

Hiatus in Argentinian Spanish

Gustavo Beritognolo

In this paper, I deal with the syllabification of an unstressed high vowel (H) followed by a vowel (V) in a CHV context. Unstressed H is expected to surface as a glide. However, in some cases it is a full vowel: word-initially and with stress on V or one syllable at the right of the word-initial sequence; at the boundary between two stems in compounds when stress is on V. I propose that hiatus in these environments is a means of providing a perceptual cue for edges and boundaries of words.

1. Introduction

This paper examines the syllabification of high vocoids (H) followed by other vocoids (V). The general tendency for high vocoids in this configuration in Spanish is to surface as glides (in the same syllable as V) if unstressed (e.g. [far.má.sja] ‘pharmacy’) and as a vowel (in its own syllable) if stressed (e.g. [ma.rí.a] ‘Mary’). However in certain contexts H is realized as a vowel even if it is not stressed. Most studies of hiatus in Spanish have concentrated in Peninsular Spanish (PS), (e.g. Hualde 1997, 1999, 2005; Aguilar 1999; Colina 1999; Face & Alvord 2004; Simonet 2006; Cabré & Prieto 2006). The present study aims to provide a broad description of the distribution of and account for hiatus in my dialect of Argentinian Spanish (AS). The contribution of this paper is twofold: (i) it expands the description of the dialectal distribution of hiatus; (ii) it provides an analysis which is more adequate than previous studies in both its formalisation and its ability to account for unsatisfactorily explained data. It is important to note that, as in other dialects, hiatus in AS is a tendency that in some speakers is disappearing at least in some contexts. I will deal with the cases where hiatus is observed and leave dialectal variation for future research.

The paper is organized as follows. In section 2, I present the data, which are divided into the different contexts where hiatus appears. In section 3, I state my assumptions concerning the syllabification of HV. Section 4 reviews other approaches to this phenomenon. In section 5, I offer my own analysis within the framework of Optimality Theory (OT) (Prince & Smolensky 1993; McCarthy & Prince 1995). I contend that hiatus is triggered for perceptual reasons. I specifically propose that hiatus is a means of providing a perceptual cue for edges and boundaries of words. Finally, I conclude in section 6.

2. Gliding/hiatus contexts

This section describes the environments that favour or disfavour the appearance of hiatus. I provide data already described for PS and also observed in AS. I will restrict my data to configurations of the type C(onsonant)H(igh)V(owel).¹ The main factors relevant for hiatus are: (a) the position of the sequence HV in the word (initial *vs.* medial and final) and (b) the presence of HV at word boundaries, where H belongs to the right edge of a constituent and V to the left edge of the following constituent. Note that the factors just mentioned are necessary but not sufficient conditions for the appearance of hiatus. Stress is also important: its presence on the second vowel of the sequence or near the sequence is crucial for favouring hiatus. Thus, not only are the position in the word and, in some cases, the consonant preceding H but also the distance that separates the sequence from the stressed syllable determinants for hiatus.²

2.1 Word position

In this section, I show the positions within roots where hiatus can appear.

2.1.1 Word initiality

Hiatus is favoured word-initially.³ When the sequence is located word-initially and stressed falls on V, hiatus appears:

- | | | | | |
|-----|--------------|------------|--------------|--------------------------|
| (1) | [di.á.blo] | ‘devil’ | [fi.ám.bre] | ‘cold meat’ |
| | [si.á.ti.ka] | ‘sciatica’ | [di.ó.do] | ‘diode’ |
| | [mi.ó.pe] | ‘myopic’ | [bi.ó.lo.go] | ‘biologist’ |
| | [su.ám.po] | ‘swamp’ | [bu.í.do] | ‘pointed’ ^{4,5} |

¹ When the high vocoid is at the absolute beginning of a word or is preceded (and followed) by another vocoid (VHV), it always surfaces as a glide and even consonantalises (e.g. /koiote/ [ko.ʒó.te] ‘coyote’ (see Harris & Kaisse (1999) for discussion)

² I provide the examples transcribed in IPA. Syllables are separated with dots and stress is marked with an acute accent, whether it is written in the orthography or not.

³ i.e. immediately after the word-initial consonant.

⁴ Some exceptions include [pjá.no] ‘piano’, [bján.da] ‘food’, [pjó. xo] ‘louse’, [fjór.do] ‘fiord’, [bjú.da] ‘widow’, [bwí.tre] ‘vulture’, [swí.sa] ‘Switzerland’. The HV sequence is also tautosyllabic when H is *u* and the preceding consonant is *k* or *g* (e.g. [kwá.dro] ‘picture’, [gwár.dia] ‘guard’).

⁵ The sequences *ie* and *ue* have been noted to be peculiar in Spanish (see Hualde 1997, 2005; Cabré & Prieto 2006). They display two different patterns: a. the so-called historical diphthongs, which developed from stressed Vulgar Latin mid-low vowels [ɛ, ɔ] (*ferrum* > *hierro* ‘iron’, *ovu* > *huevo* ‘egg’), alternate with [e] and [o]. [je] and [we] appear when stressed, a monophthong surfaces when stress is not present on the sequence:

(i) [djén.te /den.tál] ‘tooth’/ ‘dental’ [dwé.lo /do.lór] ‘mourning’/ ‘pain’

The historical sequences *ie* and *ue* have been claimed to be always pronounced as diphthongs in PS (Hualde 1997, 2005; Cabré & Prieto 2006), independently of the fact that they meet the condition for hiatus, i.e. whether the sequence is word-initial and the second vocoid of the sequence is stressed.

b. sequences *ie* and *ue* not derived from the historical diphthongs (and non alternating). Some words containing these non-historical sequences are pronounced with a diphthong (iia) and some with a hiatus (iib):

(ii) a. [sjén.sja] ‘science’ [swé.ter] ‘sweater’
b. [du.é.to] ‘duet’ [bi.é.la] ‘connecting rod’

When HV is word-initial and stress is placed only one syllable to the right of the sequence, hiatus also surfaces:

