that AL(CL/V) >> *COMPL^C

In other cases, however, the optimal candidate violates ALIGN(CL/V), because the other candidates violate higher ranked constraints, one of them being ALIGN(μ–μ), which is responsible for the alignment between morphemes and which is ranked higher than ALIGN(CL/V).

(17) ALIGN(μ–μ) (AL(μ–μ)): For two consecutive morphemes X, Y, align the right edge of morpheme X with the left edge of morpheme Y, within a lexical item.

We believe CONTIGUITY, ALIGN(μ–μ) and ALIGN(CL/V) to be part of one and the same family of constraints, all of them favoring morphological integrity. These constraints presumably have a universally fixed ranking.

As shown in (18), the grammatical output corresponding to /tiɾɛm#l+z+i/, [ti.ɾɛ́.mə̣l.zi], 'let's throw to them' violates ALIGN(CL/V), while the non-winning candidate that avoids violating σ-STRUC, *[ti.ɾɛ́m.lə̣.zi], in (18c), fatally violates ALIGN(μ–μ) (this constraint would also rule out, for /tiɾɛw#l+z+i/ in (16), the ungrammatical candidate *[ti.ɾɛ́w.lə̣.zi]).

(18) /tirɛm#l+z+i/: [ti.ɾɛ́.məl.zi] 'let's throw to them'

/tirɛm#l+z+i/	σ-STRUC	AL(μ–μ)	AL(CL/V)	NO-CODA	DEP
a. ti.ɾɛ́ml.zi	*!			*	
☞ b. ti.ɾɛ́.məl.zi			*	*	*
c. ti.ɾɛ́m.lə.zi		*!		*	*

This constraint shows that AL(μ–μ) >> AL(CL/V)

Before addressing the problem posed by the combinations where epenthesis is not strictly needed for syllabification, let us see the cases in which there is no epenthesis, the cases where a C-clitic appears next to a vowel of the verb. Examples with proclisis are easily dealt with given the constraints introduced so far. A candidate like [si.mí.tə] (from /s#imitə/ '(s/he) imitates herself/himself') will win over any other candidate (like *[ə.si.mí.tə] or *[səj.mí.tə]), given that it has a perfect syllable structure, it does not violate any Alignment constraints, and it is maximally faithful to the input. However, given what we have said so far, an example with enclisis, like the input /tirə#n/ 'throw some!', should give as the syllabically optimal output *[tí.ɾə.nə] (in front of the grammatical, and faithful, output [tí.ɾən]), because of the ranking NO-CODA >> DEP; having a coda is worse than having an epenthetic vowel. The constraint that makes of [tí.ɾən] the optimal candidate is FINAL-C, a constraint that also plays a crucial role in clitic clusters. FINAL-C, defined below, is ranked higher than NO-CODA.[19]

(19) FINAL-C (FIN-C): Align (PrWd, R, Cons., R) (i.e., "every prosodic word ends in a consonant", McCarthy and Prince 1994).

Following Selkirk (1995), we assume that what we have only descriptively called "clitic group" in Catalan has the prosodic structure corresponding to what she calls internal clitics: [[X]fnc [Y]lex]PWd or [[Y]lex [X]fnc]PWd; the clitic (a function word) together with its host (a lexical word, not a prosodic word) form a prosodic word.[20] The tableau corresponding to [tí.ɾən] appears in (20); we include in it only the constraints that are violated by some candidate.

(20) /tiɾə#n/: [tí.ɾən] 'throw some!'

/tiɾə#n/	FIN-C	NO-CODA	DEP
☞ a. tí.ɾən		*	
b. tí.ɾə.nə̱	*!		*

This tableau shows that FIN-C >> NO-CODA

6.2. *Apparently unmotivated epenthesis and Alignment*

As was extensively exemplified in (10), there are cases in which epenthesis takes place without an apparent syllabic motivation (case (11b)). This is illustrated in (21), where the relevant cases are shaded.

(21)

	SINGLE WORDS		CLITICIZED ENVIRONMENTS	
	monomorph. codas	bimorphemic codas	-V]_verb#[CC]_clitic	-C]_verb#[C]_clitic
-rn codas	/kárn/ [kárn] 'meat'			/tiɾáɾ#n/ [ti.ɾár.nə̱], *[ti.ɾárn] 'to throw some'
-ns codas	/diʎúns/ [di.ʎúns] 'Monday'	/líkən+z/ [lí.kəns] 'lichens'	/tíɾi#nz/ [tí.ɾins] 'throw (pol. sg.) us!'	/tíɾin#s/ [tí.ɾin.sə̱], *[tí.ɾins] 'throw (pol. pl.) yourselves'

Looking, for example, at the contrast between /kaɾn/, without epenthesis, [kárn], and /tiɾaɾ#n/, with epenthesis, [ti.ɾár.nə̱], one could think that what forces the appearance of an epenthetic vowel in the latter case is a constraint that requires the right edge of a lexical word (Lex) to be aligned with the right edge of a syllable, along the lines of McCarthy and Prince (1993), and later work. This constraint is stated in (22).

(22) ALIGN-R(σ) (AL-R(σ)): Align (Lex, R; σ, R) (the right edge of a lexical word (Lex) has to coincide with the right edge of a syllable).

This constraint would be violated by the most faithful candidate for an input like /tiɾaɾ#n/, that is *[ti.ɾár)_Ln)_σ], but would be satisfied in the candidate with final

epenthesis, the grammatical output: [ti.ɾár)_{L,σ}.nə]. This constraint would also seem to account for the presence of epenthesis in very similar examples, like /tiɾin#s/ (cf. [tí.ɾin)_{L,σ}.sə] vs. *[tí.ɾin)_{L}s)_σ]), and for its absence in single words like *carn* (where the right edge of Lex coincides with the right edge of a syllable). However, a closer look to these an other cases shows that ALIGN-R(σ) is not the right constraint to account for all the cases of apparently unmotivated schwa.

For an example like /tiɾin#s/, in order to obtain as optimal candidate the grammatical form, [tí.ɾin.sə], ALIGN-R(σ) would have to be ranked above FINAL-C and DEP, given that the latter constraints are violated by the grammatical form.

(23) /tiɾin#s/: [tí.ɾin.sə] 'throw (pol. pl.) (to) yourselves'

/tiɾin#s/	ALIGN-R(σ)	FINAL-C	DEP
a. tí.ɾin)_{L}s)_σ	*!		
☞ b. tí.ɾin)_{L,σ}.sə		*	*

This tableau would show that ALIGN-R(σ) >> FINAL-C and DEP (but see (29)).

However, this precise ranking wrongly predicts that examples like *tira'n* [tí.ɾən] 'throw some!' (from /tiɾə#n/), without epenthesis, should surface with an epenthetic vowel. The same wrong prediction is made for any other examples in which a C-clitic appears as enclitic to a verbal form ending in a vowel.

(24) /tiɾə#n/: [tí.ɾən] 'throw some!'

/tiɾə#n/	ALIGN-R(σ)	FINAL-C	DEP
a. tí.ɾə)_{L}n)_σ	*!		
💣 b. tí.ɾə)_{L,σ}.nə		*	*

Re-ranking FINAL-C or DEP above ALIGN-R(σ) would allow the grammatical form [tí.ɾən] to surface as the optimal candidate, but this re-ranking would then have fatal consequences for the previous example, /tiɾin#s/. Thus, the use of ALIGN-R(σ) creates a ranking paradox.

