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THE PHONEMICITY OF GLIDES IN SPANISH: *CAMBIA* VS. *ROCÍA*

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In the present article I will argue that there is no need to posit underlying glides in Spanish because the syllabicity of high vowels *(i, u)* is determined by the stress pattern of the word and the segmental environment of the vowels. I will also argue that non-alternating rising diphthongs and falling diphthongs can uniformly be accounted for in the framework of strict CV (Lowenstamm 1996).[1]

1. INTRODUCTION

After a brief introduction to the topic, in Section 2. arguments are presented from the phonological literature of Spanish in favour of and against the underlying status of glides. In Section 3. I give a brief introduction to CV phonology, the theoretical framework applied in this article. In Section 4. a unified representation of non-alternating rising diphthongs and falling diphthongs follows and the problem posed by present tense verb forms is solved. Section 5. deals with *náutica* type words. Finally, high vowel sequences are discussed. The article does not deal with alternating rising diphthongs since I believe their structure differs from that of non-alternating rising diphthongs because they are lexically present as contour segments (see Bárkányi 2001). I will not deal with the so called 'drastic narrowing of the stress window': *convoy*-type words either. (Examples are given in their usual Spanish orthographical form except for the glides, which are spelt with *j* and *w,* and additional accent marks are provided as well.)

[1] I would like to thank Péter Rebrus and Miklós Törkenczy for reading and commenting on earlier versions of this paper.

2. THE PHONEMICITY OF GLIDES

2.1. Diphthongs are underlyingly present

The best-known analysis supporting the existence of underlying glides in Spanish is presented in works by James Harris, especially Harris (1992). In this paper Harris states that since we find words like *náwfrago* 'shipwreck', diphthongs must exist before stress assignment otherwise – if it was underlyingly *na.u.fra.go* – this word would violate the three-syllable-window condition, which states that stress in Spanish must fall on one of the last three syllables. Contrary to Harris, I claim that stress in Spanish is lexical, not assigned by rules. (See Bárkányi in press for details.)

Present tense verbs provide further evidence for the underlying status of glides in Spanish. These verb forms (both in indicative and in subjunctive) always bear stress on the penultimate syllable: *ámo,* 'I love', *amámos* 'we love', etc. Harris (1969) correctly observes that there are numerous noun-verb pairs, where the noun bears stress on the antepenult, e.g. *fórmula* 'formula', *intérprete* 'interpreter', and in the verb forms the stress is systematically shifted to the penult: *formúla* 'he formulates', *interpréte* 'I/he interpret(s) subj.'. However, there are a number of verbs – whose corresponding noun is stressed in the same way – which contain a rising diphthong (RD) in the final syllable and bear stress on the preceding vowel: e.g. *cámbjo* 'exchange, I change', *cópja* 'copy, he copies'. These forms contrast with noun-verb pairs like *rocío* 'dew, I sprinkle', in which the high vowel is stressed and appears in hiatus. The same contrast is observed with verbs containing a falling diphthong (FD): *cáw.sa* 'he causes' vs. *a.ú.pa* 'he lifts'. The minimal contrast in identical morphological environment shown by these forms poses serious problems for Harris's system. He claims that stress assignment precedes syllable contraction. So if there are no underlying glides, at the time stress is assigned *cópja* is trisyllabic: *co.pi.a*. However, the stress rule says: „stress is assigned to the penultimate syllable of present tense verbs". Therefore the expected form is **copía*. This paradox makes Harris say that Spanish has underlying glides, that is to say, rising and falling diphthongs *(co.pja, caw.sa).*[2]

2.2. Diphthongs are derived

In (1) a number of phonological facts are presented, partly following Carreira (1990), which support the two-syllable analysis of RDs.

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2 A drawback of the analysis is that Harris does not account for the systematic glide-vowel alternation within the paradigm of the same verbs. So while *cámb**ja*** contains a RD, *roc**ía*** does not, but the same verbs in 1/Pl *camb**já**mos*, *roc**já**mos* both contain a RD.

