The importance of being Onset

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In Balearic Catalan, verbal forms that correspond to the first person of present indicative do not show an explicit inflectional morph, unlike most dialects of Catalan. Among these forms we can find final consonantal clusters that involve a violation of the restrictions imposed by the sonority scale, according to which the degree of sonority between the segments of a syllable must be decreasing in relation to the nucleus. Furthermore, these final consonantal groups also exhibit a peculiar behavior with respect to the nominal forms. In previous approaches, these verbal clusters have been analyzed as the onsets of an empty nucleus. In this paper we are going to investigate the problems derived from this kind of approach and prove they are better analyzed by considering paradigmatic effects, such as uniformity and contrast between the members of a paradigm.

1. *Introduction*

Balearic is the Catalan dialect spoken in the Balearic Islands and is composed by three subdialects, Majorcan, Minorcan and Eivissan Catalan. Balearic is probably the most differentiated dialect of Catalan due to the isolation that their inhabitants have been subjected to. In this paper we are going to analyze one of the features that confers more singularity to this dialect: the behavior of the verbal forms corresponding to the first person singular of present indicative.

Final consonantal clusters of the verbal forms that correspond to the first person of present indicative, which in Balearic do not show any explicit inflectional morph, often involve a violation of the syllabic restrictions imposed by the sonority scale. This can be seen in the examples of (1a). An epenthetic final vowel ([ə]) is inserted in the nominal forms that are not properly constructed from a syllabic point of view (1b); however, first person singular verbal forms with a similar structure are maintained although they violate the sonority hierarchy (1a).

(1) Balearic Catalan
a. verbal forms   b. nominal forms
alegr /əlegɾ/   [ə.ˈlekɾ] '(I) amuse' *magre* /magɾ/   [ˈma.ɣɾə] 'skin'
compr /kompɾ/ [ˈkompɾ] '(I) buy'   *timbre* /timbɾ/   [ˈtim.bɾə] 'bell'

entr	/ɛntɾ/	[ˈɛn̪tɾ]	'(I) enter'	*centre*	/sentɾ/	[ˈsen̪.tɾə̣]	'center'
mescl	/mɛskl/	[ˈmɛskl]	'(I) mix'	*mascle*	/maskl/	[ˈmas.klə̣]	'male'
mostr	/mɔstɾ/	[ˈmɔstɾ]	'(I) show'	*mestre*	/mɛstɾ/	[ˈmɛs.tɾə̣]	'teacher'

Except for Alguer Catalan, in the rest of Catalan dialects the verbal forms that correspond to the first person of present indicative exhibit an inflectional morph ([u], [o] or [e] depending on the dialect), which is the nucleus of these consonantal clusters; therefore, in these dialects there are no problems of syllabification.

Furthermore, there are first person present indicative forms that violate the syllabic restrictions of sonority because they show final consonantal clusters with the same degree of sonority (2a). The same final sequences in nominal forms require the insertion of an epenthetic vowel (2b).

(2) Majorcan and Minorcan Catalan

a. verbal forms			b. nominal forms		
adopt	[ə.ˈðott]	'(I) adopt'	*concepte*	[kun.ˈsɛt.tə̣]	'concept'
design	[də.ˈzinn]	'(I) design'	*signe*	[ˈsin.nə̣]	'sign'
condemn	[kun̪.ˈdenn]	'(I) condemn'	*solemne*	[su.ˈlen.nə̣]	'solemn'

Catalan also avoids codas with a glide plus a sonorant. The list is limited to a few borrowed words such as *gasoil* ('gas oil') and *rail* ('rail'), learned words such as *linòleum* ('linoleum'), or archaisms such as *saur* ('dark yellow'). The avoidance of this type of segmental combinations in Catalan explains the insertion of a final epenthetic vowel in most cases, as we can see in (3b). However, in Balearic Catalan it is possible to find first person present indicative verbal forms that end in one of these combinations of glide plus sonorant (3a).

(3) Balearic Catalan

a. verbal forms			b. nominal forms		
entaul	[ən̪.ˈtawl]	'(I) strike up'	*retaule*	[rə.ˈtaw.lə̣]	'altarpiece'
restaur	[rəs.ˈtawɾ]	'(I) restore'	*centaure*	[sən̪.ˈtaw.ɾə̣]	'centaur'
lliur	[ˈʎiwɾ]	'(I) deliver'	*lliure*	[ˈʎiw.ɾə̣]	'free'

Apart from these cases, which are cases of underapplication of a general process of the language, i.e. epenthesis, there are first person present indicative forms that exhibit an unexpectedly behavior within the patterns of Minorcan dialect. These are typical cases of overapplication of a process. In Minorcan Catalan regressive place assimilation only applies if the second consonant of a cluster is placed in onset position, either due to syllabification —as in *accent* 'accent' (4a)— or due to resyllabification —as in *lloc segur* 'safe place' or in *pocs amics* 'few friends' (4a). On the contrary, regressive place assimilation does not take place on final position, precisely because the second consonant of the group is not in onset position, but in coda position, as we can see in (4b). Note that this behavior shows up clearly in the contrast between a sequence such as *pocs* 'few' (4b), without assimilation, with a sequence such as *pocs*

amics 'few friends' (4a), in which regressive place assimilation applies precisely because the *s* in *pocs* is syllabified in onset position, due to resyllabification. Against this generalization, though, in this dialect there is regressive place assimilation in the consonantal endings that correspond to the first person singular of present indicative (4c).

