Changes in Inflectional Class as a Means to Repair Phonology[*]

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1. Introduction

The emergence of phonological conflicts during the regular evolution of languages can be repaired by different strategies: (i) phonological repairs can be used to fit the regular phonology or to weaken regular patterns, (ii) morphophonological solutions can come at play to change the exponents of roots or those of affixes (i.e. allomorphy), and (iii) morphological solutions can induce changes in inflectional class; (iv) a more radical –and marginal– solution can be lexical substitution. Strategies (i) and (ii) are well studied in the literature (e.g. Davis & Napoli 1990), whereas strategies (iii) and (iv) are usually disregarded, such cases being typically accounted for through random analogy or left without an explanation. The goal of this work is to show that strategy (iii) can be motivated on the same grounds as (i) and (ii), citing evidence from the verbal system of Catalan. The investigation further argues, along the lines of, e.g., Aronoff's (1994: §4) work on Arapesh, that the distribution of lexical items over inflectional classes can be phonologically motivated.

The paper is organized as follows. Section 2 presents an outline of the verbal system of Catalan –the conjugations into which the verbs typically split and their historical origin. Section 3 examines the conjugational system of the Catalan spoken in the city of Alghero (Sardinia), showing that certain verbs are assigned to specific inflectional classes due to their phonological shape. Finally, section 4 presents some concluding remarks.

2. The conjugations of the verbal system of Catalan

Catalan verbs are traditionally divided into three conjugational classes. Class I consists of verbs with infinitives in tonic -ar (e.g. *cantar* 'to sing'), which derive from Latin first conjugation verbs (-ĀRE). Class II consists of verbs with infinitives in atonic -re (e.g. *perdre* 'to lose') and a few verbs with atonic -er infinitives (e.g. *témer* 'to fear'), which derive from Latin second and third conjugation verbs (-ĒRE and -ĔRE).[1] The inflectional paradigm of -re and -er class II verbs is identical except in the form of the infinitive (-re vs. -er) and in the absence or presence of -e- in the paradigms of the future and conditional tenses (future: *perdré*, *perdràs*…; conditional: *perdria*, *perdries*… vs. future: *temeré*, *temeràs*…; conditional: *temeria*, *temeries*…). Class III consists of verbs with infinitives in tonic -ir, which derive from Latin fourth conjugation verbs (-ĪRE). Class III has two subclasses. The distinction

[1] Catalan followed the Provençal -ĔRE > -ĒRE pattern, and not the -ĒRE > -ĔRE shift undergone by other Iberian languages. There are 10 irregular verbs (and their compounds) with tonic -er infinitives, most of which display atonic -re or -er variants (e.g. *ser/ésser* 'to be', *caber/cabre* 'to fit', *caler/caldre* 'to be necessary', *doler/doldre* 'to grieve', etc.), and 3 irregular athematic verbs (and their compounds): *dir* 'to say', *dur* 'to bring', and *fer* 'to do'.

between them is based on the presence (subclass IIIa, e.g. *servir* 'to serve') or absence (subclass IIIb, e.g. *dormir* 'to sleep') of a post-root affix *-eix-* (dialectal variants: *-ix-*, *-esc-*, *-isc-*) in some present forms. The segment *-eix-* developed from the Latin inchoative affix -SC- preceded by the thematic vowel -Ē-, reanalyzed as affix -ĒSC-, and spread to other verbs up to the point that nowadays only a small group of verbs (24 and even less in certain varieties) belongs to subclass IIIb. The post-root affix *-eix-* is stressed and regularizes the stress pattern of subclass IIIa verbs by maintaining the root atonic throughout the whole paradigm. In other words, the affix occurs in the IIIa verbal forms that would otherwise be rhizotonic; cf. (1).[2]

(1) a.   Subclass IIIa:
          1, 2, 3, 6 PI: serv-'eix-o/es/Ø/en   vs.   4, 5 PI: serv-'im/'iu
          1, 2, 3, 6 PS: serv-'eix-i/is/i/in   vs.   4, 5 PS: serv-'im/'iu
          2, 3, 6 Imp: serv-'eix-Ø/i/in   vs.   4, 5 Imp: serv-'im/'iu
     b.   Subclass IIIb:
          1, 2, 3, 6 PI: 'dorm-o/s/Ø/en   vs.   4, 5 PI: dorm-'im/'iu
          1, 2, 3, 6 PS: 'dorm-i/is/i/in   vs.   4, 5 PS: dorm-'im/'iu
          2, 3, 6 Imp: 'dorm-Ø/i/in   vs.   4, 5 Imp: dorm-'im/'iu

By far the largest number of verbs belongs to class I. Perea (2001) offers an approximate survey based on the verbs that appear in the *DIEC* (1997): 84% of the verbs belongs to class I (5.567 verbs), 4% belongs to class II (250 verbs), and 12% belongs to class III (801 verbs). New verbs are inflected in class I (e.g. loans from English: *esprintar* 'to sprint', *flirtejar* 'to flirt'), which is the productive class. Some verbs of subclass IIIb tend to move to subclass IIIa (e.g. *bullir* 'to boil': 1 PI *bullo* > *bulleixo*).