(1) Arguments for derived RDs

The lack of words like **cáricja* and **cárjaci* (antepenultimate stress and RD in the penult or ult) suggests that words with this type of syllabic structure at the moment of stress assignment (or in the lexicon, if we assume that stress assignment is not rule-based) contain four syllables, therefore the word with antepenultimate stress would bear stress on the fourth syllable from the right (cá.ri.ci.a), violating the three-syllable-window condition.

The same vowel sequence is often clearly bisyllabic in morphologically related words, e.g. *ma.ní.a* 'mania' vs. *ma.nja.ti.co* 'maniac'.

There are no phonotactic restrictions between the members of the diphthong as any vowel can be combined with any high vowel to form a diphthong. Usually there are co-occurrence restrictions between the members of a diphthong.

If we assume that RDs form part of the phoneme inventory of Spanish, would mean that the number of vowels must be significantly increased, which is undesirable unless we have a strong theoretical motivation for doing so. Especially, if we take into account the lack of co-occurrence restrictions between the members of RDs.

In careful speech and poetry non-alternating rising diphthongs can be pronounced bisyllabically.

Carreira claims that syllable contraction (rising diphthong formation) in her system is a possible repair strategy for those verbs that do not comply with the canonical stress pattern of present forms (stress on the penult). This means that similarly to nouns there are proparoxytonic present tense verbs as well (cám.bi.a), but they must be realised with stress on the penult. The type of the verb (paroxytonic or proparoxytonic) is in close relation with the morphologically related nominal. So the verb whose corresponding noun bears stress on the penultimate high vowel like *rocío* 'dew' will have the same stress pattern – *rocío* 'I sprinkle' – and will not become **rócjo* due to syllable contraction. In Carreira's model falling diphthong formation precedes, while rising diphthong formation follows stress assignment. In this way she can account for the existence of words like *náwtica,* but cannot account for the different stress pattern of *cáwsa* vs. *aúpa*. Before providing a unified account of rising and falling diphthongs in Spanish, let us have a brief introduction to CV phonology.

3. STRICT CV

A radical view of syllable structure has been proposed by Lowenstamm (1996) and is discussed in Polgárdi (1998), Scheer & Ségéral (1999), Rebrus (2000) and others. The claim Lowenstamm makes is that syllable

structure can be universally reduced to CV sequences – an onset and a nucleus. This means that timing units and syllabic constituents are conflated into the CVCV – tier. In this sense, similarly to other frameworks, where the position in the syllable determines whether the segment is realised as [j/w] or *i/u,* the host of the segment (C or V) partly determines the melodic interpretation. Strict CV accepts the existence of empty skeletal positions.

The mechanisms governing the emptiness of vowel positions is Proper Government (following Kaye et al. 1985) (2) and C-to-C government (Gussman - Kaye 1993; Szigetvári 1999 and others). Both Proper Government (PG) and C-to-C government apply from right to left. In PG a full vowel can properly govern the nearest vowel position on its left. Nearest here means that no other V position intervenes. As PG operates from right to left, domain-final nuclei are parametrically licensed.

(2) Proper Government (applied to CV)
A nuclear position α properly governs a nuclear position β if
α is adjacent to β (on a given projection)
α is not governed itself

The creation of C-to-C governing domains is subject to melodic conditions and is language specific. If C-to-C government is established, the empty V position is buried and it has exactly the same properties as properly governed vowel positions, that is to say, it remains uninterpreted. Let us not forget that only ungoverned positions can govern. So in C-to-C government the two consonants are interdependent. The surface clusters created by C-to-C government are typically those which in traditional syllabic terms are coda-onset clusters. The advantage of CV phonology over those frameworks where the distinction between *i~j* and *u~w* is determined by the position of these segments within the syllable is that in strict CV resyllabification (a destructive operation) is not needed as it will become obvious in 4.