- (2) [si.a.nú.ro] ‘cyanide’ [di.a.frág.ma] ‘diaphragm’,
 [mi.o.kár.dio] ‘myocardium’ [di.u.ré.ti.ko] ‘diuretic’
 [di.ok.sí.na] ‘dioxin’ [bu.ar.dí.ʒa] ‘loft’⁶

However, if stress falls two or more syllables to the right of HV, then gliding is favoured:

- (3) [sja.nu.rá.to] ‘cyanide’ [dja.go.nál] ‘diagonal’,
 [fjo.ri.tú.ra] ‘fioritura’ [dwa.li.dád] ‘duality’

2.1.2 Word medial or final position

In cases where the HV sequence is stressed but located in a position other than the initial one, gliding is generally preferred, both in medial (4a) and final (4b) position:

- (4) a. [ta.tjá.na] (proper name) [pi.twí.ta] ‘flegm’
 b. [ru.fján] ‘scoundrel’ [kam.pjón] ‘champion’

The sequence is also tautosyllabic when it is non-initial and unstressed, whether followed by stress (5a) or preceded by it (5b):

- (5) a. [me.dja.sjón] ‘mediation’ [a.bjo.né.ta] ‘light aircraft’
 [si.twa.sjón] ‘situation’
 b. [pa.ró.dja] ‘parody’ [má.fja] ‘mafia’
 [pré.djo] ‘place’ [kon.tí.nwa] ‘continuous’

Table 1 summarizes the contexts of appearance of hiatus just described:

Stress	Initial Position	Non-Initial Position
On HV sequence	<u>CV.V</u> ’CV(...)	CV.CGV’(...)
Immediately following HV	CV.V.CV’(...)	CV.CGV.CV’(...)
Following HV further away	CGV.CV.CV’(...)	CV.CGV.CV.CV’(...)
Preceding HV sequence	---	(...).CV’.CGV

Table 1

(C= consonant; V= full vowel; G= glide)

Cabré & Prieto (2006) suggest that examples in (iia) might be pronounced with a diphthong by analogy with words like those in (i), hence the presence of diphthongs even in word-initial position (cf. (1) and (2)). In AS *ie* and *ue* seem to display the same behaviour with respect to hiatus. I leave this peculiarity of these sequences for future research.

⁶ Except [sju.dád] ‘city’.

The word-initial effect has also been attested in PS. Hualde (1997, 2005) and Cabré & Prieto (2006) mention that in PS hiatus also arises in the contexts illustrated (1) and (2) but not in examples like those in (3) and (4).

2.2 Complex words

In many languages, complex words formed with two roots and those formed with a root and suffixes have been observed not to behave alike with respect to phonological processes (see e.g. Peperkamp 1997). This distinction is also visible in AS with respect to hiatus.

At the boundary between two words (6a) or a bound non-native root⁷ and a word (6b), hiatus is preferred if stress falls on V; if the sequence is not stressed then gliding takes place (6c-d):

- | | | | | |
|-----|----|---|---------------------|---------------------------------------|
| (6) | a. | /bok-i-antʃo/
mouth- <i>i</i> -wide | [bo.ki.án.tʃo] | ‘wide-mouthed’ |
| | | /barb-i-etʃo/
beard- <i>i</i> -done | [bar.bi.é.tʃo] | ‘clean shaved’ |
| | b. | /anti-asido/
anti-acid | [an.ti.á.si.do] | ‘antacid’ |
| | | /multi-uso/
multi-use | [mul.ti.ú.so] | ‘multi-purpose’ |
| | c. | /bok-i-abierto/
mouth- <i>i</i> -open | [bo.kja.bjér.to] | ‘surprised’ |
| | | /barb-i-espeso/
beard- <i>i</i> -thick | [bar.bjes.pe.so] | ‘thick-bearded’ |
| | d. | /anti-aereo/
anti-aerial | [an.tja.é.re.o] | ‘anti-aircraft’ |
| | | /pluri-empleado/
several-employer | [plu.rjem.ple.á.do] | ‘person that holds more than one job’ |

As indicated, the high vowel forms a syllable with the last consonant of the first component while the second vowel of the HV sequence belongs to the second root.⁸ The high vocoid in

⁷ It seems that there is no consensus with respect to the morphological status of morphemes like *anti-*, *semi-*, etc. Some linguists consider them non-native roots while others classify them as prefixes. I take stance for the first position (cf. Varela & García 1999). The main arguments are (i) they can be conjoined (e.g. *pro y antiaborto* ‘pro and anti-abortion’, *pluri y unicelular* ‘pluri and unicellular’) like native compounds (e.g. *boqui y cariancho* ‘wide-mouthed and ‘broad-faced’, and unlike prefixes (e.g. **des y reunir* ‘disjoin and rejoin’); (ii) they can be equated with prepositions and quantifiers: they cannot combine with suffixes, like prepositions and quantifiers (e.g. **anti-ción*, **contra-ción* ‘against-tion’, **multi-dad*, **mucho-dad* ‘many-ity’, and they can form syntactic relations with the other member of the compound in a similar way as in phrases (*multiuso/muchos usos* ‘multi-purpose/several purposes’ quantifier+complement) (see also Moyna 2000).

⁸ The compounds in (6a) and (6c) are a combination of a noun plus an adjective (see section 5.2.2). They are relatively productive and many of them have a compositional meaning. There is another type of compounds formed with a linking H. These are a concatenation of two nouns and those whose second member is vowel-initial are pronounced with a diphthong. They are almost unproductive and for most of them their meaning is not compositional (e.g. *maniobra* ‘manoeuvre’ (literally *mano* ‘hand’ and *obra* ‘work’). They are analysed as a single word (see Val Álavaro 1999) and therefore subject the same restrictions as examples in (4a).

(6a) and (6c) is a linking H which replaces the final vocalic desinence of the first member (cf. [boka] ‘mouth’).

As for suffixes, the HV sequence forms a diphthong even though V is stressed:

- (7) /konfi-able/[kon.fjá.ble] ‘trustful, /xesu-ita/ [xe.swí.ta] ‘Jesuit’
 /xeni-al/ [xe.njál] ‘great’, /iubi-oso/ [zu.bjó.so] ‘rainy’
 /mafi-oso/ [ma.fjó.so] ‘Mafioso’ /odi-oso/ [o.djó.so] ‘hateful’

The examples show that stress on V is not enough of a factor for the occurrence of hiatus in a root-suffix boundary. That is to say, unlike compounds, even though stress falls at the root-suffix boundary, H, which belongs to the base and V, which belongs to the suffix, are tautosyllabic.