Moreover, assuming, as is usually the case with Alignment constraints, that ALIGN-R(σ) is gradient, examples like [tí.ɾins], from /tiɾi#nz/, would wrongly be predicted to surface with an epenthetic vowel, as shown below.[21]

(25) /tiɾi#nz/: [tí.ɾins] 'throw (pol. sg.) (to) us!'

/tiɾi#nz/	ALIGN-R(σ)	FINAL-C	DEP
a. tí.ɾi)$_L$ns)$_σ$	n s!		
☞ b. tí.ɾi)$_L$n)$_σ$.zə̠	n	*	*

It is clear, then, that some other constraint must be at play, a constraint that, as we shall see, is closely related to but more specific than ALIGN-R(σ). The crucial aspects to bear in mind are still related to the relation between the right edge of Lex and syllable structure. The relevant aspects concerning syllable structure are pointed out in the examples in (26) and (27).

(26) /tiɾin#s/ /tiɾaɾ#n/ Cf. /kaɾn/

a. *tí.ɾin)$_L$s *ti.ɾaɾ)$_L$n kárn)$_L$
       C   C   C

b. tí.ɾin)$_L$.sə̠ ti.ɾár)$_L$.nə̠
       C   C

(27) /tiɾi#nz/ /tiɾə#n/
      tí.ɾi)$_L$ns tí.ɾə)$_L$n
         N C   N C

The difference between the ungrammatical candidates, *[ti.ɾár)$_L$n] and *[tí.ɾin)$_L$s] in (26a), and all the grammatical candidates in (26) and (27) is that only in the former is there a complex coda whose first member belongs to Lex and whose second member belongs to the clitic; in other words, the rightmost segment of Lex is deeply embedded in a complex coda. The output [kárn)$_L$], in (26a), contains a complex coda but the right edge of Lex is outside it. More significantly, the output corresponding to /tiɾi#nz/, [tí.ɾi)$_L$ns], in (27), does contain a complex coda but it is *beyond* the right edge of Lex.

On the contrary, in the case of /tiɾin#s/ only the grammatical and unfaithful candidate [tí.ɾin)$_L$.sə̱], with epenthesis, in (26b), avoids having the right edge of Lex embedded in a complex coda, while this is not the case with the more faithful and ungrammatical candidate *[tí.ɾin)$_L$s] in (26a). It is worth noting that in the examples in (27) the right edge of Lex does not coincide with the right edge of a syllable, which is what originated the problem with ALIGN-R(σ). The fact, though, that it is not embedded further down in syllabic structure (within a complex coda) is what allows for the survival of the more faithful candidate, without epenthesis.

Based on these facts, we propose that syllabic categories other than 'syllable' can be referred to by Alignment constraints, or that, at least, the set of subsyllabic constituents can be referred to:

(28) ALIGN-RIGHT(SUB-σ) (AL-R(SUB-σ)): Align (Lex, R; M, N, R) (the right edge of a lexical word (Lex) has to coincide with the right edge of some subsyllabic constituent, margin (M) or nucleus (N)).

This constraint will only be violated in the case of complex subsyllabic constituents. In addition to complex codas, as will be seen below, there can be violations in the case of complex onsets. Following Bonet and Lloret (1998), we assume that nuclei can only contain a single vowel in Catalan; hence no violations of ALIGN-RIGHT(SUB-σ) can arise when Lex ends in a vowel.

ALIGN-RIGHT(SUB-σ) and the more general constraint ALIGN-RIGHT(σ) are in a subset relation: a violation of ALIGN-RIGHT(SUB-σ) implies a violation of ALIGN-RIGHT(σ), but not viceversa (examples like /tiɾə#n/ [tí.ɾə)$_L$n] or /tiɾi#nz/ [tí.ɾi)$_L$ns] violate ALIGN-RIGHT(σ) but not ALIGN-RIGHT(SUB-σ)). Therefore these two constraints have a fixed ranking: ALIGN-RIGHT(SUB-σ) >> ALIGN-RIGHT(σ). As we shall see from the tableaux that follow, in Barceloní ALIGN-RIGHT(SUB-σ) is ranked below ALIGN(CL/V) but above FINAL-C, while examples like /tiɾə#n/ show that ALIGN-RIGHT(σ) has to be ranked

below FINAL-C (given that this is the only ranking that allows the output without epenthesis, [tí.ɾən], to be the optimal candidate, as shown in (29), below). As a consequence of the proposal made here, some of the cases that might have previously been attributed to the effect of ALIGN-RIGHT(σ), are now due to the more highly ranked ALIGN-RIGHT(SUB-σ).[22]

The following tableaux illustrate how the paradox pointed out earlier with ALIGN-RIGHT(σ) disappears with the incorporation of ALIGN-RIGHT(SUB-σ) to the proposal. The right edges of codas and nuclei appear abbreviated as M and N, respectively. The tableau in (29) shows the lower ranking of ALIGN-RIGHT(σ) with respect to FINAL-C.

(29) /tiɾə#n/: [tí.ɾən] 'throw some!'

/tiɾə#n/	AL-R(SUB-σ)	FIN-C	AL-R(σ)	DEP
☞ a. tí.ɾə)_{L,N} n			*	
b. tí.ɾə)_{L,N}.nə̱		*!		*

This tableau shows that FIN-C >> AL-R(σ).

The tableau in (30) corresponds to /tiɾaɾ#n/, and shows that the more faithful (and ungrammatical) candidate is ruled out by ALIGN-RIGHT(SUB-σ), before FINAL-C comes into play. (30) can be compared with the tableau corresponding to the noun [káɾn], without epenthesis, in (31).

(30) /tiɾaɾ#n/: [ti.ɾáɾ.nə̱] 'to throw some'

/tiɾaɾ#n/	AL(CL/V)	AL-R(SUB-σ)	FIN-C	*COMPL^C	DEP
a. ti.ɾáɾ)_{L}n)_M		*!		*	
☞ b. ti.ɾáɾ)_{L,M}.nə̱			*		*
c. ti.ɾá.ɾ)_{L,M} ə̱n	*!				*

This tableau shows that AL(CL/V) and AL-R(SUB-σ) >> FIN-C (for AL(CL/V) >> AL-R(SUB-σ) see (34)).

(31) /kaɾn/: [káɾn] 'meat'

/kaɾn/	AL-R(SUB-σ)	FIN-C	*COMPL^C	DEP
☞ a. káɾn)$_{L,M}$			*	
b. kár.n)$_{L,M}$ ə̯		*!		*

The tableau for /kaɾn/, in (31), is essentially identical to that of /tiɾi#nz/, in (32).

(32) /tiɾi#nz/: [tí.ɾins] 'throw (pol., sg.) (to) us!'

/tiɾi#nz/	AL(CL/V)	AL-R(SUB-σ)	FINAL-C	*COMPL^C	DEP
☞ a. tí.ɾi)$_{L,N}$ ns				*	
b. tí.ɾi)$_{L,N}$ n.zə̯			*!		*

In (31) and (32) it can be seen that the constraint responsible for ruling out the candidate with epenthesis is FINAL-C. Therefore, ALIGN-RIGHT(σ), being ranked below FINAL-C, cannot be a deciding constraint.

In the case of /tiɾin#s/, in (33), the high ranking of ALIGN(CL/V) and ALIGN-RIGHT(SUB-σ) make of [tí.ɾin.sə̯], with epenthesis, the optimal candidate.

(33) /tiɾin#s/: [tí.ɾin.sə̯] 'throw (pol. pl.) (to) yourselves!'