(4) Minorcan Catalan
a. nominal forms (C2=onset position)
accent   /əksent/   [ət.t͡sent̪]   'accent'
lloc segur   /ʎɔk##səɡuɾ/   [ˌʎɔt.t͡sə.ˈɣu]   'safe place'
pocs amics   /pɔk+z##əmiɡ+z/   [ˌpɔd.d͡zə.ˈmiks]   'few friends'
b. nominal forms (C2=coda position)
pocs   /pɔk+z/   [ˈpɔks]   'few'
fax   /faks/   [ˈfaks]   'fax'
llums /ʎum+z/   [ˈʎums]   'lights'
c. first person singular of present indicative verbal forms (C2=coda position)
fix   /fiks/   [ˈfi͡ts]   'I fix'
relax   /rəlaks/ [rə.ˈla͡ts] 'I relax'
prems   /prems/   [ˈprens] 'I press'

2.   *Previous approaches*

The special behavior of first person singular present indicative verbal forms, specially the one shown in (1a) and (2a), has been analyzed in different ways. The first formal analysis of these final consonantal groups can be found in the work of Dols (1993a, 1993b), which deals with different aspects of Majorcan consonantism within the framework of autosegmental phonology. The author bases his analysis on Gussmann (1992), a paper devoted to Polish consonantism. Polish, like Balearic Catalan, presents heavy consonantal final clusters (cf. naste[mpstf] 'consequence gen. plur.'). Polish also shows a restriction that bans the presence of non-sonorant consonants in coda position. In order to explain this violation and the presence of heavy clusters, Gussmann proposes to reduce all word-final consonantal clusters to a sonorant in coda position plus a complex onset, which has been desyllabified as a result of vowel deletion. Dols puts forward this approach and analyses these final consonantal clusters of Balearic Catalan as onsets of an empty nucleus. A verbal morpheme (M), corresponding to the first person singular of present indicative, would license this syllabic position without segmental content. Similar structures without this morpheme (M) are subjected to epenthesis.

In an article published in 1995, Dols and Wheeler analyze these final consonantal clusters from a different point of view. They try to simplify the Majorcan syllabic structure to the highest degree by assuming that the syllable is composed exclusively of a nucleus, an onset and a monoconsonantal coda. Any other consonant in final position is considered an onset. Therefore, a group of consonants in word final position is always interpreted as a unique coda-consonant plus an onset composed of one or two consonants. Although a

syllabic nucleus is what universally tends to license an onset, the authors propose that it may also be licensed by the right edge of a prosodic domain. Note that an important difference with regard to Dols (1993a, 1993b) proposal is that the morpheme (M) no longer licenses these onsets but the right edge of a prosodic domain.

This proposal, although very attractive at first sight, has some problems derived from the overgeneralization of certain structures. In fact, their analysis is led by the facts of these special (and exceptional) cases, while regular forms become exceptional. That is the case of forms such as *timbre* 'ring' or *magre* 'skin' (cf. 1b), which have an underlying structure identical to that of first person singular present indicative verbal forms but require the insertion of an epenthetic vowel (/timbɾ/ [ˈtim.bɾə̱], /maɡɾ/ [ˈma.ɣɾə̱]). The authors, in order to explain the fact that first person endings do not require epenthesis, argue that these final vowels in nominal forms are either cases of insertion morphophonologically conditioned to nominal inflection, or that they are not inserted but are different allomorphs of the masculine morpheme. Considering these forms exceptional and subjected to a morphophonological rule entails the unnecessarily overloading of the lexicon. For that reason, it seems more convincing, as Dols states in earlier works, to propose that it is the morpheme M (of first person singular of present indicative) what licenses these final consonantal groups.

In fact, an analysis along these lines within Optimality Theory is what Serra (1996) proposes. This author provides an interpretation of these final consonantal groups by assuming the existence of an *extrasegmental* morpheme (that is, a morpheme without segmental content) in the forms which correspond to the first person of the present indicative. This morpheme would license those structures which are not well-formed from a syllabic point of view (1a, 2a and 3a). Under this proposal, the absence of this extrasegmental morpheme in the nominal forms (1b, 2b and 3b) explains the insertion of the epenthetic vowel.

