

Coda-avoiding: Some Evidence from Portuguese [1]

João VELOSO – University of Porto (Portugal), jveloso@letras.up.pt

Abstract. Romance languages are known to be more restrictive than Germanic languages as far as segmental coda-filling is concerned. Moreover, it is also known that within the Romance family some languages have more restrictive constraints ruling coda-filling than others. This paper deals with the specific question of segmental coda-filling in Portuguese. Looking at a large array of different historical phenomena, it is claimed that avoiding any segmental material in coda position corresponds to a very strong tendency of Portuguese phonology which is surfaced under several manifestations. A typological distinction is then proposed here on the basis of the ranking of AVOIDCODA as a prosodic constraint. Such distinction allows not only the differentiation among Romance languages but also between European and Brazilian Portuguese, since Brazilian Portuguese seems to be even more restrictive than European Portuguese in this particular respect.

Resumen. Las lenguas románicas son más restrictivas que las lenguas germánicas con respecto al relleno segmental de las codas silábicas. Además, hay que tener en cuenta que incluso cuando comparamos diferentes lenguas románicas hay lenguas más restrictivas que otras en cuanto al relleno de las codas silábicas. Este artículo tratará sobre la cuestión específica del relleno segmental de las codas silábicas del portugués. Nos basaremos sobre la observación de diferentes fenómenos históricos para proponer que el vaciamiento de todo el material segmental de la posición de coda corresponde a una fuerte tendencia de la fonología del portugués que se traduce por una serie de diversas manifestaciones de superficie. Se propondrá entonces una distinción tipológica basada en el *ranking* de una restricción prosódica como EVITARCODA. Esa distinción permitiría no solo una diferenciación entre lenguas románicas pero también entre las variedades europea y brasileña del portugués, ya que el portugués brasileño, según la presente propuesta, parece aún más restrictivo que el portugués europeo en lo que toca a esta materia en particular.

Key Words/Descriptors. Syllabic structures; Coda constraints; Portuguese syllables; Romance syllables

This paper will discuss some topics related to syllable codas in Portuguese. Our main suggestion will be that avoiding any segmental material in coda position corresponds to a rather strong phonological constraint of Portuguese which has been very effective ever since in the history of this language.

In the introductory remarks of section 1, some basic assumptions about the marked character of coda-filling in various language families will be surveyed, so that the specific question of Portuguese coda-filling can be discussed more thoroughly from section 2 onwards.

1 – Preliminary remarks: the markedness of coda-filling in the world’s languages, in Romance and in Portuguese

Throughout the world’s languages, coda-filling corresponds to a marked [2] syllabic format, as expressed by the universal constraint NOCODA of Optimality Theory (OT) (Prince & Smolensky 1993; Cohn 2001: 195; Van Oostendorp 2005: 2 ff.), reformulated as –COD in Prince & Smolensky (2004: 41, 106 and *passim*).

Cross-linguistically, empty codas (i.e., open syllables) are more frequent than closed syllables’ filled codas (in fact, no language disallows open syllables – Van Oostendorp 2005: 2). A universal implicational relationship between filled and empty codas expresses this regularity: if one language has only one of these two syllable types, the attested format is the empty, not the filled, coda (Blevins 1995: 218 ff.; Cohn 2001: 195; Van Oostendorp 2005: 2 ff.). This observation shows that low occurrence frequency and exceptionality – two important requirements for markedness [3] – are associated with coda-filling in most languages.

Moreover, coda neutralisation [4] and the «Onset/Coda licensing asymmetry» (Prince & Smolensky 2004: 154-156, 188) [5] are found cross-linguistically: as a general pattern, the number of consonants admitted in coda position is always lower than the number of consonants admitted in syllable onsets (Blevins 1995: 218 ff.; Cohn 2001: 195; Prince & Smolensky 2004: 154-156, 188; Van Oostendorp 2005: 2 ff.). As a result of this, coda consonants are restricted to the unmarked items of the consonant inventory of each language (Kenstowicz 1994: 62; Kiparsky 2004: 17-18).

Therefore, filled codas are commonly accepted as a universally marked format. Accordingly, CV syllables are viewed as the universally unmarked syllabic format, i.e., as the «core syllable» (see, among others: Kaye & Lowenstamm 1981: 290 [6]; Roca 1994: 139-40; Blevins 1995: 216-220; Cohn 2001: 195; Van Oostendorp 2005: 2 ff.; see also Prince & Smolensky's (2004:106) Basic Syllable Structure Constraints).

Romance languages are not an exception regarding the markedness of filled codas. Indeed, if we compare Romance codas to Germanic codas, or even to Classical Latin codas [7], it can be said that Romance languages seem to be comparatively more restrictive as far as coda-filling is concerned (Mateescu 2003) [8]. Notwithstanding, it should also be borne in mind that, as underlined by Lausberg (1963: 227), even within Romance some languages are more restrictive than others in this particular aspect of phonological structure. Within this framework, Portuguese – both in its European and Brazilian varieties – could be included in the set of the most restrictive Romance languages with respect to coda-filling.

2 – The exceptionality of coda-filling in Portuguese

In the following paragraphs, we will concentrate on some properties of Portuguese phonology that highlight the just mentioned assumption of Portuguese as a restrictive language regarding coda-filling.

Indeed, Portuguese phonology may be seen, in this respect, as even more restrictive than other Romance and Ibero-Romance languages. See, for instance, that Spanish admits a larger inventory of consonants in coda position, which includes, differently from Portuguese, [-son], [-cor] segments. According to Navarro Tomás (1926: 94, 99-100), Harris (1989: 499-500) and Quilis (1993: 382), this inventory includes the consonants /b/, /p/, /d/, /t/, /θ/, /g/, /k/, /x/, /N/,

/R/, /s/ and /l/, which can occur either in simple or bipositional codas (Navarro Tomás 1926: 94, 99-100 [9], 108-109; Harris 1989: 499-500; Quilis 1993: 370-371).