The evolution of the -ĔRE verbs (originally from the Latin third conjugation or assimilated to the third from the second conjugation) illustrates different kinds of strategies to which a language may resort to solve emerging phonological problems. In Catalan, the regular loss of the (internal short) -Ĕ- thematic vowel gave rise to two different situations: either the resulting clusters fitted the phonotactics of the language (2), as complex onsets (2a) or as coda-onset sequences (2b), or they did not (3), as in the case of sequences of sonorant consonants (3a) or sibilants followed by a tap (3b). In (3), the consonantal clusters resulting from vowel loss are not allowed because the sonority distance between the consonants is not adequate to be properly syllabified as complex onsets or as coda-onset sequences in Catalan (cf., e.g., Wheeler 2005: §3.1, §8.2).[3]

(2) Without problem when -Ĕ- deletes:
     a.   Complex onset 'non-sibilant obstruent + [ɾ]':
          PERDĔRE > per.dre 'to lose'   REMITTĔRE > reme.tre 'to remit'
          RECIPĔRE > re.bre 'to receive'   VENDĔRE > ven.dre 'to sell'
          FUNDĔRE > fon.dre 'to melt'   INCENDĔRE > encen.dre 'to set on fire'
     b.   Syllable contact '[w.ɾ]':
          BIBĔRE > beu.re 'to drink'   VIVĔRE > viu.re 'to live'
          CADĔRE > cau.re 'to fall'   CREDĔRE > creu.re 'to believe'
          PLACĔRE > plau.re 'to please'   COQUĔRE > **COCĔRE > coure 'to cook'

(3)   With problem when -ĕ- deletes:
    a.   *Complex onset 'sonorant + [ɾ]'; *Syllable contact 'sonorant.[ɾ]':
        PONĔRE > *po.[nɾ]e, *po[n.ɾ]e 'to lay (eggs)'
        TEMĔRE > *te.[mɾ]e, *te[m.ɾ]e 'to fear'
        PLANGĔRE > *pla.[ɲɾ]e, pla[ɲ.ɾ]e 'to pity'
        MOLĔRE > *mo.[lɾ]e, *mo[l.ɾ]e 'to grind'
        CURRĔRE > *co.[rr]e, *co[r.ɾ]e 'to run'
    b.   *Complex onset 'sibilant + [ɾ]'; *Syllable contact 'sibilant.[ɾ]':
        VINCĔRE > *ven.[sɾ]e, *ven[s.ɾ]e 'to defeat'
        TORQUĒRE> **TORCĔRE > *tor.[sɾ]e, *tor[s.ɾ]e 'to bend'
        CRESCĔRE > *crei.[ʃɾ]e, *crei[ʃ.ɾ]e 'to grow'
        NASCĔRE > *nei.[ʃɾ]e, *nei[ʃ.ɾ]e 'to be born'
        FUGĔRE > *fu.[ʒɾ]e, *fu[ʒ.ɾ]e 'to flee'

In the problematic situation illustrated in (3), dialectal variation emerged from the use of different strategies to fix the ill-formed resulting clusters. The most common repair was to turn to a phonological solution. In this scenario, a phonetic detail could be optimized, as in the case of stop insertion where an original intrusive stop that occurred between an alveolar nasal or lateral and a tap became phonologized (4a). This kind of repair occasionally spread to other contexts in some varieties (4b-c). Another phonological solution was to minimally change one of the segments to adjust the syllable contact, as is the case of r-tensing in (5). In all these instances, the sonority relations between the adjacent consonants improve and hence the regular phonology of the language is satisfied.[4]

(4)   a.   Standard Catalan:
            MOLĔRE > mol.dre 'to grind'
            PONĔRE > pon.dre 'to lay (eggs)'
    b.   Varieties of north-eastern Catalan, southern Valencian Catalan:
            TEMĔRE > tem.bre 'to fear'
            FUMĔRE > fum.bre 'to do (colloquial)'
            PLANGĔRE > plany.dre 'to pity'
    c.   Southern Valencian Catalan:
            CONOSCĔRE > coneix.tre 'to know'
            CONSUĔRE > cus.dre 'to sew'

(5)   Varieties of north-eastern central Catalan:
        MOLĔRE > mol.[r]e 'to grind'   PONĔRE > pon.[r]e 'to lay (eggs)'
        TEMĔRE > tem.[r]e 'to fear'   FUMĔRE > fum.[r]e 'to do (colloquial)'

A further phonological repair consisted in weakening the phonotactics of the language by allowing contacts of poor sonority distance. This is the case, for instance, in varieties of north-eastern central Catalan that accept complex onsets with worse sonority distance than the regular ones, e.g. they permit onsets of sibilants followed by a tap, at the contact of a verb root and the infinitive affix (6). In these varieties, sibilant-tap onsets also appear as a result of deleting internal [ə] in proparoxytone words (e.g. *llíssera* [ʎí.sɾə] 'mullet', *llissa* [ʎí.sə] in other varieties; *jàssera* [ʒá.sɾə] '(main) beam', *jassa* [ʒá.sə] in other varieties; *flamígera* [flə.mí.ʒɾə] 'flammifereous').

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[4] According to Wheeler (2005: §8.2), in Catalan the sonority ranking at work is the following (the sonority value of each class is given in parenthesis): Glides (15) > Tap (9) > Laterals, Trill (8) > Nasals (5) > Sibilant continuants (4) > Non-strident continuant obstruents (2) > Non-sibilant stops / Strident continuants (0). The minimum sonority distance allowed in an onset sequence is ≥ 6. The Syllable Contact Law (cf. Vennemann 1988, Clements 1990) determines that the final element of a syllable should not be less or equal sonorous than the initial element of next syllable.

