"THE TRUE MYSTERY OF THE WORLD IS THE VISIBLE, NOT THE INVISIBLE": SOME REFLECTIONS ON THE VERBAL MORPHOPHONOLOGY OF BALEARIC CATALAN*

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Abstract: In Balearic Catalan, first person singular present indicative verb forms do not show an explicit inflectional morph, as do most dialects of Catalan. Among these forms, we find final consonant clusters that involve a violation of the sonority constraint according to which the degree of sonority between the segments of a syllable must be decreasing in relation to the nucleus. The same clusters in nominal inflection are resolved by means of a process of vowel epenthesis. The exceptional phonological behavior of these consonant clusters is not circumscribed to sonority factors, but also concerns the regular phonology of the dialect, either because a general process fails to apply, or because a process applies though the conditions that make it applicable are not visible. Previous approaches have analyzed these final consonant clusters, not as codas, but as onsets of empty nuclei: this exceptional syllabic status would, according to these proposals, throw some light on this peculiar phonological behavior. In this paper we investigate the theoretical problems deriving from approaches of this kind and demonstrate that they are better analyzed by considering paradigmatic effects, such as uniformity and contrast between the members of a morphological paradigm. Furthermore, we critically review the different theories developed in Optimality Theory in order to account for surface resemblances and dissimilarities between the members of a paradigm and introduce a detailed formalization of PARADIGMATIC CONTRAST.

Keywords: Catalan verbal morphophonology, Optimality Theory, Paradigmatic Contrast (formalization), Optimal Paradigms, Anti-Faithfulness constraints

1. Introduction

Balearic is the Catalan dialect spoken in the Balearic Islands (situated in the Western Mediterranean) and it is composed by three subdialects, Majorcan, Minorcan and Eivissan Catalan (henceforth, "MaC, MiC, EC") (see Fig. 1 and Fig. 2). Balearic Catalan is, along with Alguerese Catalan, the most differentiated dialect of Catalan, due to the isolation that the inhabitants have experienced. In this paper we analyze one of this dialect's most distinctive features: the behavior of the first person singular present indicative verb forms (henceforth "1sg.pi"). The absence of an explicit morph for these morphological properties explains the peculiar phonological behavior of these verb forms, either because a general process of the language underapplies, or because a process applies though the conditions that make it applicable are not surface true.

Previous approaches have analyzed these final consonant clusters, not as codas, but as onsets of empty nuclei: it is this exceptional syllabic status that explains the unusual phonological behavior mentioned. In this paper, we investigate the problems deriving from an account of this kind and demonstrate that these verb forms are better analyzed by considering paradigmatic effects, such as uniformity and contrast between the members of a morphological paradigm, along the lines of my previous studies (Pons 2002a;b) and Lloret (2003; 2004).

This paper is organized as follows: in section **2**, the special behavior of these verb forms is outlined: section **2.1** deals with cases of underapplication and section **2.2** with cases of overapplication; section **3** critically reviews previous accounts of these verb forms; finally, section **4** introduces a novel approach to these verb forms based on paradigm contrast and uniformity, following Kenstowicz (2005); Rebrus–Törkenczy (2005); McCarthy (2005); Pons (2002a;b); and Lloret (2003; 2004). This section also critically outlines the main characteristics of these proposals and attempts a formalization of the PARADIGMATIC CONTRAST constraint within the general theory of paradigms in Optimality Theory.
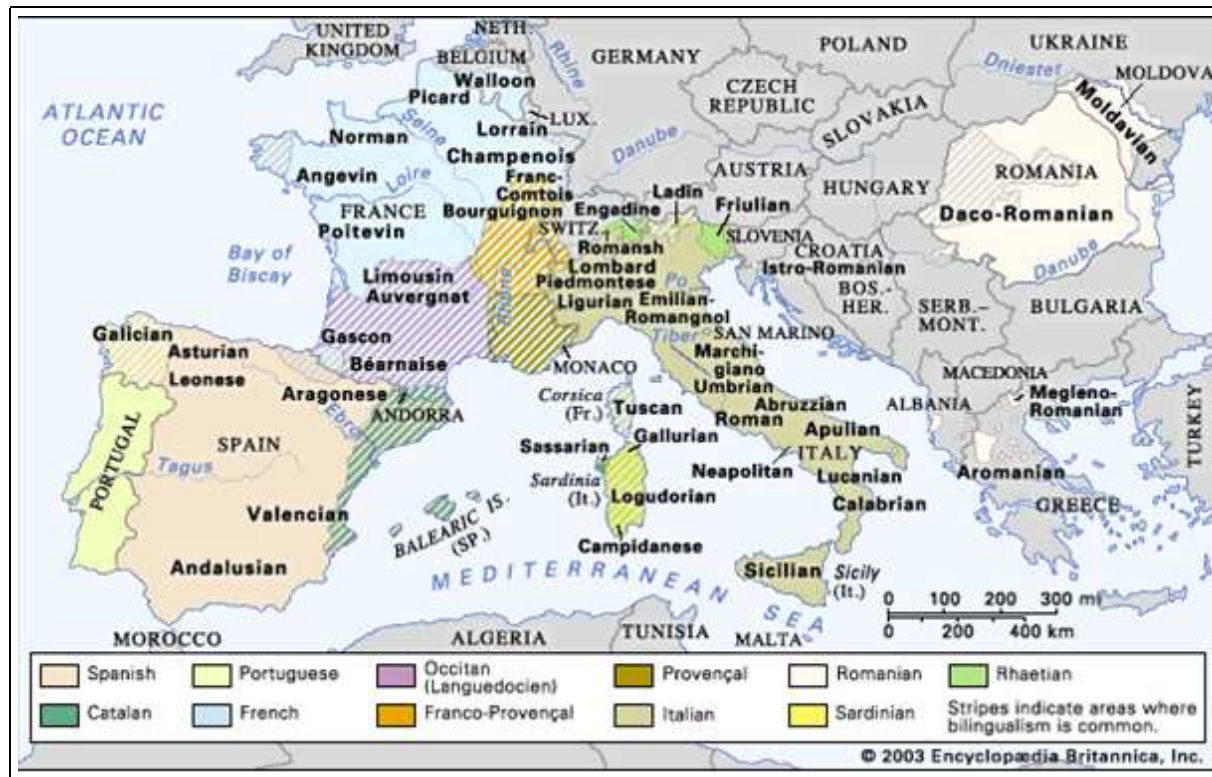
Fig. 1

Balearic in the context of European Romance languages
(Adapted from *Encyclopaedia Britannica*)
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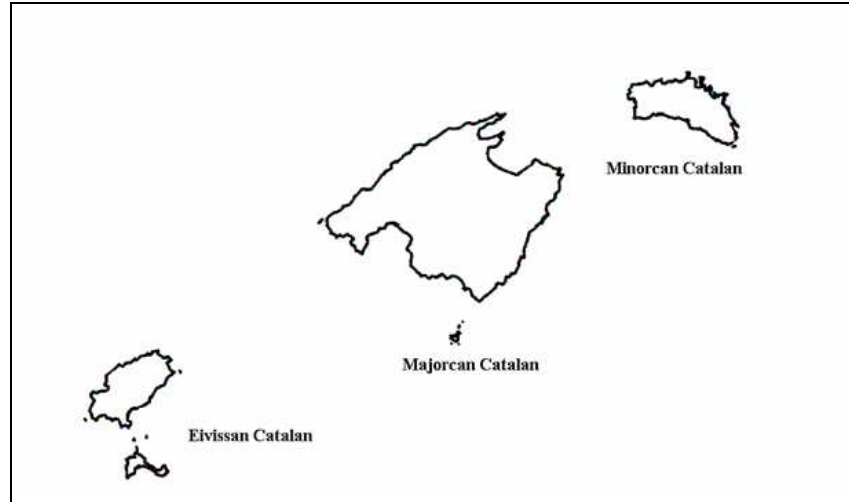Used with permission.

Fig. 2

Balearic Catalan dialects (adapted from Perea 2001)

2. The mystery

In Balearic Catalan, 1sg.pi verb forms do not show an explicit inflectional morph, unlike most dialects of Catalan, in which the morphological properties of the present indicative, in the case of the first person singular, are represented by the morphs /u/, /o/, /e/ or /i/. This divergent morphological structure is illustrated in (1).

(1)

Ortographic form and translation		Balearic	Central	North-Western	Southern	North-Eastern
canto	'(I) sing'	['kaṇt]	['kaṇtu]	['kaṇto]	['kaṇte]∼['kaṇto]	['kaṇti(k)]
temo	'(I) worry'	['tem]	['temu]	['temo]	['tem]∼['temk]	['temi]∼['temu(k)]
sento	'(I) hear'	['seṇt]	['seṇtu]	['seṇto]	['seṇt]∼['seŋk]	['seṇti]
pateixo	'(I) suffer'	[pə'təsk]	[pə'tɛʃu]	[pa'tiʃo]	[pa'tiʃo]∼[pa'tiʃk]	[pə'tɛʃi]

These verb forms exhibit a particular behavior with respect to the regular phonological behavior of Balearic Catalan: in some cases, a general phonological process of the variety fails to apply although the context that makes it applicable is met (see **2.1**) and, in some other cases, a phonological process applies even though the conditions that make it applicable are not surface true (see **2.2**).

2.1. Underapplication

2.1.1. Underapplication of epenthesis in Balearic Catalan

In Balearic Catalan, as in other Catalan varieties, final consonant clusters made up by segments with a flat or rising sonority are repaired via epenthesis (2a–b).[1]

(2)   Balearic Catalan

    (a)   Final clusters with a flat sonority (nominal inflection)

       pacte   /pakt/∼/patt/[2]   ['pat.tə]   'pact'
       (cf. *pact-isme* [pət.'tiz.mə] 'pactism')
       apte   /apt/∼/att/   ['at.tə]   'apt'
       (cf. *apt-itud* [ət.ti.'tut] 'aptitude')
       alumne   /əlumn/∼/əlunn/   [ə.'lun.nə]   'pupil'
       (cf. *alumn-at* [ə.lun.'nat] 'students')
       solemne   /sulemn/∼/sulenn/   [su.'len.nə]   'solemn'
       (cf. *solemn-itat* [su.lən.ni.'tat] 'solemnity')

    (b)   Final clusters with a rising sonority (nominal inflection)

       magre   /maɡɾ/   ['ma.ɣɾə]   'thin'
       (cf. *magr-íssim* [mə.'ɣɾi.sim] 'thin *superl.*')
       timbre   /timbɾ/   ['tim.bɾə]   'bell'
       (cf. *timbr-ot* [tim.'bɾɔt] 'big bell')
       centre   /sentɾ/   ['sen̩.tɾə]   'center'
       (cf. *centr-al* [sən̩.'tɾal] 'central')
       mascle   /maskl/   ['mas.klə]   'male'
       (cf. *mascl-isme* [məs.'kliz.mə] 'male chauvinism')
       mestre   /mɛstɾ/   ['mɛs.tɾə]   'teacher'
       (cf. *mestr-atge* [məs.'tɾad.ʤə] 'leadership')

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[1] The existence of epenthesis in non-verbal forms is a well-known assumption in the theoretical studies devoted to Catalan phonology (see, for instance, Wheeler 1987 and Bonet–Lloret 1998).

[2] According to the Richness of the Base hypothesis (Prince–Smolensky 1993), there are no language restrictions on underlying representations, so that for a form such as ['pattə], in which there is not empirical evidence of the underlying place specification of the first stop segment, it can be postulated either an underlying form /pakt/ or /patt/. The ranking constraint is ultimately responsible for the selection of the actual form in a language. This hypothesis is assumed throughout the paper, and it is particularly relevant to understand the cases in **2.2.1.**

The process, however, underapplies in the 1sg.pi verb forms (3a–b); that is, final consonant clusters with a flat or rising sonority are not repaired in these cases.