An inherent problem of the analyses of Dols (1993a, 1993b) and Serra (1996) is that the presence of the extrasegmental morpheme is justified by the special behavior of these consonantal clusters and this special behavior is justified by appealing to the presence of an extrasegmental morpheme. Therefore we inexorably fall into cyclic argumentation. Moreover, the authors have not explored the consequences of such analysis for nominal inflection, where other extrasegmental 'zero' morphemes could be posited although this would not interfere with syllabic structure (Pons 2000).

Apart from that, these verbal forms undergo a series of phonological processes that are generally associated with the coda position and not with the onset position. For instance, this is the case of the devoicing process that affects final obstruents; this process applies systematically in final clusters integrated by one, two or three consonants, as can be seen in the following examples.

(5) Balearic Catalan (general)

a. *pos*   /pɔz/   [ˈpɔs]   '(I) put' (cf. [ˈpɔ.zə] '(he/she) puts')
    acab   /əkab/   [ə.ˈkap]   '(I) finish' (cf. [ə.ˈka.bə] '(he/she) finishes')
    ajud   /əʒud/   [ə.ˈʒut]   '(I) help' (cf. [ə.ˈʒu.ðə] '(he/she) helps')

b. *reserv* /rəzerv/   [rə.ˈzeɾf]   '(I) book' (cf. [rə.ˈzer.və] '(he/she) books')
     enfang /ənfang/   [əɲ.ˈfaŋk] '(I) muddy' (cf. [əɲ.ˈfaŋ.gə] '(he/she) muddies')
     allarg /əʎarg/   [ə.ˈʎaɾk] '(I) extend' (cf. [ə.ˈʎaɾ.ɣə] '(he/she) extends')
     obr   /ɔbɾ/   [ˈɔpɾ]   '(I) open' (cf. [ˈɔ.βɾə] '(he/she) opens')
     arregl /ərreglʲ/   [ə.ˈrekl] '(I) repair' (cf. [ə.ˈreg.glə] '(he/she) repairs')
c. *sembr* /sɛmbɾ/   [ˈsɛmpɾ] '(I) sow' (cf. [ˈsɛm.bɾə] '(he/she) sows')
     sembl /sɛmblʲ/   [ˈsɛmpl] '(I) look like' (cf. [ˈsɛm.blə] '(he/she) looks like')

There is another process that affects verbs that end in –*var* in certain Majorcan varieties that also casts doubt on the convenience of treating these forms as onsets of an empty nucleus (Pons 2000). In Catalan, the intervocalic [v] (or [β] in case of dialects which do not have the voiced labiodental fricative phoneme) generally alternates with a labiovelar glide in final position. In the Majorcan dialect, verbal forms with an intervocalic [v] can show, as demonstrated in (6), two types of behavior when this consonant is placed in final position: either this [v] is realized unvoiced, as shown in the examples of (6a), or this [v] is realized as a labiovelar glide, as shown in the examples of (6b). In fact, the latter is the general behavior that these segments show in nominal forms, as the examples in (6c) illustrate.

(6)
a. Majorcan and Minorcan Catalan
prov   [ˈpɾɔf]   '(I) try'   (cf. [pɾu.ˈva]~[pɾo.ˈva] 'to try')
aprov   [ə.ˈpɾɔf] '(I) aprove'   (cf. [ə.pɾu.ˈva]~[ə.pɾo.ˈva] 'to aprove')
cav   [ˈkaf]   '(I) dig'   (cf. [kə.ˈva] 'to dig')
b. Majorcan Catalan (some varieties)
prov   [ˈpɾɔw]   '(I) try'   (cf. [pɾu.ˈva]~[pɾo.ˈva] 'to try')
aprov   [ə.ˈpɾɔw] '(I) aprove'   (cf. [ə.pɾu.ˈva]~[ə.pɾo.ˈva] 'to aprove')
cav   [ˈkaw]   '(I) dig'   (cf. [kə.ˈva] 'to dig')
c. Catalan (nominal forms)
meva~meu   [ˈme.va], [ˈme.βə]~[ˈmew]   'mine fem.~masc.'
neva~neu   [ˈne.və], [ˈne.βə]~[ˈnew]   'it snows~snow'

None of the aforementioned studies refers to this kind of alternation in final position, which is clearly associated to final position. If these final consonants are considered onsets of an empty nucleus they should not alternate, because this behavior is only related to the coda position.[1] To sum up, the convenience of treating these final forms as onsets is not clear at all, because, as the last

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[1] In the analysis proposed by Dols & Wheeler (1995), in which the presence of the structures that are not well-formed from a syllabic point of view is not justified by the presence of an empty nucleus, but simply by the right edge of a prosodic domain, the lack of voice in these cases is justified because these consonants are in the coda position before the eventual transference to the onset position. And it is in this position where the voice features disappear. This approach exhibits contradictory derivations in the context of the language that for expository reasons we will not refer to and it is insufficient to explain the lack of voice in cases like *reserv* [rə.ˈzeɾf] '(I) book', *allarg* [ə.ˈʎaɾk] '(I) extend' or *sembr* [ˈsɛmpɾ] '(I) sow', where the final obstruents are never associated to the coda position.

examples have proved, the lack of voicing segments and the presence of [w] also affect consonantal segments associated to the onset position according to these proposals.