(6)   Varieties of north-eastern central Catalan:
        VINCĔRE > ven.[sɾ]e 'to defeat'   CONOSCĔRE > conei.[ʃɾ]e 'to know'
        CRESCĔRE > crei.[ʃɾ]e 'to grow'   FUGĔRE > fu.[ʒɾ]e 'to flee'

Finally, a more radical phonological solution was to stop the regular change and, in the case under study, to block the loss of (internal short) -Ĕ- in order to display a sequence with good sonority distances among the segments (7).

(7)   Standard Catalan:
        VINCĔRE > vèn.cer 'to defeat'   TORQUĔRE > **TORCĔRE > tòr.cer 'to bend'
        CONOSCĔRE > conèi.xer 'to know'   CRESCĔRE > créi.xer 'to grow'
        TEMĔRE > té.mer 'to fear'   FUMĔRE > fú.mer 'to do (colloquial)'
        PLANGĔRE > plà.nyer 'to pity'   CURRĔRE > có.rrer 'to run'

If the preceding phonological solutions are examined per dialect, the following generalizations can be extracted. The evolution of -ĔRE verbs resulted in verbs with infinitives in atonic -re when no problem arose from the regular loss of the internal short vowel. These verbs composed the majority group of class II in all Catalan varieties. Additionally, in the most widespread situation, verbs with problems resulting from the -Ĕ- loss solved the question with consonant insertion (cf. (4a)) and vowel-loss blocking (cf. (7)). The former added to the more common -re group; the latter made up the minority group of verbs with atonic -er infinitives (9a), which are listed in (8):

(8)   atènyer 'to reach', córrer 'to run', créixer 'to grow', empènyer 'to push', estrènyer 'to narrow', fènyer 'to finish kneading the dough', fúmer 'to do (colloquial)', merèixer 'to deserve', néixer 'to be born', péixer 'to graze', pertànyer 'to belong', plànyer 'to pity', prémer 'to press', témer 'to fear', tòrcer 'to bend', trémer 'to tremble (literary use only)', vèncer 'to defeat'; and their compounds

A less common pattern found, for example, in north-eastern central Catalan is the non-existence of atonic -er verbs, through the acceptance of new complex onsets (cf. (6)). Some of these varieties also turned to consonant-insertion to repair some ill-formed contacts (cf. (4)) (9b*i*), while others turned to r-tensing (cf. (5)) (9b*ii*); in both cases, though, the results added to the -re majority group. Under this scenario, an interesting case remains to be studied. How is the RR'R sequence (e.g. CURRĔRE 'to run') going to be repaired if no cluster [rɾ] is possible (neither intersyllabically, *[r.ɾ], nor intrasyllabically, *[.rɾ]) and atonic -er verbs are waived? The same question arises in varieties of southern Valencian Catalan where the non-existence of atonic -er verbs is also strict due to the spread of the consonant-insertion solution (cf. (4)) (9c). The idea put forward in this work is that, when phonology cannot fix the problematic resulting form, morphology can come at play and repair the ill-formed form by changing the inflectional class. In the case under study, the hypothesis is confirmed by the shift of CURRĔRE from class II to class III, with a paradigm with a tonic -ir infinitive (corrir) and the presence of -i- in the future and conditional tenses (cf. future: corriré, corriràs…; conditional: corriria, corriries…), solving the problems resulting from the loss of the original internal short vowel.

      One remark is necessary here. In the case examined so far, there is little data and hence there exists the risk of overgeneralizing certain facts or, to put it in Corbett's (2008) words, maybe "we're asking more (more sophisticated) questions of a limited body of material" than we should. A close observation of other instances of change of conjugation provides, however, further support to our claim. To be considered first are other verbs, in addition to CURRĔRE > corrir 'to run', which followed the morphological shift from class II to class III in the variety of Catalan spoken in Alghero: TEMĔRE > temir 'to fear', PLANGĔRE > planyir 'to pity', VINCĔRE > vencir 'to defeat', CRESCĔRE > creixir 'to grow'.[5] The same change is also found in other varieties sporadically: TORQUĔRE > **TORCĔRE > torcir

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[5] In Alghero Catalan, some class II verbs without phonological problems have also been attracted to class III; e.g. VIVĔRE > viure~vivir 'to live' (viure in other dialects), SCRIBĔRE > escriure~escrivir 'to write' (escriure in other

'to bend' (north-eastern central Catalan, in alternation with *torçre*), FUGĔRE > *fugir* 'to flee' (standard), CONSUĔRE > *cosir* 'to sew' (standard), TREMĔRE > *tremir* 'to tremble' (western varieties, in alternation with *tremolar*). Additionally, a few class II problematic verbs moved to class I; e.g. TORQUĔRE > **TORCĔRE > *torçar* 'to bend' (standard, in alternation with *tòrcer*), TORRĔRE > *torrar* 'to toast' (standard), and the interesting case of TREMĔRE → TREMULĀRE (vulgar Latin) > *tremolar* 'to tremble' (standard), with an additional lexical change. The table in (9) summarizes the different results of -ĔRE verbs that we have checked so far in varieties of Catalan.