(3)   Balearic Catalan[3]

  (a)   Final clusters with a flat sonority (1sg.pi)

  afect   /əfɛkt/   [ə.ˈfɛtt] (MaC&MiC)
          ∼/əfɛtt/   ∼ [ə.ˈfɛkt] (EC)   '(I) affect'
  respect   /rəspɛkt/   [rəs.ˈpɛtt] (MaC&MiC)
          ∼/rəspɛtt/   ∼[rəs.ˈpɛkt] (EC)   '(I) respect'
  desvetl   /dəs##vətl/   [dəz.ˈvəll] (MaC&MiC)
          ∼/dəs##vəll/   ∼[dəz.ˈvəll] (EC)   '(I) awake'
  condemn /kundemn/   [kun̪.ˈdenn] (MaC&MiC)
          ∼/kundenn/   ∼[kun̪.ˈdemn] (EC)   '(I) condemn'

  (b)   Final clusters with a rising sonority (1sg.pi)

  penetr   /pənetɾ/   [pə.ˈnetɾ]   '(I) go through'
  alegr   /əlegɾ/   [ə.ˈlekɾ]   '(I) joy'
  obr   /ɔbɾ/   [ˈɔpɾ]   '(I) open'
  arregl   /ərregl/   [ə.ˈrekl]   '(I) fix'
  pobl   /pɔbl/   [ˈpɔpl]   '(I) populate'
  empr   /əmpɾ/∼/ənpɾ/   [ˈəmpɾ]   '(I) use'
  entr   /əntɾ/   [ˈən̪tɾ]   '(I) enter'
  sembr   /səmbɾ/∼/sənbɾ/   [ˈsəmpɾ]   '(I) sow'
  engendr   /ən##ʒɛndɾ/   [ən̪.ˈʒɛn̪tɾ] '(I) give rise to'
  sembl   /səmbl/∼/sənbl/   [ˈsəmpl]   '(I) seem'
  filtr   /filtɾ/   [ˈfil̪tɾ]   '(I) seep'
  mostr   /mɔstɾ/   [ˈmɔstɾ]   '(I) show'
  mescl   /məskl/   [ˈməskl]   '(I) blend'

In MaC and EC, this particular behavior is also found in the second and third person singular present indicative verb forms of the second and the third conjugation. In these cases, however, more variants are found: for instance, the presence of a vowel ([ə] or [i]) after the stem (see (4c), (4d), (5b)) is frequent (see **4.1** for more discussion on these forms).

(4)   (a)   Majorcan and Eivissan Catalan[4]

      corr   /korr/   [ˈkor]   '(I) run'
      corres /korr+z/ [ˈkors] '(you) run'
      corr   /korr/   [ˈkor]   '(he/she) runs'

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[3] See Appendix I for a comprehensive list of verbs exhibiting this behavior.

[4] According to Alcover–Moll (1929–1933) (*apud* Perea 2001), the towns exhibiting this behavior are Pollença, Alcúdia, Artà and Sant Mateu.

    (b) Majorcan and Eivissan Catalan[5]

        corr   /koɾɾk/   ['korc]∼['kork] '(I) run'
        corres /koɾɾ+z/ ['kors]   '(you) run'
        corr   /koɾɾ/   ['kor]   '(he/she) runs'

    (c) Eivissan Catalan[6]

        corr   /koɾɾk/   ['kork] '(I) run'
        corres /koɾɾ+z/ ['korəs] '(you) run'
        corre /koɾɾ/   ['korə] '(he/she) runs'

    (d) Majorcan Catalan[7]

        corr   /koɾɾ/   ['kor] '(I) run'
        corres /koɾɾ+z/ ['kors] '(you) run'
        corr   /koɾɾ/   ['korə] '(he/she) runs'

(5) (a) Majorcan Catalan (Binissalem)

        opr /ɔbɾ/   ['ɔpɾ]   '(I) open'
        obrs /ɔbɾ+z/ ['ɔpɾs]∼['ɔts] '(you) open'
        obr /ɔbɾ/   ['ɔpɾ]   '(he/she) opens'

    (b) Majorcan Catalan and Eivissan Catalan[8]

        opr /ɔbɾ/   ['ɔpɾ] '(I) open'
        obrs /ɔbɾ+z/ ['ɔbris] '(you) open'
        obr /ɔbɾ/   ['ɔβɾi] '(he/she) opens'

(6) Majorcan, Minorcan and Eivissan Catalan

   umpl   /unpl/∼/umpl/   ['umpl]   '(I) fill'
   umpls /unpl+z/∼/umpl+z/ ['umpls]∼['ums]∼['uns] '(you) fill'
   umpl   /unpl/∼/umpl/   ['umpl]   '(he/she) fills'

In Minorcan Catalan the presence of the vowel [ə] is always compulsory in the second and third person singular:

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[5] According to Alcover–Moll (1929–1933) (*apud* Perea 2001), the towns exhibiting this behavior are sa Pobla, Santa Margalida, Ariany, Son Cervera and Felanitx.

[6] According to Alcover–Moll (1929–1933) (*apud* Perea 2001), the towns exhibitng this behavior are Corona, Sant Jordi, Jesús, Eivissa, Sant Francesc de Formentera, Eivissa vila Marina and Eivissa vila Nord.

[7] According to Alcover–Moll (1929–1933) (*apud* Perea 2001), the towns exhibitng this behavior are Esporles and Sóller.

[8] According to Alcover–Moll (1929–1933) (*apud* Perea 2001), all Majorcan towns exhibit this behavior except for Binissalem.

(7)   Minorcan Catalan

    corr   /koɾɾ/   [ˈkor]   '(I) run'

    corres /koɾɾ+z/ [ˈkorəs] '(you) run'

    corre /koɾɾ/   [ˈkorə]   '(he/she) runs'

    obr   /ɔbɾ/   [ˈɔpɾ]   '(I) open'

    obres /ɔbɾ+z/   [ˈɔβrəs] '(you) open'

    obr   /ɔbɾ/   [ˈɔβrə] '(he/she) opens'

Catalan also avoids codas consisting of a glide plus a sonorant. 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 (8a). However, in Balearic Catalan it is possible to find 1sg.pi verb forms that end in one of these combinations of a glide plus sonorant (8b).

(8)   Balearic Catalan

    (a)   Nominal inflection

        retaule   /ɾətawl/   [ɾə.ˈtaw.lə]   'altarpiece'

        centaure /səntawɾ/ [sən̪.ˈtaw.ɾə] 'centaur'

        lliure   /ʎiwɾ/   [ˈʎiw.ɾə]   'free'

    (b)   Verbal inflection (1sg.pi)

        entaul   /ən##tawl/ [ən̪.ˈtawl] '(I) strike up'

        restaur /ɾəstawɾ/   [ɾəs.ˈtawɾ] '(I) restore'

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

The special behavior of these verb forms is not circumscribed to sonority factors but also affects other aspects of the phonology of Catalan. These cases are dealt with in the following sections.

2.1.2. Underapplication of posttonic *-n* and *-r* deletion in Balearic Catalan

Catalan shows a regular process of deletion of the final *-n* or *-r* when preceded by a stressed vowel (9a); this process, however, does not apply in 1sg.pi verb forms (9b).

(9)   Balearic Catalan[9]

   (a)   Nominal inflection

     cançó /kənson/ [kən.'so] 'song'   (cf. *cançoneta* [kən.su.'nɛ.tə] 'song *dimin.*')[10]
     raó   /rəon/   [rə.'o]   'reason' (cf. *raonar* [rəw.'na] 'to reason')
     tercer /tɛrseɾ/ [tər.'se] 'third' (cf. *tercera* [tər.'se.rə] 'third *fem.*')
     carrer /kəɾɾeɾ/ [kə.'re] 'street' (cf. *carreró* [kə.rə.'ro] 'street *dimin.*')

   (b)   Verb forms (1sg.pi)

     man   /man/   ['man]   'I order'
     deman /dəman/ [də'man] 'I ask for'
     mir   /miɾ/   ['miɾ]   'I look'
     cur   /kuɾ/   ['kur]   'I heal'

2.1.3. Underapplication of gliding in Balearic Catalan

In Catalan, the intervocalic labiodental fricative alternates with the labiovelar [w] in word-final position, due to a process of final gliding (10a). This process fails to apply, again, in the case of 1sg.pi verb forms (10b) in most Balearic varieties (see, however, the examples in (18)).

(10)   Balearic Catalan[11]

   (a)   Nominal inflection

     blava ['bla.və] 'blue *fem.*' ~ *blau* ['blaw] 'blue *masc.*'
     activa [ət.'ti.və] 'active *fem.*' ~ *actiu* [ət.'tiw] 'active *masc.*'
     seva ['se.və]   'their *fem.*' ~ *seu* ['sew]   'their *masc.*'
     neva ['ne.və]   'it snows'   ~ *neu* ['new]   'snow'

   (b)   Verbal inflection

     prova ['prɔ.və]   '(he/she) tries'   ~ *prov* ['prɔf] '(I) try'
     aprova [ə.'prɔ.və] '(he/she) passes'   ~ *aprov* [ə.'prɔf] '(I) pass'
     renova [rə.'nɔ.və] '(he/she) renovates' ~ *renov* [rə.'nɔf] '(I) renovate'
     lleva   ['ʎe.və]   '(he/she) takes out' ~ *llev* ['ʎef]   '(I) take out'
     eleva [ə.'le.və]   '(he/she) elevates' ~ *elev* [ə.'lef] '(he/she) elevate'

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[9] For a complete list of verbs exhibiting this behavior, see Appendix II.

[10] The existence of a process of posttonic *-n* and *-r* deletion is the standard assumption in Catalan linguistics. For a comprehensive explanation of the application of this process in Catalan, see Mascaró (1976; 1983, 112); Bonet–Lloret (1998, 100).

[11] For a complete list of verbs exhibiting this behavior, see Appendix IV

2.1.4. Underapplication of cluster reduction in Eivissan Catalan

In Eivissan Catalan, as in most Catalan dialects, final homorganic clusters consisting of a sonorant followed by a stop are reduced to a single sonorant (11a); this process, however, is not triggered in 1sg.pi verb forms (11b):

(11) Eivissan Catalan[12]

    (a) Nominal inflection

        pont /pɔnt/   ['pɔn] 'bridge'   (cf. *pontet* [puṇ.'tɛt] 'small bridge')

        molt /molt/   ['mol] 'a lot *masc.*' (cf. *molta* ['moḷ.tə] 'a lot *fem.*')

        camp /kamp/~/kanp/[13] ['kam] 'field'   (cf. *acampar* [ə.kəm.'pa] 'to camp')

        sang /sang/   ['saŋ] 'blood'   (cf. *sangonós* [səŋ.gu.'nos] 'bloody')

    (b) Verbal inflection (1sg.pi)

        cant   /kant/   ['kaṇt]   '(I) sing'

        salt   /salt/   ['saḷt]   '(I) jump'

        acamp /əkamp/~/əkanp/[14] [ə.'kamp] '(I) camp'

        tanc   /tank/   ['taŋk]   '(I) close'

2.1.5. Underapplication of affrication in Balearic Catalan

In Catalan, the intervocalic voiced prepalatal fricative /ʒ/ alternates in final position with the unvoiced prepalatal affricate [tʃ] (12a). This alternation, again, is not manifested in the 1sg.pi verb forms of Balearic Catalan (12b):

(12) (a) Nominal inflection

        pujol   /puʒ+ɔl/   [pu.'ʒɔl]   'hill'   ~ *puig* /puʒ/ ['putʃ] 'hill'

        fageda /faʒ+ɛd+ə/ [fə.'ʒɛ.ðə] 'beech wood'~ *faig* /faʒ/ ['fatʃ] 'beech'

    (b) Verbal inflection (1sg.pi)

        puj   /puʒ/ ['puʃ]   '(I) go up' (cf. *puja* /puʒ+ə/ ['pu.ʒə] '(he/she) goes up')

        estoj /stoʒ/ [əs'toʃ] '(I) keep'   (cf. *estoja* /stoʒ+ə/ [əs.'to.ʒə] '(he/she) keeps')

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[12] For a complete list of verbs exhibiting this behavior, see Appendix III.

[13] See footnote 2.

[14] See footnote 2.

2.2. Overapplication

In Minorcan Catalan, a general process of regressive place assimilation is triggered when a stop is followed by a heterosyllabic obstruent (13a).[15] The process does not apply when the consonants that integrate the cluster are placed in the same syllable; this is why regressive place assimilation is not triggered in word-final position (13b). Against this general behavior, however, 1sg.pi verb forms show regressive place assimilation although the consonant cluster is placed in word-final position; this is a case of overapplication of regressive place assimilation (13c).