In the analysis I also assume that phonological features are unary,[3] but the present analysis would not be much different if binary feature matrices were applied. I use unary features (elements) because their application makes a model more restrictive. In these models, distinction does not lie in the value of a feature, but in the presence or absence of the prime in question, which means that phonological processes can only refer to elements that are present in the representation. An element can be interpreted on its own (this is not necessarily true in all models applying unary features) and can be combined with other elements to form compounds.

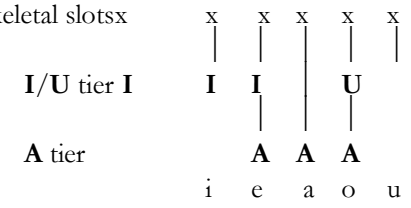
[3] Known from works like Kaye et al. 1985; Anderson - Ewen, 1987, John Harris 1994 and others.

The elements usually posited for vowels are: **A**, **I** and **U**. They can be interpreted on their own yielding *a, i* and *u* respectively; or they can be combined with each other, as in (3).

(3) [**A**, **I**] = e
[**A**, **U**] = o
[**I**, **U**] = ü

There is a three-element compound as well: [**A**, **I**, **U**], which is *ö*. Elements belonging to the same skeletal slot are thought to occupy different autosegmental tiers, so no relation of precedence is assumed between them.[4] Languages may choose to conflate two or more autosegmental tiers, which means that the elements on these tiers cannot be combined. Spanish conflates **I** and **U** tiers – a common option cross-linguistically – which calls forth a five-member vowel system (4), and excludes front rounded vowels. (Note that **A** is not linked to **I**/**U**, they are on separate tiers.)

(4)



4. UNIFYING RISING AND FALLING DIPHTHONGS

At the beginning of this section an „intuitive" solution is provided for treating uniformly non-alternating RDs and FDs in Spanish. In part 4.1 the theoretical status of Proper Government in Spanish will be discussed in detail.

As it has been mentioned earlier, I assume that stress in Spanish is the lexical property of the syllable, in our case, that of the V position. Let us also assume that lone **I**/**U** elements float in the lexical representation of Spanish words, that is, they are not linked to a skeletal position C or V. Although these elements are not lexically linked to any skeletal position, they still must surface, so they cannot be left unlinked. According to this the lexical representation of *sáwce* 'weeping willow' and *saúco* 'elder' is the same except for the place of stress (5). (**V** indicates that the vowel is lexically stressed.) In (5a) sáwce V_3 bears lexical stress, while in (5b) saúco V_2 is stressed.

[4] I will not discuss headedness relations, as it is not relevant for Spanish. The interested reader is referred to John Harris (1994).

(5) a. C **V**$_3$ C V$_2$ C V$_1$ b. C V$_3$ C **V**$_2$ C V$_1$

s a **U** c e s a **U** c o

We know that the floating element must surface in Spanish. This seems to be a language specific property, which we might consider as a parameter setting or less desirably as a stipulation. So if there is a C position available, the floating element will attach to that, forming in this way either a structure traditionally referred to as rising diphthong (6a) and (7a) or a „falling diphthong" (6b) and (7b) depending on which C position hosts segmental material and which one is available for the floating element. This means that the „first choice" of a floating **I** or **U** is to dock on a C position. If, however, a V position is stressed, it must be interpreted, it cannot remain empty, so the floating element gets linked to it (6c) and (7c) independently of the available C positions. Hiatus is cross-linguistically marked, in Spanish in the case of **I**/**U** it is only allowed under lexical stress. If the V position is not stressed, but there is no other skeletal position available for **I**/**U** to dock on, it will attach to a V position as a „last resort" (6d) and (7d). (**V** indicates that the V position is stressed.)

