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THE SYLLABLE STRUCTURE IN EUROPEAN PORTUGUESE*

(A Estrutura da Sílaba em Português Europeu)

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ABSTRACT: The goal of this paper is to discuss the internal structure of the syllable in European Portuguese and to propose an algorithm for base syllabification. Due to the analysis of consonant clusters in onset position and the occurrence of epenthetic vowels, and considering the variation of the vowels in word initial position that occupy the syllable nucleus without an onset at the phonetic level, we assume that, in European Portuguese, the syllable is always constituted by an onset and a rhyme even though one of these constituents (but not both) may be empty, that is, one of then may have no phonetic realisation.

RESUMO: O objetivo deste artigo é o de discutir a estrutura interna da sílaba em Português Europeu e o de propor um algoritmo para a silabificação de base. Tendo en conta a análise dos grupos de consoantes que ocupam o lugar de ataque e a possibilidade de existência de vogais epentéticas que desfazem alguns desses grupos, e considerando, ainda, a variação de vogais em posição inicial de palavra que constituem núcleo de sílaba sem ataque no nível fonético, apresenta-se a hipótese de que a sílaba, em Português Europeu, é sempre constituída por um ataque e por uma rima, mesmo que um desses constituintes (mas não os dois) seja vazio. Ou seja, um dos dois constituintes pode não ter realização fonética.

Key Words: Syllable; Onset; Empty nucleus; Base syllabification; consonant cluster.

Palavras-Chave: Sílaba; Ataque; Núcleo vazio; Silabificação de base; Grupo de consoantes.

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1. Data

1.1. Consonant clusters

In European Portuguese (henceforth, EP), we find many sequences of consonants in word-initial and word-internal position. Examples are in (1)-(3).

(1)

(a)

[pn] - pneu	'tyre'	
[gn] - gnomo	'gnome'	
[ps] - psicologia	'psychology'	

(b)

[bn] - obnóxio	'obnoxious'	[bs]	- absurdo	'absurd'
[dm] - admirar	'to admire'	[bv]	- óbvio	'obvious'
[tm] - ritmo	'rhythm'	[bʒ]	- abjurar	'to abjurate'
[gm] - estigma	'stigma'	[tz]	- quartzo	'quartz'
[tn] - étnico	'ethnic'	[ks]	- axioma	'axiom'
[pt] - captar	'to capture'	[dv]	- advertir	'avertir'
[kt] - pacto	'pact'			
[bt] - obter	'to obtain'	[mn]	- amnésia	'amnesia'
[dk] - adquirir	'to acquire'	[ft]	- afta	'thrush'

(2)

(a)

[pɾ][1] - prato	'dish'	
[bɾ] - branco	'white'	
[tɾ] - trapo	'rug'	
[dɾ] - droga	'drug'	
[kɾ] - cravo	'carnation'	
[gɾ] - graça	'grace'	
[pl] - plano	'plan'	
[bl] - ablução	'ablution'	
[tl] - atleta	'athlete'	
[kl] - claro	'bright'	
[gl] - glande	'glande'	

(b) [fɾ] - frito 'fried'

[1]Traditional representation of the tap in Portuguese is [ɾ]. We use the IPA [ɾ] that corresponds to the word-internal and word-final single *r*.

[vr]	- palavra	'word'
[fl]	- flor	'flower'

[i] deletion[2] that frequently occurs in coloquial EP in unstressed position, gives rise to other consonant sequences (see (3)).

(3)

[ʃt]	- estar	'to be'
[ʃpr]	- esperar	'to wait'
[ds]	- decifrar	'to decode'
[sp]	- separar	'to separate'
[dvd]	- devedor	'ower'
[mrs]	- merecer	'to deserve'
[dʃpg]	- despegar	'to take away'
[dʃprz]	- desprezar	'to despise'

The examples given in (3), caused by the deletion of [i] in colloquial EP, show sequences of three consonants in word-initial position (e.g. *devedor* [dvdór] - plosive + fricative + plosive) four consonants (e.g. *despegar* [dʃpgár] - plosive + fricative + plosive + plosive) and five consonants (e.g., *desprezar* [dʃprzár]): sequences of different consonants are thus very frequent in EP at the phonetic level.