(13) (a) Heterosyllabic clusters

      accent   /əksent/ ∼ /ətsent/ [ət.ˈtseṇt]   'accent'

      lloc segur   /ʎɔk##səguɾ/   [ˌʎɔt.tsə.ˈɣu]   'safe place'

      pocs amics /pɔk+z##əmig+z/ [ˌpɔd.dʑə.ˈmiks] 'few friends'

    (b) Tautosyllabic clusters

      pocs   /pɔk+z/ [ˈpɔks]   'few'

      fax   /faks/   [ˈfaks]   'fax'

      llums /ʎum+z/ [ˈʎums] 'lights'

      annex /ənɛks/   [ə.ˈnɛks] 'annex'

      sufix /sufiks/   [su.ˈfiks] 'suffix'

    (c) 1sg.pi verb forms

      fix   /fiks/∼/fits/[16]   [ˈfits]   '(I) pay attention'

      relax /rəlaks/∼/rəlats/ [rə.ˈlats] '(I) relax'

      prems /prems/∼/prens/ [ˈprens] '(I) press'

      annex /ənɛks/∼/ənɛts/ [ə.ˈnɛts] '(I) annex'

      sufix /sufiks/ ∼/sufits/ [su.ˈfits] '(I) suffix'

      tax   /taks/∼/tats/   [ˈtats]   '(I) tax'

3. The invisible

The special behavior of 1sg.pi verb forms, particularly the one shown in (3a) and (3b), has been analyzed from various perspectives.

    The first formal analysis of these final consonant groups can be found in the work of Dols (1993a;b), which deals with various aspects of Majorcan consonantism within the framework of autosegmental phonology.

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[15] When followed by a sonorant, a process of regressive manner assimilation is triggered (see Pons 2005 for an analysis of this process).

[16] See footnote 2.

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.*'); it also shows a restriction according to which a non-sonorant consonant in coda position is banned. In order to justify the preservation of these heavy clusters and the presence of non-sonorant consonants in coda position, Gussmann (1992) 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 a process of vowel deletion. Dols (1993a;b) advocates this approach and analyzes these final consonantal clusters of Balearic Catalan as onsets of an **empty nucleus**. A verbal morpheme (M), corresponding to the 1sg.pi, would license this syllabic position without segmental content. Similar structures without this morpheme (i.e., nominal forms) are subjected to epenthesis.

(14) Dols (1993a;b)

$$\begin{array}{cccc} \text{M} & \text{M} & & \text{M} & \text{M} \\ | & | & & | & | \end{array}$$

empr /ɛmpɾ+∅/ → [ˈɛm.pɾ∅]   *accept* /əksept+∅/ → [ət.tset.t∅]

An analysis along these lines within Optimality Theory is proposed by Serra (1996). 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 1sg.pi forms. This morpheme would license those structures which are not well-formed from a syllabic point of view. Under this proposal, the absence of this extrasegmental morpheme in the nominal forms explains the insertion of the epenthetic vowel.

As pointed out in Pons (2002a;b) and Lloret (2003; 2004), a significant theoretical problem in the analysis of Dols (1993a;b) 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, the argument is circular. On the other hand, according to some authors (see Viaplana 2000, for instance), a morpheme can be postulated when it has, at least, one phonological representation, but it becomes a highly speculative task to invoke a morpheme that does not have any phonological manifestation. And this would be the case we are dealing with in this paper, since the "alleged" 1sg.pi morpheme **never** emerges. Nevertheless, even within a perspective that admits mor-

phemes without any segmental representation, the analysis of Dols has to face some serious problems: Dols does not explore, for instance, the consequences of his analysis for nominal inflection and other sites of verbal inflection, where other extrasegmental morphemes could be posited although this would not block the regular strategies of syllabification (see Pons 2002a;b; Lloret 2003; 2004 for discussion on this aspect): in Catalan, the 'masculine', and specially the 'singular' morphemes do not have explicit morphs (15a); some authors like Mascaró (1986) appeal to a ∅ morph to explain the opposition 'masculine' ∼ 'feminine' and the opposition 'singular' ∼ 'plural'; the presence of this ∅ morph could block epenthesis, as it does the morpheme of 1sg.pi, but it does not (15b).

(15) Catalan nominal inflection

(a) *petit*   /pətit+∅+∅/ [pə'tit]   'small *masc. sg.*'
     petita /pətit+ə+∅/ [pə'titə] 'small *fem. sg.*'

     petit   /pətit+∅+∅/ [pə'tit]   'small *masc. sg.*'
     petits /pətit+∅+z/ [pə'tits] 'small *masc. plur.*'

(b) *centre* /sentɾ+∅+∅/ ['sentɾə]   'center *masc. sg.*'
     mascle /maskl+∅+∅/ ['mas.klə] 'male *masc. sg.*'

Dols and Wheeler (1996) analyze these final consonant 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 consisting 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 the proposal in Dols (1993a;b) is that these final onsets are licensed, not by the 1sg.pi morpheme, but the right edge of a prosodic domain, following the proposals made within Government Phonology (Kaye et al. 1990) and Strict CV phonology (Lowenstamm 1996; Scheer 1999).

(16) Dols–Wheeler (1996)

   camp 'k a m. p 'field'   *empr* 'ɛ m. p ɾ '(I) use'   *entr* 'ɛ n. t ɾ '(I) enter'
           | | | V | V
           C O   C O   C O

This proposal has some problems derived from the overgeneralization of
these verbal structures. 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. (2a) and
(2b)), which have an underlying structure identical to that of 1sg.pi verb
forms but require the insertion of an epenthetic vowel (/timbɾ/ ['tim.bɾə],
/magɾ/ ['ma.ɣɾə]). The authors, in order to explain the fact that the
1sg.pi verb forms do not require epenthesis, argue that the final vow-
els 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. To consider these forms
exceptional and subjected to a morphophonological rule or to resort to
different allomorphs of the masculine morpheme entails the unnecessary
overloading of the lexicon. For that reason, it seems more convincing, as
Dols states in earlier works, to propose that it is the morpheme of 1sg.pi
that licenses these final consonantal groups.

A general problem of all these syllabically-driven proposals, more-
over, is that these verb forms undergo a series of phonological processes
that are generally associated with the coda position and not with the on-
set position. This is the case, for instance, of the devoicing process that
affects final obstruents; this process applies systematically in final clusters
of one, two or three consonants, as can be seen in the following examples.

(17) Balearic Catalan (general)

  (a) *pos*   /pɔz/   ['pɔs]   '(I) put'   (cf. ['pɔ.zə] '(he/she) puts')
       acab   /əkab/   [ə.'kap] '(I) finish' (cf. [ə.'ka.bə] '(he/she) finishes')
       ajud   /əʒud/   [ə.'ʒut] '(I) help'   (cf. [ə.'ʒu.ðə] '(he/she) helps')

  (b) *reserv* /ɾəzeɾv/ [ɾə.'zeɾf]   '(I) book'   (cf. [ɾə.'zeɾ.və] '(he/she) books')
       enfang /ənfang/ [əɱ.'faŋk]   '(I) muddy' (cf. [əɱ.'faŋ.gə] '(he/she) muddies')
       allarg /əʎaɾg/   [ə.'ʎaɾk]   '(I) extend' (cf. [ə.'ʎaɾ.ɣə] '(he/she) extends')
       obr   /ɔbɾ/   ['ɔpɾ]   '(I) open'   (cf. ['ɔ.βɾə] '(he/she) opens')
       arregl /ərregl/ [ə.'rekl]   '(I) repair' (cf. [ə.'reg.glə] '(he/she) repairs')

  (c) *sembr* /sɛmbɾ/ ['sɛmpɾ] '(I) sow'   (cf. ['sɛm.bɾə] '(he/she) sows')
       sembl /sɛmbl/ ['sɛmpl] '(I) look like' (cf. ['sɛm.blə] '(he/she) looks like')

In the analysis proposed by Dols–Wheeler (1996), the lack of voice in cases
like the one in (17a) is justified because these consonants are in the coda
position before their eventual transference to the onset position. And
it is in this position that the voice features disappear. According to the
authors, on the other hand, the forms in (17c) exhibit voicing contrasts in

this position (cf. *sembr* /sɛmbɾ/ [ˈsɛmbɾ] vs. *empr* /ɛmpɾ/ [ˈɛmpɾ]), which reinforces their argument according to which the final consonants occupy the onset position. This approach exhibits contradictory derivations in the context of the language which for reasons of space we will not explore here, and it is unable to explain the lack of voice in cases like *reserv* [rə.ˈzeɾf] '(I) book', *allarg* [ə.ˈʎaɾk] '(I) extend', where the final obstruents are never associated to the coda position. On the other hand, as pointed out in Pons (2000; 2002a;b), the existence of voicing contrasts in final position in cases like (17c) *sembr*, *empr* is not clear at all (see, in this respect, appendix V).[17]

There is another process that affects verbs that end in *-var* in certain Majorcan varieties that also raises doubts about the validity of treating these forms as onsets of an empty nucleus (see a development of this argument in Pons 2002a;b and Lloret 2003; 2004). As partially shown in **2.1.3**, 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, verb forms with an intervocalic [v] can show two types of behavior when this consonant is placed in final position: either this [v] is realized unvoiced, as shown in the examples in (18a), or this [v] is realized as a labiovelar glide, as shown in the examples of (18b). In fact, the latter is the general behavior that these segments show in nominal forms, as the examples in (18c) illustrate.

None of the aforementioned studies refers to this kind of alternation in final position, which is clearly associated to the coda position. If these final consonants were onsets of an empty nucleus they should not alternate, because this behavior is only related to the coda position.

To sum up, it is by no means clear that treating these final consonant clusters as onsets is justified, because, as the last examples prove, the lack of voiced segments and the presence of [w] also affect consonantal segments associated to the onset position according to these proposals.

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[17] The voicing contrast of these final clusters (especially the one composed of a stop and a lateral) is a controversial issue, which has recently been investigated by Recasens et al. (2004) from a phonetic point of view: the results of this study indicate that the realization of these clusters is subject to a lot of variation and depends on the speakers, the place of articulation of the stop, among other factors; moreover, according to the authors, "there are reasons to believe that a sound change process may be under way in [Majorcan Catalan]. Indeed, while being robust for two of three of the elder speakers [. . .], the voicing contrast is partially or completely neutralized in the case of the younger ones" (*op.cit.*, 115).

(18) (a) Majorcan and Minorcan Catalan

      prov   ['pɾɔf]   '(I) try'   (cf. [pɾu.'va] ∼ [pɾo.'va] 'to try')

      aprov [ə'pɾɔf] '(I) pass' (cf. [ə.pɾu.'va] ∼ [ə.pɾo.'va] 'to pass')

      cav   ['kaf]   '(I) dig'   (cf. [kə.'va] 'to dig')

  (b) Majorcan Catalan (some varieties)

      prov   ['pɾɔw]   '(I) try'   (cf. [pɾu.'va] ∼ [pɾo.'va] 'to try')

      aprov [ə.'pɾɔw] '(I) pass' (cf. [ə.pɾu.'va] ∼ [ə.pɾo.'va] 'to pass')

      cav   ['kaw]   '(I) dig'   (cf. [kə.'va] 'to dig')

  (c) Catalan (nominal forms)

      meva ∼ *meu* ['me.va], ['me.βə] ∼ ['mew] 'mine *fem.* ∼ mine *masc.*'

      neva ∼ *neu*   ['ne.və], ['ne.βə] ∼ ['new]   'it snows ∼ snow'

4. The visible

4.1. The others

The analysis we propose is to consider that 1sg.pi verb forms exhibit a different phonological behavior with respect to the noun forms because of the pressure that other forms exert in the context of the same paradigm, along the lines of my previous studies (Pons 2002a;b) and Lloret (2003; 2004). The pressure can either work by contrast—in which case surface homophony within the same paradigm is avoided—or by analogy—in which case the shared stem by the paradigm members tends to homogenization.

Paradigmatic pressures had a relevant role in neogrammarians' work on sound change, where exceptions to sound laws were frequently accounted for by resorting to concepts such as analogy. In the SPE model and subsequent work, analogy and similar concepts were excluded from any phonological explanation: in this framework, paradigmatic influences between morphologically related words were expressed in terms of rule ordering and the cycle. In Optimality Theory, traditional ideas of analogy and contrast between the members of a paradigm have been invigorated; indeed, Optimality Theory has developed a wide assortment of submodels and refinements that have the purpose of accounting for surface similarities and dissimilarities across the members of a paradigm. The rest of this section overviews these accounts.