/tiɾin#s/	AL(CL/V)	AL-R(SUB-σ)	FIN-C	*COMPL^C	DEP
a. tí.ɾin)$_L$s)$_M$		*!		*	
☞ b. tí.ɾin)$_{L,M}$.sə̯			*		*
c. tí.ɾi.n)$_{L,M}$ ə̯s	*!				*

ALIGN-RIGHT(SUB-σ) is sometimes violated in the actual output of a verb-clitic combination. This is the case of examples like /tiɾɛw#l+z+i/ 'throw (pl.) to them!' [ti.ɾɛ́wl.zi], whose (partial) tableau was given in (16) in order to show how ALIGN(CL/V) forces unusual complex codas to surface in Barceloní. The higher ranking of ALIGN(CL/V) with respect to ALIGN-RIGHT(SUB-σ) forces a candidate violating the latter constraint to be the optimal candidate.

(34) /tiɾɛw#l+z+i/: [ti.ɾɛ́wl.zi] 'throw (pl.) to them!'

/tiɾɛw#l+z+i/	AL(μ-μ)	AL(CL/V)	AL-R(SUB-σ)	*COMPL^C	DEP
☞ a. ti.ɾɛ́w)_L l)_M.zi			*	*	
b. ti.ɾɛ́.w)_{L,M} ǝl.zi		*!			*
c. ti.ɾɛ́w)_{L,M}.lǝ.zi	*!				*

This tableau shows that AL(CL/V) >> AL-R(SUB-σ).

As is common with Alignment constraints, ALIGN-RIGHT(SUB-σ) is a gradient constraint; its gradiency is what causes the presence of an epenthetic vowel in examples like [ti.ɾɛ́wn.zǝ] (from /tiɾɛw#nz/ 'throw (pol. pl.) (to us!'), as shown in (35).[23]

(35) /tiɾɛw#nz/: [ti.ɾɛ́wn.zǝ] 'throw (pol. pl.) (to) us!'

/tiɾɛw#nz/	AL(CL/V)	AL-R(SUB-σ)	FINAL-C	*COMPL^C	DEP
a. ti.ɾɛ́w)_L ns)_M		n s!		*	
☞ b. ti.ɾɛ́w)_L n)_M.zǝ		n	*	*	*
c. ti.ɾɛ́.w)_{L,M} ǝns	*!			*	*

In (35), the only way of avoiding a violation of ALIGN-RIGHT(SUB-σ) is by inserting an epenthetic vowel between the verb and the clitic, as in the ungrammatical candidate [ti.ɾɛ́.w)_{L,M} ǝns]; but that candidate violates the higher ranked ALIGN(CL/V). Therefore, violating AL-R(SUB-σ) is unavoidable. The difference between the optimal (and grammatical) candidate [ti.ɾɛ́w)_L n)_M.zǝ], in (35b), and the more faithful (but ungrammatical) candidate [ti.ɾɛ́w)_L ns)_M], in (35a), is that the optimal candidate, (35b), violates AL-R(SUB-σ) minimally, because only one consonant, [n], separates the right edge of the verb from the right edge of a subsyllabic constituent (a coda), while in the more faithful candidate, (35a), two consonants, [n] and [s], separate the right edge of the verb from the right edge of the coda. The grammatical form, (35b), violates a higher number of constraints than the other candidates shown in the tableau, but it is nevertheless the best possible output.

To finish this section, notice that ALIGN-RIGHT(SUB-σ), and not ALIGN-RIGHT(σ), is the constraint that accounts for the syllabification of sequences like /ɾɛb#l+a/ *rep-la* 'receive her!', which is pronounced, in the standard language, [ɾɛ́b.lə], with a simple coda and a simple onset.[24] Within words, onsets are maximized and *bl* or *pl* clusters are therefore homosyllabic (cf. *sublim* [su.βlím] 'sublime', *suplici* [su.plí.si] 'torture'), while between words resyllabification takes place only to provide a syllable with an onset, not to maximize one (cf. *tap humit* [tà.pu.mít] 'humid cork' vs. *tap lila* [tab.lí.lə], *[ta.plí.lə] 'purple cork'). Pronominal clitics seem, then, to pattern with independent words with respect to syllabification, while at the same time undergoing many phonological processes traditionally attributed to the lexical phonology. Under the present account, the syllabification of single words, word sequences, and clitic groups follows from one and the same constraint ranking within a parallel model, as shown below. (36) shows the crucial constraints involved in the syllabification of single words.[25]

(36) /suplisi/: [su.plí.si] 'torture'

/suplisi/	NO-CODA	*COMPL^O
☞ a. su.plí.si		*
b. sub.lí.si	*!	

This tableau shows that NO-CODA >> *COMPL^O.

The syllabification of sequences like /ɾɛb#l+a/ follows from the fact that ALIGN-RIGHT(SUB-σ) is ranked higher than these syllable-related constraints.

(37) /ɾɛb#lə/: [ɾɛ́b.lə] 'receive her!'

/ɾɛb#lə/	AL-R(SUB-σ)	NO-CODA	*COMPL^O
☞ a. ɾɛ́b)$_{L,M}$.lə		*	
b. ɾɛ́.β)$_L$ l)$_M$ ə	*!		*

ALIGN-RIGHT(SUB-σ) rules out the ungrammatical candidate *[rɛ́.βlə] because the last segment of the verb (the bilabial voiced stop that would be pronounced as an approximant in onset position after a vowel) is too embedded in syllabic structure; it is embedded in a syllable margin, in this case a complex onset.[26]

The lack of onset maximization in word sequences, like *tap lila*, has been attributed within Optimality Theory to an Alignment constraint that aligns the left edge of a lexical word with the left edge of a syllable (cf. Colina 1995, Serra 1996, Jiménez 1997, for Catalan). Under the present account, however, this lack of onset maximization could be due to ALIGN-RIGHT(SUB-σ), instead, as shown in (38). Further work is needed to see whether the two types of Alignment constraints are needed.[27]

(38) /tap##lilə/: [tab.lí.lə] 'purple cork'

/tap##lilə/	AL-R(SUB-σ)	NO-CODA	*COMPL^O
☞ a. tab)$_{L,M}$.lí.lə		*	
b. ta.p)$_L$ l)$_M$ í.lə	*!		*

6.3. Consonant deletion vs. epenthesis

As mentioned in section 4.2, verb-clitic sequences can undergo both a general deletion process (Cluster Simplification) and a deletion process that seems to be specific to clitics (case (11c)). In what follows we present a unified account of the two types of deletion following the basic lines of the analysis of Cluster Simplification in Colina (1995) and Jiménez (1997) for Catalan (which differ somewhat from the analysis presented in Côté 1997).

Within the clitic group some consonants but not others are deleted. While a gerund-final /t/ is deleted before a clitic starting with a consonant in a sequence like /tiránt#n/, [ti.ɾán.nə̯] 'throwing some', it is not possible to further delete one of the underlying /n/ (from the verb or from the clitic, with the result *[ti.ɾán]), instead of resorting to

epenthesis, in order to avoid the syllabification problem caused by a candidate *[ti.ɾánn]. The absence of the /t/ of the gerund (/nt/) is a product of (mandatory) Cluster Simplification: in Catalan, a stop is deleted in coda position when it is preceded by a homorganic nasal or lateral.[28] Some examples of this process are provided in (39):

(39) /pɔnt+z/:   [pɔ́ns] 'bridges'   (cf. [pun.tét] 'small bridge')

      /fang/:   [fáŋ] 'mud'   (cf. [fəŋ.gu.nós] 'muddy')

      /alt/:   [ál] 'tall'   (cf. [əl.tí.sim] 'very tall')

      /tiɾa+nt#n/: [ti.ɾán.nə] 'throwing some' (cf. [ti.ɾán.tu] 'throwing it',

                                                from /tiɾa+nt#u/)

As suggested in Mascaró (1984), Cluster Simplification is possible in coda position because the segments involved are essentially non-distinct; they share the place of articulation and the feature [–continuant] (we assume, like Wheeler 1979 or Bonet and Lloret 1998, that laterals are [–continuant]). If a word like /kalk/ [kálk] 'tracing, copy' presented deletion of the final /k/, the information about its place of articulation would be unrecoverable, while this is not the case in /alt/, [ál]. The constraint responsible for faithfulness to input features is MAXFEATURE, below.