3. *Paradigmatic effects*

The analysis we propose is to consider that first person singular present indicative verbal forms exhibit a different syllabification with respect to the nominal forms because of the pressure that other forms exert in the context of the same paradigm. The pressure can either work by contrast —in which case homophony is avoided— or by analogy —in which case the shared stem tends to homogenization. The lack of these paradigmatic pressures in nominal inflection explains the application of the regular phonological processes of the language.

Recently, these kinds of paradigmatic pressures have been discussed in the framework of Optimality Theory by different authors with the same purpose in mind: to give an account for the surface similarities and differences among morphologically related words, that is, between the members of a paradigm.

Up to now, constraints with uniformity effects have been largely explored from different perspectives.

In order to explain this kind of behavior, Kenstowicz (1996) proposes two different constraints, BASE-IDENTITY and UNIFORM EXPONENCE. The former explains those cases where an immediate constituent, the base, exerts pressure over its derived form, motivating either the underapplication or the overapplication of a process. The latter, on the contrary, explains those cases where there is no base that exerts pressure or those cases where it is the base form the one which is modified due to the pressure of a derived form. As pointed out in McCarthy (2001), this later approach to surface resemblances is inherently symmetric because none of the forms morphologically related has priority among the others, so that any form can be modified.

According to Benua's (1997) Transderivational Correspondence Theory, which deals basically with derivational morphology, the relation between the words subjected to uniformity is expected to be asymmetric, since there is a base, the simple word, to which the derived forms are faithful.

In McCarthy (2001), it is argued that within inflectional morphology only symmetric relations between the members of a paradigm are possible, which means that any form of the paradigm can be the one which exerts the pressure. In order to formalize pressures between the members of an inflectional paradigm, the author proposes the Optimal Paradigms model. According to this model, candidates consist of entire inflectional paradigms, which are all subjected to markedness and I-O faithfulness constraints. The members of the paradigm also stand in a surface correspondence, which is materialized by a set of O-O faithfulness constraints.

Paradigmatic homophony avoidance, on the other hand, has been formalized by Crosswhite (1997), who appeals to an ANTI-IDENT constraint

responsible for the blocking of vowel reduction in a dialect of Bulgarian and in Standard Russian when it would create homophone words within a paradigm. Similarly, Kenstowicz (to appear) proposes a PARADIGMATIC CONTRAST constraint which ensures that 'two morphologically distinct members of the paradigm remain phonetically distinct'.

We should point out that what uniformity and contrast constraints have in common is that they apply within a paradigm, that is, among a set of forms that share a stem. However, whereas uniformity constraints are only sensitive to the shared morpheme of a paradigm, constraints which express contrast are sensitive to the whole inflected form.

In this paper, we are going to prove how the special phonological behavior of the verbal forms exposed in § 1 can be explained appealing to such paradigmatic relations. We are going to show, first, how the lack of epenthesis in the verbal forms exposed in (1a), (2a) and (3a) can be analyzed as the result of the effect of a constraint that bans the presence of identical forms in the same paradigm.

First of all, we must give an account for the nominal forms listed in (1b), (2b) and (3b), which exhibit a regular behavior, that is, with the insertion of an epenthetic vowel (cf. *timbre* /timbɾ/ [ˈtim.bɾə] 'bell'). To explain the syllabification of these nominal forms, we need those markedness constrains which ensure a proper syllabification in Catalan, that is *P/C, according to which only a vowel can be the nucleus of a syllable, and the SONORITY SEQUENCING PRINCIPLE, according to which the sonority between the segments of a syllable must be decreasing with respect to the nucleus.