Unlike those of (2a) and (2b) that are allowed onset clusters, the sequences of consonants exemplified in (1) do not belong to the same syllable. This statement is justified by empirical arguments. For instance, speakers have difficulties to assign the consonants in (1), either one or the two of them, to the coda (C) of the first syllable or to the onset of the second one. This is true when naïve speakers have to break a word into syllables (see Andrade & Viana,1993b), as for instance when they hesitate between *ad-mirar* and *a-dmirar*.

[2] The traditional representation of this neuter vowel is [ə], like the French schwa. However, contemporary studies in Portuguese phonetics and phonology show that [i] is a more adequate representation either because of its phonetic characteristics (it is a high vowel) or because of phonological processes in Portuguese grammar (see A. Andrade (1992) *Reflexões sobre o 'e mudo' em Português europeu*. Unpublished. Lisboa: CLUL).

Furthermore, child productions during language acquisition or mispellings show an inserted vowel between the consonants (e.g. [pinéw] for *pneu* 'tyre' [pnéw] or [áfitɐ] for *afta* [áftɐ] 'thrush'). Moreover, in child language we often find deletion of the second consonant in allowed onset clusters (e.g. [pátu] for *prato* 'dish' or [bɐ̃ku] for *branco* 'white') but we never find deletion of the second element in disallowed sequences like those included in (1); in other languages, on the contrary, we find the loss of the first segment in this last kind of sequences, like in *neumático* (Spanish 'tire') or in the pronunciation of *psychology*, in English.

Finally, an argument that reinforces our statement that the consonant clusters in (1) do not belong to the same syllable is the fact that, in most dialects of Brasilian Portuguese (henceforth BP), they constitute two syllables due to the insertion of an epenthetic vowel, mostly, [i], as exemplified in (4).

(4)

pneu	[pi]neu
gnomo	[gi]nomo
psicologia	[pi]sicologia
absurdo	a[bi]surdo
pacto	pa[ki]to
afta	a[fi]ta

Notice that consonant clusters in (2), that are allowed onset clusters in Portuguese, never show this inserted vowel in BP. So, for instance, *[pi]rato, *[bi]ranco, *pala[vi]ra are unacceptable (needless to say, the consonant sequences of the words in (3) do not occur in BP as the vowel [i] does not exist in this variety).

All these sequences of consonants are specific to EP and are due to phonological processes that do not apply in BP. The differences observed at the phonetic level between EP and BP caused by the existence of these consonant clusters are certainly at the origin of the distinct rhythms of the two varieties.

Concerning the examples in (2), the consonant sequences - plosive plus liquid and fricative plus liquid - are typically onset syllables in

Portuguese as in the majority of Romance languages, even though clusters with a plosive are much more frequent than those with a fricative, and the same for sequences ending in a tap versus those ending in a lateral.

These clusters are in accordance with the Sonority Principle which states that the sonority of the segments that constitute the syllable increases from the beginning till the nucleus and decreases to the end.

The proposals about the hierarchy of the segments that constitute the sonority scale are broadly consensual in establishing the following decreasing sonority: vowels (low, medium, high) - glides - liquids - nasals - fricatives - plosives. It is worth to note, however, that the definition of this principle and its relation with the sonority scale is not sufficient to establish the possible sequences for Portuguese syllable onsets. Restrictions to the occurrence of some consonant clusters in onset position occur in all languages: they are language-specific and they are also related to the distance between the members of the sonority scale. This assumption constitutes the basis for the Dissimilarity Condition, which states that it is necessary to postulate, for each language, the value of the permitted sonority difference between two segments in a sequence belonging to the same syllable. Quantifying this difference implies indexation of the sonority scale (as, for instance, that proposed by Selkirk, 1984). A tentative indexation for Portuguese has been presented by Vigário & Falé (1993), who also suggested that in Portuguese sequencial segments in the same syllable may have a certain difference in sonority. Concerning consonant clusters, only plosives or fricatives + liquids have the allowed distance. Thus, adjacent members on the sonority scale can never constitute an onset cluster. According to Harris (1983), the non-adjacency requirement of the two segments represents the universally unmarked case for syllable constituency and thus Portuguese grammar has no costs in this specific case.