At first glance, two commonly mentioned characteristics of Portuguese syllables would be sufficient to emphasise the markedness of segmentally filled codas in this language: comparative frequency of open vs. closed syllables and the structural restrictions that rule coda-filling.

As for the occurrence frequency of open vs. closed syllables in Portuguese, especially in European Portuguese (EP), the quantitative predominance of open syllables is explicitly acknowledged in several phonological descriptions (see, for instance: Barbosa 1983: 211-212; Barroso 1999: 161) [10]. It is also demonstrated by quantitative studies which deal with the specific question of the frequency of the different syllable types of this language: as demonstrated by studies such as those of D'Andrade & Viana (1994: 41-42), Vigário & Falé (1994: 468, 472) and Vigário, Martins & Frota (2006), there is a clear statistical predominance of V- and CV-syllables within the set of the most frequent words of Portuguese.

With respect to the structural restrictions that rule coda-filling in this language, it has to be noticed that the limitations which apply to coda-filling in Portuguese stem from two different categories: «quantitative» restrictions (the maximum number of consonants admitted within a single coda) and «qualitative» restrictions (which consonants, from the entire phoneme inventory of the language, can be licensed as coda-fillers). As far as quantitative restrictions are concerned, it is generally assumed that Portuguese does not admit more than one consonant in a segmentally filled coda (Mateus & D'Andrade 2000: 53) [11]. Qualitative limitations, by their own hand, show that EP fully agrees with coda neutralisation and the onset-coda licensing asymmetry, for the inventory of consonants that are admitted in coda position does correspond

to a very small subset of the consonants of this language, indeed to a small subset of the consonants admitted in onset position [12]. In fact, from the entire phonological consonant inventory of EP, only /l/ [13], /r/ and /S/ [14] can occur as segmental coda-fillers [15] (Barbosa 1983: 177, 181-182; 1994: 150 ff.; Barroso 1999: 143 [16]; Mateus & D'Andrade 1998: 21-23; 2000: 11-12, 52-54; Mateus, Brito, Duarte, Faria, Frota, Matos, Oliveira, Vigário & Villalva 2003: 1046-1047) [17]. In the demarcation of this subset, sonorancy [18] and coronality seem to play an important role: with the sole exception of /S/, EP coda-consonants are [+sonorant]. Additionally, these three phonological consonants are [+coronal], which is, according to Mateus & D'Andrade (2000: 35) and Mateus et al. (2003: 1008), the predictable, unmarked C-place feature in EP [19]. Bearing in mind that [+sonorant] segments have high degrees of syllabic sonority [20], this observation also shows that sonority gaps are more easily tolerated in the onset-nucleus sequence than in the nucleus-coda relation (Blevins 1995: 227), in accordance with the Sonority Dispersion Principle (SDP; Clements (1990), referred to by Calabrese 1996: 6) [21].

The coda-filling limitations of Portuguese that have been considered so far correspond to rough phonological properties of Modern Portuguese. They are widely mentioned in current phonological descriptions of the language, such as Barbosa (1983; 1994), Barroso (1999) and Mateus & D'Andrade (2000), among others. In the next sections, we will focus on some historical data from different periods of the history of Portuguese. Such data illustrate a systematic attempt to inhibit segmental coda-filling in different stages of the history of Portuguese. They will be presented here as a set of related manifestations of a common, underlying tendency towards coda-emptying.

2.1 – Complete deletion of Latin [-sonorant] codas

In the historical change from Latin etyma to Modern Portuguese words, many [-sonorant] consonants in coda position were completely deleted from the words' phonological representation (see examples in (1) [22]), although conventional spelling still maintains their graphical representation in many written forms of official Portuguese orthography [23].

- (1)
Lat. *op.ti.mum* > EP *ó<p>timo* [ˈɔ.ti.mu] ‘very good’
Lat. *aċ.tum* > EP *a<c>to* [ˈa.tu] ‘act’
Lat. *sep.tem* > EP *sete* [ˈsɛ.ti] ‘seven’

These examples seem to allow the structural explanation given in (2), showing how many Portuguese empty codas ((2b)) emerged from Latin filled codas ((2a)).

- (2)
The emergence of Portuguese empty codas from Latin filled codas
- | | | |
|---|---|---|
| (2a) | | (2b) |
| Latin | | Portuguese (European/Brazilian) |
| [V _{Nucleus} C _{Coda}]Rime | → | [V _{Nucleus} ∅ _{Coda}]Rime |

2.2 – Gliding of Latin [-sonorant] codas

The same [-sonorant] Latin codas mentioned in 2.1 could also undergo a different change when they were admitted in Portuguese, as they evolved very often into a glide (traditional historical phonetics uses the term «semivocalization» to describe this change; see Xavier & Mateus 1990: 330). If we accept that the VG-diphthong that results from this gliding belongs to a branching nucleus (Mateus & D’Andrade 2000: 46; Mateus et al. 2003: 1044) [24], the main prosodic consequence of this change is, once again, the emptying of a historically filled coda: like consonant deletion presented in 2.1, gliding demonstrates – it rather «confirms» – the same

tendency towards coda-emptying in this language since it also generates empty codas (see examples in (3) and summary in (4)).

- (3)
 Lat. *ac.tum* > EP *au.to* [ˈaw.tu] ‘theatre play’
 Lat. *fac.tum* > EP *fej.to* [ˈfej.tu] ‘feat’
 Lat. *oc.to* > EP *oi.to* [ˈoj.tu] ‘eight’
 Lat. *pec.tus* > EP *pei.to* [ˈpej.tu] ‘breast’

- (4)
 Gliding and coda-emptying from Latin to Portuguese
- | | | |
|---|---|--|
| (4a) | | (4b) |
| Latin | | Portuguese (European/Brazilian) |
| [V _{Nucleus} C _{Coda}]Rime | → | [VG _{Nucleus} ∅ _{Coda}]Rime |