(7) *P/C: C may not associate to Peak (Nuc) nodes (Prince & Smolensky 1993)

(8) SONORITY SEQUENCING PRINCIPLE: Between any member of a syllable and the syllable peak, only sounds of higher sonority rank are permitted (Clements 1990)

A constraint banning intrasyllabic clusters integrated by a glide plus a sonorant is also active in Catalan dialects. For simplicity, we collapse these specific constraints under the constraint σ STRUCT. In Catalan, this constraint is undominated with respect to the correspondence constraint that prohibits epenthesis (DEP-IO) but not with respect to the correspondence constraint that bans deletion (MAX-IO), so that deletion is not the strategy selected to satisfy syllabic restrictions exposed above.[2] Since epenthesis is always peripheral in Catalan, the CONTIGUITY constraint, which prevents from morpheme internal insertion or deletion, must be high-ranked, so that the candidate with external epenthesis is selected as the optimal, as it can be seen in the tableau of (12).[3]

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[2] Jiménez (1997, 1999), which deals with other phenomena of Catalan, argues that the constraint which prevents from deletion due to syllabic restrictions is Max-F.

[3] If we take into account the whole data of these dialects, other interacting constraints such as *CCC]σ should be included. For the sake of simplicity, we exclude them.

(9)   DEP-IO: Every segment in S_2 has a correspondent in S_1 (Epenthesis is prohibited). (See McCarthy & Prince 1995)

(10) MAX-IO: Every segment of S_1 has a correspondent in S_2 (Deletion is prohibited). (See McCarthy & Prince 1995)

(11) CONTIGUITY-IO: The portion of S_1 standing in correspondence forms a contiguous string, as does the correspondent portion of S_1. (Morpheme epenthesis and deletion of segments are prohibited) (See McCarthy & Prince 1995)

(12) *timbre* /timbɾ/ [ˈtim.bɾə] 'bell'

/timbɾ/	CONTIGUITY	MAX-IO	σ STRUCT	DEP-IO
☞ a. ˈtim.bɾə				*
b. ˈtimpɾ.			*!	
c. ˈtimp.		*!		
d. ˈtim.bəɾ	*!			*

The same ranking for a verbal form like /ɛmpɾ/ '(I) use', with a similar underlying structure as /timbɾ/ 'bell', would predict the selection of the wrong candidate as the optimal, as we can see in the following tableau.

(13) /ɛmpɾ/ [ˈɛmpɾ] '(I) use'

/ɛmpɾ/	CONTIGUITY	MAX-IO	σ STRUCT	DEP-IO
☞ a. ˈɛm.pɾə				*
b. ˈɛmpɾ.			*!	
c. ˈɛmp.		*!		
d. ˈɛm.pəɾ	*!			*

We need an explanation for the lack of vowel insertion in the case of the first person singular present indicative verbal forms. In fact, there is. Epenthesis does not take place in these cases because this would produce a form identical to another form of the same paradigm: the third person singular of present indicative (/ɛmpɾ+ə/ [ˈɛmpɾə]), where the final schwa is the tense morph of the verbs of the first conjugation of verbs in Catalan. In order to understand this behavior, we list the whole paradigm of this verb below.

(14) Present indicative paradigm of *emprar* 'to use'

<u>*empr*</u>	[ˈɛmpɾ]	/ɛmpɾ/	'(I) use'
empres	[ˈɛm.pɾəs]	/ɛmpɾ+ə+z/	'(you) use'
<u>*empra*</u>	[ˈɛm.pɾə]	/ɛmpɾ+ə/	'(he/she) uses'
empram	[əm.ˈpɾam]	/ɛmpɾ+a+m/	'(we) use'
emprau	[əm.ˈpɾaw]	/ɛmpɾ+a+w/	'(you) use'
empren	[ˈɛmpɾən]	/ɛmpɾ+ə+n/	'(they) use'

As indicated before, Crosswhite (1997) proposes an Anti-Ident constraint which bans the presence in a paradigm of two identical forms, and it is stated as follows.

(15) **Anti-Ident**: For two forms, S_1 and S_2, where $S_1 \neq S_2$, $\exists\, \alpha$, $\alpha \in S_1$, such that $\alpha \neq \mathcal{R}(\alpha)$ (Crosswhite 1997)

According to this constraint, given two forms, S_1 and S_2, there must be some segment α belonging to S_1 such that α is not identical to its correspondent in S_2. As stated in (15), the forms subject to Anti-Ident (S_1 and S_2) must be different. We should point out that it is not always the case that two members of a paradigm have an element which stands in a correspondence relation, as it is the case we are dealing with in this paper. Note, on the other hand, that it is not necessary to make reference to the fact that the forms subject to this constraint must be morphologically or semantically different because the members of an inflectional paradigm inherently have a different morphological structure and, therefore, a different meaning. That is why we propose a more general constraint with similar effects, which could be stated as follows.