The first approximation to paradigm uniformity within Optimality Theory is found in Kenstowicz (1996), who proposes two different

constraints, BASE-IDENTITY and UNIFORM EXPONENCE. The former explains those cases where an immediate constituent—the base or the word— exerts pressure over its derived form or over its occurrence in a sentence, 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 that is modified due to the pressure of a derived form. BASE-IDENTITY is relevant when dealing with derivational morphology, where the base has priority over the derived forms, whereas UNIFORM EXPONENCE is relevant when dealing with inflectional morphology, where there is no identifiable base that has priority over the rest of the members of the paradigm.

(19) BASE-IDENTITY (Kenstowicz 1996)
      Given an input structure [X Y], output candidates are evaluated for how well they match [X] and [Y] if the latter occur as independent words.

(20) UNIFORM EXPONENCE (Kenstowicz 1996)
      Minimize the differences in the realization of a lexical item (morpheme, stem, affix, word).

As pointed out in McCarthy (2005), the first approximation (BASE-IDENTITY) is inherently asymmetrical, since there is a base to which the derived forms must be faithful, so that the base has priority over the rest of the paradigm forms. The second approximation (UNIFORM EXPONENCE), on the other hand, is inherently symmetrical, to the extent that any member of the paradigm can exert pressure over the rest of the paradigm constituents and motivate, therefore, the overapplication or the underapplication of a process. According to McCarthy, UNIFORM EXPONENCE has two significant theoretical problems. On the one hand, it predicts that a base can be influenced by a derived form, which is—if not impossible—empirically rare. On the other hand, a constraint which states "Minimize the differences in the realization of a lexical item" expresses more an intuition than a computable constraint. The same formal problem is found in the formulation of BASE-IDENTITY: indeed, what is the exact evaluation of a constraint which says "Given an input structure [X Y], output candidates are evaluated for **how well** they match [X] and [Y] if the latter occur as independent words."?

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

the opposite direction, that is, the pressure of the derived form over the base is proscribed due to base priority. In order to express the pressure that the base exerts over its derived form or its occurrence in the sentence, a set of Output-Output faithfulness constraints that emulate the Input-Output ones are invoked.

A complementary model to Benua's approach is found in McCarthy (2005), a paper which deals with inflectional morphology. In this paper, it is argued that, within inflectional morphology, only symmetric relations between the members of a paradigm are possible: this means that any form of the inflectional paradigm can be the one which exerts the pressure. In order to formalize these kinds of pressure, the author proposes the Optimal Paradigms model (OP). According to OP, candidates consist of entire inflectional paradigms, whose members are all subjected to the evaluation of the standard markedness and Input-Output faithfulness constraints. The stem of each paradigm member also stands in a surface correspondence with the stem in every other paradigm member; this correspondence is articulated by a set of Output-Output faithfulness constraints. In the OP model, in contrast to TCT, the pressure is multidirectional, not unidirectional, in so far as all the members of the paradigm are equal in their "potential to influence the surface phonology of other members of the paradigm". Another prediction of the OP model, which is different to TCT, is that paradigmatic pressures motivate only the overapplication of a process, not its underapplication: overapplication, certainly, means the satisfaction of the high ranked markedness constraint, which is necessarily ranked above the faithfulness constraint, given the assumed existence of the process in the language; underapplication is only possible if another markedness constraint blocks overapplication. OP and TCT are not competing, or mutually excluding, but complementary theories: TCT is an adequate model to account for surface resemblances when an element of the paradigm has priority over others, that is, when there is an identifiable base to which the rest of members must be faithful (i.e., in derivational morphology) and OP is an adequate model when no element of the paradigm has priority among the others, because there is no identifiable base (i.e., inflectional morphology).

The theories outlined aim to account for the homogenization of the realizations of the stem; it is also possible, however, that paradigmatic pressures affect the realizations of affixes; the most explicit theory of affix leveling is the one proposed by Burzio in terms of METRICAL CONSISTENCY (Burzio 1994) and more recently in terms of the principle ANTI-

Allomorphy, which require a consistent realization of morphemes in all their phonological properties. It should be noted that Kenstowicz's proposal of Uniform Exponence also covers this possibility.

Paradigmatic pressures can also achieve homophony avoidance. The same grounds that motivate phonological contrast (expressed in terms of input-output faithfulness constraints) induce lexical contrast: the need for effortless and effective communication. Homophony avoidance within a paradigm has been formalized by Crosswhite (1999), 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.

(21) Anti-Ident (Crosswhite 1999)
      For two forms, S_1 and S_2, where $S_1 \neq S_2$, $\exists \alpha, \alpha \in S_1$, such that $\alpha \neq R(\alpha)$.

According to this constraint, given two forms, S_1 and S_2, there must be some segment belonging to S_1 such that is not identical to its correspondent in S_2. As stated in (21), the forms subjected to Anti-Ident (S_1 and S_2) must be different. The proposal of Crosswhite is based on Correspondence Theory (McCarthy–Prince 1995), as far as two strings stand in a correspondence relation; this correspondence relation is evaluated, not by faithfulness constraints, but by anti-faithfulness constraints. It is important to point out that the members subjected to the Anti-Ident constraints are not "the same" underlyingly, so that it does not apply to forms that are supposed to be underlyingly identical; Anti-Ident aims to ensure that forms that minimally do not mean the same do look different.

This formulation faces a series of problems: (a) The first is that it should be specified what "not be the same" means; does it refer to the phonological structure of the pairs under correspondence, or does it refer to their morphological structure? It is not always the case that a different morphological structure and, therefore, a different "meaning", are translated into different underlying forms: two different morphemes can certainly have the same phonological structure. (b) The constraint, as formulated, does not exclusively affect forms which belong to the same paradigm but can also affect forms morphologically unrelated. It is clear, however, that the paradigmatic pressure exerted between forms that are morphologically related is stronger than between forms that are not. The same effect can be found when dealing with paradigm uniformity. In this sense, Paul (1880) stated: "The more tightly words are associated with each other, the stronger the preference for uniform paradigms". It is

desirable, therefore, that constraints against homophony target morpho-
logically related and morphologically unrelated words in different ways.
(c) The constraint, as formulated, does not determine the property that
must be different between the members under correspondence: there are
multiple strategies for avoiding homophony, for instance: triggering or
blocking deletion, insertion, featural changes, etc. This limitation is
solved in Alderete's (1999) proposal (see below). (d) Note, finally, that
it is not necessary to refer to the fact that the forms subjected to this
constraint must be morphologically or semantically different if the ap-
plicability scope of the constraint is well-defined, in so far as the members
of an inflectional paradigm inherently have a different morphosyntactic
structure, and, also, a different meaning.

Alderete (1999) proposes that, in addition to markedness and faith-
fulness constraints, UG, and more specifically CON, contains a set of an-
tifaithfulness constraints that evaluate pairs of morphologically related
words and require a phonological difference between them, which, obvi-
ously, implies a phonological change of some kind; the related words are
typically a base and its derivative. These constraints entail phonological
alternations between members of the same paradigm and frequently, but
not necessarily, imply a violation of faithfulness constraints. This pro-
posal has the advantage over Crosswhite's that it is more specific about
the type of property that must be different.

Several problems arise, however, when the proposal is analyzed thor-
oughly. Unlike faithfulness and markedness constraints, antifaithfulness
constraints are not functionally motivated when considered individually,
that is, it is comprehensible that surface forms tend to be faithful to
their underlying correspondents for communicative reasons; it is also log-
ical that surface forms tend to be as unmarked as possible for perceptual
and articulatory reasons, and, still, that segments in morphologically re-
lated words tend to homogenization through output-output faithfulness
constraints; but it is not deducible from the general behavior of languages
that forms differ from another in absolute terms. It is only within a par-
adigm or in relation to the other segments of the system that two forms
want to be different; in other words, it is the lexical items that want to
be different, but not the segments under correspondence.

An inherent and significant problem of both approximations to ho-
mophony avoidance is that not all the segments belonging to the members
of a paradigm stand in a correspondence relation, in so far as the members
of a paradigm are morphologically different, and, therefore, are integrated

by different morph(eme)s. In this regard, it is important to bear in mind that, unlike OP, paradigmatic contrast affects the whole string, including not only the stem, but also the inflection and the derivative morphemes. This is why the constraint should be sensitive to the morphological status of the members under evaluation (i.e., they belong to the same paradigm), but not to their internal morphological constituency (i.e., stem, affix, etc.).

Kenstowicz (2005) proposes a PARADIGMATIC CONTRAST constraint which ensures that "two phonologically distinct members of a paradigm must remain phonetically distinct". An immediate objection to this formulation is the following: what is the role of PARADIGMATIC CONTRAST when the members of the paradigm are morphologically different but phonologically identical? PARADIGMATIC CONTRAST, like other output-output faithfulness constraints evaluate only surface forms and not the input-output relationship. And the formulation given by Kenstowicz (2005) includes two conditions in itself: the members must be phonologically distinct and, once this condition is satisfied, they must be phonetically different.

Having reviewed some of the approximations to paradigm uniformity and contrast and having detected their main deficits, in the rest of this section we propose an explicit formalization of the PARADIGMATIC CONTRAST constraint evaluation, in relation to the one proposed by McCarthy (2005) to account for surface resemblances between the members of an inflectional paradigm (i.e., Optimal Paradigms).

(i) *The optimal paradigm*

The optimal paradigm is the one in which the stem of each paradigm member shows as few discrepancies as possible and, also, the one in which the members differ at least for one property.

(ii) *The scope of Paradigmatic Contrast*

The scope of PC is the paradigm—or, eventually, the subparadigm—, so that the candidate under evaluation is the entire (sub)paradigm, as in the standard OP model.

(iii) *The target of evaluation*

The target of evaluation of standard OP constraints is the stem, that is, the shared string of the paradigm members; therefore, inflection and derivational material are not evaluated by OP constraints. The target of PC constraint is the entire string, that is, the stem and, also, the

inflectional and the derivative material. The PC constraint is blind to the internal morphological structure of the members under evaluation.

(iv) *The source of the contrast*

Against what is proposed by Crosswhite and Kenstowicz, candidates under evaluation can be phonologically different or identical; what matters is that if they are morphologically different, they must remain phonetically distinct. If they are phonologically identical, the satisfaction of PC necessarily implies a violation of the standard faithfulness constraints, since it is the grammar that is responsible for the paradigm members emerging phonetically distinct. If they are phonologically different, the PC promotes faithfulness to the underlying form in order to preserve the difference already present in the underlying representation.

(v) *Paradigmatic Contrast requirements*

The candidates under evaluation are necessarily morphologically different but they must belong to the same (sub)paradigm. Homophony avoidance outside the paradigm is another issue, which has recently been analyzed by Ichimura (2006).

(vi) *The member which exerts the pressure*

When candidates are phonologically identical, a non-trivial problem must be considered: which of the two candidates exerts pressure and which one undergoes it? (In **4.2**, different solutions to the problem applied to Balearic Catalan are sketched out.)

(vii) *Brief formalization of Paradigmatic Contrast*

Each member phonetically identical to another in the same paradigm incurs a violation of PC; for instance, the hypothetical paradigm $\langle_1$ˈən̪tɾə, $_2$ˈən̪tɾəs, $_3$ˈən̪tɾə, $_4$ən̪ˈtɾam, $_5$ən̪ˈtɾaw, $_6$ˈən̪tɾən$\rangle$ incurs two violations of PC; one of the first member of the paradigm in relation to the third and one of the third member of the paradigm in relation to the first one. The hypothetical paradigm $\langle_1$ˈən̪tɾə, $_2$ˈən̪tɾə, $_3$ˈən̪tɾə, $_4$ən̪ˈtɾam, $_5$ən̪ˈtɾaw, $_6$ˈən̪tɾən$\rangle$ incurs six violations; the hypothetical paradigm $\langle_1$ˈən̪tɾə, $_2$ˈən̪tɾə, $_3$ˈən̪tɾə, $_4$ən̪ˈtɾam, $_5$ən̪ˈtɾaw, $_6$ˈən̪tɾə$\rangle$ nine violations, and so on.