Certain etyma underwent coda-emptying more than once and according to both possibilities (consonant deletion and consonant gliding) in the history of Portuguese. Indeed, in the 15.th and 16.th centuries, Portuguese was subject to a deliberate effort of «relatinization», lead mainly by the first grammarians of the language (Teyssier 1980: 86 ff.). Such effort consisted of introducing in the lexicon some words directly borrowed from Classical Latin (the same occurred also with words from Classical Greek), i.e., as «learned words» (Teyssier 1980: 42, 86 ff.; Pountain 2003) “[...] which have not had a continuous descent from spoken Latin but which have been borrowed directly from Latin as a result of learned awareness of Latin from the Middle Ages on” (Pountain 2003: 9). These new lexical entries were meant to keep, as much as possible, the original phonological structures of their original language (Teyssier 1980: 87) [25]. Nevertheless, in spite of such deliberate effort to introduce in Portuguese some phonological structures that had been discarded a few centuries before in the history of the language, such as [-sonorant] codas, and in spite of the fact that official orthography renders the written representation of these consonants mandatory, the grammar of the language

eliminated them for the second time in history (not through gliding, as it had happened before, but through complete deletion).

The Latin word «*actum*» exemplifies this situation: when it was first introduced in Medieval Portuguese through spontaneous evolution from a Latin etymon, this word was «reshaped» as «*auto*» ‘theatre play’ and «*eito*» ‘straight’, i.e., with the gliding of coda-/k/ (therefore transferred into the nucleus – (4) and (5a)). When, in the context of Renaissance relatinization, it was reintroduced as «*acto*» ‘act’ (expectedly with a [-sonorant] consonant, /k/, in coda), this «unadmitted» coda was, for the second time in history, eliminated, now by means of consonant deletion ((2) and (5b)). Note that the three forms descending from Lat. «*actum*» always present empty codas, as shown in (5).

(5)
 Different manifestations of coda-deletion in Portuguese with the same Latin etymon
 Latin
ac.tum
 [a_{Nucleus}k_{Coda}]Rime

(5a)
 → Medieval Portuguese («continuous descent»)
au.to and *ei.to*
 [a_{WNucleus}∅_{Coda}]Rime [e_{jNucleus}∅_{Coda}]Rime

(5b)
 → Renaissance Portuguese («learned word»)
a<c>.to
 [a_{Nucleus}∅_{Coda}]Rime

2.3 – Nucleation of Latin [+nasal] segmental codas

At the phonetic level, Modern EP, in its standard dialect, includes a set of five «nasal vowels»: [ĩ ē ẽ õ ũ] (Barbosa 1983: 81 ff.; 1994: 55-56, 112; Barroso 1999: 73-77; Mateus & D’Andrade 2000: 18; Mateus et al. 2003: 992). Phonologically, according to the same authors, nasal vowels are though assumed to correspond to a theoretical, abstract combination of a non-

nasal vowel «plus» nasality (i.e.: [V̄]=/VN/; see, for instance: Barbosa 1983: 92 ff.; Mateus & D’Andrade 2000: 21 ff.). Nasality is then interpreted as a theoretical segment «deleted at the phonetic level» (Mateus & D’Andrade 2000: 23), as a «floating segment» (Mateus & D’Andrade 2000: 130, 131), an «autosegment» (D’Andrade 1994: 134, 138; Mateus & D’Andrade 2000: 131-132) or an «archiphoneme» (Barbosa 1983: 96 ff.; 1994: 195-196; Barroso 1999: 143) that is licensed as coda (Barbosa 1983: 210; 1994: 137; Barroso 1999: 126, 143, 159; Mateus & D’Andrade 2000: 21 [26]). This interpretation is exemplified in (6), where N stands for such abstract unit [27].

(6)
 Prosodic representation of Portuguese nasal vowels
 $[V_{\text{Nucleus}}N_{\text{Coda}}]_{\text{Rime}}$

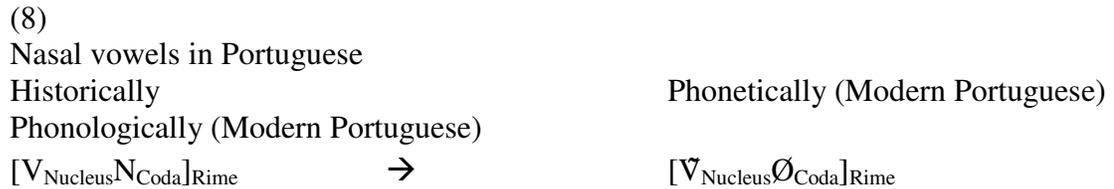
Nasality as a segmental element of the syllable which is independent from the preceding vowel existed in Latin (Touratier 2005: 126-128). It is also maintained in modern Romance languages like Spanish and Italian (see (7)). Contrarily, in Modern Portuguese, nasality has lost its segmental nature [28], and only underlyingly is it accepted as a coda-filler (see (7), where N, once again, does not represent a segment – instead it stands for an autosegmental property).

(7)
 Phonetic realization and prosodic status of nasal vowels in Latin, Spanish and Portuguese