(6)

PG PG

a. C V C **V** C V b. C **V** C V C V c. C V C **V** C V d. C **V** C V C V

d **I** a n a b o **I** n a c a **I** d a a n **I** m a

D[já]*na* *b*[ój]*na* *caída* *ánima*

'Diana' 'baret' 'fall' 'soul'

(7)

PG PG

a. C V C V C **V** C V b. C **V** C V C V c. C V C **V** C V d. C **V** C V C V

a d **U** a n a c a **U** s a s a **U** c o l o b **U** l o

ad[wá]*na* *c*[áw]*sa* *saúco* *lóbulo*

'customrs' 'cause' 'elder' 'lobe'

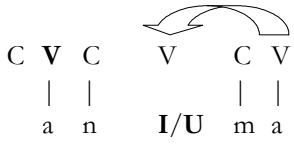
Proper Government takes care of the empty V positions (indicated by an arrow over the V positions), but it is suspended in cases (6c-d) and (7c-d).

The above representation shows that there is no need for differentiating underlying glides and high vowels. The surface properties of these segments follow from their position in the skeleton, which is partly determined in terms of stress.

4.1. The status of Proper Government

In Government Phonology Proper Government is assumed to be present in the lexical representation of a given item. If this view is extended to Spanish, both PG and stress are lexically given. It is not enough to state that PG is present, the conditions of its presence have to be determined as well. In Spanish the target of PG is an unstressed V position which does not host segmental material. In this way words like those in (6a-c) and (7a-c) are explained because in (6a-b) and (7a-b) PG takes care of the unstressed V position, in (6c) and (7c) PG does not apply since the V position is stressed. However, the representation of words like *ánima* and *lóbulo* runs into difficulty. It is not obvious why PG does not make the unstressed V position uninterpreted, that is to say why PG is suspended. We could assume, of course, that there are words in the lexicon like the hypothetical form in (8) where we never find out that there is a floating **I** or **U** in the lexical representation of the word.

(8)



**ánma*

There are several problems with the above representation though. Firstly, it is quite wrong to assume the existence of something that is never detectable. This concept is essential in most frameworks.[5] Secondly, the above representation still does not account for the existence of *ánima* and *lóbulo* type words, i.e. the suspension of PG. Thirdly, Spanish does not allow true bogus clusters like *-nm-* or *-tk-,* which is a strong argument against the functioning of PG, since where in traditional terms coda-onset clusters appear, these are always „created" by C-to-C government. It seems that the language has a stronger compulsion not to erase any floating segments than not to suspend PG, the formal representation of this requirement, however, awaits further research.

Another option is to assume that PG is not lexically present in Spanish, only stress is lexically present, and PG is evoked when necessary, that is to say, when it needs to take care of the V position which remains empty. Although this solution accounts for *ánima* type words, it is theoretically more objectionable because PG should see in advance the result of its application. For this reason I assume that PG is given lexically in Spanish, but is suspended in words like *ánima.* In this way the three syllable stress window can also be stated in strict CV: this condition is sensi-

[5] Let us think about the Naturalness Condition formulated in Postal (1968) or Lexicon Optimization in Optimality Theory.

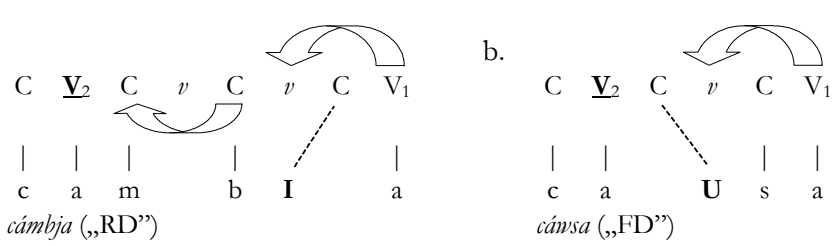
tive to those V positions which are muted by PG, but it is not sensitive to those V positions which are buried by a C-to-C governing domain (i.e. coda-onset clusters).