It is necessary to recall that the Sonority Principle and the Dissimilarity Condition are intended primarily as applying to base syllabification, as shown by many violations of these principles at the phonetic level in different languages. To explain this apparent violation of the Sonority Principle and the Dissimilarity Condition, we hypothesise, then, the existence of an empty nucleus between the consonants belonging to the words in (1) and we propose that this

nucleus is not filled at the phonetic level in EP. This means that, in base syllabification, all consonant clusters are licenced as onset syllable (in the sense of Goldsmith (1990) syllable licencing).

1.2 Vowels and diphthongs

In Portuguese there are no syllabic consonants. The rhymes of Portuguese syllables always have a nuclear vowel which may be followed by a glide at the phonetic level, thus constituting a falling diphthong. Falling diphthongs may occur in stressed, pre-stressed and post-stressed syllables.

(5)

(a) Stressed		(b) Pre-stressed	
[ɐ́j] - queixa	'complaint'	[ɐj] - queixume	'complaint'
[ɛ́j] - papéis	'papers'	[aj] - ensaiar	'to essay'
[áj] - pai	'father'	[oj] - boiada	'drove'
[ɔ́j] - herói	'hero'	[uj] - cuidado	'care'
[ój] - boi	'ox'	[ew] - endeusar	'to divinise'
[új] - azúis	'blue (pl.)'	[aw] - pautar	'to rule'
[íw] - viu	'(s/he) saw'		
[éw] - deus	'god'	(c) Post-stressed	
[ɛ́w] - véu	'veil'	[ɐj] - fáceis	'easy (pl.)'
[áw] - pauta	'register'		

Nasal diphthongs are quite frequent in Portuguese due to the fact, among others, that they appear in every third person plural of verb forms. Nevertheless, they only occur in word-final syllables, either stressed or post- stressed [3].

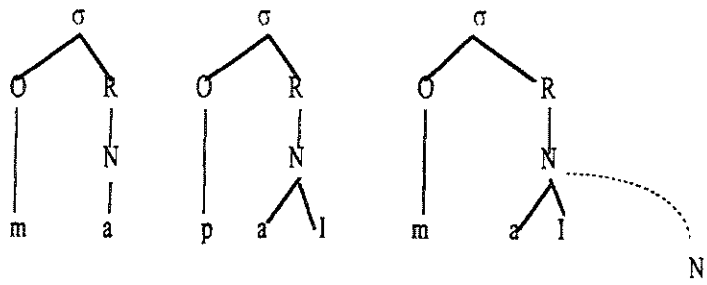
[3] There is a small number of words in Portuguese having a diphtong in the penultimate stressed syllable: *cãibra* [kɐ̃j̃brɐ] 'crump' and dialectal *cãibo, cãibas, cãibro* 'different pieces of the oxen-cart'. Because of their exceptionality, *cãibra* is often pronounced as [kɐ̃brɐ], without the diphthong, and the others have alternating forms without the glide. The word *muito* [mu̍j̃tu] is the only one that presents the [u̍j̃] diphthong and that is the reason why it is included in (6). Also, some words that can be reanalised by speakers as compounds (like *bendito* [bɐ̃j̃+ditu] **(Cont.)**

(6)

(a) Stressed		b) Post-stressed	
[ɐ̃j] - mãe	'mother'	[ɐ̃j] - prendem	'(they) arrest'
[ɐ̃j] - refém	'hostage'	[ɐ̃w] - falam	'(they)talk'
[õj] - compões	'(you) compose'	[ɐ̃j] - homem	'man'
[ũj] - muito	'much'	[ɐ̃w] - sótãos	'garrets'
[ɐ̃w] - mão	'hand'		