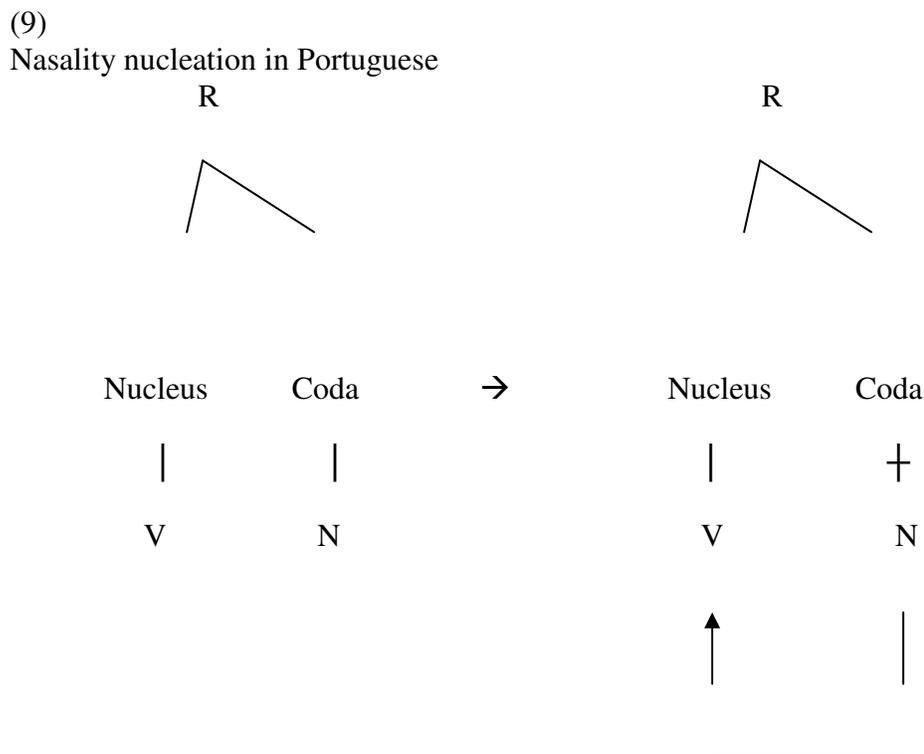
Lat. <i>cam.pu(m)</i>		Sp./It. <i>cam.po</i>	Port. <i>cam.po</i>
[‘kam.pum]	→	[‘kam.po]	[‘kẽ̃.pu]
$[a_{\text{Nucleus}}m_{\text{Coda}}]_{\text{Rime}}$		$[a_{\text{Nucleus}}m_{\text{Coda}}]_{\text{Rime}}$	$[a_{\text{Nucleus}}N_{\text{Coda}}]_{\text{Rime}}$

In sum, for the understanding of this particular aspect, it is necessary to relate (i) the historical origin of Portuguese nasal vowels [29] and (ii) their current phonological status in Modern

Portuguese (=V+N, both as independent units split into nucleus and coda separately) to their phonetic realization (=V̄, one single element, belonging only to nucleus, i.e., emptying the coda), as represented in (8).



So, nasality was seemingly «transferred» into the preceding vowel, i.e., it was moved into the syllable nucleus, as represented in (9). According to Morales-Front & Holt (1997: 402-403), nasality underwent, in their own words, a process of «nucleation» [30].



2.4 – Complete deletion of segmental /n/-endings of Classical Latin and Greek

Being a [+sonorant], [+coronal] consonant, /n/ apparently fulfils the requirements to become a coda-filler in EP. Notwithstanding, just a very few learned words admit such possibility in word-final position only [31]. Besides, even this small lexical subset underwent coda-emptying, as it is shown in (10).

(10)

Lat. *regimen* > EP *re.gi.me* [ri.'ʒi.mi] 'regimen'

Lat. *carmen* > EP *car.me* ['kar.mi] 'poem'

Lat. *abdomen* > EP *ab.do.me* [ɐ.b.'dɔ.mi] 'abdomen' [32]

Greek *oxymoron* > EP *o.xí.mo.ro* [ɔ.'ksi.mu.ru] 'oxymoron'

Greek *hyperbaton* > EP *hi.pér.ba.to* [i.'pɛr.bɐ.tu] 'hyperbaton'

2.5 – Complete velarization of coda-/l/

In most dialects of Brazilian Portuguese (BP) (Monaretto, Quednau & Hora 1996: 215; Mateus & D'Andrade 2000: 12; Tasca 2002: 273 e ss.; Silva 2002: 162-165; Mateus et al. 2003: 46, 1047), as well as in certain northern dialects of EP (Boléo & Silva 1962: 96; Mateus & D'Andrade 2000: 12), coda-[ɫ] is often surfaced as [w] (e. g.: *mel* /mɛɫ/ 'honey' – EP: [mɛɫ]; BP [mɛw]). It undergoes, then, «complete velarization» [33], characterised by the complete lost of alveolar articulation (by other words, by means of the complete lost of all C-place features). Therefore, coda-/l/, even if [+sonorant], [+coronal], can undergo gliding as well, just as it happened very often with [-sonorant] etymological Latin codas in Medieval Portuguese (see

2.2). Hence, the explanation summarised in (4a) can be accepted for this case as well. This is the proposal of (11).

$$\begin{array}{ccc}
 (11) & & \\
 \text{Complete velarization of coda-}/ & & \text{Complete velarization of coda-}/ \\
 (11a) & & (11b) \\
 [V_{\text{Nucleus}}/l_{\text{Coda}}]_{\text{Rime}} & \rightarrow & [V^w_{\text{Nucleus}}\emptyset_{\text{Coda}}]_{\text{Rime}}
 \end{array}$$

Hence, complete velarization is in full accordance with the tendency towards coda-emptying. Quoting Mateus & D’Andrade’s (2000: 12) words, when the authors compare EP incomplete velarization with BP complete velarization of coda-}/, it could be said that, in this particular respect, BP has gone one “[...] step further [...]” (Mateus & D’Andrade 2000: 12) in the path towards complete coda-emptying.

2.6 – Deletion of coda-}/r/ in certain dialects and styles of Portuguese

In EP, [r] is one of the very few consonants that can occur in coda position (Barbosa 1983: 181, 182; 1994: 150, 151-152; Barroso 1999: 143, 161; Mateus & D’Andrade 2000: 11, 52; Mateus et al. 2003: 995, 1046-1047).

In BP, coda-rhotics can be surfaced as [R], [x], [h] or even as \emptyset (Monaretto et al. 1996: 206, 208, 209, 215-216, 217 ff. [34]; Callou, Moraes & Leite 1998; Monaretto 2002; Silva 2002: 140 ff., 159 ff.; Mateus et al. 2003: 1047) [35]. For the purpose of this article, only the latter possibility (/R/ \rightarrow \emptyset) will be dealt with [36].

In EP colloquial style, many productions of coda-}[r] as \emptyset can also be found (as a free, optional variation), when a word-final flap precedes a word beginning with a [+cons] segment, like in (12). (12)

in Portuguese. English recent loanwords [39] and Hebrew Biblical names, once again, illustrate this situation.