(9)   Evolution of -ĔRE verbs in varieties of Catalan:

	-*re* (class II majority group)				-*er* (class II minority group)	-*ir* (class III) -*ar* (class I)
	-Ĕ- loss without problems	-Ĕ- loss with problems				
		Phonological repairs				Morphological repair
		C-insertion	R-tensing	New onsets	Blocking of -Ĕ- loss	Change of class
a. Standard	√	√			√	√
b. North-east. central: Variety (i)	√	√		√		√
Variety (ii)	√		√	√		√
c. South. Valencian	√	√				√
d. Alghero	√				√	√

There are few examples of class change, but many of them conspire to avoid the atonic -*er* group through the shift of conjugation. There is little data, but in our view it is not by chance that multiple dialectal variants are just found in verbs whose regular evolution posed problems. Traditional historical grammars considered all previous cases of migration to other conjugations as instances of random analogy, because they did not see any pattern of behavior (cf., e.g., Badia i Margarit 1951, Moll 1952). We argue, instead, that in the cases under study the change was motivated by phonotactic problems and hence the shift is not to be considered a random change.[6]

Finally in this section, mention must be made of an additional controversial characteristic of class II verbs. Many class II verbs show velar forms with *c/g(u)* (/g/), which recurrently appear in the following inflected forms (the examples in (10) are from the *beure*, 'to drink', paradigm in standard Catalan):

(10)   1 PI: bec   vs.   2-6 PI: beus/beu/bevem/beveu/beuen
       3, 4, 6 Imp: begu-i/em/in   vs.   2, 5 Imp: beu/beveu
       Part: beg-ut   vs.   Inf: beure; Ger: bevent
       PS: begu-i/is/i/em/eu/in
       IS: begu-és/essis/és/éssim/éssiu/essin

Historically, the velar segment originated either in the preterit root from the Latin perfect -*u*- affix (e.g. POTUIT > *pog* 's/he could' in old Catalan) or in forms of the present tense from Latin roots ending in a velar stop (e.g. DICO > *dic* 'I say'). These two elements later extended to other verbal forms and created, among other things, contrasts between certain forms, e.g. indicative – subjunctive in *podem – puguem*

'we can (PI) – we can (PS)'; 1 – 3 in *dic – diu* 'I say – s/he says' (cf. Wheeler 1984, 1985; Pérez Saldanya 1998).

From a synchronic perspective, the grammatical nature of this velar segment is debatable and, because of that, it has been analyzed in different ways. The most traditional view is to consider that the velar segment is part of the root, i.e. it is the final consonant of one of the allomorphs of the root (cf., among others, Roca Pons 1968, Mascaró 1986, Badia i Margarit 1994, Wheeler 2002). An alternative view is to analyze this segment as an independent affix (cf., among others, Malkiel 1974, Viaplana 1984). According to some scholars, it is just an infix with no meaning associated to it, which overtly separates the root from the inflectional affixes (Malkiel 1974, Wheeler 1979), or empty morph (DeCesaris 1998). According to other scholars, the velar segment can be part of different allomorphs depending on the morphosyntactic category that it marks in each case (Wheeler 1993, Pérez Saldanya 1996). Under this view, for example, /i/ and /gi/ are allomorphs of the morpheme 'present subjunctive' because there the velar consonant reinforces the morphosyntactic category 'subjunctive', cf. *dorm – dorm-i* 's/he sleeps (PI) – s/he sleep (PS)' but *beu – be-gui* 's/he drinks (PI) – s/he drink (PS)', as well as /o/ (/og/ in certain varieties) and /g/ are allomorphs of the morpheme 'first person singular' in the present indicative tense because there the velar marks (or reinforces) the morphosyntactic category 'person', cf. *dorm – dorm-o* (dialectal variants: *dorm-oc*, *dorm-c*) 's/he sleeps – I sleep', *beu – bec* 's/he drinks – I drink'. Finally, other scholars analyze this velar segment as a thematic affix, like *-eix-* in subclass IIIa, which splits class II into two subclasses: subclass IIa, without post-root affix, and subclass IIb, with post-root velar affix (Viaplana 1984, 1986, 1996, 2005; Clua 1998; Lloret & Viaplana 1999; Perea 2000, 2002; Querol 2006, in progress, among others).[7] There are good arguments in the literature pro and contra the aforementioned positions. In this paper, we will follow the thematic interpretation, which is well supported by the systematic distribution of the velar segment (interdialectally) and its regular expansion (in all dialects), spreading to additional verbal forms (e.g. infinitive and gerund: *poguer* 'to be able to', instead of *poder*, and *poguent* 'being able to', instead of *podent*) and to additional verbs (e.g. Valencian Catalan, where all class II verbs show the velar segment) (cf., among others, Lloret & Viaplana 1999). Adding to previous arguments, we will show that the conjugational system of Alghero Catalan provides independent evidence for this interpretation. Finally, the analysis of the conjugational system of Alghero Catalan will also provide evidence for a systematic case of phonologically grounded morphological change.