In most of the falling diphthongs, the phonetic glide is, phonologically, an underspecified vowel that has to be lexically marked as a trough (see Andrade & Laks, 1991). Both elements of these diphthongs - either oral or nasal - belong to the syllable nucleus. An argument to sustain this statement is the fact that, in nasal diphthongs, both segments are nasalised by the projection of the nasal autosegment to the nucleus. The underspecified fricative /S/ is the only consonant that can belong to a rhyme having a diphthong. In (7) we see the syllabic representation of the words *má* [má], 'bad (fem.)', *pai* [páj], 'father' and *mãe* [mɐ̃j], 'mother'.

(7)



1.3. Sequences of glides + vowel at the phonetic level

Sequences of glide and vowel at the phonetic level are included in (8):

(Cont.)

'benedict' or *Benfica* [bɐ̃j+fikɐ]) and the very frequent word *também* [tɐ̃wbɐ̃j] can be pronunced with a diphthong in the penultimate syllable.

Sequences of glide and vowel at the phonetic level are included in (8):

(8)
(a) Stressed

[jé]	- frieza	'coldness'	[wí]	- suíno	'pig'
[jé]	- viés	'bias'	[wé]	- roer	'to gnaw'
[já]	- real	'royal/real'	[wɛ́]	- cuecas	'pants'
[j$\widetilde{\acute{e}}$]	- criança	'kid'	[wá]	- voar	'to fly'
[jó]	- pior	'worst'	[wɔ́]	- suor	'sweat'
[jó]	- mioma	'myoma'	[wó]	- voou	's/he flew'
[jú]	- miúdo	'kid'	[w$\widetilde{\acute{e}}$]	- coentros	'coriandre'

(b) Unstressed

[jɐ]	- realeza	'royalty'
[jɐ̃]	- adiantar	'to advance'
[ju]	- miudeza	'minuteness'
[wi]	- suinicultura	'pig breeding'
[wɐ]	- voador	'flyer'

The same glides can precede diphthongs:

(9)

[jáj∫]	- criais	'(you) create'	[wáj]	- recuai	'put back (imperat.)'
[jéj∫]	- fiéis	'faithful (pl.)'	[wɛ́j∫]	- cruéis	'cruel (pl.)'
[j$\widetilde{\acute{e}\tilde{w}}$]	- leão	'lion'	[wɛ́j]	- voei	'(I) flew'

Phonetic glides preceding vowels raise more problems even for the phonetic description. When we spell out words like *viés* 'bias', *suor* 'perspiration', *farmácia* 'pharmacy' (see (8)), the [+high] segment preceding a [-high] vowel, either stressed or unstressed, is perceived by Portuguese speakers as syllabic, that is, a vowel and not a glide. This is confirmed, for instance, by the traditional classification of the word *farmácia* as a proparoxiton which indicates that two syllables are counted following stress. Within a structuralist approach, these segments

(e.g. p[ia]r 'to cheet' / p[í]o 'cheet', s[ua]r 'to sweat' / s[ú]o 'I sweat'). In the SPE framework, these segments are underlying vowels (cf. Mateus, 1975).

In colloquial Portuguese, however, these two vowels, /i/ and /u/ when unstressed and before a vowel, have a reduced duration and intensity, and they can be perceived by the speakers as belonging to the same syllable as the following vowel. This variation is common to a large number of languages. Consequently, in casual speech glides may be followed by any vowel (with some phonetic restrictions).

The examples in (8) and (9) show that, when these phonetic glides occur before either a nasal vowel or a nasal diphthong, they are not nasalised (cf. [j͡ẽ] - criança 'kid'and [j͡ẽw̃] - leão)[4]. This is enough evidence to consider them as independant of the syllabic rhyme (see Andrade et Viana, 1993a, and also Mateus,1993), and to allow us to interpret them as vowels.Thus, even if they are perceived at the phonetic level as glides by the speakers and constitute a rising diphthong, they are syllable nuclei at the base level. These sequences of glide and vowel at the phonetic level are thus very different from the true rising diphthongs existing in other languages, where glides are associated with the following vowel and integrate the rhyme (see for instance Harris,1983, for Spanish).