(viii) *Paradigmatic Contrast evaluation*

Assign one violation mark for any member of a paradigm which is phonetically identical to another member of the same (sub)paradigm. The generation of the paradigm or eventually of the subparadigm is the responsibility of the GEN component.

(ix) *PC (general formulation)*

For n members of a paradigm $X \exists n$ surface realizations that are different for at least one property (see Pons 2002a;b).

(x) *The triggered strategies to satisfy Paradigmatic Contrast*

The strategy selected to satisfy PC can be active (i.e., triggering a process) or passive (i.e., blocking a process): the selection of the particular strategy depends on the specific hierarchy of the markedness and the faithfulness constraints in a given language.

4.2. Paradigmatic contrast and uniformity in the verbal phonology of Balearic Catalan

4.2.1. Underapplication of epenthesis

In this section we show how the lack of epenthesis in the verb forms shown in (3a) and (3b) can be analyzed as the result of the effect of the PARADIGMATIC CONTRAST constraint, which bans phonetically identical forms in the same paradigm. In order to explain the exceptional behavior of the verb forms, it is necessary, first, to account for the behavior of the nominal forms listed in (2a) and (2b), which exhibit a regular behavior, that is, the insertion of an epenthetic vowel to avoid a potential rising or flat sonority within the syllable (cf. *timbre* /timbɾ/ [ˈtim.bɾə] 'bell'). The markedness constraints which advocate a proper syllabification are the SONORITY SEQUENCING PRINCIPLE (SSP), according to which the sonority between the segments of a syllable must be decreasing with respect to the nucleus (22), *P/C, which bans a consonant being the nucleus of a syllable (23), and NUCLEUS, demanding that a syllable has a nucleus (24).

(22) SONORITY SEQUENCING PRINCIPLE (SSP) (Clements 1990)

Between any member of a syllable and the syllable peak, only sounds of higher sonority rank are permitted.

(23) *P/C (Prince–Smolensky 1993)

C may not associate to Peak (Nuc) nodes.

(24) NUCLEUS (N) (Prince–Smolensky 1993)

A syllable must have a nucleus.

These constraints, obviously, occupy a high-ranked position in the hierarchy, given the process of epenthesis in the language. The facts related

to the 1sg.pi verb forms show that the constraints *P/C and N are ranked above the SSP: the SSP—and not N or *P/C—is the syllabic constraint which is violated in order to satisfy PC. These syllabic constraints interact with faithfulness constraints, such as Dep-IO, which bans insertion (25), Max-Edge, according to which the final element of the Grammatical Word must have a correspondent in the surface form and which is responsible for the blocking of final deletion (26), Contiguity, which bans morpheme internal deletion or insertion (27)–(28), and some specific Max constraints, advocating for the preservation of consonants specified for some feature.[18]

(25) Dep-IO

Every segment in S_2 has a correspondent in S_1 (Epenthesis is prohibited). (See McCarthy–Prince 1995)

(26) Max-Edge

The final element of the Grammatical Word must have a correspondent in the surface form.

(27) Contiguity-OI

The portion of S_1 standing in correspondence forms a contiguous string, as does the correspondent portion of S_2. (Internal morpheme epenthesis is prohibited.) (See McCarthy–Prince 1995)

(28) Contiguity-IO

The portion of S_2 standing in correspondence forms a contiguous string, as does the correspondent portion of S_1. (Internal morpheme deletion is prohibited.) (See McCarthy–Prince 1995)

(29) Majorcan Catalan hierarchy[19]

Max-Edge, N, *P/C, Contig-OI ≫ Contig-IO ≫ SSP ≫ Dep-IO

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[18] See Pons (2004) for a justification of this constraint hierarchy. The specific Max constraints are irrelevant for the explanation of the examples taken as illustration of the behavior of these forms; that is why they are not considered in the tableaux.

[19] The constraint hierarchy of Minorcan and Eivissan Catalan is slightly different: for expository reasons, in this paper the hierarchy of Majorcan Catalan will serve as illustration.

(30) Majorcan Catalan *apte* /apt/ [ˈat.tə] 'apt'

/apt/	Max-Edge	N *P/C	Contig-OI	Contig-IO	SSP	Dep-IO
(a) [ˈatt]					*!	
(b) [ˈat.t]		*!				
☞ (c) [ˈat.tə]						*
(d) [ˈap]	*!					
(e) [ˈat]				*!		
(f) [ˈa.pət]			*!			*

(31) Majorcan Catalan *sucre* /sukɾ/ [ˈsu.kɾə] 'sugar'

/sukɾ/	Max-Edge	N *P/C	Contig-OI	Contig-IO	SSP	Dep-IO
(a) [ˈsukɾ]					*!	
(b) [ˈsu.kɾ]		*!				
(c) [ˈsu.kɾ̩]		*!				
☞ (d) [ˈsu.kɾə]						*
(e) [ˈsuk]	*!					
(f) [ˈsuɾ]				*!		
(g) [ˈsu.kəɾ]			*!			*

(32) Majorcan Catalan *centre* /senɾ/ [ˈsen̩.tɾə] 'center'

/senɾ/	Max-Edge	N *P/C	Contig-OI	Contig-IO	SSP	Dep-IO
(a) [ˈsen̩tɾ]					*!	
☞ (b) [ˈsen̩.tɾə]						*
(c) [ˈsen̩.tɾ]		*!				
(d) [ˈsen̩.tɾ̩]		*!				
(e) [ˈsen̩t]	*!					
(f) [ˈsetɾ]				*!		
(g) [ˈsen̩.təɾ]			*!			*

We now need an explanation for the lack of vowel insertion in the case of the 1sg.pi verb forms, with an identical phonological structure. Our hypothesis is that epenthesis does not take place in these cases because this would produce a surface form identical to another surface form of the same paradigm: the third person singular of the present indicative (/εmpɾ+ə/ [ˈεmpɾə]), where the final schwa is the tense morph of the verbs belonging to the first conjugation (33). In the case of nouns (cf. *sucre, centre*), the lack of forms in the paradigm which can exert pressure can explain the application of epenthesis. In the case of adjectives (cf. *apte*), contrarily, the insertion of epenthesis produces two homophonous

forms in the paradigm in the case of the oriental varieties of Catalan which have vowel reduction of /a/ to [ə] i.e., Balearic Catalan): the one corresponding to the masculine (cf. *apte* [ˈattə]) and the one corresponding to the feminine (cf. *apta* [ˈattə]). This circumstance demonstrates that the PARADIGMATIC CONTRAST constraint must be relativized to the type of inflection concerned (verbal or nominal). A parallel approach can be found, for instance, in Rebrus–Törkenczy (2005), where the CONTRAST constraints are relativized to two different morphosyntactic dimensions to account for the Hungarian verbal paradigm.

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

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

The constraint PC is responsible, therefore, for the blocking of the epenthesis process, as can be seen in the following tableaux. Recall that the candidates under evaluation are the entire (sub)paradigms, the members of which are all subjected to input-output faithfulness constraints, markedness and output-output faithfulness constraints. Note, in addition, that GEN generates the candidate set, that is, the subparadigm.

The candidates (34a, 35a) are ruled out because they incur two fatal violations of PC; the candidates (34c, 35c) are also discarded because of the activity of the sonority constraints; and candidates (34d, 34e, 34f) and (35d, 35e, 35f), finally, fatally violate various faithfulness constraints, so that they are also disqualified.

Lloret (2003; 2004) sketches out some problems with this proposal, stating that there are many cases where two phonetically identical verb forms coincide within the same verbal paradigm. This is the case, for instance, of the first person singular and the third person singular of the past indicative or present subjunctive verb forms (see (36) and (37)).

(34) Majorcan Catalan 1sg.pi of *adoptar* 'to adopt'

⟨/ədopt/, /ədopt+ə+z/, /ədopt+ə/, /ədopt+a+m/, /ədopt+a+w/, /ədopt+ə+n/⟩	Max-Edge	N *P/C	Contig-OI	Contig-IO	PC	SSP	Dep-IO
(a) ⟨[ə.ˈðot.tə],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩					**!		*
☞ (b) ⟨[ə.ˈðott],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩						*	
(c) ⟨[ə.ˈðot.t],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩		*!					
(d) ⟨[ə.ˈðot],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩	*!						
(e) ⟨[ə.ˈðotət],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩			*!				*
(f) ⟨[ə.ˈðot₂],[ə.ˈðot.təs],[ə.ˈðot.tə], [ə.ðut.ˈtam],[ə.ðut.ˈtaw],[ə.ˈðot.tən]⟩				*!			

(35) Majorcan Catalan 1sg.pi of *centrar* 'to center'

⟨/sentɾ/, /sentɾ+ə+z/, /sentɾ+ə/, /sentɾ+a+m/, /sentɾ+a+w/, /sentɾ+ə+n/⟩	Max-Edge	N *P/C	Contig-OI	Contig-IO	PC	SSP	Dep-IO
(a) ⟨[ˈsentɾə],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩					**!		*
☞ (b) ⟨[ˈsentɾ],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩						*	
(c) [ˈsen.tɾ],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩		*!					
(d) ⟨[ˈsent],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩	*!						
(e) ⟨[ˈsen.tər],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩			*!				*
(f) ⟨[ˈsetɾ],[ˈsentɾəs],[ˈsentɾə], [sən̩ˈtram],[sən̩ˈtraw],[ˈsentɾən]⟩				*!			

(36) Past Indicative of *cantar*

    <u>*cantava*</u>   /kant+a+və/   [kən̪ˈtavə]
    cantaves /kant+a+və+z/ [kən̪ˈtavəs]
    <u>*cantava*</u>   /kant+a+və/   [kən̪ˈtavə]
    cantavem /kant+a+və+m/ [kən̪ˈtavəm]
    cantàveu /kant+a+və+w/ [kən̪ˈtavəw]
    cantaven /kant+a+və+n/ [kən̪ˈtavən]

(37) Present Subjunctive of *cantar*

    <u>*canti*</u>   /kant+i/   [ˈkan̪ti]
    cantis /kant+i+z/ [ˈkan̪tis]
    <u>*canti*</u>   /kant+i/   [ˈkan̪ti]
    cantem /kant+ɛ+m/ [kən̪ˈtɛm]
    canteu /kant+ɛ+w/ [kən̪ˈtɛw]
    cantin /kant+i+n/ [ˈkan̪tin]

The observation of Lloret is that the constraint PC could wrongly induce the deletion of the last segment of one of these verb forms (cf. *cantava* *[kən̪.ˈtaf], *canti* *[ˈkan̪t]). In fact, as suggested by the author, this is not a real problem for the PC hypothesis. These cases of homophony are in fact different to the one dealt with in the present paper: the homophony in the cases of (36) and (37) is already present in the underlying form, and the potential effects of PC can be inhibited by constraints such as REALIZE-MORPHEME (according to which a morpheme must have some phonetic realization) and METRICAL CONSISTENCY (according to which the realization of a morpheme must be as consistent as possible). The deletion of the [i] in the case of *canti* ∼ *canti* would incur a violation of the former, and the deletion of the [ə] in the second case would incur a violation of the latter. It should be noted, on the other hand, that one of the central assumptions of Optimality Theory is precisely the fact that the effect of a constraint, although universal, can be inhibited by the activity of another constraint which ranks higher.

    Another counter-example to the PC proposal pointed out by Lloret (2003) refers to the behavior of second and third conjugation verbs in Majorcan Catalan, and more sporadically in Minorcan and Eivissan Catalan. Within these conjugations, it is possible to find cases where the first and the third singular of present indicative verb forms are phonetically identical; in these cases, moreover, it is not only the first person that violates the SSP but the third person as well.

(38) Majorcan and Eivissan Catalan[20]

    corr   /korɾ/   ['kor] '(I) run'
    corres /korɾ+z/ ['kors] '(you) run'
    corr   /korɾ/   ['kor] '(he/she) runs'

(39) Majorcan Catalan (Binissalem)

    opr /ɔbɾ/   ['ɔpɾ]   '(I) open'
    obrs /ɔbɾ+z/ ['ɔpɾs]∼['ɔts] '(you) open'
    obr /ɔbɾ/   ['ɔpɾ]   '(he/she) opens'

(40) Majorcan, Minorcan and Eivissan Catalan

    umpl   /unpl/∼/umpl/   ['umpl]   '(I) fill'
    umpls /unpl+z/∼/umpl+z/ ['umpls]∼['ums]∼['uns] '(you) fill'
    umpl   /unpl/∼/umpl/   ['umpl]   '(he/she) fills'

The constraint hierarchy proposed in (29) would indubitably motivate epenthesis; and we should add that this constraint hierarchy generates two paradigm candidates as the optimal: one with vowel insertion in the 1sg.pi, and the other in the 3sg.pi.