In conclusion, whereas morphological boundaries of compounds produce some effects in the choice of hiatus or gliding, i.e. they favour glide formation only when V is not stressed, they have no influence on suffixed words, i.e. HV in suffixed forms behaves just as in roots. In Section 5.2.2, it will be seen that the difference in behaviour between compounds and suffixed forms on the other is due to a difference in prosodic structure.

Stress	Compound boundary	Suffix-stem boundary
Stress on V	CV.CV.V’CV(...)	CV.CGV’.CV(...)
Immediately following HV	CV.CGV.CV’(...)	CV.CGV.CV’(...)
Following HV further away	CV.CGV.CV.CV’(...)	----

Table 2

The behaviour of compounds in PS is identical to that in AS. That is, hiatus obtains only when V is stressed. As for suffixes the two dialects differ. According to Hualde (1999, 2005) and Cabré & Prieto (2006), suffixed forms do not behave uniformly with respect to a HV cluster. Words having a root ending in [u] and a suffix starting with a stress V trigger hiatus (e.g. /actu-al/ [ak.tu.ál] ‘present’), while this effect is not observed if the base ends in [i] (e.g. /labi-al/ [la.bjál] ‘labial’).

3. Syllabification of glides

As mentioned in the introduction, when an unstressed high vocoid is followed by another vocoid, it is expected to surface as a glide. However in very specific contexts, unstressed H is realized as a vowel.⁹ Before giving an account of this apparent particularity, I state my assumptions about the structural difference between a H syllabified as a glide or as a vowel.

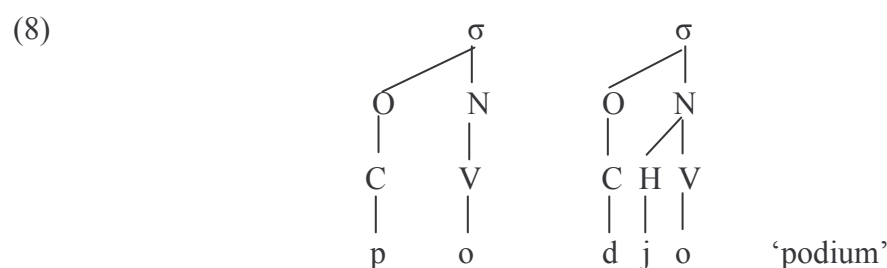
⁹ The concatenation of /u/ and /o/ constitutes an additional context where H and V are heterosyllabic. The cluster always surface as hiatus in AS with no concern of its position in the word, the placement of stress and the content of the relevant onset:

- (i) a. du.o.dé.no ‘duodenum’
 b. du.o.de.ní.to ‘little duodenum’
 c. su.pér.flu.o ‘superfluous’
 d. ár.du.o ‘arduous’

Carreira (1991) claims that Spanish displays a ban on tautomorphemic *uo* sequences, contrary to facts (c.f. ia, b). In PS, the sequence seems to surface tautosyllabic in all contexts. I leave this issue to future research.

It has been recognized for a long time that there are no featural differences between glides and vowels (see e.g. Roca 1997). The corresponding surface effect (i.e. a high vocoid either as a glide or as a full vowel) stems from the mechanics of syllabification, thanks to which glides and vowels have distinct syllabic affiliation. Vowels are syllabic peaks whereas glides are non-peaks. If a vocoid is a syllabic peak, it heads the syllable, and if it is non-peak, it is dependent of some head. In a CHV configuration two possibilities are offered to non-peak vocoids: either to attach to the onset headed by the preceding consonant or to the nucleus headed by the following vowel. Following Rosenthal (1994), Roca (1997) and Harris (2000), among others, I propose that Spanish prevocalic H in a CHV configuration is syllabified in the nucleus, not in the onset (contra Cabré & Prieto 2006, see below).

The structure of tautosyllabic CHV can be represented as in (8):



The combination of a high vocoid and another vocoid in the same syllabic constituent, i.e. the nucleus, results in a rising diphthong. V is the nuclear head and the syllabic peak, and H is the dependant and a non-peak.

4. Previous analyses

This section examines previous phonological analyses applied to hiatus in PS and highlights some drawbacks at least for AS and some advantages.

4.1 Morphological relations and lexically-specified syllabification

Hualde (1997) examines his own dialect of Peninsular Spanish (PS). He observes that the HV sequence surfaces as hiatus word-initially, in prefixed and suffixed words, and in compounds. The occurrence of hiatus with unstressed H is treated by Hualde (1997) from a point of view of markedness. He seems to relate markedness to the notion of rare frequency of occurrence. He contends that diphthongisation is a much more frequent configuration than hiatus. Thus Spanish has a rule of glide formation for unstressed high vocoids appearing in a position adjacent to another vocoid. This rule has morphological and idiosyncratic exceptions. According to him, morphological exceptions are explained by appealing to related forms (e.g. /bi-able/ [bi.á.ble] 'viable' cf. [bí.a] 'way'), and morphological boundaries (e.g. /bi-enio/ [bi.é.njo] 'bienium'; /santu-ario/ [san.tu.á.rjo] 'sanctuary', /birtu-oso/ [bir.tu.ó.so] 'virtuous'). Idiosyncratic exceptions block gliding because they have a lexically-specified syllabification: the high vocoid is underlyingly marked as nuclear (e.g. /di.ablo/).

Hualde admits that this configuration is not randomly distributed in the lexicon: morphological and phonological factors favour the presence of hiatus. However, his analysis

remains at the descriptive level, that is to say, he does not attempt to explain why morphologically derived words and morphologically related words surface with hiatus instead of a diphthong. Moreover, his description of the phenomenon is not complete. For instance, he does not take into account the influence of stress: as observed in section (2) when stress is not on V or on the syllable right next to the HV sequence, then diphthongisation is favoured, even in PS (cf. Cabré & Prieto 2006; Pensado 1999). As for non-morphologically motivated hiatus, lexically-specified syllabification is not an adequate account. Special lexical marking devices are used for unpredictable exceptions. But hiatus occurring e.g. word-initially does not seem just a merely exceptional phenomenon.