(16) **Paradigm Contrast (PC)**: "For *n* members of a paradigm X $\exists$ *n* surface realizations that are different for at least one property" (Identical forms in a paradigm are prohibited)

In a form such as /ɛmpɾ/ '(I) use', the insertion of the epenthetic vowel is blocked in order to avoid that the resultant form was identical to another form that already exists in the same paradigm. The constraint responsible for the blocking of epenthesis is PC, which bans the presence of identical forms in a paradigm. As we can see in the following tableau, the candidate with epenthesis is discarded because it is identical to another form of the paradigm, and, because of this, it ends up violating PC. Deletion of the final consonant (17c) or the medial epenthesis (17d) are not possible strategies to satisfy PC because Max-IO and Contiguity are high-ranked constraints in Catalan (See, for example, Colina 1995, Bonet & Lloret 1996, 2001, Serra 1996, Jiménez 1997, 1999). That is why the blocking of epenthesis is the strategy selected to satisfy PC in spite of σ Struct constraints.

(17) *empr* /ɛmpɾ/ [ˈɛmpɾ] '(I) use'

/ɛmpɾ/	Contiguity	Max-IO	PC	σ Struct	Dep-IO
a. ˈem.pɾə			*!		*
☞b. ˈɛmpɾ.				*	
c. ˈɛmp.		*!			
d. ˈɛm.pəɾ	*!				*

This kind of approach would give a satisfactory explanation for forms such as the one seen in (2), *adopt* [ə.ˈðott] '(I) adopt', and (3), *lliur* [ˈʎiwɾ] '(I) deliver',

as we can see in the following tableaux. We list the whole paradigm of these verbs before each tableau.

(18) Present indicative paradigm of *adoptar* 'to adopt'

<u>*adopt*</u>	/ədopt/	[ə.ˈðott]	'(I) adopt'
adoptes	/ədopt+ə+z/	[ə.ˈðot.təs]	'(you) adopt'
<u>*adopta*</u>	/ədopt+ə/	[ə.ˈðot.tə]	'(he/she) adopts'
adoptam	/ədopt+a+m/	[ə.ðut.ˈtam]	'(we) adopt'
adoptau	/ədopt+a+w/	[ə.ðut.ˈtaw]	'(you) adopt'
adopten	/ədopt+ə+n/	[ə.ðot.ˈtən]	'(they) adopt'

(19) *adopt* /ədopt/ [ə.ˈðott] '(I) adopt'

/ədopt/	CONTIGUITY	MAX-IO	PC	σ STRUCT	DEP-IO
a. ə.ˈðottə			*!		*
☞b. ə.ˈðott				*	
c. ə.ˈðot		*!			
d. ə.ˈðo.pə̱t	*!				*

(20) Present indicative paradigm of *lliurar* 'to deliver'

<u>*lliur*</u>	/ʎiwɾ/	[ˈʎiwɾ]	'(I) deliver'
lliures	/ʎiwɾ+ə+z/	[ˈʎiw.ɾəs]	'(you) deliver'
<u>*lliura*</u>	/ʎiwɾ+ə/	[ˈʎiw.ɾə]	'(he/she) delivers'
lliuram	/ʎiwɾ+a+m/	[ʎiw.ˈɾam]	'(we) deliver'
lliurau	/ʎiwɾ+a+w/	[ʎiw.ˈɾaw]	'(you) deliver'
lliuren	/ʎiwɾ+ə+n/	[ˈʎiw.ɾən]	'(they) deliver'

(21) *lliur* /ʎiwɾ/ [ˈʎiwɾ] '(I) deliver'

/ʎiwɾ/	CONTIGUITY	MAX-IO	PC	σ STRUCT	DEP-IO
a. ˈʎiwɾə̱			*!		*
☞ b. ˈʎiwɾ				*	
c. ˈʎiw		*!			
d. ˈʎiwə̱ɾ	*!				*

The consonants in these final clusters are associated with coda position, and thus they are expected to undergo the typical processes associated with this position, that is, syllable-final devoicing. As we can see in the following tableau, the ranking of IDENTONSET(voice), which ensures the preservation of the laryngeal features of the segment associated with the onset position, above the markedness constraint *VOICEDOBSTRUENT, which penalizes voiced obstruents, explains the voicing alternations seen in the examples of (5).

(22) *VOICEDOBSTRUENT: Voiced obstruents are prohibited. (See Beckman 1998)

(23) IDENTONSET(voice): Onset segments and their input correspondents must agree in voicing. (See Beckman 1998, Lombardi 2001)

(24) IDENT(voice): The specification for voice of an input must be preserved in its output correspondent. (See McCarthy & Prince, Beckman 1998)

(25) *obr* /ɔbɾ/ [ˈɔpɾ] '(I) open'

/ɔbɾ/	IDENTONSET(voice)	*VOICEDOBSTRUENT	IDENT(voice)
a. ˈɔbɾ		*!	
☞ b. ˈɔpɾ			*

(26) *reserv* /rəzeɾv/ [rəˈzeɾf] '(I) book'

/rəzeɾv/	IDENTONSET(voice)	*VOICEDOBSTRUENT	IDENT(voice)
a. rəzeɾv		*!	
☞ b. rəzeɾf			*

We will give an account now for the unexpectedly assimilation in final position that we find in first person present indicative verbal forms in Minorcan Catalan, where regressive place assimilation never applies in final position. The constraint responsible for place assimilation is AGREE(place), which is stated below:

(27) AGREE(place): Adjacent consonants have the same specification for place articulation

In Majorcan and Minorcan Catalan, where regressive place assimilation is really common, this constraint is very high-ranked with respect to the one which prevents from changes of place articulation between the input and the output segments, that is IDENT(place). This can be seen in the tableau of (29), where the markedness constraint AGREE(place) is ranked above IDENT(place), and thus the candidate with regressive place assimilation is selected.