- (15)
 Eng. «*film*» > EP «*fil.me*» [ˈfiɫ.mi]
 Eng. «*club*» > EP «*clu.be*» [ˈklu.bi]
 Eng. «*football*» > EP «*fu.te.bol*» [fu.ti.ˈbɔɫ]

 Heb. «*Ruth*» > EP «*Ru.te*» [ˈRu.ti]
 Heb. «*Edith*» > EP «*E.di.te*» [i.ˈdi.ti]
 Heb. «*David*» > EP «*Da.vi.de*» [dø.ˈvi.di] [40]

(16)

$$[(x)[V_{\text{Nucleus}}[(C_i)C_j]_{\text{Coda}}]_{\text{Rime}}]_{\text{Syllable}} \$ \rightarrow [(x)[V_{\text{Nucleus}}(C_i\text{-Coda})]_{\text{Rime}}]_{\text{Syllable}} \cdot [C_j\text{-Onset } V_{\text{Nucleus}}]_{\text{Rime}}]_{\text{Syllable}} \$$$

Just like «nucleation» is a possible term to refer to the transfer of a segment from coda to nucleus (see 2.3), «onsetization» appears to be an acceptable term to describe the transfer of a segment from coda to onset, as shown by the examples of (15) and sketched out in (16).

3 – Final remarks

On the basis of the previous arguments of this study, exceptionality of coda-filling in Portuguese may be seen as more than a mere statistic property of lexical representations. Indeed, it seems to be the result of a strong, systematic phonological tendency that has played a very important role in the differentiation of this language from other Romance and even Ibero-Romance languages and also in the differentiation between European and Brazilian Portuguese.

Several historical phenomena and some phonological changes suffered by lexical borrowings, like the ones that were mentioned in sections 2.1-2.8, are presented here as an expression – more appropriately, as the result – of a common cause for them all: complete deletion or

gliding of coda-consonants, among other phenomena, seem to represent but different ways for the language to get rid of segmental material that is not admitted by its phonology at the syllable right edge. That is to say, all these changes and phenomena can be unified under a strongest, common motivation. Such motivation certainly confirms that Portuguese is in the number of languages where NOCODA is ranked among the top-most phonological constraints that rule syllable constituency. To sum up, it is suggested here that Portuguese phonology obeys a strong, characterising tendency for which the expression «coda-avoiding» seems to be quite appropriate. As a consequence, the possibility of labelling Portuguese as a «coda-avoiding language» seems rather adequate.

According to this proposal, at least the following phenomena ((17)) – all of them identifiable in Portuguese, as seen in sections 2.1-2.8 – can be accepted as «different modalities» of coda-avoiding in Portuguese.

(17)

The different modalities of coda-avoiding in Portuguese

(17a) coda-consonant complete deletion

Coda-consonants are completely deleted, originating, at the surface level, V- or (C)CV- «core syllables» (see sections 1 and 2). Examples of this modality of coda-avoiding are found in 2.1 and 2.7 (complete deletion of [-sonorant] etymological, Latin or Hebrew, codas), 2.4 (complete deletion of segmental /n/ from coda position), and 2.6 (complete deletion of a coda-[r] in certain dialects and styles of BP and, under specific stylistic circumstances, in EP too).

(17b) coda-consonant «onsettization»

Coda-consonants are transferred to the onset of the next syllable (necessarily a new syllable). This modality is clearly illustrated by the cases of recent lexical borrowings from English and by Biblical Hebrew names ending with a [-sonorant] consonant that originated a new syllable with such consonant in onset position (see 2.8 above).

(17c) coda-consonant nucleation

Coda-consonants are transferred to the nucleus, according to three basic, alternative patterns: (i) the original coda is filled by an etymological [-sonorant] consonant that undergoes gliding and then is transferred into the nucleus, as it happened very often with words descending spontaneously from Vulgar Latin (see 2.2); (ii) the original coda-consonant is a segmental nasal that loses its articulation, originating a surface «nasal vowel» (though, underlyingly, nasality can be licensed as a coda-filler – see 2.3 above); or (iii) the original coda-consonant is a lateral /l/ that undergoes «complete velarization» (/l/→[w]), as it happens in BP and in certain northern dialects of EP, originating a surface branching nucleus like (VG)_{Nucleus} (see 2.5 above).

As far as nucleation is particularly concerned, it should be noted that this term is used by Morales-Front & Holt (1997: 402-403) to make reference only to the historical transfer of segmental nasals from the coda to the nucleus (see 2.3). In our opinion, though, nasality

transfer from coda to nucleus is, among others (see (17)), just a modality of nucleation. Therefore, all cases where any segments or properties (not only nasality or segmental nasals) are transferred to the syllable nucleus could be accepted as instances of nucleation. Other different modalities of nucleation are summarised under (17c).

In addition, coda-avoiding may be regarded as a *gradient* property on which language typological distinctions can be based. That is to say, gradation of coda-avoiding means that languages can be compared on the basis of how restrictive their phonologies are regarding coda-filling: languages that allow filled and even branched codas very often and admit large inventories of consonants in this prosodic position may be regarded as «poorly-restrictive» languages, i.e., as languages where coda-avoiding is not a very strong tendency (they could also be named «minimal coda-avoiding languages»). On the contrary, languages where these universal constraints are more effective and more evident – with less frequent filled codas, a very few possibilities of branched codas and restricting coda-consonants to a very small subset within the phonemic inventory – are to be seen as «highly-restrictive languages». These, of course, are the languages where coda-avoiding is really effective as a phonological constraint (as such, they could be referred to as «maximal coda-avoiding languages» too).

A comparison of a few genetically related languages – Classical Latin, Spanish [41] and Portuguese (in its two main varieties: EP and BP) – according to this typology is exemplified in (18).