4.2 Identity and correspondence

Taking some data from the PS dialect studied by Hualde (1992), Colina (1999) provides an OT account in terms of identity (McCarthy & Prince 1995; Kenstowicz 1995) and correspondence (McCarthy & Prince 1995; Benua 1995). She focuses on the same type of items as Hualde (1997): compounds (e.g. /anti-asido/ [an.ti.á.si.do] ‘antacid’) and suffixed forms (/manu-al/ [ma.nu.ál] ‘manual’), derived words morphologically related to words with a high stressed vowel (/piad-oso/ [pi.a.dó.so] ~ [pí.o] ‘merciful ~ devout’) and underived words (especially those with word-initial HV) ([di.á.blo] ‘devil’, [e.du.ár.do] ‘Edward’). For compounds and suffixed words, her proposal, based mainly on Kenstowicz’ (1995) Uniform Exponence, consists of an output-output identity constraint (IDENT Base-Root/Affixed form (σ))¹⁰ requiring that segments keep the same syllabic role in corresponding forms. In this case, a vocoid parsed in the nucleus in one correspondent must fill the same position in the other. This constraint is ranked higher than ONSET, the restriction against onsetless syllables (the square brackets indicate the base, i.e. the form to which the output is compared):

(9)

	/manu-al/ [mano]	IDENT B-R/A (σ)	ONSET
a.	ma.nu.ál		*
b.	ma.nwál	*!	

Candidate (b) loses because it violates the identity constraint: the last vocoid of the base occupies the nucleus position, but in the derived form it is a satellite, i.e. a glide, so it does not have the same syllabic role in both correspondents. In contrast, candidate (a) is the winner since the segment [u] heads its own syllable both in the base, where in isolation it surfaces as [o], and in the derived word.

This analysis might succeed in accounting for some compounds and some suffixed forms in PS. But it is not sufficient. As already mentioned, in a compound, when stress does not fall on V of the HV sequence, diphthongisation is favoured. Colina’s analysis cannot capture the difference in syllabification between forms like [an.ti.á.si.do] ‘anti-acid’ [an.tja.é.re.o] ‘anti-aircraft’. It predicts that both words should surface with hiatus or a diphthong, depending on the syllabic role of H in the base:

¹⁰ Colina (1999) does not identify the members that enter into the identity relation. I use the terms “base”, “root” and “affixed form” for derived forms as well as for non-morphologically related forms for the sake of exposition.

(10) /anti-/ [an.ti.mi.síl ‘antimissile’, an.ti.so.sjál ‘antisocial’] (nuclear H)

	/anti-asido/	IDENT B-R/A (σ)	ONSET
a. ☞	an.ti.á.si.do		*
b. ☹	an.tjá.si.do	*!	

IDENT B-R/A (σ) evaluates the identity of the syllabic role that segments have in all the realizations of a morpheme. That is to say, the constraint is complied with if segments keep the same syllabic role in all the realizations of a morpheme. In tableau (10) the ranking correctly selects candidate (a): this candidate satisfies the dominant identity constraint, because the root high vowel [i] in [an.ti.á.si.do] has the same syllabic role, i.e. nucleus, as in the other prefixed forms. Candidate (b) loses since in [an.tjá.si.do] the high vocoid surfaces as a syllabic satellite, not as a nucleus.

(11) /anti-/ [an.ti.mi.síl ‘antimissile’, an.ti.so.sjál ‘antisocial’] (nuclear H)

	/anti-aereo/	IDENT B-R/A (σ)	ONSET
a. ☞	an.ti.a.é.re.o		*
b. ☹	an.tja.é.re.o	*!	

According to this ranking, H in the first root is predicted to have the same syllabic role in all its realizations, in this case, the syllabic nucleus and so in tableau (11) candidate (a) is chosen. However the actual candidate is (b).

Hiatus in underived words is also analysed by Colina (1999) with a correspondence-based analysis. According to Hualde (1997, 1999, 2005), hiatus particularly in this set of data undergoes variation in PS: the sequence HV (e.g. word-initially) is syllabified with hiatus in some words and with a diphthong in other words (e.g. [swá.be] ‘soft’). Colina (1999) attempts to explain this variation and its greater incidence in underived words. She proposes that underived words with hiatus establish a correspondence with other words where H is nuclear, just as in the case of morphologically related words. The difference between the set of morphologically related words and underived words resides in the type of correspondence between the items. According to Colina (1999), underived words can establish correspondence relations with some related or unrelated form (affix, word, etc). She gives the word *biólogo* ‘biologist’ as an example. She affirms that this word is syllabified as [bi.ó.lo.go], with a hiatus, because the sequence /bi/ is in correspondence with the form [bi] “possibly analogically with the suffix *bi-* ‘two’ like in /bi-polar/ [bi.po.lár] ‘bipolar’” (Colina 1999: 129). IDENT B-R/A (σ) requires that H realized as a syllabic nucleus in the prefix [bi] be also a nucleus in *biólogo*. Thus underived words can have idiosyncratic correspondents. She claims that this idiosyncratic nature of correspondence results in (i) the variation in the setting up of correspondence relations, i.e. the fact that different speakers create correspondences with different set of words, and (ii) the difficulty in the identification of the correspondence relations, which, according to Colina (1999) explains the greater incidence of variability in the set of underived words with respect to hiatus. She concludes that for underived forms, the syllabification of the HV in the relevant contexts as a diphthong indicates no correspondence relation. IDENT B-R/A (σ) is not applicable and in order to satisfy ONSET, the form with the glide is selected. The presence of hiatus reveals a correspondence relation between a derived form with the HV sequence and some (un)related

form with nuclear H. IDENT B-R/A (σ) is relevant and its ranking over ONSET results in hiatus.