4.2. Present tense verb forms

The examples given in (6) and (7) are nouns. I think that similarly to nouns *cámbja* type verbs are distinguished from *rocía* type verbs on the basis of their stress pattern, also verbs like *cáwsa* differ from verbs like *aúpa* in the locus of stress. Similarly to the related nouns *cámbja* and *cáwsa* are proparoxytonic, which is the lexical property of these words, while *rocía* and *aúpa* are paroxytonic. However, if there are proparoxytonic as well as paroxytonic verbs, one would expect present tense verbs with stress on the antepenultimate syllable – in those cases where the formation of a „diphthong" is not possible.[6] I refer to cases where the C positions are filled like in the hypothetical verb form **fórmulo*.

I assume that in the case of present tense verb forms an inviolable word-level constraint, a filter, must be satisfied according to which present tense verb forms can only surface with penultimate stress.[7] This constraint says that present tense verbs must be stressed on the second filled vowel position counting from the right, empty vowels do not count (9) – this filter, unlike the three-syllable stress window, is sensitive only to filled vowel positions. The three-syllable window count all the V positions except for those which are buried in a C-to-C governing domain. The requirement on present tense verbs explains why *cámbja*$_V$ and *cáwsa*$_V$ can survive, but **fórmula*$_V$ is ill-formed (although the noun is stressed on the antepenult), *aúpa* and *rocía* will bear stress where it is lexically assigned. (**V**= lexically assigned stress; $\underline{V}_2$ = stress required by the constraint on present tense verb forms; *v* = vowel positions which remain empty and are therefore invisible to verbal stress checking; the arrow under the C positions indicates C-to-C government, i.e. a burial domain).

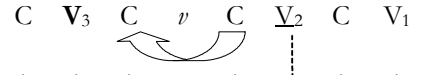
(9)



[6] I use the term diphthong between inverted commas because it follows from the representation given in (6) and (7) that these sequences are not proper diphthongs.

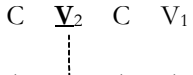
[7] Monosyllabic verb forms, naturally, cannot bear stress on the penult (e.g. *dóy* 'I give).

c.



**fórmula* → *formúla*[8]

d.



aúpa (hiatus)

The representation given in (9) coupled with the inviolable surface requirement on present tense verbs accounts for the behaviour of high vowels in Spanish and supports the claim that there is no need to posit underlying glides in the language.

The above representations also explain why *(C)V*w/j*C – is not a well – formed syllable in Spanish.[9] If V*j/w* were a true diphthong, both of its elements would occupy V positions as in (10a), so there would be no need for governing any V position because the two filled V positions would form a so called closed domain indicated by square brackets.[10] So tautosyllabic – VGC – sequences should exist in Spanish, but they do not. But if **I/U** are linked to a C slot, as in our representation, the following V must govern the position which remains empty as in (10b). This, however, is not possible because empty vowels cannot govern.

(10) „sewn"

a.

**sewn* as a true diphthong

b.

sewn* with floating **U

The analysis so far proves that it is not justified to posit underlying glides in Spanish. If this is so, and we want to maintain the representation provided in (9), *návtica* type words present a problem for strict CV as well

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[8] I am aware of the destructive nature of the „stress shift" and I view it as a problem. Stress shift is only necessary if we assume certain monotonicity between the related noun-verb pairs. The solution might lie in referring to the „split-base effect" as discussed in Steriade (1998). Split-base effect arises when the morphosyntactic base of affixation lacks a phonological property that is desirable in the derivative, so the derivative may adopt the phonology of a distinct listed allomorph. I will not discuss this problem here, though.

[9] The only exception is where the syllable-final consonant is *s*, which can appear in this context (e.g. *Áws.tria* 'Austria') and *véjnte* 'twenty', *tréjnta* 'thirty'. There are a handful of words which according to their spelling contain this type of exceptional syllables e.g. *a*[wks]*ílio* 'help', but the cluster in these cases is simplified in pronunciation.