1.4. Codas

Consonants /R/, /L/ and /S/[5] are usually considered the only ones that can occur in Portuguese syllable coda. They are underspecified autosegments with different realisations. Examples are in (10a) and (10b).

(10)

(a)	par /paR/	[pár]	'pair'
	mal /maL/	[máɬ]	'evil'
	más /maS/	[máʃ]	'bad (fem.pl.)'

[4] According Luis-Carlos Cagliari, in BP the glide preceding a nasal vowel is nasalised in many cases and dialects.

[5] We use capital letters to indicate underspecified segments.

(b)	parte /paRte/	[párti]	'part'
	falta /faLta/	[fáɬtɐ]	'fault'
	peste /pɛSte/	[pɛ́ʃti]	'plague'
	mesmo /meSmo/	[mɛ́ʒmu]	'same'

There is enough evidence to consider these three segments as the only ones that can occur in syllable coda:

- [r] is not allowed word-initially; [l] never begins a word if followed by another consonant;

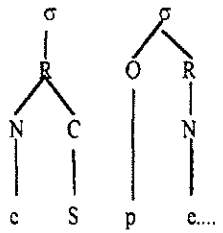
- [S] or [ʒ] resulting from the phonetic realisation of /S/ followed by another consonant trigger voicing assimilation; they may also be placed at the begining of the word without being preceded by any vowel at the phonetic level (cf. *esvaído* and *esperado* in (11)).

(11)

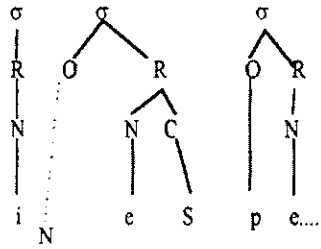
esvaído	[ʒvɐídu]	'fainted'
esperado	[ʃpirádu]	'expected'
inesperado	[iniʃpirádu]	'unexpected'
feliz	[filíʃ]	'happy'
infeliz	[ĩfilíʃ]	'unhappy'

In this case, however, /S/ is preceded by an underlying vowel, and the existence of this vowel is attested by words like *inesperado* (resulting from syllabification of the word esperado when the prefix /iN/ is added): the underlying vowel is the nucleus of the first syllable; the nasal autosegment of the prefix /iN/ fills the onset of this syllable and is phonetically manifested as a nasal consonant. On the other hand, if the word begins with a consonant (like *feliz*, see (10b)) the nasal autosegment of the prefix will be associated with its nucleus, as it happens in *infeliz*, [ĩfilíʃ], and the nasality will spread over the vowel. See the representation in (12) and (13).

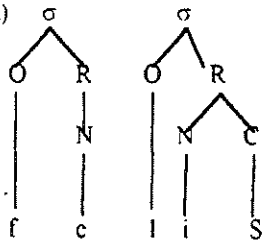
(12)(a)



(b)



(13)(a)



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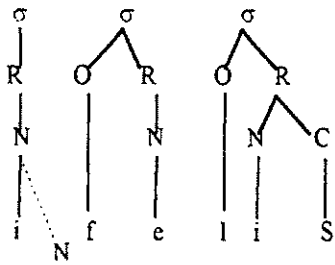


In sum, the three segments /R/, /L/ and /S/ are the only licensed consonants in Portuguese codas. As in most languages (cf. Goldsmith, 1990), consonants licensed in coda position are fewer than those that can occur in the first half of the syllable; in Portuguese their number is reduced to 3. The realisation of these underspecified segments is the result of a phonological process sensitive to the phonetic context.

1.5. Alternations (diphthong oral and nasal / single vowel)

The syllabic hierarchical organisation at the base level raises the problem, among others, of whether all segments of the phonetic level are associated with a skeletal position. Let us see other data about diphthongs.

In Portuguese there is no difference between long and short vowels. Diphthongs, however, seem to have different weights, and this difference

has consequences in the number of skeleton positions they occupy. We think that the constraints on the occurrence of diphthongs should be analysed in relation with the stressed syllable in order to establish their different 'weights', if there is any. It is what we are doing now.