(18)

Gradation of **coda-avoiding** in Latin and some Romance languages

**Poorly-restrictive
languages**

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«**MINIMAL
CODA-
AVOIDING**»

Classical Latin Admits [-son], [-cor] codas
Admits segmental /n/ in coda
Admits branched codas

Spanish Admits a few [-son], [-cor] codas
Admits segmental /n/ in coda
Admits branched codas

**Highly-restrictive
languages**

«**MAXIMAL
CODA-
AVOIDING**»

European
Portuguese Only [+son], [+cor] codas
[ʃ], [r] and /S/-codas

Brazilian
Portuguese Mainly /S/-codas only
[r]-codas often reduced to Ø

Finally, a remark on the effectiveness of coda-avoiding in the current stage of Portuguese phonology should be made. The historical importance of this constraint seems clear when the information found from sections 2.1 onwards is taken into consideration: even within the framework of Renaissance relatinization, efforts to enrich the Portuguese lexicon with words whose codas had not been allowed before did not succeed in imposing such phonological

structures in this language (see 2.1 and 2.2). More recently and even in present-day Portuguese, phenomena such as the onsettization of [-sonorant] codas of recent lexical borrowings (see 2.8), the complete deletion of nasality from any rimes that is observed in certain Northern dialects [42] and the ongoing deletion of segmental /n/ from word-final codas (see 2.4), for example, suggest that coda-avoiding still plays an important role in the characterization of Portuguese phonology. Deletion of segmental /n/ from codas, more precisely, shows in a very clear manner that coronality, sonorancy and accordance with SDP are not sufficient (even though necessary) conditions for a consonant to be admitted in coda in Portuguese.

To sum up, NOCODA does seem to play a very prominent role in syllable-constituency of Portuguese and to be ranked, in this language, higher than other constraints, such as [+SON,+COR]CODA. What is more, the tendency towards deletion of any segmentally filled codas in different periods of the language history and according to a considerable array of different surface manifestations leads us to the proposal of a more powerful constraint such as AVOIDCODA. By the one hand, this constraint could describe all the facts and phenomena that were addressed in this paper. Additionally, it allows a typological distinction between minimal and maximal «coda-avoiding languages», within which Portuguese must be included amongst the highly-restrictive languages.

Notes

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[2] Throughout this paper, «markedness» will be referred to in the sense that has been assigned to this term since the Prague school of phonology: marked units bear a special distinctive mark which is absent from unmarked ones (Troubetzkoy 1939: 77; Greenberg 1966: 14; Chomsky & Halle 1968: 402-435; Martinet (dir.) 1969: 240-243); marked items or structures tend to correlate with lower levels of occurrence, either universally or in a given language (Greenberg 1966: 14 ff.; Jakobson 1968: 58; Martinet (dir.) 1969: 242; Basbøll 1981: 25; Kean 1981: 564-565 ff.; Kenstowicz 1994: 62; Van Oostendorp 2005: 2 ff); unmarked items emerge preferentially in marked positions (Kenstowicz 1994: 62; Kiparsky 2004: 17-18); marked structures undergo very often regularization procedures which aim at deriving unexceptional forms from exceptional ones (Fikkert 1994: 5-6; Blevins 1995: 218, 220, 228; Cohn 2001: 196 ff.; Stites, Demuth & Kirk 2004: 4); marked items and structures are the last ones to be acquired by the child who learns his/her mother tongue (Jakobson 1968: 46-48, 51-58; Fikkert 1994: 5-6; Blevins 1995: 218, 220; Demuth 1995; Macken 1995: 676-677; Stites et al. 2004).

For a broader presentation of the concept of markedness and its epistemological motivation in the history of linguistics, see, among others, Greenberg (1966), Martinet (dir., 1969: 240-243), Basbøll (1981), Kean (1981) and Kenstowicz (1994: 62-65).

[3] See note 2.

[4] Coda neutralization means that in every language most phonological oppositions disappear from coda (Kiparsky 1995: 661; 2004: 17 ff.).

[5] “Cross-linguistically, the inventory of possible codas is a subset of the inventory of possible onsets, but not vice versa.” (Prince & Smolensky 2004: 154).

“There are languages in which some possible onsets are not possible codas, but no languages in which some possible codas are not possible onsets.” (Prince & Smolensky 2004: 188).

[6] Kaye & Lowenstamm (1981: 290) mention V-syllables as an unmarked syllable type too. Based on her own experimental data showing that V- and CV-syllables are found very often in Portuguese children’s early productions, Freitas (1996: 80 ff.; 1997: 146 ff.) proposes these two syllable patterns as the basic syllabic formats of European Portuguese (EP) too.

[7] An important difference has to be taken into account as far as coda-filling is concerned in Classical Latin and Vulgar Latin. As Lausberg (1963: 226-227) points out, Vulgar Latin already showed a clear preference for open syllables rather than for closed syllables. This suggests an important contrast with Classical Latin, where closed syllables are rather frequent and indeed very rich: as a matter of fact, this language not only admits a large set of consonants in coda position, including many non-sonorants and non-coronals (/t/, /d/, /n/, /s/, /r/, /l/, /b/, /m/, /k/), but also codas with two (/ps/, /ks/, /ns/, /rs/, /ls/, /nt/, /rt/, /lt/, /st/, /ɲk/) or three (/mps/, /rps/, /ɲks/, /rks/, /lks/) consonants (Touratier 2005: 126-128) (though, the latter three-consonant codas are also subject to other phonological interpretations, as recognised by Touratier 2005: 127 ff.).

[8] “[...] Romance languages [...] seem to favour open syllables while in Germanic languages (English included) closed syllables are statistically preponderant” (Mateescu 2003: 1/3 of <http://www.unibuc.ro/eBooks/filologie/mateescu/pdf/75.pdf>. Retrieved 11th May, 2006).

[9] Navarro Tomás (1926: 100) mentions, however, that in colloquial Spanish word-final [d] is deleted very often. According to Guitart (1997), consonant dropping of coda consonants is a very strong tendency in Caribbean Spanish.

[10] See also Freitas's (1996: 112-114) review of quantitative data found in previous studies.

[11] "[...] Portuguese rhyme can only have one consonant in coda [...]" (Mateus & D'Andrade 2000: 53).

[12] This observation is naturally true for the great majority of all languages too (see, e.g., Cohn 2001: 195; Van Oostendorp 2005: 2 ff.).