This part of the analysis is also inadequate. The postulation of idiosyncratic correspondence can lend itself to very arbitrary and far-fetched relations between correspondents, as in the case of *biólogo* and the prefix *bi-*. Output-output correspondences are usually set up with forms that are morphologically linked. This type of link can provide some principled motivation for a phonological correspondence. But with the case that I am reporting, no such link is possible. Besides, identification of correspondence relations between underived forms and unrelated forms is difficult just because there might be no relation whatsoever. From a theoretical point of view, Colina seems to misuse Kentowicz' (1995) Uniform Exponence, since she employs it in order to explain apparent relations between elements that are neither part of the same paradigm nor morphologically related. From an empirical point of view, her account is not applicable at least in AS. First, cases like [sja.nu.rá.to] 'cyanide', where stress is far removed from the HV sequence and which is related to a form with hiatus, [si.a.nú.ro] 'cyanide', are not explained. Second, although Colina (1999) mentions that hiatus in underived words is mainly observed word-initially, the identity constraint makes no reference to specific positions in the word and the stress factor. This implies that an idiosyncratic correspondence relation could be established between a word with the HV sequence and other form with a nuclear H both in any position and independently of the influence of stress.

4.3 Positional segmental faithfulness

In their study, Cabré & Prieto (2006) aim to explain the behaviour of HV in a conservative variety of PS, for which they also provide an OT account. They examine the HV sequence in initial position, with observations similar to the ones described in section (2.1), and in morpheme boundaries.

For their analysis, Cabré & Prieto (2006) assume that glides in sequences of rising sonority that do not derive from the historical diphthongs, i.e. *ia*, *io*, *iu*, *ua*, *ui*, *uo*, are underlying vowels, not underlying glides. They also adopt the view, contrary to standard assumptions (see e.g. Hualde 1991, 1997, Harris 2000), that these glides, except the historical ones, are positioned in the onset. Thus in words like [kamjón] 'truck' the nasal and the glide form a complex onset.

For their account for the presence of diphthongs, Cabré & Prieto (2006) employ a constraint prohibiting the attachment of a high vowel to one of the syllabic margins, in this case the onset, *M/V_[+high]. This constraint is dominated by ONSET:

(12)

	/kamion/ 'truck'	ONSET	*M/V _[+high]
a.	ka.mi.ón	*!	
b.	↗ ka.mjón		*

For the word-initial factor, Cabré & Prieto (2006) claim that hiatus occurrence is due to greater phonological salience typical of word-initial position. The idea is that the beginning of words is usually a psycholinguistically prioritized or perceptually prominent position (Beckman 1997). This observation is captured through a faithfulness constraint (MAX_{INIT-V})

which requires that every word-initial vowel in the input have an output correspondent. This constraint competes with ONSET:

(13)

	/diana/ ‘Diana’	MAX _{INIT-V}	ONSET	*M/V _[+high]
a.	di.á.na		*	
b.	djá.na	*!		*

MAX_{INIT-V} guarantees the surfacing of H as a full vowel and so the tendency to pronounce hiatus in word-initial position is accounted for, according to Cabré & Prieto (2006).

Cabré & Prieto (2006) claim that the lack of preference for hiatus when stress is far away from the word-initial HV sequence is due to a propensity to reduce the number of successive unstressed syllables. This prosodic tendency disfavours a succession of more than two unstressed syllables. They express this effect with the constraint *LAPSE. This constraint is ranked above MAX_{INIT-V}:

(14)

	/sianurato/	*LAPSE	MAX _{INIT-V}	ONSET	*M/V _[+high]
a.	sja.nu.rá.to		*		*
b.	si.a.nu.rá.to	*!		*	

The ranking in (14) indicates that it is preferable for a word to have no more than two unstressed syllables preceding the tonic syllable. Candidate (a) has two pretonic syllables whereas candidate (b) has three. That is why candidate (a) is selected.

As for derived words, recall that in PS if a stem ends in *u* and V is stressed then the vowels surface in hiatus (e.g. /birtu-al/ [bir.tu.ál] ‘virtual’), unlike those stems ending in *i* (e.g. /labial/ [la.bjál] ‘labial’). Cabré & Prieto (2006) do not provide any analysis. They just mention that /u/ is less prone to gliding, for which they just offer an imprecise comment. According to them, the resistance of /u/ to gliding is due to a segmental requirement imposed by a “minor faithfulness constraint [that] applies to very few cases, [given] that the amount of roots ending in /u/ is lower than [the number of roots] ending in /i/” (Cabré & Prieto 2006: 24). Compounds are also not analysed. An account for hiatus in these forms is not even attempted.

While the resort to the notion of perceptual prominence and salience of the word-initial syllable is appealing, I think that Cabré & Prieto (2006) do not succeed in explicating the phenomenon under investigation in an adequate manner from a theoretical point of view. The usage of a faithfulness constraint as MAX_{INIT-V} is not appropriate mainly for two reasons. First, faithfulness constraints are normally employed to account for deletion. That is, a high ranked MAX_{INIT-V} constraint prohibits the absence of an input segment in the output. But in the case at hand an input initial vocoid is not removed from the output. So in a candidate like (13b) there is no faithfulness violation. As a consequence, a MAX constraint cannot be used to prevent a high vocoid from appearing as a glide, instead of as a full vowel. Second, this MAX constraint is especially problematic with respect to Richness of the Base (ROB). ROB determines that there are no constraints on inputs. Since there is no underlying contrast between glides and high vowels, either type of segment can be in the input. So if both the input and the output have a vowel, then the constraint is satisfied; with a vowel in the input and a glide in the output the constraint is violated, as in (13). If the input has a glide and the output either a glide or a vowel, the constraint is also respected. So the constraint cannot exclude a form like [djá.blo] when a glide is in the input. We can see that the constraint

produces the correct results in three cases, but one case renders it useless. Consequently a different type of constraint is needed. Likewise, the prohibition of lapses is not well-implemented. I will provide a more precise version.

5. Analysis

In this section, I provide an account that overcomes all the difficulties stated above. I propose that hiatus arises because of perceptual reasons. A HV cluster is heterosyllabic in word initial position and complex words so as to cue the beginning of words and thus facilitate the perception of word edges.