We observed above that, in Portuguese, there are strong restrictions for the occurrence of diphthongs in post-stressed position (see examples in (14)).

(14)

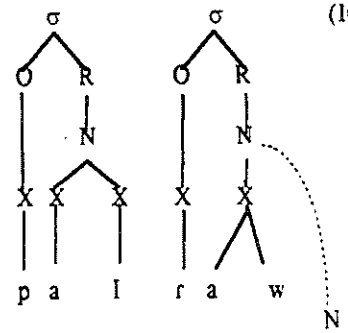
[ɐjʃ]	- fáceis	'easy (pl.)'
[ɐ̃w̃]	- sótão	'garret'
[ɐ̃j̃]	- homem	'man'
[ɐ̃j̃]	- prendem	'(they) fast'
[ɐ̃w̃]	- falaram	'(they) have talked'
[ɐ̃w̃]	- pairam	'(they) soar'

If the penultimate syllable is stressed and has a diphthong, restrictions are stronger and the only diphthong that can occur in post-stressed position is a nasal one. This only happens in verb forms, and the diphthong is the realisation of the third person plural suffix (e.g. *pairam*, cf. (15)).

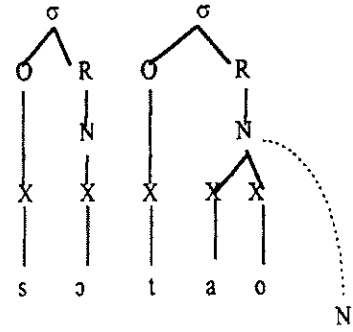
In fact, the glide of final unstressed diphthongs, either in verbal ending or in words like *homem*, is ephenthetic and it is not, as in *sótão*, the phonetic realisation of a class marker. In this case, diphthongs are light in Portuguese and they occupy one position in the skeleton.

In (15) we show the syllabic representation of *pairam* and of *sótão* in (16). The difference between the two representations lays in the number of skeletal positions for the diphtong in the last syllable.

(15)



(16)



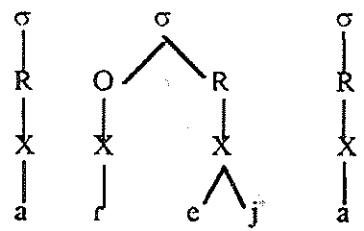
There is another kind of diphthongs that can also be viewed as light. See in (17) the morphological alternations between the lexical representations of *passear* /pase+ar/ pas[i]ar]/pas[j]ar] 'to walk' and *passeio* /pase+o/ pas[ɐ̯j]o 'walk' or between *areal* /are+al/ ar[i]al/ar[j]al 'beach' and *areia* /are+a/ ar[ɐ̯j]a 'sand'.

(17)

/pase+ar/	pas[i]ar/pas[j]ar	'to walk'
/pase+o/	pas[ɐ̯j]o	'walk'
/are+al/	ar[i]al/ar[j]al	'beach'
/are+a/	ar[ɐ̯j]a	'sand'

As we see in (17), Portuguese, similar to other languages cited above, shows the same alternation light diphthongs / single vowel related to morphological alternation (e.g. French *voir* / *verrons* or Spanish *poder* 'to can' / *puedo* 'I can'): the glide is introduced in the segmental tier as a consequence of word-formation with the addition of the morphemic vowel. In this case, the resulting diphthong occupies a single position in the skeleton.

(18)



1.6. Empty onset positions

As there are segments that do not have a proper position in the skeleton, there are also positions that are not associated with any segment. This statement allowed us to assume the existence of empty syllable nuclei. We also propose that, in Portuguese, any syllable is obligatorily constituted by an onset and a rhyme. If a position corresponding to a constituent is not filled, this fact can have consequences at the phonetic level.