3. The verbal system of Alghero Catalan
3.1. The conjugations of Alghero Catalan

Alghero Catalan has the three conjugations presented in section 2: class I (e.g. *cantar* 'to sing'); class II (subclass IIa, without post-root affix, e.g. *perdre* 'to lose' and *conèixer* 'to know', and subclass IIb, with the post-root velar affix *-c/g(u)-* /g/, e.g. *beure* 'to drink'), and class III (subclass IIIa, with the post-root affix *-eix-* /ˈeʃ/, e.g. *servir* 'to serve', and subclass IIIb, without post-root affix, e.g. *dormir* 'to sleep', with the shape *romir* in Alghero Catalan due to metathesis and assimilation). Additionally, Alghero Catalan presents an innovation with respect to all other varieties of Catalan: it has verbs with post-root affixes in class I as well. In particular, class I displays a subclass with the velar affix *-c/g(u)-* (subclass Ib: /g/, e.g. *canviar* 'to change') and a subclass with a palatal affix *-eig/etj-* (subclass Ic: /ˈedʒ/, e.g. *odiar* 'to hate') (Rovira Bidegain 1993, Lloret & Viaplana 1999). The overall verbal system of Alghero Catalan is presented in (11).[8]

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[7] In addition to the aforementioned interpretations, Hualde (1992) analyzes this velar segment as a lexically marked epenthetic consonant.

[8] An anonymous reviewer points out that the analysis put forth in this paper seems closer to a multiple inheritance hierarchy of inflectional classes than to a simple hierarchy like the one presented in (11) (where classes I, II, and III merely divide into Ia, Ib, Ic; IIa, IIb, and IIIa, IIIb). In the former view, there will be two dimensions, i.e. the infinitive vowel (*a* for class I; *Ø~e* for class II, and *i* for class III) and the post-root affix (none, /g/, /ˈedʒ/, and /ˈeʃ/), combining among them; in this sense, the transitions observed would result in changing only one value on one dimension. We leave this interesting issue open to further research.

(11) a. Class I:
         Subclass Ia (without post-root affix):   cantar 'to sing'
         Subclass Ib (with post-root velar affix /g/):   canviar 'to change'
         Subclass Ic (with post-root palatal affix /ˈedʒ/):   odiar 'to hate'
      b. Class II:
         Subclass IIa (without post-root affix):   perdre 'to lose', conèixer 'to know'
         Subclass IIb (with post-root velar affix /g/):   beure 'to drink'
      c. Class III:
         Subclass IIIa (with post-root palatal affix /ˈeʃ/):   servir 'to serve'
         Subclass IIIb (without post-root affix):   dormir (> romir) 'to sleep'

There are two issues to be discussed with respect to the new subclasses that appear in class I, concerning the shape and distribution of the affixes, firstly, and the distribution of verbs over the subclasses, secondly. As for the velar segment in subclass Ib, its shape is exactly like that of the post-root affix that appears in subclass IIb (i.e. /g/) and its distribution is also identical except in the case of the participle (highlighted in italics below); cf. (12).

(12) Distribution of the post-root velar affix in Alghero Catalan (IIb: *beure*, Ib: *canviar*):
      1 PI: be-c
                  canvi-c
      PS: be-gu-i/is/i/em/eu/in   (~ 4, 5 PS: bei-em/eu)
                  canvi-gu- i/is/i/em/eu/in   (~ 4, 5 PS: canvi-em/eu)
      IS: be-gu-essi/essis/essi/éssim/éssiu/essin
                  canvi-gu-essi/essis/essi/éssim/éssiu/essin
      3, 6 Imp: be-gu-i/in
                  canvi-gu-i/in
      Part: be-g-ut
                  canvi-at
      Fut: be-gu-eré/eràs/erà/erem/ereu/eran
                  canvi-gu/aré/aràs/arà/arem/areu/aran
      Cond: be-gu-eriva/erives/eriva/erívem/eríveu/eriven
                  canvi-gu-ariva/arives/ariva/arívem/aríveu/ariven

    As for the palatal segment in subclass Ic, its distribution is completely identical to that of subclass IIIa, but its shape is different: /ˈedʒ/ in subclass Ic, /ˈeʃ/ in subclass IIIa; cf. (13).

(13) Distribution of the post-root palatal affix in Alghero Catalan (IIIa: *servir*, Ic: *odiar*):
      1, 2, 3, 6 PI: serv-'eix- Ø/es/Ø/en
                       odi-'etj-Ø/es/a/en
      1, 2, 3, 6 PS: serv-'eix-i/is/i/in
                       odi-'etj-i/is/i/in
      2, 3, 6 Imp: serv-'eix-Ø/i/in
                       odi-'etj-a/i/in

The shape of the palatal segment of subclass Ic is different from that of subclass IIIa because their origin is distinct: -*eix*- (/ˈeʃ/ in Alghero Catalan), present in all Catalan dialects with different dialectal variants (-*ix*-, -*esc*-, -*isc*-), derives –as said– from the Latin affix -ESC-, while the specifically Algherese affix /ˈedʒ/ has been imported from Sassarese (an essentially Tuscan dialect with affinities with Sardinian), from the Latin verbs in -IDIARE. The affix derived from -IDIARE is tonic, like the one derived from -ESC-, and occurs with different variants in dialects of Italy to regularize verb stress patterns, that is, it has the same function as the palatal segment -*eix*- in subclass IIIa. For example, in Abruzzo and Molise the affix derived from -IDIARE appears in 1, 2, 3, 6 PI forms (e.g. [lakɾəˈmɛjjə] 's/he weeps') (Hastings 2005) and in Corsica in 1 PI forms (e.g. [telefuˈnɛɟu] 'I phone') (Dalbera-Stefanaggi 2005), and in both cases the presence of the affix homogenizes the stress pattern of the

present tense by maintaining atonic the roots throughout the paradigm. In short, the form of the Algherese /ˈedʒ/ affix is Sassarese, but its distribution follows the Catalan path because it regularizes the stress pattern according to the Catalan verbal paradigm.