[13] In coda position, /l/ is phonetically realized as a «dark /l/» («velarized [ɫ]») in most dialects of EP (Barbosa 1983: 181; Barroso 1999: 99, 106, 110; Mateus & D'Andrade 2000: 12; Mateus, Brito, Duarte, Faria, Frota, Matos, Oliveira, Vigário & Villalva 2003: 991, 993, 995, 997-998, 1016, 1047). For further details, see also section 2.5.

[14] Coda-/S/ is phonetically realized in EP either as [ʃ] or [ʒ], depending on the voicing of the following consonant (if any). Thus, structuralist phonological studies consider that [ʃ] and [ʒ] correspond, in this prosodic context, to the phonetic realization of an «archiphoneme» or an «opposition neutralization» (Barbosa 1983: 182; 1994: 151, 152-153; Barroso 1999: 143). For this reason, Mateus (1975: 33) represents this abstract unit as /S/, while Mateus & D'Andrade (2000: 13) and Mateus et al. (2003: 991-992) represent it as /s/. Based on the structuralist convention that reserves Roman capitals to the representation of archiphonemes in phonemic transcription (see, for instance, Martinet 1967: 79), we will represent this phonological unit, in this text, as /S/.

[15] This makes a clear difference between Modern Portuguese and other related languages such as Classical Latin and Modern Spanish (see previously mentioned data in this text).

[16] Based on a distributional analysis, Barbosa (1983: 177, 181-182 ff.; 1994: 150 ff.) and Barroso (1999: 143) include the glides (/j/, /w/) in the set of the consonantal elements that can occur in Portuguese codas.

[17] The preposition «*sob*» ('under'), which is used very seldom and belongs to the learned vocabulary of Portuguese, is the only word that admits a [-son, -cor] at its ending. Netto (2001: 159) contrasts with the view expressed in the text, as he admits the consonants [s r ʎ b k p t ʃ] as unexceptional coda-fillers in Portuguese (in words such as «*ritmo*», 'rhythm', in which, contrarily to other phonological interpretations that will be mentioned later on, [t] is admitted as the first syllable's coda).

[18] This is in line with a universal tendency ("Languages that permit codas often restrict them to sonorant consonants" – Stites et al. 2004: 4) and with the Sonority Dispersion Principle that is mentioned in this section (see note 21).

[19] As underlined by Mateus & D'Andrade (2000: 16), "It is generally assumed that codas may not have C-place (...)". See also Kenstowicz's (1994: 62) and Kiparsky's (2004: 17-18) remarks about the predominance of unmarked items in marked, neutralizing phonological positions.

[20] See sonority scales like Selkirk's (1984: 112) and Blevins' (1995: 211), for example. See also their application to Portuguese (Vigário & Falé 1994: 474; Mateus & D'Andrade 2000: 40-41; Mateus et al. 2003: 1040).

[21] SDP states that sonority's increase in the onset-nucleus linear sequence is always higher than sonority's decrease in the nucleus-coda combination (see Clements (1990), referred to by Calabrese 1996: 6).

SDP could then be interpreted as a possible cause of coda neutralization: imposing serious limitations on the segmental material admitted in coda, it contributes for the neutralization of many distinctive oppositions in this syllabic position.

In Classical Latin, as well as in several modern Germanic languages, this principle does not seem to be so effective, since [-sonorant] segments in coda are quite frequent, as seen in the following examples:

Classical Latin: *hic, prop.ter, amat, sub, ob, ad, duc*

English: *but, root, cup, hook, cupboard, flag*

Swedish: *vid, med, väg.*

[22] Throughout this paper, the orthographic representation of the structures under discussion will be underlined, when pertinent. Syllable-breaks, when appropriate too, will be marked following the IPA convention, i.e., with a dot (.), either in orthographic or in phonetic/phonemic transcription. Etymological consonants – i.e., consonants that are kept in official orthography for etymological reasons although they are not pronounced anymore – will be written between angle brackets (<>).

The Latin syllable-breaks presented throughout this text respect the syllabifications proposed by Allen (1965) and Touratier (2005).

Portuguese phonemic transcriptions, except where otherwise stated, correspond to Standard Modern EP.

[23] Brazilian spelling does not include these «etymological consonants» in words in which they are no longer articulated: making written form closer to phonetic form, Brazilian orthography maintains such consonants only when they are still pronounced at the contemporary stage of the Brazilian norm of the language (e. g.: «*recepção*» ‘reception’ [Resɛ’psẽw̃], but «*ótimo*» ‘very good’ [’otʃimu] – compare, for the latter, with the European orthography «*óptimo*», corresponding to the EP pronunciation [’otimu]). In fact, this is one of the main differences between both orthographies (European, followed in Portugal and in the former Portuguese possessions of Africa, Macau and East-Timor, vs. Brazilian).

[24] For authors from the structural-functionalist approach of Linguistics, who base their proposal on distributional data, the glide of these diphthongs belongs to the coda, not to the nucleus (see, for instance, Barbosa (1983: 181, 210-211; 1994: 155 ff.) and Barroso 1999: 122-123, 143). See also Câmara (1971: 27, 30) for an identical position regarding Brazilian Portuguese (BP).

[25] Contrarily, words that entered the language «spontaneously» (as «popular words», following Teyssier’s (1980: 25) terms), i. e., as the result of the «continuous descent» from Latin (Pountain 2003: 9), always adapted their structures to the structures of the new language in which they were to be admitted (Teyssier 1980: 25, 42, 86, 87-88).

[26] “We assume that, *underlyingly, there are no nasal vowels in Portuguese*. At the underlying level, we will treat them as sequences of oral vowel plus nasal segment.” (Mateus & D’Andrade 2000: 21 – authors’ italics).