It is generally recognised that syllables always possess a rhyme (with its nucleus). Concerning the onset, we propose that its presence in Portuguese is also obligatory, that is, every base syllable in Portuguese consists of an O and a R even though any one of them (but not both) may be empty. There is an interesting evidence that can support our proposal about empty onset positions.

(19)

(a)	Elvira	[ɛ]lvira	'Elvire'
	elefante	[i]lefante	'elephant'
	ermida	[i]/[e]rmida	'hermitage'
	esperado	[ʃ]perado	'expected'
(b)	olhar	[o]/[ɔ]lhar	'to look'
	ornar	[o]/[ɔ]rnar	'to adorn'

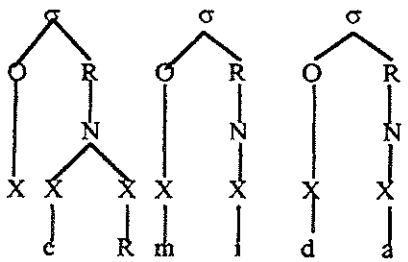
Unstressed underlying vowels /e/ and /ɛ/ are phonetically [ɨ] in EP in word-final and word-internal position. However, in word-initial position, [i] does not exist. Underlying /e/ and /ɛ/ occur as:

a) ɛ] when the coda is /L/ (see Elvira);
b) as [i] when the rhyme has no coda (see elefante);
c) there is some variation between [i], [e] and [E] when the coda is an /R/ (see ermida);
d) they are deleted when the coda is an /S/ (see esperado).

Examples are in (19a). According to our proposal, this exceptional behaviour is due to the fact that these word-initial syllables have an empty onset: the empty position does not allow the presence of an [i].

The same happens with unstressed underlying /o/ and /ɔ/ that are [u] in every context except word-initially where there is a variation between [o] and [ɔ] (examples are in (19b)).In the representation of *ermida* we can see the empty onset position.

(20)



2. Base syllabification: conventions

The most adequate way to build up syllable structure in Portuguese is the usually called 'all nuclei first' approach, starting with constructing the rhymes in accordance with the restrictions of the language (see Goldsmith,1990) about different proposals for base syllabification). This means that we consider rule-based algorithms more adequate than template-matching algorithms (see Blevins,1995).

It is necessary to formulate an algorithm that associates all X assigned to [-cons] segments with a nucleus (N). Association with a nucleus automatically builds up the rhyme (R). It is worth to recall that the phonetic glides of the falling diphthongs are [-cons] segments and are lexically marked as troughs.

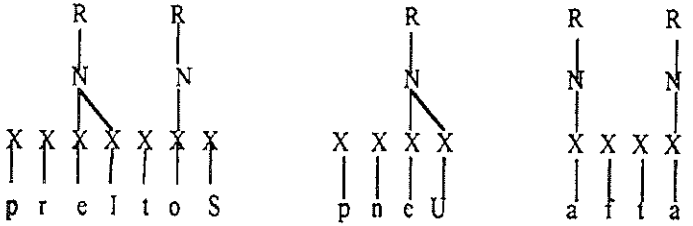
(21) *Nucleus Association Convention*

(a) Adjoin to a N(ucleus) all [-consonant] X as long as they are not lexical troughs preceded by another [-cons].

(b) Adjoin the remainder [-cons] X to the N leftwards.

The application of syllabification conventions is exemplified with the words *preitos* 'homages', *pneu* 'tire' and *afta* 'thrush'.

(22)



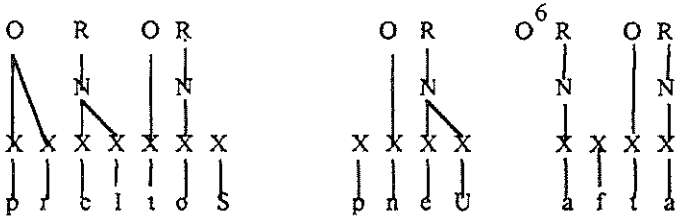
The next convention (Onset Association) syllabifies the [+cons] in associating them to the onsets (O). Each X [+cons] that precedes a vowel is assigned to an onset. A sequence of two [+cons] is associated to the same onset if the consonants are in accordance with the Sonority Principle and the Dissimilarity Condition.