(28) IDENT-IO(place): The specification for place articulation of an input must be preserved in its output correspondent (See McCarthy & Prince 1995).

(29) *poc segur* /pɔk##səguɾ/ [pɔt.t͡sə.ˈɣu]

/pɔk##səguɾ/	AGREE(place)	IDENT(place)
☞ a. [pɔt.sə.ˈɣu][4]		*
b. [pɔk.sə.ˈɣu]	*!	

As the tableau in (30) express, this ranking should be completed with another constraint which refers to the direction of assimilation, that is

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[4] We don't consider actual candidates with a lengthened affricate because it is not relevant to the purpose of this paper. This lengthening is related to Syllable Contact Law.

IDENTONSET(place). This constraint stands for the maintenance of the place features in the segments that are placed in a strong position, i.e. in onset position. This constraint ensures that the assimilation is regressive and not progressive, so that candidate (30a) is selected as the optimal.[5]

(30) *poc segur* /pɔk##səɡuɾ/ [pɔt.t͡sə.ˈɣu]

/pɔk##səɡuɾ/	IDENTONSET(pl.)	AGREE(pl.)	IDENT-IO(pl.)
☞ a. pɔt.sə.ˈɣu			*
b. pɔk.xə.ˈɣu	*!		*

We should point out, however, that the constraints given so far are not sufficient enough to explain the facts of Minorcan Catalan, where there is regressive place assimilation only when the second consonant is placed in the onset position. With the constraint ranking proposed above we do not have any means to discriminate forms with or without regressive place assimilation in final position. This can be seen in the next tableau, where the wrong candidates, (31b) and (31c), are selected as the optimal:

(31) *pocs* /pɔk+z/ [ˈpɔks] 'few'

/pɔk+z/	IDENTONSET(place)	AGREE(place)	IDENT(place)
a. ˈpɔks		*!	
☞ b. ˈpɔts			*
☞ c. ˈpɔkx			*

The introduction of a constraint banning that two final consonants share the same specification for place, ranked at the same level as AGREE(place), would give the actual output.[6]

(32) *poc segur* /pɔk##səɡuɾ/ [pɔt.t͡sə.ˈɣu]

/pɔk##səɡuɾ/	IDENTONS (pl.)	AGREE (pl.)	NO-LINK CC]σ	IDENT(pl.)
a. pɔt.sə.ˈɣu				*
☞ b. pɔk.sə.ˈɣu		*!		
c. pɔk.xə.ˈɣu	*!		*	*

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[5] In recent studies devoted to voicing and place assimilation, it has been argued that the reference to syllabic positions is not complete enough to give an account for the assimilation processes (see, for example, Steriade 1999 or Padgett 1995). In fact, the consonants that universally tend to preserve the voice and place features are the one defined as release, that is, the positions where the acoustic cues of voicing and place are more perceptible. For simplicity, we will refer to syllabic positions.

[6] Another interpretation to these data with similar effects would be to ascribe the lack of regressive place assimilation in final position to the extrasyllabic character of the final <s>, so that AGREE(place) would be vacuously satisfied (cf. ˈpɔk<s> vs. ˈpɔd.zə.mik<s>).

(33) *pocs* /pɔk+z/ [ˈpɔks] 'few'

/pɔk+z/	IDENTONS(pl.)	AGREE(pl.)	NO-LINK CC]σ	IDENT(pl.)
☞a. pɔks		*		
b. pɔt͡s			*	*!
c. pɔkx			*	*!

With the set of constraints given so far, we could hardly explain, however, regressive place assimilation in a case such as *fix* [ˈfi͡ts] '(I) fix' (5c), where the two final consonants are placed in coda position and, therefore, regressive place assimilation is not expected. The presence of assimilation in these verbal forms could be explained by appealing to a constraint responsible for the uniformity of the paradigm. As we show in the next examples, all the other forms of the paradigm exhibit assimilation precisely because in all these cases the second consonant of the cluster is syllabified in onset position.