[27] Several arguments support this phonological interpretation (Barbosa 1983: 92 ff.; 1994: 113-114; Mateus & D’Andrade 2000: 21-23). For example, after a non-final syllable whose coda is filled by /l/ or /s/, the only rhotic which is admitted in the next syllable’s onset is [R] (not [r]); the same happens if the non-final syllable contains a nasal vowel. The fact that no consonant can co-occur with a nasal vowel at its left in the same syllable could be added to the list of arguments found in the aforementioned references. That is to say, given that in Portuguese no more than one consonant is admitted in coda position (Mateus & D’Andrade 2000: 53), the inhibition of any coda consonant by a nuclear nasal vowel suggests that this prosodic constituent is actually filled («saturated») by nasality.

[28] “[...] underlyingly, Portuguese nasal vowels receive their nasality from a nasal segment that is deleted at the phonetic level.” (Mateus & D’Andrade 2000: 23).

A very few words are accepted to maintain a segmental nasal as a coda-filler in Modern EP, provided it occurs word-finally and it is [+coronal] (e.g.: «*hifen*» ‘hyphen’ [‘ifɛn]). Even with these words, however, a tendency towards coda-emptying is seemingly very effective too, through a considerable range of possibilities. See discussion of this specific case in section 2.4.

In many northern dialects of EP, nasality is completely deleted from final unstressed syllables, in production such as

«*homem*» [‘ɔmi] ‘man’ (Standard EP: [‘ɔmẽ])

«*fizeram*» [fi’zɛru] ‘[they] did’ (Standard EP: [fi’zɛrẽw])

These examples suggest that, even if not segmentally filled, whichever codas found in the language are always good candidates to coda-emptying.

[29] See Lüdtke’s (1953) explanation that briefly relates the phonological status of Portuguese nasal vowels to their historical origin in the language: according to this author, Portuguese nasal vowels – historically a combination of ‘oral vowel+nasal segment’ – would be losing such status and becoming true «phonemes» of the language, as in French (Lüdtke 1953: 213).

[30] For a discussion of the status of nasality in Portuguese phonology, see Morales-Front & Holt (1997: 401-403). Based on a comprehensive review of the previous literature, the authors conclude that “[...] there is no evidence to show that the nasal is in coda position” (Morales-Front & Holt 1997: 403), i.e., nucleation is no longer a purely phonetic step; instead, it has already entered the phonological domain of the language.

[31] See note 28. The treatment of word-final segmental /n/ in the history of Portuguese is not the main subject of this paper. It shall be mentioned, nevertheless, that when an etymological segmental /n/ occurred in coda position, the phonology of the language admitted the possibility of eliminating it through a number of different surface processes. These processes can be summarised as follows: (i) complete deletion of the segmental consonant (e. g.: Lat. *abdomen* > EP *abdome* [ɐ.b.’dɔ.mi] ‘abdomen’) or (ii) nasality transfer to the nucleus of the preceding syllable, originating a phonetic nasal vowel or diphthong (e. g.: Lat. *hominem* > EP *homem* [‘ɔ.mẽ]) ‘man’). Such processes are observable even in words where orthography chose to maintain the written representation of this consonant (dictionaries such as the *Dicionário da Língua Portuguesa Contemporânea da Academia das Ciências de Lisboa* (Academia das Ciências de Lisboa 2001) and the *Dicionário Houaiss da Língua Portuguesa* (Instituto Antônio Houaiss de Lexicografia – Portugal 2002) present both forms in words like «*abdómen/abdomen*» ‘abdomen’ and «*regímen/regime*» ‘regimen’). Notice that, as mentioned in the text, these words form a very small subset of the Portuguese lexicon and, with a very few exceptions, belong to its learned vocabulary.

[32] For this word, two different syllable-breaks are presented: in the orthographic form, syllable edges correspond to the orthographic conventions that rule line-breaking in writing; in the phonemic transcription, Mateus & D’Andrade’s (2000: 60-64) algorithm of syllabification in Portuguese is followed, with the creation of an empty nucleus between the obstruents /b/ and /d/.

[33] As mentioned earlier (see note 13), most dialects of EP show a «dark», velarized /l/ ([ɫ] in this context, i.e., «incomplete» velarization is the most frequent phonetic form of coda-/l/ in EP. Contrarily, «complete» velarization (coda-/l/→[w]) corresponds to the most typical

realization of this segment in BP, although Collischonn (1996: 124), not mentioning complete velarization, refers only to a coda-[ʃ] in this variety of the language as well.

[34] Monaretto, Quednau & Hora (1996: 215, 218-219 ff.) refer to a comprehensive set of previous studies that discuss this specific question.

[35] In other syllabic contexts, some of these possibilities of R-surfacing are also admitted, as underlined by Monaretto et al. (1996: 206, 208, 209, 215-216, 217 ff.), Callou, Moraes & Leite (1998) and Silva (2002: 140 ff., 159 ff.).

[36] The cases where a coda-rhotic is replaced by segments like [x] or [h] would deserve a thorough analysis too, since deletion of all supralaryngeal C-place features could be probably regarded as a first step to further complete consonant deletion.

[37] For this name, both [dɐ.'vi] and [dɐ'.vi.di] (and also the spelling «*Davide*») coexist in EP. Similarly, the Portuguese name of the Spanish capital («*Madrid*») admits two alternative phonetic forms in spoken EP: [mɐ.'dri] and [mɐ.'dri.di]. Notice that neither the first nor the second phonetic form of each of these words admits a segmental [d] in the syllable coda.

[38] Similar procedures, motivated by the same constraints, can be found in other languages, such as Beijing Chinese (Blevins 1995: 228; Stites et al. 2004: 4).

[39] Some of these examples, explaining the same phenomenon, are also found in Barroso (1999: 161).

[40] See note 37.

[41] The labelling of Spanish as a poorly-restrictive language, according to this categorization, is based on the references mentioned in the beginning of section 2 (Navarro Tomás 1926: 108-109; Harris 1989: 499-500; Quilis 1993: 370-371; 382). However, if studies such as Guitart's (1997) are taken into consideration, some differences can be traced among several dialects of Spanish (non-Peninsular Spanish dialects included) on the basis of coda-filling constraints too. It would be then possible to think of some Spanish dialects, like Caribbean Spanish, as more restrictive than Standard Peninsular Spanish as far as coda-filling is concerned.

[42] See note 28.

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