(23) *Onset Association Convention*

(a) Adjoin all [+cons] X immediately preceding a nucleus to an O(nset).

(b) Adjoin to the same O a preceding [+cons] X if it is in accordance with the Sonority Principle and the Dissimilarity Condition.

(24)



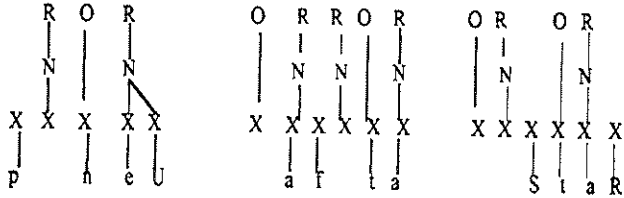
[6] Remember that we assume that every base syllable in Portuguese consists of an O and a R even though any of them (but not both) maby be empty

The remaining fully specified consonants that are not integrated in the syllabic structure, either word-initially (as /p/ in *pneu*) or word-internally (as /f/ in *afta*), after the application of (23), will not be associated with any constituents of the syllable. The existence of a 'non-associated' consonant gives rise to the introduction of a empty nucleus position.

(25) *Empty Nuclei Creation Convention*

Leftwards of an O, insert a N with the corresponding skeletal positionf to the right of a non associated segment if it is a fully specified consonant and to its left if it is an underspecified segment:

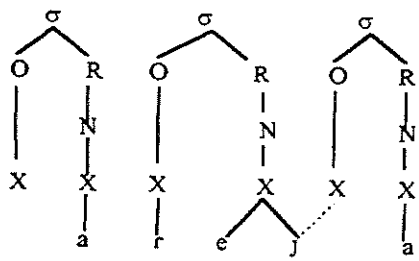
(26)



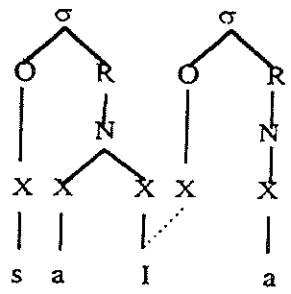
The non-associated consonants can now associate with an onset, as they are followed by a (empty) nucleus, by the re-application of (23).

When there is a diphthong followed by a vowel (e.g. *areia*, see (18), or *saia* [sáje] 'skirt'), the glide can associate with the onset of the following syllable (an empty onset) and it becomes then ambisyllabic. See the representation of *areia* 'sand' in (27) and *saia* in (28).

(27)



(28)

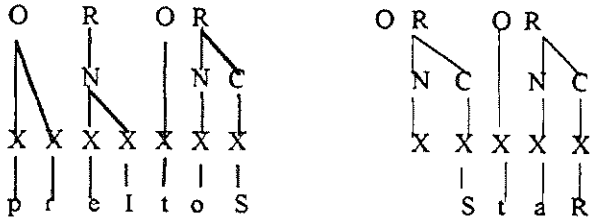


If the consonants are underspecified, that is, /R/, /L/ or /S/, (those that can occur in Portuguese codas), they remain non-associated and become floating segments. At the end of base syllabification, these floating segments are assigned to the codas of the preceding rhyme.

(29) *Coda-Association Convention*

Assign the floating X [+cons] to the coda of the preceding rhyme.

(30)



Thus, base syllables in Portuguese are CV syllables, despite apparent violations at the phonetic level in EP. It is worth to note, as a consequence of the statements made above, that what is traditionally considered as a 'hiatus' (two adjacent vowels as, for instance, in *boa* [bóɐ] 'good (fem.)') is in fact a sequence of two vowels separated by an empty onset at the base level.

We consider that our approach, involving rules of syllabification that apply in an ordered fashion, is better than other approaches so far developed for syllable with respect to Portuguese. It is clearly empirically adequate as it accounts for the oral and nasal falling diphthongs and the

consonant clusters in European Portuguese. Moreover, it is in accordance with our proposal of floating codas.

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