This is why Lloret (2004), applying the Optimal Paradigms Model (McCarthy 2005), interprets that the underapplication of epenthesis in these verb forms is an effect of the constraints which account for surface similarities between the members of an inflectional paradigm, namely the OP faithfulness constraints: vowel insertion in the 1sg.pi verb forms is blocked due to the constraint OP-Dep-V. The insertion of a vowel in the form *compr* 'I buy' (cf. *['komprə]) involves several violations of this constraint, since the rest of the members of the (sub)paradigm do not insert a vowel after the stem (cf. *compres* [ˈkompɾ]+ə+s], *compra* [ˈkompɾ]+ə], *compram* [ˈkumpɾ]+a+m], *compram* [kumˈpɾ]+a+w], *compren* [ˈkompɾ]+ə+n]). As pointed out in **4.1**, the OP model predicts that only overapplication of a process is possible due to paradigmatic pressures, unless it is blocked because of the activity of a high-ranked markedness constraint. In fact, this is the case adduced for the author: the overapplication of the process of epenthesis motivated by the pressure of the first singular of present indicative verb form would be the expected strategy to maintain the uniformity of the paradigm; overapplication of epenthesis, however, is blocked because the presence of a final vowel in the stem of all the candidates would result in multiple violations of the

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[20] Towns: Pollença, Alcúdia, Artà, Sant Mateu.

high-ranked constraint *VV (according to which two posttonic adjacent vowels are prohibited).

A significant problem facing this proposal is that epenthesis could be considered to be not within the stem, as assumed by Lloret, but in between the stem and the affix, satisfying, therefore, the OP constraint which advocates the uniformity of the stem as far as vowel epenthesis is concerned; the epenthetic vowel could also be inserted, on the other hand, before the affix, also satisfying the OP constraints: these cases are instances of structural homophony.

(41) 1sg.pi: ˈkompɾ]ə vs. ˈkompɾ[əə vs. ˈkompɾə]
      1sg.pi: ˈsen̪tr]ə vs. ˈsen̪tr[əə vs. ˈsen̪trə]
      1sg.pi: ˈsəmbl]ə vs. ˈsəmbl[əə vs. ˈsəmblə]

In fact, in Catalan there are a quite extensive set of verbal forms in which an epenthetic vowel has to be added, and it is not by no means clear what morphological position it occupies:

(42) (a) *temeria*   /tem+ɾiə/ [tə.mə.ɾíə] '(I) would be afraid'
           temeré   /tem+ɾe/   [tə.mə.ɾé]   '(I) will be afraid'
           (cf. *temia* [təmíə] 'he/she was afraid')

      (b) *venceria* /bɛns+ɾiə/ [bən.sə.ɾíə] '(I) would win'
           (cf. *vencia* [bənsíə] 'he/she won')

It should be noted, on the other hand, that there are other data from Balearic Catalan that take exactly the opposite direction to that outlined by Lloret, since certain features of the first and the third singular person of the present indicative differ. In Minorcan Catalan, for instance, the third and the second person singular of present indicative of the verbs *córrer* and *obrir* show a final vowel, unlike the first person, which does not. The same behavior is found in some varieties of Majorcan and Eivissan in the case of *córrer*. In most Majorcan and Eivissan Catalan varieties, the first and the third singular of present indicative verb forms do not coincide because the third person shows a final *-i* or because the first person shows a final velar segment. It is worth remarking the unproductive character of the second and the third conjugation, which, naturally, explains irregularities of this kind.

(43) (a) Minorcan Catalan

        corr   /koɾɾ/   ['koɾ]   '(I) run'
        corres /koɾɾ+z/ ['koɾəs] '(you) run'
        corre   /koɾɾ/   ['koɾə] '(he/she) runs'

        obr   /ɔbɾ/   ['ɔpɾ]   '(I) open'
        obres   /ɔbɾ+z/ ['ɔβɾəs] '(you) open'
        obr   /ɔbɾ/   ['ɔβɾə] '(he/she) opens'

   (b) Majorcan and Eivissan Catalan[21]

        corr   /koɾɾk/   ['korc]∼['kork] '(I) run'
        corres /koɾɾ+z/ ['kors]   '(you) run'
        corr   /koɾɾ/   ['kor]   '(he/she) runs'

   (c) Eivissan Catalan[22]

        corr   /koɾɾk/   ['kork]   '(I) run'
        corres /koɾɾ+z/ ['korəs] '(you) run'
        corre   /koɾɾ/   ['korə]   '(he/she) runs'

   (d) Majorcan Catalan and Eivissan Catalan[23]

        opr   /ɔbɾ/   ['ɔpɾ]   '(I) open'
        obrs /ɔbɾ+z/ ['ɔbɾis] '(you) open'
        obr   /ɔbɾ/   ['ɔβɾi]   '(he/she) opens'

The analysis of these forms in terms of PC is, nevertheless, complex because, given the underlying homophony of the forms, there is no mechanism which determines which of the two forms exerts pressure and which undergoes the effects of this pressure. It might be speculated that the third form is the one that undergoes the regular phonological processes (i.e., epenthesis), since it is the least marked form from a morphological point of view. Some kind of morphological faithfulness of the sort "be faithful to a concrete morphological category" should be invoked: in this case, DEP-IO (first singular person) ≫ DEP-IO (third singular person). Another possible explanation would be that the tense properties of the third person singular of present indicative, which generally are not represented by an explicit morph in second and third conjugation verbs, have two allomorphs, underlyingly ordered {∅ and [ə]}. The first would be the default selected strategy and the second, the strategy selected for markedness reasons, that is, to avoid a violation of the SSP—see Bonet

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[21] Towns: sa Pobla, Santa Margalida, Ariany, Son Cervera, Felanitx.

[22] Towns: Corona, Sant Jordi, Jesús, Eivissa, Sant Francesc de Formentera, Eivissa vila Marina, Eivissa vila Nord.

[23] All varieties except for Binissalem.

et al. (2003), and Mascaró (in press) for detailed discussion on allomorph selection. Another possible explanation is to consider that some kind of interparadigmatic pressure is exerted by the most productive conjugation (i.e., the first) over the least productive, motivating, along with the SSP, the insertion of a vowel in the third singular person of the present indicative and blocking the insertion in the 1sg.pi verb forms (see Lloret 2003 for an approximation on this direction).

4.2.2. Underapplication of posttonic *-n* and *-r* deletion

Underapplication of *-n* and *-r* deletion in 1sg.pi is obviously a phenomenon unrelated to PC, since forms with deletion would not incur a violation of this constraint (cf. 1sg.pi, *man* *[má]; 3sg.pi *mana* [mánə]). This is more likely an effect of paradigm uniformity, or better, an effect of Optimal Paradigm constraints, as suggested in Lloret (2003; 2004). It should be recalled, however, that underapplication of a process is not an expected solution in the OP model, unless a high ranked constraint blocks overapplication. But this is the case we are dealing with: the constraint *VV (according to which two adjacent vowels are prohibited), adduced by Lloret (2003) to justify underapplication of epenthesis, blocks overapplication of the processes of *-n* and *-r* deletion: *[máəs], *[máə], *[məˈám], *[məˈáw], etc. Therefore, the only strategy to maintain homogeneity within the paradigm is the preservation of the sonorant.

4.2.3. Underapplication of cluster reduction in Eivissan Catalan

As shown in (44), in Eivissan Catalan, as other Catalan dialects, final homorganic clusters integrated by a sonorant followed by a stop are reduced to a single sonorant (44a); this process, however, is not triggered in the 1sg.pi verb forms (44b).

(44) Eivissan Catalan

    (a) Nominal inflection

        pont /pɔnt/ [ˈpɔn] 'bridge'   (cf. *pontet* [pun̩ˈtɛt] 'small bridge')

        molt /molt/ [ˈmol] 'a lot *masc.*' (cf. *molta* [ˈmol̩tə] 'a lot *fem.*')

    (b) Verbal inflection (1sg.pi)

        cant /kant/ [ˈkan̩t] '(I) sing'

        salt /salt/ [ˈsal̩t] '(I) jump'

Pons (2004; 2006) proposes an analysis of cluster reduction in nominal inflection which interprets that the process has its origin in the plural

forms, with more than two consonants in coda position (cf. *camps*), in which the reduction is motivated by a markedness constraint that prohibits the presence of three consonants in coda position (*COMPLEX-CODA3). The analogical pressure which the plural forms exert over singular forms explains the fact that simplification also affects the final sequences with two consonants (cf. *camp*). Therefore, an integrated analysis of all Catalan dialects is obtained, both of those that simplify plural and singular forms and those that only simplify the plural forms. The difference between the two behaviors is explained by the different degree of analogical pressure exerted between the plural and the singular forms, which is expressed through a different hierarchy of paradigmatic constraints. The analogical process is formalized by resorting to the OP model (McCarthy (2005)): a faithfulness constraint that requires the structural homogeneity between the members of an inflectional paradigm explains the application of simplification in the singular forms. The fact that certain consonants are not susceptible to deletion is interpreted as an effect of the syntagmatic constraints that advocate the maintenance of the consonants that contrast with the adjacent ones if a certain feature is concerned, following Côté (2000). That is, there is no deletion when there is a sufficient contrast between adjacent consonants, but it is frequent in cases in which the contrast is minimal: the activity of the constraints MAX-C[ContrastPA]—which prohibits the deletion of a segment that contrasts with a preceding segment in terms of the place of articulation—and MAX-C[ContrastCont]—which prohibits the deletion of a segment that contrasts with a preceding one in terms of the continuant manner of articulation—explain the preservation of certain consonants in the varieties with cluster reduction.

This hypothesis is reinforced by the behavior of Eivissan Catalan. The lack of cluster reduction in 1sg.pi verb forms is expected since, contrarily to nominal paradigms, in verbal paradigms there is no verb form that can exert pressure in that direction: indeed, all the members of the paradigm have a final stop in the stem, and this explains its preservation in the 1sg.pi verb forms.

(45) *cantes*   ['kan̪təs]   *saltes*   ['sal̪təs]
      canta   ['kan̪tə]   *salta*   ['sal̪tə]
      cantam   [kən̪'tam]   *saltam*   [səl̪'tam]
      cantau   [kən̪'taw]   *saltau*   [səl̪'taw]
      canten   ['kan̪tən]   *salten*   ['sal̪tən]

4.2.4. Underapplication of gliding and affrication

The 1sg.pi verb forms also show underapplication of the processes of gliding and affrication, two processes expected in word-final position. As accounted for in Lloret (2003), the process of gliding is blocked in this context (46a) because of the pressure exerted by the rest of the paradigm members (46b), in which the stem ends in voiced labiodental fricative.

(46) (a) *prov*   ['prɔf]   (b) ⟨['prɔvəs], ['prɔvə], [prʊ'vam], [prʊ'vaw], ['prɔvən]⟩
         aproves [ə'prɔf]   ⟨[ə'prɔvəs], [ə'prɔvə], [əprʊ'vam], [əprʊ'vaw], [ə'prɔvən]⟩
         cav   ['kaf]   ⟨['kavəs], ['kavə], [kə'vam], [kə'vaw], ['kavən]⟩

Overapplication of gliding is blocked because it would create several forms with a glide in onset position, violating the high-ranked constraint *[w] ONSET; the high ranking of this constraint is consistent with the phonological behavior of Catalan and, more specifically, with the behavior of Majorcan Catalan and Minorcan Catalan as far as this segment is concerned: (a) there are a few words in Catalan starting with this consonant, most of them are loanwords (cf. *web*, *whisky*, etc.); (b) the intervocalic [w] found in some words of Catalan varieties is realized as [v] in Majorcan and Minorcan Catalan (cf. most Catalan varieties: *cla*[w] ∼ *cla*[w]*eta*, *bla*[w] ∼ *bla*[w]*et*; Majorcan and Minorcan Catalan: *cla*[w] ∼ *cla*[v]*eta*; *bla*[w] ∼ *bla*[v]*et*; in Majorcan Catalan, an interesting process of consonantal epenthesis applies to avoid a hiatus created by two non-anterior vowels; for markedness reasons, the quality of the epenthetic consonant should be a labiovelar glide, as it does occur in Eivissan Catalan (cf. *lleó* [ʎə'wo], *raó* [rə'wo]); however, the inserted consonant in Majorcan Catalan is a voiced labiodental fricative (cf. *lleó* [ʎə'vo], *raó* [rə'vo]).