5.1 Diphthongisation

In section 3.1 I mentioned that the difference between a glide and a full vowel resides in their syllabic affiliation. Vowels are syllabic peaks while glides are non-peaks. Gliding occurs in order to satisfy ONSET, one of several constraints expressing a preference for CV syllables. ONSET interacts with a MAX and a DEP constraint, which prohibit deletion and epenthesis respectively. The association of vocoids and syllabic nuclei is also controlled by the intervention of constraints. Based on Bakovic (2006), I propose that the link between syllabic nuclei and vocoids is established by ONE-TO-ONE:

- (15) ONE-TO-ONE: every nucleus must dominate one and only one vocoid and every vocoid must be dominated by only and only one nucleus.

The constraint in (15) prohibits the dominance of more than two vocoids by the same syllabic nucleus.

From the previous tableaux, it can be seen that vocalic segments in clusters are never deleted in order to satisfy ONSET. This means that both faithfulness constraints dominate the markedness constraint. Moreover, since an unstressed high vocoid can precede another vocoid within the same syllable but at the expense of surfacing without its own nucleus, the high vocoid must be syllabified under the nucleus dominating the second vowel. The HV string forms a diphthong. Thus the requirement of a bijective relation between syllabic nuclei and vocoids is overridden. This is indicated with a low ranking of ONE-TO-ONE:^{11,12}

(16)

	/farmasIa/	DEP-IO	MAX-IO	ONSET	ONE-TO-ONE
a.	far.má.si.a			*!	
b.	far.má.si.Ca	*!			
c.	far.má.sa		*!		
d.	☞ far.má.sja				*

¹¹ A capital I or U in the input indicates a high vocoid.

¹² A candidate like [far.má.sia] with two tautosyllabic vowels is excluded since all vowels are peaks and all peaks project their own syllable. Therefore two abutting vowels are never prosodised within the same syllable.

One of the faithful outputs, candidate (a), is excluded because it violates ONSET. The second and third are not faithful to the input; therefore they are not chosen either. Only candidate (d) can win because it complies with the dominant constraints although it violates the requirement on the link between vocoids and syllabic nuclei.

I mentioned in the introduction that high vocoids followed by vowels in Spanish surface as glides (in the same syllable as V) if unstressed and as a vowel (in its own syllable) if stressed. The ranking in (16) predicts that high vocoids in this configuration will always be syllabified as diphthongs, since it is not stressed. However, in section 2, it was seen that in certain contexts hiatus formed by HV sequences arises, even if H is unstressed. In the subsequent sections I will provide a formalisation of the circumstances under which this configuration occurs in AS.

5.2 *Word boundary cues*

5.2.1 *Hiatus at the left edge*

It has been suggested (e.g. Beckman 1997; Casali 1996; Smith 2002) that word initiality is a psycholinguistically important position. Its importance resides in its role in speech processing, lexical storage, and retrieval. Smith (2002) specifically argues that the word initial position is relevant for word recognition. That is, the word-initial position helps “the match[ing of] an acoustic signal with lexical entries so that the words in the utterance can be identified” (Smith 2002:254). For word recognition to take place, the speech stream must be segmented and the edges of words be demarcated. Demarcation of edges has been observed to be facilitated by the usage of several phonetic and phonological cues. For the left edges of words, i.e. word initial position, Pierrehumbert & Talkin (1992) state that some English left-edge consonants are strengthened, i.e. articulated with a tighter constriction. It was also discovered that left-edge consonants enjoy a reduced amount of overlap with a preceding segment across boundaries (see Côté 2000). Smith (2002) observed that in several languages (e.g. the Northern dialect of Arapaho (Algonquian), Guhang Ifugao), require the presence of consonants in the onset position of initial syllables while they tolerate onsetless syllables medially, that is, no word starts with a vowel in these languages. Other languages (e.g. Mongolian) allow only non-sonorant consonants in word initial position, i.e. liquids and glides are banned in this position. Casali (1996) also reports the special behaviour of word initial position in some African languages. For instance, Nawuri has a process in which front vocoids centralize interconsonantly. The process applies to word-final vowels when followed by a word-initial consonant, but it never affects word-initial vocoids which follow a word-final consonant. Côté (2000) and Smith (2002) conclude that all these devices contribute to an effective localisation of word boundaries and word recognition.

The facts mentioned in the previous paragraph indicate that the left edge of words benefit from a special status which renders it different from other positions. This status was acquired by virtue of phonetic and phonological cues. We observed that hiatus is favoured word-initially but not word-medially or finally. A HV cluster can occur in any position. At the left edge of words it syllabifies heterosyllabically whereas in other positions it is tautosyllabic. I suggest that hiatus arises word-initially so as to provide a cue for the left edge of words. That is, a syllabification of a vocalic cluster which is different in word-initial position from its

syllabification in other positions is a good indication of the point where a new word starts in the speech stream. Consider the samples of speech from AS in (17):

- (17) a. [far.má.sja.núro] *Farmacia Nuro* ‘(proper name) pharmacy’
 b. [to.ma.si.a.nú.ro] *toma cianuro* ‘he takes cyanide’

Both chunks contain the same segments, including a HV sequence, except for the first syllable. In (17a) the sequence is prosodised in one syllable whereas in (17b) it surfaces in two syllables. Hiatus in (17b) indicates that the second word starts with the syllable *si*, and so the first word ends in *ma*. In (17a) the diphthong is a sign that the stream cannot be separated before *sja*, but it can be divided after it. Thus I propose that hiatus at the word-left edge facilitates speech segmentation and consequently word recognition.

5.2.1.1 Positional markedness

I turn now to formalize the perceptual argument for word-initial hiatus using positional markedness. The preceding discussion indicates that hiatus formed by a HV string is restricted to a specific position. In OT terms, hiatus is the result of the intervention of constraints that target this position. Based on Smith (2002), I suggest that the obtention of word-initial hiatus can be encapsulated with the use of a markedness constraint that is relativized to this position.

Note that perceptibility motivates position-specific constraints but the constraints themselves are not defined in perceptual terms, but in phonological terms. That is to say, although the constraints responsible for hiatus are phonetically grounded, they are formalized with phonological elements (cf. Beckman 1997 and Smith 2002).