The final point to be discussed concerns the distribution of class I verbs over the subclasses with affixes. The verbs listed in the literature for subclass Ib (with /g/ affix) are the following: *assetiar* 'to arrange', *batiar* 'to baptise', *canviar* 'to change', *copiar* 'to copy', *criar* 'to create', *enrabiar* 'to annoy', *estudiar* 'to study', *fiar* 'to entrust', *somiar* 'to dream', *triar* 'to choose', and *pouar* 'to draw water' (Scala 2003: 51). The verbs listed in subclass Ic (with /ˈedʒ/ affix) are the following: *animar* 'to animate', *arruiar* 'to waste', *atuar* 'to take care', *augurar* 'to predict', *considerar* 'to consider', *criticar* 'to criticize', *darriar* 'to move back', *dimenticar* 'to forget', *educar* 'to educate', *eliminar* 'to eliminate', *esperdeciar* 'to waste', *estroniar* 'to sneeze', *esvariar* 'to be delirious', *fusilar* 'to shoot down', *limitar* 'to limit', *nadar* 'to swim', *obligar* 'to oblige', *odiar* 'to hate', *ocupar* 'to occupy', *preocupar* 'to worry', *pronunciar* 'to pronounce', *restaurar* 'to restore', *senyalar* 'to mark', *telefonar* 'to phone', and *variar* 'to vary' (Bosch 2002: 154, Scala 2003: 52-53). Bosch and Scala point out that the verbs that belong to subclass Ic are loans from Sasserese or Italian and verbs from Catalan not commonly used; no remark is done with respect to subclass Ib verbs. An additional fact highlighted by Lloret (2002a) from the verbs in the previous lists is that class I verbs whose root ends in a vowel belong to subclasses Ib or Ic. The point emphasized by this author is that, if these verbs inflected in subclass Ia, they would display ill-formed 1 PI forms because they would superficially end in a root unstressed vowel, which, as we will next argue (see §3.2), is an undesirable form in Catalan (e.g. *canvi* 'I change' or *odi* 'I hate', with the 'zero' regular inflectional 1 PI ending of Alghero Catalan, instead of *canvi-c* or *odi-eig*, with a final consonant provided by the post-root affixes). On these lines, Lloret (2002a) puts forth the idea that the distribution of verbs over subclasses Ib and Ic is a means to repair such situations.[9] Hence, subclass distribution will be predictable from the phonological shape of the roots. The final purpose of this work is to further ground this claim with a larger set of data; but, before turning to new data, for the sake of the argumentation it is of interest to first briefly overview some generalizations on the shape of Catalan words.

3.2. On the shape of Catalan words

In Catalan, canonical roots end in consonant, but there are a few roots ending in a vowel (cf. Pérez Saldanya 1998). Words may end up surfacing with a final unstressed vowel due to inflectional or derivational affixing (e.g. *cas-a* 'house', where *-a* is a gender morph of the feminine gender; *oss-i* 'osseous', where *-i* is an adjectival derivational suffix). However, inflected words surfacing with a final unstressed root vowel due to 'zero' affixing tend to be repaired through the addition of a consonant. In current speech, for example, *geni* becomes *gèni*[t] 'temper'; *premi*, *prèmi*[t] 'prize'; *gremi*, *grèmi*[t] 'guild'…. (cf. Bibiloni 2002: 284 and, for Alghero Catalan, Scala 2003: 31); but *oss-i* does not become *òss-i*[t].[10]

In nominal morphology, the common repair is purely phonological in all varieties, since, as illustrated above, nominals add an epenthetic consonant. A phonological solution is also found in the verbal morphology of Balearic Catalan when inflected forms arise with final unstressed root vowels due to 'zero' affixation. That is, Balearic, which has maintained the old 'zero' ending in 1 PI forms like

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[9] Lloret (2002a) further highlights the fact that the verb *restaurar* 'to restore', with a root ending in a glide followed by a sonorant consonant (i.e. /resˈtawɾ/-), which is another unacceptable surface ending in Catalan (cf. Wheeler 1987, 2005: §8.3; Lloret 2002b), is also inflected in a subclass with a post-root affix; e.g. 1 PS: *restaur-eig* (subclass Ic), and not *restaur* (subclass Ia).

[10] The tendency of words to end in a consonant is grounded psycholinguistically. In Optimality Theory, this is captured by the constraint FINAL-C ("Every prosodic word ends in a consonant", McCarthy & Prince 1994), which is used in Bonet & Lloret (2005) to justify the surface form of certain clitic groups in Catalan. These authors also mention the role of such a constraint in the nominals mentioned above (cf. p. 58: n. 19). Under this view, words ending in inflectional vowels do not add a consonant to avoid variance in inflectional endings, since alternation in inflectional marks is strongly disfavored in order not to interfere with the paradigmatic information the inflectional affixes bear (cf. Burzio 2000; Lloret 2002a, 2003).