(40) MAXFEATURE (MAX-F): Input features must have correspondents in the output

                          (McCarthy and Prince 1999).

MAX-F is violated when featural information (in this case place of articulation being the most relevant one) is lost. MAX-F is violated in the output *[kál], from /kálk/ (because the velar place has been lost) but not in the output [ál] from /alt/ (the coronal place of articulation is kept). In both *[kál] and [ál] there is a violation of MAX(-IO) (input segments must have output correspondents; McCarthy and Prince 1995), because in both cases a segment has been deleted. We give in (41) and (42) the tableaux corresponding to /alt/ [ál] and /kalk/ [kálk]. We exclude candidates with deletion of the first consonant in the cluster (/l/ in both cases), which would violate the very highly

ranked constraint CONT (and presumably a more specific version of MAX-F, given that the feature [lateral] is lost).

(41) /alt/: [ál] 'high, tall'

/alt/	MAX-F	FIN-C	*COMPL^C	MAX	DEP
a. ált			*!		
b. ál.tə̯		*!			*
☞ c. ál				*	

This tableau shows that FIN-C and *COMPL^C >> MAX.

(42) /kalk/: [kálk] 'tracing, copy'

/kalk/	MAX-F	FIN-C	*COMPL^C	MAX	DEP
☞ a. kálk			*		
b. kál.kə̯		*!			*
c. kál	*!			*	

This tableau shows that MAX-F >> *COMPL^C.

When we look at possible deletion cases in the clitic group, another constraint becomes relevant, REALIZE-μ (definition from Walker 1998).

(43) REALIZE-μ (REAL-μ): A morpheme must have some phonological exponent in the output.

The deletion of a segment might imply the loss of a morph. For example if the final /m/ of a form like /tiɾɛ+m/ were deleted, a morph would disappear, because /m/ is the morph corresponding to first person plural.[29] For an input like /tiɾɛ+m#n/ 'let's throw some' (see the tableau in (13)), which cannot have a faithful output due to syllabification problems, the constraints MAX-F and REALIZE-μ, both highly ranked, are responsible for the elimination of candidates with deletion, like *[ti.ɾɛ́m] (without the clitic, and without the coronal place of articulation) or *[ti.ɾɛ́n] (without the first person plural verbal morph and without the labial place of articulation). The same problems would

force the lack of deletion and the presence of an epenthetic vowel (violating ALIGN(CL/V) in cases like [ti.ɾɛ́.məl.zi], from /tiɾɛ+m#l+z+i/; the deletion of any of the three consonants /m/, /l/ or /z/ causes a violation of the two mentioned constraints.

In (44) and (45) we compare the tableaux for /tiɾa+nt#n/ [ti.ɾán.nə] 'throwing some', with deletion of one consonant and epenthesis, and /tiɾa+nt#u/ [ti.ɾán.tu] 'throwing it', with a faithful output.

(44) /tiɾa+nt#n/: [ti.ɾán.nə] 'throwing some'

/tiɾa+nt#n/	σ-STRUC	MAX-F	REAL-μ	AL(CL/V)	FIN-C	*COMPL^C
a. ti.ɾán.t)$_{L,M}$ n	*!					
b. ti.ɾá.n)$_{L,M}$ n	*!					
c. ti.ɾán)$_{L,M}$			*!			
d. ti.ɾá)$_{L,M}$ n			*!			
☞ e. ti.ɾán)$_{L,M}$.nə					*	
f. ti.ɾánt)$_{L,M}$.nə					*	*!
g. ti.ɾán.t)$_{L,M}$ ən				*!		

This tableau shows that REAL-μ >> FIN-C.

Notice that MAX-F is not violated by any of the candidates, not even when one /n/ has been deleted; this is so because the sequence contains an adjacent /n/, which ensures the presence of the relevant features (place, [±continuant], and even nasality). Notice also that the optimal candidate does not violate REALIZE-μ because the deletion of the /t/ of the gerund does not imply the deletion of the morph, given that the /n/ of the gerund morph /nt/ is still in the output. For reasons of space some (not relevant) constraints have been left out from (44): ALIGN-RIGHT(SUB-σ), because it is not violated by any candidate (the last segment of the verb is never embedded within a complex coda), and MAX, because it cannot be decisive, being ranked lower than *COMPLEX^{CODA}.

(45) /tiɾa+nt#u/: [ti.ɾán.tu] 'throwing it'

/tiɾa+nt#u/	AL(CL/V)	FIN-C	MAX	NO-CODA
☞ a. ti.ɾán.t)_{L,M} u		*		*
b. ti.ɾán.t)_{L,M} <u>ə</u>w	*!			**
c. ti.ɾá.n)_{L,M} u		*	*!	

This tableau shows that MAX >> NO-CODA.

The ranking of the constraints determines that the most faithful candidate is also the optimal candidate. The most faithful candidate does not have syllabification problems (it does not violate σ-STRUC) and the last consonant of the verb, as illustrated in all the candidates, corresponds to the last segment of a subsyllabic constituent. (45) shows in addition that MAX has to be ranked above NO-CODA (the opposite ranking would give *[ti.ɾá.nu], in (45c), as the optimal candidate).

Examples like /tiɾa+nt#nz/ 'throwing (to) us', have a surface form that lacks two consonants, /t/ and one /n/, and, nevertheless, it has epenthesis: [ti.ɾán.z<u>ə</u>]. As shown in the tableau in (46), this is a consequence of the constraint ranking (for reasons of space, in the tableau we do not include MAX-F because it is not violated by any of the candidates under discussion).

(46) /tiɾa+nt#nz/: [ti.ɾán.zə̲] 'throwing (to) us'

/tiɾa+nt#nz/	σ-STRUC	REAL-μ	AL(CL/V)	AL-R(SUB-σ)	FIN-C	*COMPL^C	MAX
a. ti.ɾán.t)_{L,M} ns	*!						
b. ti.ɾán)_{L,M}.ns	*!						*
c. ti.ɾá)_{L,N} ns		*!				*	**
d. ti.ɾán)_L s)_M				*!		*	**
e. ti.ɾán.t)_{L,M} ə̲ns			*!			*	
f. ti.ɾán.t)_{L,M} ə̲n.zə̲			*!		*		
g. ti.ɾánt)_{L,M} .zə̲					*	*!	*
☞ h. ti.ɾán)_{L,M} .zə̲					*		**
i. ti.ɾá)_{L,N} n.zə̲		*!			*		**

There are two candidates that coincide segmentally with the grammatical form [ti.ɾán.zə̲], (46h) and (46i). The ranking of the constraints determines that the deleted /n/ has to belong to the clitic, not to the verb. The deletion in the verb, which corresponds to the candidate in (46i) causes a violation of the highly ranked constraint REALIZE-μ (the gerund morph is in no way represented in the candidate). The ranking of the constraints also explains why there is epenthesis in spite of the fact that two consonants are deleted. There are two candidates with deletion of the two consonants but without epenthesis; that is, with the phonetic form *[ti.ɾáns], (46c) and (46d). The fact that in (46c) the deleted /n/ belongs to the verb causes a violation of the highly ranked constraint REALIZE-μ. In (46d) and (46h) the deleted /n/ belongs to the clitic, which avoids a violation of this constraint because it still keeps a segment from the clitic; in (46d), however, the surfacing [n] from the verb plus the (devoiced) [s] from the clitic form a complex coda, which causes a violation of ALIGN-RIGHT(SUB-σ).