[10] The details are not relevant here, but this is how we can differentiate between diphthongs and hiatuses.

because they seem to violate the three-syllable widow condition. As it has been mentioned above the three-syllable window is sensitive to all V positions except for those buried in a C-to-C domain. So the element U should have its „own" properly governed V position and therefore stress falls on the fourth V position from the right. Let us now proceed to the discussion of these words.

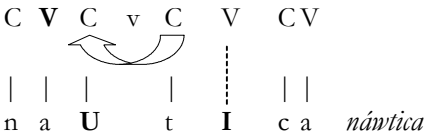
5. THE THREE-SYLLABLE STRESS WINDOW

A possible solution is to represent *náwtica*-type words with stress on the fourth V form the right. This is undesirable, though, because the three-syllable-window condition seems to be an inviolable generalisation governing Spanish stress, it is respected by the most recent borrowings as well.[11] Note that these exceptions form a small group (11) and half of them start with the Greek prefix *nau-*.

(11)	*náwfrago*	'shipwreck'	*hidráwlico/a*	'hydraulic'
	náwtica/o	'navigation', 'navigational'	*áwreo*	'golden'
	náwsea	'nausea'	*farmacéwtico*	'pharmacist'

My proposal is that in these forms the **U** element is lexically linked to a C position instead of floating, which means that the third nucleus from the right that counts for stress is *a* (12). In traditional terms it is like specifying *u* for non-syllabicity, but no new phoneme has to be introduced.

(12)



In these words the sequence [aw] and [ew] behave like real nucleus+coda sequences, and – *w*C – behaves like a coda-onset cluster, in traditional terms. In strict CV the V position between **U** and *t* in (12) is invisible for stress because it is flanked by a C-to-C governing domain. These words are irregular because these are the only cases in the language where we have to suspend that a lone **U** is floating. Such irregularities with the **I** element are not attested.

11 Although some speakers form the plural of *régimen* as *régimenes,* which suggests that the constraint might not be inviolable at least for some speakers.

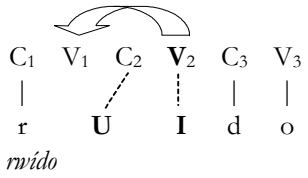
6 THE CASE OF U I *AND* I U *SEQUENCES*

For the sake of completeness I will devote a few words to the sequences formed by *i* and *u*. These sequences are generally analysed as rising diphthongs. According to Navarro Tomás (1965) the sequence (iu) is most often realised as [ju], sometimes as [i.u]. The sequence (ui) appears as [wi], [u.i] or [uj]. He also says that in the latter case the realisation as a FD predominates. It is also claimed that there is no consistency among speakers of the same dialect, or even within individual speakers. I claim that in word-final position [uj] predominates as in *múj* 'very', word-internally both [uj] and [wi] are used, e.g. *cuida* 'take care' [kújda] and [kwída], but the most accepted form differs from item to item. I will not deal with the pronunciation of high vowel sequences as a hiatus (ru.ído and vi.úda) because as it has been mentioned in (1), any type of RD can be pronounced bisyllabically.[12]

It follows from the analysis presented in Section 4. that both **I** and **U** are floating as in (13). The stressed V position must be interpreted, so one of the floating elements will attach to it. The representation of *rwído* 'noise' and *vjúda* 'widow' is the following.

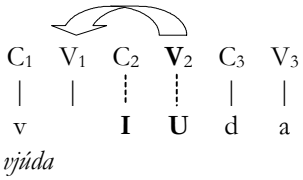
(13)

a.



rwído

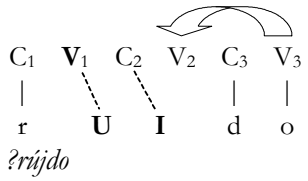
b.



vjúda

For those speakers who pronounce [rújdo] not V_2 bears stress but V_1 as in (14).