We saw in section 5.1 that gliding is the result of the association of two vocoids to one nucleus. But in the context of initial hiatus, both H and V are realized as vowels. This indicates that each vocoid is linked to a syllabic nucleus on its own in the output. I suggest that this one-to-one relation in word initial position is due to the following positional markedness constraint:

- (18) ONE-TO-ONE_(PWD-LEFTMOST): every Pwd-leftmost nucleus must dominate one and only one vocoid.

The data in (2.1.1) shows that the leftmost vocoid surfaces as a vowel, as it is associated with its own nucleus. The resulting prosodisation of HV is heterosyllabification, i.e. the vocoids have their own syllables. Since the syllable hosting the second vowel is onsetless, the positional constraint must dominate the constraint against empty onsets:

(19)

/dlablo/	1-TO-1 _(PWD-LEFTMOST)	ONSET	ONE-TO-ONE
a. ↻ di.á.blo		*	
b. djá.blo	*!		*

Candidate (19b) is excluded because it does not honour the restriction that determines the one-to-one relation between the initial nucleus and the initial vocoid. Candidate (19a) violates the constraint against onsetless syllables, but it is chosen because it complies with positional markedness restriction.

Hiatus in word-initial position and stress placed one syllable to the right of the HV also reflects the relative strength of ONE-TO-ONE_(PWD-LEFTMOST):

(20)	/sIanuro /	1-TO-1 _(PWD-LEFTMOST)	ONSET	ONE-TO-ONE
a.	☞ si.a.nú.ro		*	
c.	sja.nú.ro	*!		*

Candidate (20b) is ruled out and candidate (20a) is grammatical for the same reasons invoked for (19a).

We have observed in examples like the ones in (4) repeated here in (21) that the preference for hiatus disappears:

(21)	[sja.nu.rá.to]	‘cyanide’	[dja.go.nál]	‘diagonal’
	[fjo.ri.tú.ra]	‘fioritura’	[dwa.li.dád]	‘duality’

It happens that the effects of the positional constraint diminish when stress is not located on the second vowel of the sequence or one syllable to its right. Cabré & Prieto (2006) argue that this is due to the tendency to reduce the length of the pretonic sequence when the distance between the initial syllable and the stressed syllable increases. They consider this propensity as an effect of reducing the number of successive unstressed syllables. As mentioned in section 4.3, they express this effect with an anti-lapse constraint. I accept their explanation as correct. However, I provide a more precise implementation, which makes the difference between a lapse of two syllables and a lapse of more than two.

The intervention of an anti-lapse constraint can also be attributed to perception. I stated that the word-initial syllable is a perceptually relevant position. The stressed syllable is also phonetically important. It seems that shortening the distance between the left edge of the word and the left edge of the foot is beneficial for the perception of words. In the cases at hand this shortening is achieved by reducing the number of consecutive unstressed syllables. Thus, in a word like *fioritura* ‘fioritura’, having two pretonic syllables is more optimal than having three in terms of perceptibility on the stress dimension.

I base my analysis on Gordon (2002). He adopts a grid-based representation of stress, which determines that the level of stress associated with a syllable is a function of the number of levels of grids marks above a given syllable. Thus, an unstressed syllable has one grid mark, a secondary stressed syllable has two and a primary stressed syllable has three marks above it (adapted from Gordon 2002):

(22)	[σσðσ]
Primary stress	x
Secondary stress	x x
Syllable	xxxx
	σσσσ

A lapse is a sequence of unstressed syllables, i.e. a string of syllables that have only one grid mark. Gordon proposes two types of constraints that prohibit lapses: *LAPSE and *EXTENDED LAPSE. The former bans sequences of more than one unstressed syllables, whereas the latter has the effect of prohibiting more than two consecutive unstressed syllables. For my account I adopt *EXTENDED LAPSE (adapted from Gordon 2002):

- (23) *EXTENDED LAPSE: A sequence of more than two consecutive syllables with only one mark above it is banned.

This constraint targets configurations like the one in (24):¹³

- (24)
- | | |
|----------------|---------|
| | [σσσóσ] |
| Primary stress | x |
| | x |
| Syllable | xxxxx |
| | σσσσσ |

Let's see how *EXTENDED LAPSE works in Spanish. The constraint requires avoidance of illegal neighbouring syllables with only one grid mark. This can be achieved by reducing the number of unstressed syllables whenever possible. In the case of a HV sequence, it is possible to do so by syllabifying the two vocoids in the same constituent, which results in gliding. Since an instance of gliding in word initial position is an indication of failure to associate the initial vowel with its own nucleus, ONE-TO-ONE_(PWD-LEFTMOST) must be violated. Violation of the latter constraint must be caused in order to satisfy the rhythmic constraint. Therefore *EXTENDED LAPSE must outrank ONE-TO-ONE_(PWD-LEFTMOST):

- (25)
- | /floritura/ | *EXT LAPSE | 1-TO-1 _(PWD-LEFTMOST) | ONSET | 1-TO-1 |
|------------------|------------|----------------------------------|-------|--------|
| a. fi.o.ri.tú.ra | *! | | * | |
| b. fjo.ri.tú.ra | | * | | * |

Candidate (a) loses because it does not meet the condition on the number of grid marks. It contains three adjacent unstressed syllables (*fi*, *o* and *ri*). Candidate (b) is selected since it contains only two pretonic syllables, therefore it respects *EXTENDED LAPSE. The tableau indicates then that it is more harmonic to affect the cue to the left edge of words than have more than two pretonic syllables.

5.2.2 Hiatus at word boundaries

As shown in section (2.2), when the first member of a compound ends with a high vowel and the second member starts with a stressed vowel, hiatus is favoured. I repeat in (26) examples given in (6):

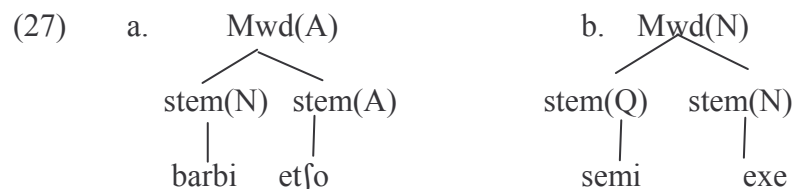
- (26) a. /barb-i-etʃo/ [bar.bi.é.tʃo] ‘clean shaved’
 b. /anti-ásido/ [an.ti.á.si.do] ‘antacid’

Before presenting an account for glide blocking in this context, I will provide the relevant morphological and prosodic structure for these complex words.