The behavior of /tiɾa+nt#nz/, with the output [ti.ɾán.zə̲], is apparently very different from the behavior of /tiɾa+nt#wz/ 'throwing (to) you (pl.)'. Although they face basically the same syllabification problems, /tiɾa+nt#wz/ surfaces without deletion and

with medial epenthesis: [ti.ɾán.tə̲ws]. As can be seen in the tableau in (47), these facts follow from the constraints proposed and their ranking (for reasons of space, in the tableau we do not include REALIZE-µ, which is not crucial here in ruling out unwanted candidates).

(47) /tiɾa+nt#wz/: [ti.ɾán.tə̲ws] 'throwing (to) you (pl.)'

/tiɾa+nt#wz/	σ-STRUC	MAX-F	AL(CL/V)	AL-R(SUB-σ)	FIN-C	*COMPL^C	MAX
a. ti.ɾán.t)_{L,M} ws	*!						
b. ti.ɾá.n)_{L,M} ws	*!						*
c. ti.ɾá)_{L,N} ws		*				*	**!
d. ti.ɾán)_L s)_M		*		*!		*	**
☞ e. ti.ɾán.t)_{L,M} ə̲ws			*			*	
f. ti.ɾán.t)_{L,M} ə̲w.zə̲			*		*!		
g. ti.ɾá.n)_{L,M} ə̲ws			*			*	*!

MAX-F punishes the deletion of the /n/ (but not the /t/) of the gerund because the absence of the /n/, in (47c), or the /w/, in (47d), implies the loss of featural content. Therefore the presence of medial epenthesis is forced, in spite of its violating ALIGN(CL/V). MAX is finally the deciding constraint: since the presence of an epenthetic vowel allows for the proper syllabification of all the input consonants, the optimal candidate remains as faithful as possible to the input.[30] If FINAL-C and *COMPLEX^CODA were unranked with respect to each other, a possibility suggested earlier, the choice between the grammatical candidate [ti.ɾán.tə̲ws] and the ungrammatical *[ti.ɾán.tə̲w.zə̲], in (47f), would be left to the lower ranked constraint DEP (not included in the tableau), given that each of these two candidates violates one of the two constraints mentioned above and would fare even at that point.

There are two cases where a parallel behavior is found with respect to deletion and epenthesis. In both cases there is deletion of one of two adjacent identical non-vocalic segments. In one case, the third person plural verbal morph /n/ (used in imperatives as a

second person plural polite) is next to the first person plural clitic /nz/: /tiɾi+n#nz/ 'throw (pl. pol.) (to) us!' is pronounced [tí.ɾin.zə̠], with deletion of one /n/ and final epenthesis. In the other case, the second person plural verbal morph /w/ is adjacent to the second person plural clitic /wz/: /tiɾɛ+w#wz/ 'throw (pl) yourselves!' is pronounced [ti.ɾɛ́w.zə̠], with deletion of one /w/ and final epenthesis. If we take the case of /tiɾi+n#nz/, for example, it is easy to see that it is essentially identical to that of /tiɾa+nt#nz/, which was shown in (46); the only difference between them is the absence, in the case at hand, of the /t/ present in the gerund. For /tiɾi+n#nz/ the optimal candidate lacks one /n/ because its deletion does not imply a featural loss; the surviving [n] has to belong to the verb, given that, otherwise, the person morph corresponding to the verb would not surface, violating REALIZE-μ. However, if the final segment of the verb is the surviving [n], there must also be an epenthetic vowel, in order to avoid a violation of ALIGN-RIGHT(SUB-σ). The reasons for [ti.ɾɛ́w.zə̠] being the optimal candidate for the input /tiɾɛ+w#wz/ are exactly the same.

There is one final case of deletion that has not been discussed so far, the one illustrated by examples like [ti.ɾɛ́m.zə̠] from an input /tiɾɛ+m#nz/ 'let's throw ourselves'. Again, there is deletion together with final epenthesis. It is clear that the deleted segment, an /n/, is the first consonant of the clitic; it is also clear that the presence of the epenthetic vowel avoids a violation of ALIGN-RIGHT(SUB-σ) (cf. *[ti.ɾɛ́m)L,Mʂ]). Moreover, we assume that the deletion of the /n/ of the clitic does not imply a violation of MAX-F: the place features of the missing /n/ are present in the following segment of the clitic, the /z/ (realized as [z] or [s]), also an anterior coronal, while all the manner features are present in the last consonant of the verb, [m], also a nasal.

6.4. Clitic sequences and TETU

While epenthesis is peripheral (whenever possible) in clitic groups with a single clitic, when there are two or more clitics, epenthesis occurs systematically between

consonantal clitics, even when syllabification does not seem to require it (case (11d)). In an example like [sə̲.li.kɾé.mə] 'something of his/hers burns', from /s#l+i#kɾemə/, it is obvious that epenthesis is necessary, given that there is a syllabification problem ([sl], or [zl], is not a possible onset in Catalan), but it is not so obvious why the epenthetic vowel does not appear before the reflexive clitic, giving the output *[ə̲z.li.kɾé.mə]. An example like /kedi#s#m#l+ə/, with the output [ké.ði.sə̲.mə̲.lə] 'keep (pol.) it (fem.) yourself for me!', constitutes a case of apparently unmotivated epenthesis, since outputs with a single epenthetic vowel, like *[ké.ðiz.mə̲.lə] or *[ké.ði.sə̲m.lə], are syllabically well-formed. The presence of an epenthetic vowel between clitics simplifies syllable structure in such a way that, within the clitic sequence, it gets as close as possible to the unmarked CV structure, a TETU effect; a sequence of two consonants occurs only when they belong to the same clitic.

The fact that this TETU effect can be observed only within a clitic sequence and not elsewhere might give the impression that an analysis that makes crucial use of domains, with a different ranking at each domain, is needed (cf. Jiménez and Todolí 1995, Jiménez 1997). However, this is, as discussed in section 5, an inadequate move. In the parallel account proposed here, this TETU effect follows automatically if we assume that the constraints responsible for aligning clitics with clitics (let us group them under the name ALIGN(CL-CL)) are ranked, contrary to ALIGN(CL/V), very low in the hierarchy, as low, at least, as DEP and, therefore, lower than the markedness constraints related to syllable structure. This is shown in (48) with the tableau corresponding to /s#l+i#kɾemə/.

(48) /s#l+i#kɾemə/: [sə̲.li.kɾé.mə] 'something of his/hers burns'

/s#l+i#kɾemə/	σ-STRUC	ONS	NO-CODA	DEP	AL(CL-CL)
a. sli.kɾé.mə	*!				
b. ə̲z.li.kɾé.mə		*!	*	*	
☞ c. sə̲.li.kɾé.mə				*	*

This tableau shows that ONS or NO-CODA >> AL(CL-CL).