(14)



?rújdo

The hesitation in pronunciation between [új] and [wí] can be explained if these sequences are analysed as contour segments. As Kaye (1985) claims, in light diphthongs it is always the more sonorous element that is the head. In his account the order of the elements is also determined by sonority. In the case of **I** and **U** there is no sonority difference, so the hesi-

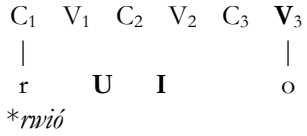
12 There are not lexical items in Spanish which can appear with the sequence [iw] like **víwda,* although I do not have an explanation for this.

tations in the pronunciation of these sequences could be the result of their identical sonority.

However, **I U** sequences pattern with non-alternating RDs (see the account in Prieto (1990) about diminutive formation) and not with alternating diphthongs, which I analyse as contour segments, so these sequences should not be analysed as contour segments either.

The analysis presented so far and the above representations predict that there are no words in Spanish with adjacent **U I** or **I U** sequences followed by a stressed vowel, and this is borne out.

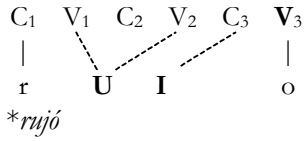
(15)



**rwió*

If **I** gets linked to C_3 and **U** to V_1 or V_2, there will be an empty CV or VC pair which makes the structure ill-formed. (By bold broken line the second possibility is indicated.)

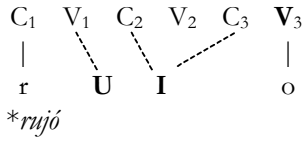
(16)



**rujó*

The situation is the same if **U** docks on V_1 and **I** on C_2 or C_3.

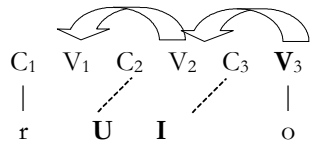
(17)



**rujó*

If both floating elements join a C position (the ideal state of affairs), V_2 can be Properly Governed by V_3, but V_1 cannot be taken care of because the empty V_2 cannot govern, so the structure is not allowed.

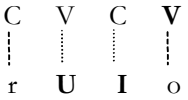
(18)



rwió*/rujó*/**rwjó*

Both floating elements could join V positions forming *ruió*, in which case there would be no need for PG. But PG in Spanish is only suspended in words like *ánima* and *lóbulo* where **I**/**U** would otherwise be unpronounced. **I**/**U** in hiatus in Spanish can appear only under lexical stress and in these cases the high vowel must bear stress. The same requirement excludes the possibility of **U** linking to C_2 and **I** to V_2, because in this case **I** and *ó* would be in hiatus, which would only be possible if **I** was stressed. So the only possible representation for the sequence **r***UI***ó** is (19), in which case **I** cannot possibly surface as a vowel. We indeed find such words e.g. *buyó* [ujó] 'he escaped', *mayo* 'May'. The element **I** in these cases is realised as a fricative (which is reflected in the orthography of these words as well). There are no similar words with the **U** element linked to a C position e.g. *[iwó].

(19)



In this section it has been shown that the representation in CV phonology with floating **I**/**U** elements accounts for the stress related behaviour of high vowel sequences as well.

7. CONCLUSIONS

It has been demonstrated that the structures traditionally referred to as non-alternating rising diphthongs and falling diphthongs are not proper diphthongs in Spanish. The stress related behaviour of high vowels can be accounted for in the framework of strict CV if we assume that **I**/**U** float in the lexical representation of Spanish words, but they must surface. The floating element ideally attaches to an empty C position unless a stronger „requirement" forces it to dock on a V position. Such requirements are if a V position is lexically stressed – because stressed V positions must be interpreted –; or if the floating element would be erased otherwise. These words pose a problem for the account because although the V position in question is unstressed PG must be suspended. Words of *návtica* type are exceptional because **U** is not floating in their lexical representation but is linked to a C position.

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