Alghero Catalan (e.g. *cant* 'I sing' in Alghero and Balearic Catalan vs. *cant-o/e/i* 'I sing' in other varieties of Catalan), inserts an epenthetic glide in 1 PI forms of vowel-ending roots (1 PI: *canvi*[j] 'I change', *odi*[j] 'I hate', *cre*[j] 'I create', *continu*[w] 'I continue'), which contrast with the inflected forms surfacing with a final unstressed vowel affix (e.g. 1 PS -/i/ morph: *canvi*-[i] 'I change (PS)', *odi*-[i] 'I hate (PS), *cre*-[i] 'I create (PS)', *continu*-[i] 'I continue (PS)'). Alghero Catalan, though, turned –in our view– to a morphological solution and moved these verbs to subclasses with affixes, whether subclass Ib (as in *canvi-c* 'I change', *cri-c* 'I create') or subclass Ic (as in *odi-eig* 'I hate', *continu-eig* 'I continue').[11] The affiliation to subclasses Ib or Ic affects, of course, the whole paradigm of the verbs, which regularly display the affixes through their paradigm according to the distribution presented in (12), for the velar affix, and in (13), for the palatal affix.

3.3. More on vowel-ending verbal roots in Alghero Catalan

The final goal of the paper is to confirm the hypothesis that all verbs with roots ending in a vowel display a post-root affix and inflect according to these affix subclasses, and to investigate if one of the two subclasses with affixes is more general than the other, or unmarked. For this purpose, a specific questionnaire was elaborated with the approximately 150 verbs that have roots that could end in a vowel in Catalan, according to the information present in Mascaró & Rafel's (1990) reversed dictionary of standard Catalan, Sanna's (1998) dictionary on Alghero Catalan, Bosch's (2002) and Scala's (2003) studies on Alghero Catalan, and spontaneous information provided by the speakers while they were interviewed.[12] Two native male speakers in their 40s were interviewed and an additional informant was used to validate disagreeing answers.[13]

A total amount of 116 verbs with roots in final vowel were finally elicited; the remaining verbs were discarded because they were considered unknown (or not used at all in Alghero Catalan) by our informants. All the elicited verbs were assigned, without hesitation, to the subclasses with affixes by the informants. By far the largest number was assigned to subclass Ic (with the palatal post-root affix). To be more specific, only 13 verbs were assigned to subclass Ib, cf. (14), from which 11 were already mentioned in Bosch's and Scala's previously mentioned lists (these verbs are highlighted in italics below). One of the verbs present in these lists, *enrabiar* 'to annoy' (cf. Scala 2003: 51), was characterized as not commonly used by the informants; one of the informants used instead a different lexical item, inflected in subclass Ic: *agueiar* (1 PI: *agueieig*).

(14)   a.   Verbs in -iar (subclass Ib):
- *assetiar* 'to arrange', *batiar* 'to baptise', *canviar* 'to change', *copiar* 'to copy', *criar* 'to create', *estudiar* 'to study', *fiar* 'to entrust', *somiar* 'to dream', *triar* 'to choose' enviar 'to send', estropiar 'to damage'
- Not commonly used:
  enrabiar (agueiar: subclass Ic) 'to annoy'

      b.   Verbs in -uar (subclass Ib):
- pouar ([pu.wá] > [pu.á]) 'to draw water' (1PI: [púwk] > [púk])

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[11] Interestingly enough, the noun *api* 'celery', which adds a consonant in most dialects, *àpi*[t], has a different gender mark in Alghero Catalan, i.e. the masculine *-u* allomorph instead of the regular 'zero' (masculine) allomorph: *àpi-u*. Scattered data again, but moving towards the same direction: here, the use of a different allomorph (i.e. *-u*, which is more usual in Alghero Catalan than in other dialects for independent reasons) emerges in a context where the regular grammar (i.e. the use of the regular 'zero' allomorph) would end up creating a problematic surface form.

[12] The list includes roots ending in one vowel (e.g. *canvi-* 'change', *odi-* 'hate') as well as a few roots ending in 'vowel+i/u' sequences, which, depending on the phonological analysis, could be interpreted as 'vowel-glide' sequences (e.g. *arrui-* 'waste', *adau-* 'cut in the shape of dice').

[13] More information on the interview criteria used by the *COD* (*Corpus Oral Dialectal*) group working in the project HUM2007-65531/FILO appears in Lloret & Perea (2002), Clua & Lloret (2006), and Viaplana *et al.* (2007). See also <http://www.ub.edu/lincat>.

99 verbs were assigned to subclass Ic, cf. (15), from which 10 already appeared in previous lists (in italics below). One of the verbs present in previous lists, *pronunciar* 'to pronounce' (cf. Scala 2003: 53), was preferably substituted by *pronunçar*, with a consonant-ending root and, accordingly, it was inflected in subclass Ia (without post-root affix); e.g. 1 PI: *pronunç*. The same happened to another verb of our list with the same shape, *denunciar* 'to accuse', with the preferred form *denunçar* (e.g. 1 PI: *denunç*). 34 more verbs of this group were considered not to be commonly used (alternatives provided by the informants appear in parenthesis below).