The ungrammatical output *[ə̲z.li.kɾé.mə] in (48b), with peripheral epenthesis, is ruled out because the only morphological Alignment constraint ranked above the syllable markedness constraints, ALIGN(CL/V), is irrelevant in this case (while it is crucial in examples like [ə̲s.kɾé.mə], from /s#kɾemə/ '(s/he/it) burns herself/himself/itself').

The output [ké.ði.sə̲.mə̲.lə] , from /kedi#s#m#l+a/, with two epenthetic vowels instead of one, proves that DEP is ranked very low, as shown in (49).

(49) /kedi#s#m#l+a/: [ké.ði.sə̲.mə̲.lə] 'keep it (fem.) yourself for me!'

/kedi#s#m#l+a/	σ-STRUC	AL-R(σ)	NO-CODA	DEP
a. ké.ði)ₗz.mlə	*!	*	*	
b. ké.ði)ₗz.mə̲.lə		*	*!	*
c. ké.ði)ₗ.sə̲m.lə			*!	*
☞ d. ké.ði)ₗ.sə̲.mə̲.lə				**

This tableau shows that NO-CODA >> DEP and AL(CL-CL).[31]

The sequence /s#m#kɾemə/ in (50) shows that the fairly high ranking of ALIGN(CL/V) (crucially above the syllabic markedness constraints) prevents a schwa from appearing between the last proclitic and the verb (see the candidate in (50d)).

(50) /s#m#kɾemə/: [sə̲m.kɾé.mə] 'something of mine burns'

/s#m#kɾemə/	σ-STRUC	AL (CL/V)	ONS	NO-CODA
a. zm.kɾé.mə	*!			
b. ə̲zm.kɾé.mə	*!		*	*
☞ c. sə̲m.kɾé.mə				*
d. sə̲.mə̲.kɾé.mə		*!		

The example in (51) /kedi#s#m#n/ could have, like (49), a possible syllable structure with just one epenthetic vowel (*[ké.ðiz.mə̲n], in (51b)), but it surfaces with two. It also provides further evidence for the ranking FINAL-C >> NO-CODA, since the opposite

ranking would favor *[ké.ði.sə.mə.nə], in (51d), with a more unmarked syllable structure.
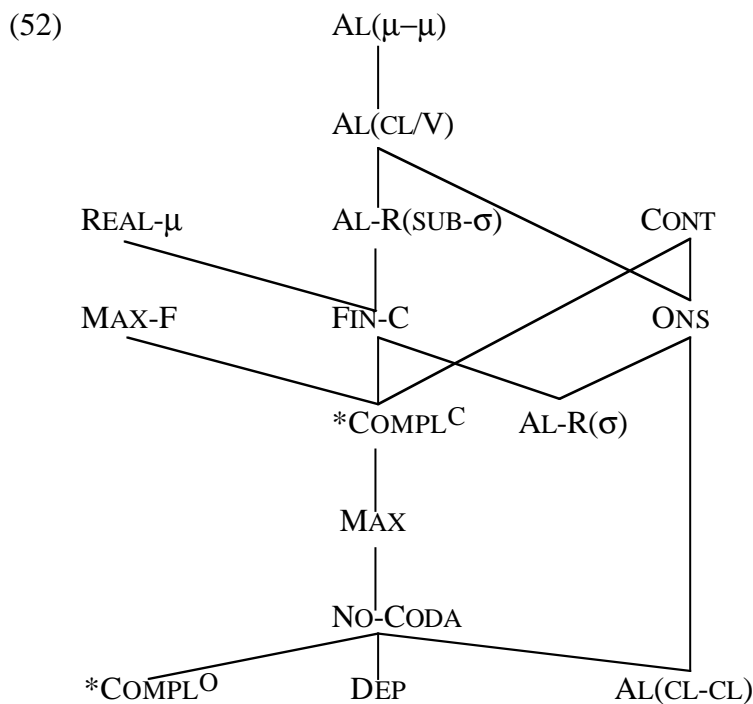
(51) /kedi#s#m#n/: [ké.ði.sə.mən] 'keep (sg. pol.) some of mine!'

/kedi#s#m#n/	σ-STRUC	FIN-C	NO-CODA	DEP
a. ké.ðiz.mn	*!		*	
b. ké.ðiz.mən			**!	*
☞ c. ké.ði.sə.mən			*	**
d. ké.ði.sə.mə.nə		*!		***

The cases in which a clitic sequence causes the deletion of some consonant follow from the analysis that has been presented. In fact, the deleted segments are the same independently of the number and type of additional clitics there are. We saw, for instance, that in [ti.ɾán.zə], from /tiɾa+nt#nz/ 'throwing (to) us', two consonants are deleted, and final epenthesis takes place (see the tableau in (46)). With an additional clitic, like the third person feminine plural clitic /l+a+z/, nothing really changes; the output is [ti.ɾán.zə.ləs] (from the input /tiɾa+nt#nz#l+a+z/ 'throwing them (fem.) to us'). A parallel behavior is found if the second clitic is the partitive: the grammatical output [ti.ɾán.zən], from an input /tiɾa+nt#nz#n/ 'throwing some to us', surfaces with the same two deleted consonants as in [ti.ɾán.zə] (it could not be otherwise) and with epenthesis in the only possible position.

7. Final hierarchy and conclusions

All the facts that have been discussed in this paper are accounted for with a single constraint hierarchy applying once. The final constraint hierarchy, with the rankings that have been proved, is given in (52).

(52)

$$
\begin{array}{c}
\text{AL}(\mu\text{--}\mu) \\
| \\
\text{AL(CL/V)} \\
\\
\text{REAL-}\mu \qquad \text{AL-R(SUB-}\sigma\text{)} \qquad\qquad \text{CONT} \\
\\
\text{MAX-F} \qquad \text{FIN-C} \qquad\qquad\qquad \text{ONS} \\
\\
\text{*COMPL}^{\text{C}} \qquad \text{AL-R}(\sigma) \\
\\
\text{MAX} \\
| \\
\text{NO-CODA} \\
\\
\text{*COMPL}^{\text{O}} \qquad\qquad \text{DEP} \qquad\qquad\qquad \text{AL(CL-CL)}
\end{array}
$$

The faithfulness constraint DEP appears fairly low in the hierarchy, below most of the syllable markedness constraints, contrary to what all previous OT analyses of Catalan have assumed. In spite of this, it is not the case that in Catalan epenthetic schwas are inserted anywhere in order to simplify syllable structure. Highly ranked constraints like CONTIGUITY, ALIGN(μ--μ) or ALIGN(CL/V) prevent schwas from being inserted inside a morph, between morphs or between a verb and a clitic, except when the absence of a schwa would cause a real syllabification problem (a violation of the undominated σ-STRUC constraints). The TETU effect in clitic sequences is caused by the very low ranking of ALIGN(CL-CL) and DEP, below syllable markedness constraints like NO-CODA. The relatively high ranking of ALIGN-RIGHT(SUB-σ) causes also the appearance of apparently unmotivated schwas. It has also been shown that ALIGN-RIGHT(SUB-σ) is not an *ad-hoc* constraint; it is a necessary constraint, which keeps a subset relationship with the more general constraint ALIGN-RIGHT (σ).