The same explanation could be adduced to account for the blocking of the process of affrication: underapplication is explained by means of the pressure of the rest of the paradigm members and overapplication of affrication is inhibited by the markedness constraint banning an affricate in intervocalic position.

(47) (a) *puj*   ['puʃ]   (b) ⟨['puʒəs], ['puʒə], [pu'ʒam], [pu'ʒaw], ['puʒən]⟩
         estoj [əs'toʃ]   ⟨[əs'toʒəs], [əs'toʒə], [əstu'ʒam], [əstu'ʒaw], [əs'toʒən]⟩

We should explore now the consequences that such paradigmatic constraints have in the voice alternations shown in forms like *obr* ∼ *obra* ['ɔpɾ] ∼ ['ɔβɾə] '(I) open ∼ (he/she) opens'; the lack of devoicing due to the pressure of the members of the paradigm is not possible because it would imply six fatal violations of the high-ranked constraint *VOICEDOBSTRU-

ENT, which obviously is ranked above IDENT(voice), given the existence of the process in the language (48a). The overapplication of the process of devoicing in the forms of the paradigm where the obstruent is placed in the onset position is not possible either because the IDENTONSET(voice) constraint is ranked above the *VOICEDOBSTRUENT constraint (48b). The selected candidate paradigm is, therefore, the one which exhibits voicing alternations in the stem (48c). Unlike the case of place assimilation (see above), we have voicing alternations within the paradigm, as the high-ranked *VOICEDOBSTRUENT and IDENTONSET(voice) constraints cannot be violated to satisfy the paradigmatic constraint, OP-IDENT(voice), in this case.

(48) *obrir* 'to open'

⟨/ɔbɾ/, /ɔbɾ+ə+z/, /ɔbɾ+ə/, /ɔbɾ+i+m/, /ɔbɾ+i+w/, /ɔbɾ+ə+n/⟩	IDENTONSET (voice)	VOICED OBSTRUENT	OP-IDENT(voice)	IDENT (voice)
(a) ⟨['ɔbɾ], ['ɔβɾəs], ['ɔβɾə], [uˈβɾim], [uˈβɾiw], ['ɔβɾən]⟩		∗∗∗∗∗∗!		
(b) ⟨['ɔpɾ], ['ɔpɾəs], ['ɔpɾə], [uˈpɾim], [uˈpɾiw], ['ɔpɾən]⟩	∗∗∗∗∗!			∗∗∗∗∗∗
☞ (c) ⟨['ɔpɾ], ['ɔβɾəs], ['ɔβɾə], [uˈβɾim], [uˈβɾiw], ['ɔβɾən]⟩		∗∗∗∗∗	∗(5∗1∗2)	∗

4.2.5. Overapplication of regressive place assimilation

We will now account for the unexpected process of regressive place assimilation in word final position that applies in the first person singular of present indicative verb forms of Minorcan Catalan: as described in **2.1.5**, in this variety regressive place assimilation never applies in the final position of the word, but does apply when the consonants involved are heterosyllabic. The constraints and the constraint hierarchy that account for this behavior are shown in (49) and (50), and their effects are shown in (51):

(49) (a) AGREE(place)

Adjacent consonants must have the same specification for place of articulation. (Heterorganic adjacent consonants are prohibited.)

(b) AGREECOONS(place)

Given the cluster XY, in which Y is placed in onset position and X in coda position, X must show the same place specification as Y.

(c) IDENT-IO(place)

  The specification for place of articulation of an input must be preserved in its output correspondent (see McCarthy–Prince 1995).

(d) IDENTONSET(place)

  The segment of S_2 placed in onset position must have the same specification as its correspondent in S_1 (Lombardi 2001; Beckman 1997).

(50) IDENTONSET(place), AGREECOONS(place) ≫ IDENT-IO(place) ≫ AGREE(place)

(51) (a) Place preservation in word final position

  pocs /pɔk+z/ [ˈpɔks] 'few'

/pɔk+z/	AGREECOONS (place)	IDENT-IO (place)	AGREE (place)
☞ (a) [ˈpɔks]			*
(b) [ˈpɔts]		*!	

(b) Regressive place assimilation in heterosyllabic clusters

  poc segur /pɔk##səguɾ/ [ˌpɔt.tsə.ˈɣu] 'not safety'

/pɔk##səguɾ/	IDENTONSET (place)	AGREECOONS (place)	IDENT-IO (place)	AGREE (place)
(a) [ˌpɔk.sə.ˈɣu]		*!		*
☞ (b) [ˌpɔt.sə.ˈɣu]			*	
(c) [ˌpɔk.xə.ˈɣu]	*!		*	

(c) Regressive place assimilation in heterosyllabic clusters

  pocs animals /pɔk+z##ənimal+z/ [ˌpɔd.ʤə.əni.ˈmals] 'few animals'

/pɔk+z##ənimal+z/	IDENTONSET (place)	AGREECOONS (place)	IDENT-IO (place)	AGREE (place)
(a) [ˌpɔg.zə.ni.ˈmals]		*!		*
☞ (b) [ˌpɔd.zə.ni.ˈmals]			*	
(c) [ˌpɔk.xə.ni.ˈmals]	*!		*	

With the set of constraints given so far, however, we are unable to explain regressive place assimilation in a case such as *fix* [ˈfits] '(I) fix' (see (13c)), where the two final consonants are placed in coda position and, therefore, regressive place assimilation is not expected. The presence of assimilation in these verb forms could be explained by appealing to a constraint responsible for the uniformity of the paradigm. As shown in the following 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.

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

    fixes   ['fit.səs]   '(you) fix'
    fixa   ['fit.sə]   '(he/she) fixes'
    fixam   [fit.'sam]   '(we) fix'
    fixau   [fit.'saw]   '(you) fix'
    fixen   ['fit.sən]   '(they) fix'

(53) Present indicative paradigm of *relaxar* 'to relax' in Minorcan Catalan

    relaxes   [rə.'lat.səs]   '(you) relax'
    relaxa   [rə.'lat.sə]   '(he/she) relaxes'
    relaxam   [rə.lət.'sam]   '(we) relax'
    relaxau   [rə.lət.'saw]   '(you) relax'
    relaxen   [rə.'lət.sən]   '(they) relax'

The pressure that all these forms exert over the first person singular form is responsible for the application of regressive place assimilation in this context, where, according to the regular behavior, it is not expected. The constraint responsible for this special behavior may be a paradigm uniformity constraint which ensures that the correspondent segments belonging to the shared stem have the same value for a specific property, in this case, place of articulation. In Pons (2002a;b), it is argued that the constraint responsible for the overapplication of regressive place assimilation in a case like *fix* ['fits] '(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* ['fits] '(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-IDENT(place) (see (54)).

    The paradigm candidate with the form without regressive place assimilation acting as the attractor, (54c), cannot be the winner because it involves multiple fatal violations of the markedness constraint AGREECO-ONS(place). The paradigm candidate with alternations for the place feature, (54a), is also excluded because OP-IDENT(place) is crucially ranked above IDENT(place). The winner is the one that satisfies both AGREE-COONS(place) and OP-IDENT(place) constraints, (54b), in spite of the syllabic position of the cluster.

(54) *fixar* 'to fix'

⟨/fiks/, /fiks+ə+z/, /fiks+ə/, /fiks+a+m/, /fiks+a+w/, /fiks+ə+n/⟩	OP-Ident (place)	AgreeCoOns (place)	Ident-IO (place)	Agree (place)
(a) ⟨['fiks], ['fit.səs], ['fit.sə], [fit.'sam], [fit.'saw], ['fit.sən]⟩	*!(5∗1∗2)		∗ ∗ ∗ ∗ ∗	∗
☞ (b) ⟨['fits], ['fit.səs], ['fit.sə], [fit.'sam], [fit.'saw], ['fit.sən]⟩			∗ ∗ ∗ ∗ ∗ ∗	
(c) ⟨['fiks], ['fik.səs], ['fik.sə], [fik.'sam], [fik.'saw], ['fik.sən]⟩		∗ ∗ ∗ ∗ ∗!		∗ ∗ ∗ ∗ ∗ ∗

5. Concluding remarks

In this paper we have presented two types of formal approaches that aim to account for the exceptional phonological behavior of the 1sg.pi verb forms in Balearic Catalan with respect to the regular phonology of the language: one that relies on the invisible and the other that relies on the visible. The first kind of approaches, indeed, impute this behavior to the special syllabic status of the final clusters associated to these verb forms, and, also, to the existence of an absolutely invisible morpheme. The other kind of approach, in contrast, attributes the special behavior to the pressure that other members in the inflectional paradigm exert. The "syllabically driven approaches" have to face severe problems, such as circular argumentation, inconsistencies with other sites of the morphology of Catalan (i.e., nominal inflection) and not homogeneous phonological conducts as far as the syllable is concerned. The paradigmatic approach appears to be more realistic in the sense that it does not need to resort to an abstract element.

In this paper, two paradigmatic approaches have been critically reviewed. One which considers that the special phonological behavior can be explained, in some cases, as a strategy to avoid homophonous verbal forms within the same paradigm and, in others, as a strategy to level the stem shared by the members of the paradigm; and another which views this special behavior exclusively as a paradigm uniformity effect. We have seen that the potential problems of the first approach can be straightforwardly explained resorting to constraint interaction. The approximation that relies exclusively on paradigm uniformity and that understands that underapplication of epenthesis is a strategy to maintain the uniformity

of the stems fails once it is accepted that the epenthetic vowel does not belong to the stem.

After reviewing previous approaches to PARADIGMATIC CONTRAST within the Optimality Theory framework, a formalization of homophony avoidance has been proposed in order to properly implement it.

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Appendix I: Balearic verbal forms
with underapplication of epenthesis