(34) Present indicative paradigm of *fixar* 'to fix' in Minorcan Catalan

fixes　　[ˈfit.t͡səs]　'(you) fix'　　*relaxes*　[rə.ˈlat.t͡səs]　'(you) relax'
fixa　　 [ˈfit.t͡sə]　 '(he/she) fixes'　*relaxa*　[rə.ˈlat.t͡sə]　'(he/she) relaxes'
fixam　　[fit.ˈt͡sam]　'(we) fix'　　*relaxam* [rə.lət.ˈt͡sam]　'(we) relax'
fixau　　[fit.ˈt͡saw]　'(you) fix'　　*relaxau* [rə.lət.ˈt͡saw]　'(you) relax'
fixen　　[ˈfit.ˈt͡sən]　'(they) fix'　　*relaxen* [rə.ˈlət.t͡sən]　'(they) relax'

The pressure that all these forms exert over the first person singular form (/fiks/) explains regressive place assimilation in this context, where, according to the regular behavior, is not expected. This would be a case of overapplication of a process due to the pressure of the rest of the forms of the paradigm. The constraint responsible for this special behavior would be a paradigm uniformity constraint which ensures that the correspondent segments belonging to the shared stem have the same value for a concrete property, in this case, place of articulation.

Following the Optimal Paradigms model proposed by McCarthy (2001), the constraint responsible for the overapplication of regressive place assimilation in a case like *fix* [ˈfi͡ts] '(I) fix' would be OP-IDENT(place), according to which the output correspondents must agree in place of articulation. In the rest of the members of the paradigm, regressive place assimilation is explained through the markedness constraint AGREE(place); it is due to the OP-IDENT(place) constraint, however, that a form such as *fix* [ˈfi͡ts] '(I) fix' exhibits regressive place assimilation, in spite of the syllabic position of the consonants of the cluster. This can be seen in the next tableau, where all the members of the paradigm are subjected to I-O faithfulness, markedness and OP constraints:

(35)

/fiks/	IDENTONS (pl.)	AGREE(pl.)	NO-LINK CC]σ	OP-IDENT(pl.)	IDENT(pl.)
a. <ˈfiks, ˈfitsəs, ˈfitsə...>		*		*!	*****
b.☞<ˈfits, ˈfitsəs, ˈfitsə...>			*		******
c. <ˈfiks, ˈfiksəs, ˈfiksə...>		******!			

The paradigm candidate with the form without regressive place assimilation acting as the attractor, (35c), cannot be the winner because it involves multiple fatal violations of the markedness constraint AGREE(place). The paradigm candidate with alternations for the place feature, (35a), is also excluded because OP-IDENT(place)[7] is crucially ranked above IDENT(place). The winner candidate is the one that satisfies both AGREE(place) and OP-IDENT(place) constraints, (35b), in spite of the syllabic position of the cluster.

We should explore now the consequences that such paradigmatic constraints have in the voice alternations shown in forms like *obr~obra* [ˈɔpɾ]~[ˈɔbɾə] '(I) open~ (he/she) opens' (cf. 6); the lack of devoicing due to the pressure of the members of the paradigm is not possible because it would imply a violation of the high-ranked constraint *VOICEDOBSTRUENT.[8] The overapplication of the process in the forms of the paradigm where the obstruent is placed in the onset position is neither possible because, as stated before, the IDENTONSET(voice) constraint is ranked above the *VOICEDOBSTRUENT constraint and, therefore, above the OP-IDENT(voice) constraint. Unlike the case of place assimilation, we have voicing alternations within the paradigm, as the high-ranked *VOICEDOBSTRUENT and IDENTONSET(voice) constraints cannot be violated to satisfy paradigmatic constraints.

4. *Concluding remarks*

In this paper we have investigated the special behavior that final consonantal clusters of first person present indicative verbal forms exhibit with respect to the nominal forms in Balearic Catalan. We have shown that this special behavior can be explained through the pressure that other forms exert in the context of the same paradigm. This pressure can either work by contrast —in which case homophony is avoided— or by analogy —in which case the shared stem tends to homogenization. A constraint which prevents from having phonetically identical forms within a paradigm explains the underapplication of epenthesis. A constraint that ensures the uniformity of the stem shared by the

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[7] If we consider the whole present indicative paradigm, the candidate (35a), with 5 forms with assimilation ([ts]) and 1 without ([ks]), exhibits 10 violations (5*1*2) of the OP-IDENT(pl.) constraint. Candidate paradigms with other place alternations, such as <ˈfiks, ˈfiksəs, ˈfiksə, fitˈsam, fitˈsaw, ˈfitsən>, are ruled out due to the activity of the AGREE(place) constraint.

[8] As justified in McCarthy (2001), only overapplication of a process is possible due to the pressure of the members of an inflectional paradigm.

members of the paradigm, on the other hand, explains the overapplication of regressive place assimilation.

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