There is one type of case, which constitutes an example of opacity (at least apparently), that cannot be accounted for with the constraint ranking in (52). This case is illustrated in (53):

(53)   /tiɾa+ɾ#nz/: [ti.ɾá)$_{L,N}$n.z<u>ə</u>]   'to throw (to) us'

This example surfaces with a final epenthetic schwa and without the infinitival /ɾ/. Notice that ALIGN-RIGHT (SUB-σ) is not violated in the grammatical output since the last segment of the verb, a vowel, is rightmost in a subsyllabic constituent (it is in fact the only segment of the nucleus). Given the constraint hierachy in (52), the optimal candidate would be the ungrammatical form *[ti.ɾá)$_{L,N}$ns]. It seems that the absent /ɾ/ is what causes the appearance of the epenthetic schwa and, thus, the answer to this type of case depends on the analysis of *r*-deletion in Catalan. [32] In Barceloní, this process applies word-finally (and before the plural morph) in oxytones. When an oxytone infinitival is followed by an enclitic, the /ɾ/ is kept before vocalic clitics (cf. /tiɾaɾ#u/ [ti.ɾá.ɾu] 'to throw it') and monoconsonantal clitics (cf. /tiɾaɾ#n/ [ti.ɾár.n<u>ə</u>] 'to throw some'), but not before biconsonantal clitics, as illustrated in (53). In non-oxytone verbs (like *témer* [té.mə] 'to fear') there is never a verb-final [ɾ], in spite of the spelling. Moreover, this process has a lot of exceptions (cf. *segur* [sə.ɣú] 'certain' vs. *futur* [fu.túr] 'future'), and they may vary, in some cases, from speaker to speaker (*anterior* 'anterior, prior': [ən.tə.ɾjó] ~ [ən.tə.ɾjór]). Indeed, before finding a possible solution to the case illustrated in (53), a proposal about *r*-deletion (and the way exceptions to it are encoded) is needed.

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Footnotes

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[2] The realization of clitics shows a lot of dialectal variation. Due to the complexity of the subject and the length of the paper, we avoid comparing Barceloní Catalan with other dialects.

[3] (pol.) stands for 'polite'. This is a form that is semantically second person (singular or plural). Morphologically, however, it is third person (singular or plural). This form is normally used when talking to an adult with no close relationship to the speaker.

[4] We exclude from (2) the realization with a final schwa adopted by all the clitics otherwise ending in a sibilant (*es*, *ens*, *us*, *les*, *els*) when the following verb starts with a sibilant (cf., e.g., *ens tira* [əns.tí.ɾə] '(s/he) throws (to) us' vs. *ens salva* [ən.zə.sál.βə] '(s/he) saves us', given in (1b), *les salva* [lə.zə.sál.βə] '(s/he) saves them (fem.)'). In this context, the appearance of the schwa avoids the contact between two sibilants, a clear OCP effect. This "strategy", however, is restricted to pronominal clitics. In the case of other clitics (like definite articles) and between words, the two sibilants are reduced to one (cf. *els sostres* [əl.sós.trəs] 'the ceilings', *les sopes* [lə.só.pəs] 'the soups', *coses senzilles* [kɔ̀.zə.sən.zí.ʎəs] 'simple things'). For an analysis of these cases see Bonet and Lloret (2002a).

[5] We use *elzi*, with a non-standard spelling, as the citation form for the third person dative plural clitic (its standard form, not used in normal speech, being identical to the third person accusative masculine plural). *Ens* and *us* are spelled *(-)nos* and *(-)vos* in certain enclitic positions.

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[6] For a more detailed description of Catalan clitics in English, the reader can take a look at Wheeler (1979), Hualde (1992), and Wheeler, Yates and Dols (1999), for instance.

[7] *El* and *els* surface, in this variety, with the masculine allomorph -*o* [u] in enclitic position when the verb ends in a consonant. In Catalan, the masculine morph is most commonly Ø (cf. *gat* [gát] 'cat', *cel* [sél] 'sky', *nas* [nás] 'nose'), and has a marked allomorph -*o* [u], present in few words (cf. *toro* [tɔ́.ɾu] 'bull', *gitano* [ʒi.tá.nu] 'gypsy', *maco* [má.ku] 'pretty'). The allomorph -*o* is the one that appears in the third person masculine enclitics [lu] and [luz]. The presence of the allomorph [u], which nevertheless interacts with the phonological behavior of the clitics (it appears under the same phonological conditions as the schwa in other clitics), raises an issue different from the one we are dealing with in this paper: it can be no accident that the choice of the [u] allomorph in forms like *tirem-lo* [ti.ɾέm.lu] 'let's throw him' (instead of *[ti.ɾέm.lə], with a schwa) avoids the homophony with its feminine counterpart; cf. *tirem-la* [ti.ɾέm.lə] 'let's throw her' (see, in this line of work, Viaplana 1980).

[8] There are few lexicalized expressions where the clitic has kept the etymological CV form before a verb starting with a consonant: *Com te* [tə] *dius?* 'What's your name?' or *Tant me* [mə] *fa* 'I don't care'.

[9] In this paper we use the term 'clitic group' only in a descriptive sense, to refer to a sequence of one or more clitics followed by a verbal form, or to a verbal form followed by one or more clitics. In fact, following Selkirk (1995), only concepts like lexical vs. functional word and prosodic word will be used in the analysis.

[10] The number of allomorphs could be reduced to two, /ən/ and /nə/, by attributing the realization [n] to vowel deletion. Given that this hypothesis would present further complications when compared to the deletion of [ə] in other contexts, we do not consider it in the text.

[11] Note that, if *us* had a unique underlying form with a vowel (/uz/), its behavior should not differ from the one found with the vocalic clitic *ho*, /u/, which never surfaces with a schwa (cf. [su.kɾέw] *s'ho creu* '(s/he) believes it', [ti.ɾán.tu] *tirant-ho* 'throwing it').

[12] Many imperatives from the second and third conjugations end in a consonant in isolation, but surface with a schwa, in many varieties, when a pronominal clitic follows: [kús] (*cus* 'sew!') but [kú.zən] (*cus-ne* 'sew some!'), and even [kú.zəw] (*cus-ho* 'sew it!'). Given that, as pointed out in the text, epenthesis might take place even when there would not be a syllabification problem, one might be led to think that the schwa that appears in these clitic groups is an epenthetic vowel too. Leaving aside the fact that the epenthesis site in these examples would be quite unusual (epenthesis is peripheral whenever possible), there are other imperatives ending in a consonant that do not surface with a schwa after the verbal form, as shown by examples like [fés] (*fes* 'do!'): [féz.nə̱] (*fes-ne* 'do some!'), with peripheral epenthesis, or [fé.zu] (*fes-ho* 'do it!'), without a schwa. No phonological constraints, with a specific ranking, could give as optimal outputs both [kú.zə̱n] and [féz.nə̱] from inputs like /kuz#n/ and /fez#n/, respectively (or [kú.zə̱w] and [fé.zu], from /kuz#u/ and /fez#u/). It is clear, as already pointed out by Fabra (1913 I) and, more recently, Mascaró (1986), that the [ə] present in forms like [kú.zən] and [kú.zəw] has to be attributed to verbal allomorphy. The underlying forms corresponding to the outputs just mentioned are then /kuzə#n/ and /kuzə#u/, respectively, and, as we saw, when the verb ends in a vowel (in the text often illustrated with examples like *imita* or *tira*) no epenthesis takes place.

[13] Following Steriade (1982) and others, one could derive deletion from impossibility of syllabification. We do not think this is the best approach to deletion, among other things because in very specific cases, with morphological conditioning, a consonant cluster can be maintained even when the stop cannot be syllabified as an onset; cf. *alt* /alt/ [ál] 'tall' vs. *resolt* /ɾəzɔl+t/ [ɾə.zɔ́lt] 'solved', where /t/ is the participial morph. We assume, in the rest of the paper, that clusters like /nt/ (or /lt/) are legitimate codas in Catalan.