Two final consonants			*Three final consonants*		
accept	[ət.ˈtsett]	'(I) accept'	centr	[ˈsen̪tɾ]	'(I) center'
adapt	[ə.ˈðatt]	'(I) adapt'	concentr	[kun.ˈsen̪tɾ]	'(I) concentrate'
intercept	[in̪.tər.ˈsett]	'(I) cut off'	entr	[ˈən̪tɾ]	'(I) enter'
opt	[ˈott]	'(I) opt'	engendr	[ən̪.ˈʒɛn̪tɾ]	'(I) beget'
afect	[ə.ˈfətt]	'(I) concern'	filtr	[ˈfil̪tɾ]	'(I) seep'
connect	[ku.ˈnett]	'(I) connect'	compr	[ˈkompɾ]	'(I) buy'
inject	[in̪.ˈʒett]	'(I) inject	empr	[ˈəmpɾ]	'(I) use'
redact	[rə.ˈðatt]	'(I) write'	desmembr	[dəz.ˈmempɾ]	'(I) dismember'
tract	[ˈtɾatt]	'(I) deal with'	nombr	[ˈnompɾ]	'(I) mention'
alegr	[ə.ˈlekɾ]	'(I) am glad'	sembr	[ˈsəmpɾ]	'(I) sow'
arregl	[ə.ˈrekl]	'(I) fix'	timbr	[ˈtimpɾ]	'(I) postmark'
penetr	[pə.ˈnetɾ]	'(I) penetrate'	administr	[əm.mi.ˈnistɾ]	'(I) administer'
idolatr	[i.ðu.ˈlatɾ]	'(I) idolize'	castr	[ˈkastɾ]	'(I) castrate'
envidr	[əɱ.ˈvitɾ]	'(I) glass'	enclaustr	[əŋ.ˈklawstɾ]	'(I) enclosure'
quadr	[ˈkwatɾ]	'(I) fit'	enllustr	[əʎ.ˈʎustɾ]	'(I) polish'
celebr	[sə.ˈlepɾ]	'(I) celebrate'	enregistr	[ən.rə.ˈʒistɾ]	'(I) register'
cobr	[ˈkopɾ]	'(I) earn'	ensinistr	[ən.si.ˈnistɾ]	'(I) train'
calibr	[kə.ˈlipɾ]	'(I) calibrate'	esfondr	[əs.ˈfontɾ]	'(I) fall down'
equilibr	[ə.ki.ˈlipɾ]	'(I) balance'	il·lustr	[i.ˈlustɾ]	'(I) illustrate'
sobr	[ˈsopɾ]	'(I) remain'	mostr	[ˈmostɾ]	'(I) show'
vibr	[ˈvipɾ]	'(I) vibrate'	subministr	[sum.mi.ˈnistɾ]	'(I) supply'
recobr	[rə.ˈkopɾ]	'(I) recover'	naspr	[ˈnaspɾ]	'(I) suck out'
ensucr	[ən.ˈsukɾ]	'(I) sugar'	emporpr	[əm.ˈporpɾ]	'(I) make purple'
involucr	[iɱ.vu.ˈlukɾ]	'(I) involve'	contempl	[kun̪.ˈtempl]	'(I) look at'
consagr	[kun.ˈsakɾ]	'(I) consecrate'	eixampl	[ə.ˈʃampl]	'(I) enlarge'
desintegr	[də.ziŋ.ˈtekɾ]	'(I) decompose'	arrambl	[ə.ˈrampl]	'(I) make off with'
emigr	[ə.ˈmikɾ]	'(I) emigrate'	assembl	[ə.ˈsəmpl]	'(I) look like'
obr	[ˈɔpɾ]	'(I) open'	sembl	[ˈsəmpl]	'(I) seem'
dobl	[ˈdopl]	'(I) duplicate'	vincl	[ˈviŋkl]	'(I) associate'
mobl	[ˈmɔpl]	'(I) furnish'	arrengl	[ə.ˈreŋkl]	'(I) line up'
pobl	[ˈpɔpl]	'(I) colonize'	mescl	[ˈməskl]	'(I) blend'
recicl	[rə.ˈsikl]	'(I) recycle'	xiscl	[ˈʃiskl]	'(I) yell'
xucl	[ˈʃukl]	'(I) sip'	encercl	[ən.ˈserkl]	'(I) circle'

Appendix II: Balearic verbal forms with underapplication
of *-n* and *-r* deletion

1sg.pi verbal forms			*Nominal forms*		
abandon	[ə.βən̪.ˈdon]	'(I) abandon'	*abandó*	[ə.βən̪.ˈdo]	'abandonment'
accion	[ə.ˈtsjon]	'(I) operate'	*acció*	[ə.ˈtsjo]	'action'
alen	[ə.ˈlɛn]	'(I) breathe'	*ale*	[ə.ˈlɛ]	'breath'
coaccion	[ku.ə.ˈtsjon]	'(I) coerce'	*coacció*	[ku.ə.ˈtsjo]	'coercion'
col·leccion	[ku.lə.tsjon]	'(I) collect'	*col·lecció*	[ku.lə.ˈtsjo]	'collection'
condicion	[kun̪.di.ˈsjon]	'(I) condition'	*condició*	[kun̪.di.ˈsjo]	'condition'
destin	[dəs.ˈtin]	'(I) send'	*destí*	[dəs.ˈti]	'destination'
enton	[ən̪.ˈton]	'(I) sing'	*to*	[ˈtɔ]	'tone'
fren	[ˈfren]	'(I) brake'	*fre*	[ˈfrɛ]	'brake'
il·lusion	[i.lu.ˈzjon]	'(I) excite'	*il·lusió*	[i.lu.ˈzjo]	'illusion'
patin	[pə.ˈtin]	'(I) skate'	*patí*	[pə.ˈti]	'skate'
perdon	[pər.ˈðon]	'(I) forgive'	*perdó*	[pər.ˈðo]	'pardon'
raon	[rə.ˈon]	'(I) reason'	*raó*	[rə.ˈo]	'reason'
relacion	[rə.lə.ˈsjon]	'(I) relate'	*relació*	[rə.lə.ˈsjo]	'relation'
subvencion	[suv.vən.ˈsjon]	'(I) subsidize'	*subvenció*	[suv.vən.ˈsjo]	'subsidy'
acalor	[ə.kə.ˈloɾ]	'(I) heat'	*calor*	[kə.ˈlo]	'heat'
aflor	[ə.ˈfloɾ]	'(I) appear'	*flor*	[ˈflɔ]	'flower'
alleuger	[ə.ʎəw.ˈʒeɾ]	'(I) lighten'	*lleuger*	[ʎəw.ˈʒe]	'light'
color	[ku.ˈloɾ]	'(I) color'	*color*	[ku.ˈlo]	'color'
cur	[ˈkuɾ]	'(I) cure'	*dur*	[ˈdu]	'hard'
demor	[də.ˈmoɾ]	'(I) delay'	*claror*	[klə.ˈro]	'brightness'
incorpor	[iŋ.kur.ˈpoɾ]	'(I) incorporate'	*cursor*	[kur.ˈso]	'cursor'
elabor	[ə.lə.ˈβoɾ]	'(I) manufacture'	*defensor*	[də.fən.ˈso]	'defender'
explor	[es.ˈploɾ]	'(I) explore'	*deserto*	[də.zər.ˈto]	'deserter'
lider	[li.ˈðeɾ]	'(I) lead'	*doctor*	[dut.ˈto]	'doctor'
mesur	[mə.ˈzuɾ]	'(I) analyze'	*immadur*	[im.mə.ˈðu]	'immature'
valor	[və.ˈloɾ]	'(I) value'	*valor*	[və.ˈlo]	'value'
repar	[rə.ˈpaɾ]	'(I) fix'	*sopar*	[su.ˈpa]	'dinner'
respir	[rəs.ˈpiɾ]	'(I) breathe'	*dinar*	[di.ˈna]	'lunch'
tir	[ˈtiɾ]	'(I) throw'	*monestir*	[mu.nəs.ˈti]	'monastery'
retir	[rə.ˈtiɾ]	'(I) remove'	*insegur*	[in.sə.ˈɣu]	'unsafe'
sur	[ˈsuɾ]	'(I) stay afloat'	*segur*	[sə.ˈɣu]	'safe'

## Appendix III: Eivissan verbal forms with underapplication
of cluster reduction

1sg.pi verbal forms			*Nominal and adjectival forms*		
adjunt	[əd.ˈʤun̪t]	'(I) enclose'	adjunt	[əd.ˈʤun]	'enclosed'
aliment	[ə.li.ˈmen̪t]	'(I) feed'	aliment	[ə.li.ˈmen]	'food'
ambient	[əm.ˈbjen̪t]	'(I) set'	ambient	[əm.bi.ˈen]	'atmosphere'
apunt	[ə.ˈpun̪t]	'(I) annotate'	apunt	[ə.ˈpun]	'note'
cant	[ˈkan̪t]	'(I) sing'	cant	[ˈkan]	'singing'
document	[du.ku.ˈmen̪t]	'(I) document'	document	[du.ku.ˈmen]	'document'
encant	[əŋ.ˈkan̪t]	'(I) fascinate'	encant	[əŋ.ˈkan]	'fascination'
aguant	[ə.ˈɣwan̪t]	'(I) bear'	elegant	[ə.lə.ˈɣan]	'elegant'
cont	[ˈkon̪t]	'(I) tell'	pont	[ˈpɔn]	'bridge'
plant	[ˈplan̪t]	'(I) plant'	implant	[im.ˈplan]	'graft'
coment	[ku.ˈmen̪t]	'(I) comment on'	pendent	[pən̪.ˈden]	'slope'
blind	[ˈblin̪t]	'(I) armor-plate'	tint	[ˈtin]	'dye'
brind	[ˈbrin̪t]	'(I) drink a toast'	vint	[ˈvin]	'twenty'
fund	[ˈfun̪t]	'(I) found'	punt	[ˈpun]	'point'
comand	[ku.ˈman̪t]	'(I) command'	normand	[nur.ˈman]	'Norman'
inund	[i.ˈnun̪t]	'(I) flood'	fecund	[fə.ˈkun]	'fertile'
asfalt	[əs.ˈfal̪t]	'(I) asphalt'	asfalt	[əs.ˈfal]	'asphalt'
dificult	[di.fi.ˈkul̪t]	'(I) hind'	ocult	[u.ˈkul]	'hidden'
escolt	[as.ˈkol̪t]	'(I) listen'	revolt	[rə.ˈvɔl]	'turn'
facult	[fə.ˈkul̪t]	'(I) authorize'	indult	[in̪.ˈdul]	'remission'
ocult	[u.ˈkul̪t]	'(I) hide'	insult	[in.ˈsul]	'insult'
ressalt	[rə.ˈsal̪t]	'(I) highlight'	molt	[ˈmol]	'a lot'
salt	[ˈsal̪t]	'(I) jump'	salt	[ˈsal]	'jump'
sold	[ˈsɔl̪t]	'(I) weld'	herald	[ə.ˈral]	'herald'
mald	[ˈmal̪t]	'(I) take care'	herald	[ə.ˈral]	'herald'
acamp	[ə.ˈkamp]	'(I) camp'	camp	[ˈkam]	'field'
escamp	[əs.ˈkamp]	'(I) disperse'	llamp	[ˈʎam]	'flash'
estamp	[əs.ˈtamp]	'(I) print'	llamp	[ˈʎam]	'flash'
tremp	[ˈtremp]	'(I) dress'	tremp	[ˈtrem]	'dressing'
tomb	[ˈtomp]	'(I) revolve'	rumb	[ˈrum]	'course'

Appendix IV: Balearic verbal forms with underapplication of gliding

1sg.pi verbal forms			*Nominal and adjectival forms*		
activ	[ət.ˈtif]	'(I) action'	*actiu*	[ət.ˈtiw]	'active'
arxiv	[ər.ˈʃif]	'(I) file'	*arxiu*	[ər.ˈʃiw]	'file'
avivar	[ə.ˈvif]	'(I) enliven'	*viu*	[ˈviw]	'alive'
desmotiv	[dəz.mu.ˈtif]	'(I) lose interest'	*motiu*	[mu.ˈtiw]	'motif'
manllev	[məʎ.ˈʎef]	'(I) borrow'	*manlleu*	[məʎ.ˈʎew]	'borrowing'
esquiv	[əs.ˈkif]	'(I) shirk'	*esquiu*	[əs.ˈkiw]	'evasive'
aprov	[ə.ˈprɔf]	'(I) approve'	*esclau*	[əs.ˈklaw]	'slave'
grav	[ˈɡɾaf]	'(I) copy'	*eslau*	[əz.ˈlaw]	'Slav'
llev	[ˈʎef]	'(I) remove'	*iguslau*	[ju.ɣuz.ˈlaw]	'Yugoslavian'
priv	[ˈpɾif]	'(I) deprive'	*massiu*	[mə.ˈsiw]	'massive'
cav	[ˈkaf]	'(I) dig'	*adoptiu*	[ə.ðut.ˈtiw]	'adoptive'
cov	[ˈkɔf]	'(I) cook'	*agressiu*	[ə.ɣɾə.ˈsiw]	'aggressive'
deriv	[də.ˈɾif]	'(I) derivate'	*explosiu*	[əs.plu.ˈziw]	'explosive'

Appendix V: Absence of voicing in final obstruents
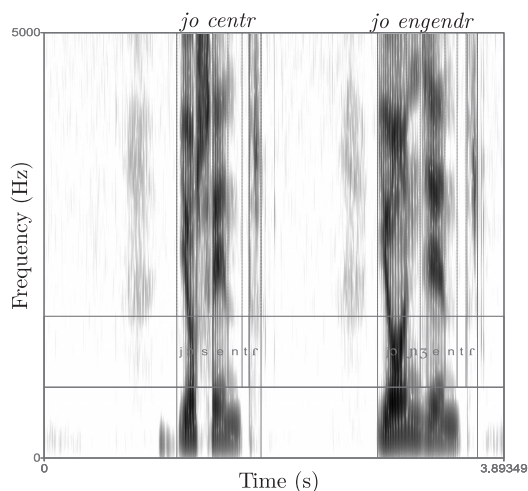
Spectrogram corresponding to the production of the sentences
jo centr '(I) center' (with an underlying unvoiced obstruent)
and *jo engendr* '(I) beget' (with an underlying voiced obstruent).