(15)   a.   Verbs in -iar (subclass Ic):
- *arruiar* 'to waste', *atuar* 'to take care', *darriar* 'to move back', *esperdeciar* 'to waste', *estroniar* 'to sneeze', *esvariar* 'to be delirious', *odiar* 'to hate', *variar* 'to vary'
  afiliar 'to affiliate', aliar 'to ally', ampliar 'to enlarge', anoiar-se 'to be bored', anunciar 'to announce', apreciar 'to value', apropiar 'to appropriate', avariar 'to damage', calumniar 'to slander', contrariar 'to oppose', desmaiar-se 'to faint', distanciar 'to space out', divorciar 'to divorce', domiciliar 'to domicile', elogiar 'to praise', encipriar 'to cover with *cípria* (a white powder used to whiten the skin)', endimoniar 'to bewitch', engabiar 'to cage up', enguiriar 'to surround', enunciar 'to enunciate', envidiar 'to envy', esfuriar 'to vent', esmaniar 'to desire', espiar 'to spy', esquirriar 'to slip', estipendiar 'to pay a stipend to', evidenciar 'to prove', exiliar 'to exile', expatriar 'to expatriate', expiar 'to expiate', expropiar 'to expropriate', extasiar 'to enrapture', fotocopiar 'to photocopy', gloriar 'to glorify', gonfiar 'to blow up', humiliar 'to humiliate', industriar 'to industrialize', iniciar 'to initiate', llicenciar 'to license', oliar 'to oil', premiar 'to give a prize', privilegiar 'to give privileges', propiciar 'to favor', reconciliar 'to reconcile', remediar 'to remedy', rengraciar 'to thank', sentenciar 'to sentence', testimoniar 'to show'
- Not commonly used:
  agueiar 'to annoy', aixiriar 'to clean a boat', ajamboliar 'to bother', amnistiar 'to amnesty', arriar 'to move forward', auxiliar 'to help', contagiar (cundir) 'to trasmit', denunciar (denunçar) 'to accuse', despropiar 'to misappropriate', encomiar 'to praise', enfuriar-se 'to get furious', enjoiar 'to adorn with jewels', espoliar 'to rob', foliar 'to foliate', incendiar (brujar, posar foc) 'to set on fire', insidiar 'to be insidious', inventariar 'to inventory', negociar 'to trade', obsequiar 'to give a present', parodiar 'to parody', *pronunciar* (pronunçar) 'to pronounce', radiar 'to radiate'

      b.   Verbs in -uar (subclass Ic):
- *atuar* 'to take care'
  continuar 'to continue', evacuar 'to evacuate', habituar 'to accustom', insinuar 'to insinuate', situar 'to place', tatuar 'to tattoo'
- Not commonly used:
  adauar 'to cut in the shape of dice', ansinuar 'to insinuate', atenuar 'to attenuate', avaluar 'to evaluate', (en)creuar 'to cross', desnuar 'to untie', efectuar 'to effect', enalguar 'to flood', escuar 'to tail out', exceptuar 'to except', graduar 'to divide, measure in degrees', individuar 'to individualize', perpetuar 'to perpetuate', puntuar 'to score'

Finally, 2 verbs were assigned to different affix subclasses depending on the informant, cf. (16a), and 2 more verbs were indistinctly assigned to the two affix subclasses by all informants, cf. (16b).

(16)   a.   enjuriar   (1 PI: enjuric/enjurieig)   'to insult'
               judiciar   (1 PI: judic/judiqueig)   'to judge'
      b.   ajuar   (1 PI: ajuc~ajueig)   'to yoke'
               atrofiar   (1 PI: atrofic~atrofieig) 'to atrophy'

The table in (17) summarizes the results:

(17) Distribution of class I verbal roots ending in vowel:

	Ia 0 verbs	Ib (/g/) 13 verbs		Ic (/ˈedʒ/) 99 verbs		Variation 4 verbs
		usual	uncommon	usual	uncommon	usual
-iar (93)	0	11	1	56	22	3
-uar (23)	0	1	0	7	14	1

From the previous data, we conclude that all verbs whose root ends in a vowel are predictably assigned to subclasses with post-root affixes. A small group is lexically assigned to subclass Ib; most of them are instead assigned to subclass Ic by default. Other external factors (e.g. loan from Sassarese) may play a role in the assignment of lexical items to subclass Ic, but without doubt the shape of the roots (an internal factor) is also decisive.

4. Conclusion

This investigation has highlighted the fact that morphological repairs are used as an alternative to phonological repairs to fix phonological problems that arise during the evolution of languages. Morphological changes are not as predictable as phonological changes; however, looking back over a change one should attempt to make sense of it without resorting –when possible– to exceptional mechanisms. Along these lines, this paper has contributed to the idea that morphological changes involving shifts in inflectional class can emerge as a means to repair phonology. Changes in inflectional class sometimes come out as a last resort strategy to fix a phonological problem (e.g. CURRĔRE > *corrir* 'to run' in dialects of Catalan without atonic *-er* verbs). In other cases they occur as a sporadic change, but the migration can nevertheless be triggered by a phonological problem (e.g. CONSUĔRE > *cosir* 'to sew'). Yet in some cases the assignment to a specific inflectional class can be fully predicted from the phonological shape of the lexical items (e.g. the distribution of verbs with vowel-ending roots over subclasses with affixes in Alghero Catalan). In all the cases studied, unless we grant the original phonological problems, the fact that just these verbs changed their conjugational class (or subclass) remains to be seen as a fortuitous detail.

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