[14] Some of the previous analyses discuss few facts related to dialectal variation (e.g. the difference between [ə̠m.tí.ɾə] and [mə̠.tí.ɾə]) in terms of constraint re-ranking (cf. Colina 1995, upon DeCesaris 1986; Jiménez and Todolí 1995; Serra 1996, and also Bonet and Lloret 1996). The facts of each system, however, are much more intricate than they are described in these works, and thus the accounts they provide are sketchy and oversimplify the facts (see, for instance, Lloret and Viaplana 1996, where cases with lexicalized schwas are contrasted with cases with epenthetic schwas). The complexity of the facts asks for independent studies before dialectal comparison is made.

[15] In this paper, DEP refers only to vowels. DEP for consonants has to be very highly ranked in Catalan, given that consonant epenthesis is limited to very specific environments related to rhotics.

[16] ONSET: "Syllables must have onsets" (Itô 1989, Prince and Smolensky 1993); NO-CODA: "Syllables may not have a coda" (Prince and Smolensky 1993, McCarthy and Prince 1994).

[17] Due to the complexity of the data and for clarification purposes, the tableaux reflect the final ranking we propose (see (52)). When relevant, below each tableau we mention the crucial rankings illustrated by the example.

[18] IO-CONTIGUITY bans morpheme internal deletion or epenthesis (see Kenstowicz 1994 and McCarthy and Prince 1995); *COMPLEX^{CODA}: "Codas are simple (no complex codas allowed)" (Prince and Smolensky 1993).

[19] A trace of FINAL-C can be found in some lexical items that end in a non-etymological consonant, instead of a vowel, in some varieties: *api* 'celery' [á.pit], *col·legi* [ku.lɛ́.ʒit] 'school', *premi* [pɾɛ́.mit] 'price', *així* [ə.ʃís] 'like this'.

[20] According to Selkirk (1995), the type of representation proposed for internal clitics "should display phonological behavior identical to that of PWd constituted of a single Lex alone" (p. 450). In fact, clitics in Catalan are affected by lexical phonological

processes, like Final Devoicing, Cluster Simplification or r-Deletion; in this sense, they behave like morphemes, not like independent words.

[21] The problem with (25) would be avoided if ALIGN-R(σ) were not conceived as a gradient constraint, but the ranking paradox posed by (23) and (24) would still persist.

[22] Jiménez (1997) is the only other OT analysis that satisfactorily deals with the cases of apparently unmotivated epenthesis. Under his account, all homosyllabic segments to the right of a nucleus except for the first one are considered to be part of an appendix (not part of a coda), and he proposes a constraint banning configurations in which a clitic is parsed as an appendix. Leaving aside the arguable status of the primitive "appendix" in syllable theory, this constraint would not account for the lack of epenthesis in examples like /tiɾi#nz/ in Barceloní, given that an output like *[tí.ɾin.zə] (not the grammatical form [tí.ɾins]) would avoid having the *s* of the clitic in an appendix and would therefore be the optimal candidate. This problem does not arise in the dialect Jiménez (1997) analyzes because in these contexts biconsonantal clitics are underlyingly syllabic (e.g., Barceloní /nz/ is /moz/ in Valencian).

[23] We are implicitly assuming an interpretation of ALIGN-RIGHT(SUB-σ) according to which, in an example like [ti.ɾɛ́wn.zə], in (35), given that the right edge of Lex, immediately to the right of [w], has to be in a coda, it wants to be at the edge of that coda (not just at the edge of any subsyllabic constituent). Notice that all the candidates fare even with respect to the right edge of the preceding nucleus, because in all the cases only [w] intervenes between the right edge of Lex and the right edge of the preceding nucleus (*[ti.ɾɛ́)$_N$w)$_L$ns], [ti.ɾɛ́)$_N$w)$_L$n.zə], and [ti.ɾɛ́.)$_N$w)$_L$ əns]). In any case, the choice of [ti.ɾɛ́wn.zə], with epenthesis, over *[ti.ɾɛ́wns], more faithful to the input in number of segments, cannot be attributed just to the degree of complexity of the complex coda (two segments in [ti.ɾɛ́wn.zə] but three in *[ti.ɾɛ́wns]) because final codas with three segments are possible in Catalan, and do not force epenthesis (e.g., the plural of *clown* is [kláwns]; *[kláwn.zə]).

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[24] In the colloquial language, a sequence like /ɾɛb#l+a/ is pronounced [ɾɛ́.βə.lə], with the verbal allomorph /ɾɛbə/, as mentioned in fn. 12. In the standard language no speaker hesitates, though, about the pronunciation of /ɾɛb#l+a/, which is consistently as given in the text.

[25] *COMPL(EX)$^{O(NSET)}$, from the constraint family *COMPLEX, militates against complex onsets (see Prince and Smolensky 1993).

[26] Notice that resyllabification in the case of *tap humit*, mentioned above, poses no problem, since in [tà.p)$_{L,M}$u.mít] the right edge of Lex coincides with the right edge of the onset. The same applies to V-clitic sequences like /fez#u/ [fé.z)$_{L,M}$u] 'do it!'.

[27] In Harris (1993) rule-based approach (briefly discussed in section 5), the contrast between cases like [su.plí.si], [ɾéb.lə], and [tab.lí.lə] is attributed to different syllabification-related rules applying at four different strata, and to their interaction with other extrinsically ordered rules. Under the parallel account presented here, phonological processes like the ones he treats (devoicing, spirantization and voicing assimilation) will have to be reanalyzed.

[28] Cluster Simplification is optional when the homorganic stop is preceded by a rhotic or *s* (both of them [+continuant] consonants). There are two other general processes of consonant deletion, Final-r deletion and Final-n deletion, which is irrelevant to the topic of this paper.

[29] From now on we provide the underlying form of verbs with the morphological boundaries that are relevant to the discussion. Although different proposals have been made about the morphological make-up of verbs (see, for instance, Mascaró 1986 and, more recently, Oltra-Massuet 1999), they do not differ with respect to the morphs that are at issue here.

[30] Examples like /tiɾa+nt#l+z+i/ 'throwing to them', which are forced to surface with a medial epenthetic vowel (cf. [ti.ɾán.tə̱l.zi]) due to their problems of syllabification and

the impossibility of deleting enough segments to solve them, surface as faithful as possible to the input; that is, without violating MAX, as in the example illustrated in (47).

[31] One might think that the ungrammatical candidate in (49c), *[ké.ði.s<u>ə</u>m.lə], is ruled out by some constraint related to a coda condition because it has a labial consonant in a coda and the following consonant has a different place of articulation. Other examples, like *témer-se-te-la* [té.mə.s<u>ə</u>.t<u>ə</u>.lə] 'to fear it (fem.) oneself on you', with the underlying cluster /s#t#l+a/, show that this is not the case, given that ungrammatical candidates like *[té.mə.s<u>ə</u>d.lə] or *[té.mə.s<u>ə</u>l.lə] (with manner assimilation, as in *atleta* [əl.lέ.tə] 'athlete') have a homorganic cluster.

[32] (53) does not constitute a problem for Serra (1996), who proposes a negative Alignment constraint forbidding the right edge of a clitic to coincide with the right edge of a stressed syllable. This constraint, which was rejected in section 5 for other reasons, would force epenthesis to take place in (53) regardless of the fate of the verb-final /ɾ/.