¹³ Since Spanish does make use of lexical secondary stress, I am only concerned with level 1 and 3.

5.2.2.1 Structure of Compounds

I assume that compounds like those in (26) have the following morphological structure:



The structures in (27) involve two stems.¹⁴ (27a) is an adjective with a noun as complement and (27b) is a noun with a quantifier as a complement. Despite the fact that these compounds are constructed with two stems, they are atomic morphological words, i.e. they are X° categories. The main argument in favour of this position is the fact that the first member of the compounds in question is not free. In addition, it is not possible to insert modifying material between the stems (e.g. **barbi-bien-hecho* ‘well-clean shaved’), or for any member to undergo wh-movement:

- (28) Q: *¿Qué es Gonzalo barbi? A: Hecho
 What is Gonzalo mouth? Wide

The conclusion is that they are treated by sentential syntax as unique entities (see Moyna 2000).

Now I turn to the mapping of these morphological structures into their prosodic structure. First I establish the prosodisation of simple words. As Cardoso (2003) states, simple lexical words are standardly assigned the status of prosodic word. This type of words bears stress, so they form a foot and consequently they can also form a prosodic word. This observation is captured by the alignment constraint ALIGN Mwd/Pwd (Peperkamp 1997; Cardoso 2003):

- (29) ALIGN (Mwd, L/R; Pwd, L/R): the left/right edge of every morphological word must coincide with the left/right edge of a prosodic word.

Next, I show the prosodic structure of compounds. Following Peperkamp (1997), I assume that the members of a compound do not form a single prosodic word. That is to say, they are not incorporated into the same prosodic word. Evidence for this assumption mainly comes from two segmental processes, *e*-epenthesis and *r*-strengthening.

- Epenthesis

It is well known that Spanish does not allow initial /sC/ onsets (see e.g. Harris 1983). Words having this underlying sequence surface with an epenthetic [e]. For instance, native words which originally had this /sC/ sequence in Latin have this epenthetic vowel added (e.g. from Hualde (2005) SPINA > [espína] ‘thorn’). This process is still active as shown by adapted borrowings (e.g. [estrés] ‘stress’, [esnób] ‘snob’, [estándar] ‘standard’). As Peperkamp (1997) notes, epenthesis is triggered by a constraint prohibiting /s/ to be followed by a tautosyllabic

¹⁴ A stem is defined as the element that results from the removal of inflexional markers (Pena 1999).

consonant in onset position. The epenthetic vowel provides a nucleus so that /s/ can be syllabified in coda position. When the cluster appears intra-word, /s/ is syllabified as a coda consonant and epenthesis does not apply (e.g. [ís.la] ‘island’, [obs.tá.ku.lo] ‘obstacle’).

Now consider the following data (from Peperkamp 1997):

(30)	a.	estrella	superestrella	‘star – superstar’
		estructura	superestructura	‘structure – superstructure’
	b.	español	antiespañol	‘Spanish – anti-Spanish’
		esclavismo	antiesclavismo	‘slavery – anti-slavery’

The compounds in (30) apparently present a case of overapplication of epenthesis, i.e. epenthesis takes place although its condition is not met, since /sC/ is not word-initial.

Epenthesis does not apply in the example in the right column in (31) even though the roots are preceded by morphemes like *anti-*:

(31)	estrofa	antistrofa	‘strophe - antistrophe’
------	---------	------------	-------------------------

According to Peperkamp (1997), the difference between the items in (30) and that in (31) resides in: (i) that the morpheme *anti-* in (31) is not the same as that used in (30): the former is non-productive and does not derive a transparent meaning with its base, unlike the latter, which is synchronically transparent and derives a compositional meaning with its bases; (ii) the bases in (30) are independent words but that in (31) is not.

Peperkamp (1997) concludes that epenthesis takes place at the left edge of prosodic words. Epenthesis applies in (30) because the members of the compounds are not prosodised within the same prosodic word. That is, the bound roots are outside the prosodic word that includes the base to which they combine. The combination of stems and transparent bound roots thus does not eliminate the context for epenthesis. Epenthesis does not apply within the prosodic word. Non-transparent bound roots are incorporated to the same prosodic word as their bases. Since the sC sequence is not at the left edge, the environment for epenthesis is not met.

- Strengthening

Spanish makes use of two rhotic segments, an alveolar flap [r] and an alveolar trill [r̄]. These segments are distinctive only in intervocalic position (e.g. fo[r]o ‘forum’/fo[r̄]o ‘lining’). In all other contexts, they are in complementary distribution, with only [r] word-initially (cf. Roca 2005a). Harris (1969, 1983) argues that both rhotics are not underlyingly distinct but are derived from a single phoneme. One main argument for this stance involves /rC/ clusters. The alveolar flap appears in coda position before onset-initial syllables (e.g. [kár.pa] ‘tent’, [pár.te] ‘part’). Nevertheless, [r̄] never occurs in coda position before an [r]-initial syllable. Harris (1983) claims that this gap is explained by positing an underlying geminate rhotic /r-r/ which surfaces heterosyllabically and by taking this geminate to be the source the intervocalic alveolar trill.

As regards the phonetic realization of the rhotic in word-initial position, Harris (1983) proposes a rule of *r*-strengthening by virtue of which /r/ becomes [r̄]. Harris (1983) illustrates the activity of this process with two pieces of evidence. The first is shown by diachronically related examples in (32):

- (32) a. [r]o-er e-[r]o-sión ‘to eat away - erosion’
 b. [r]ec-to e-[r]ec-ción ‘upright - erection’

When the rhotic in the stems *ro-* and *rec-* is intervocalic it surfaces as the flap, but when it is word-initial it realizes as the trill. As Peperkamp (1997) mentions, this alternation suggests that *r* is the underlying phoneme, which is changed into [r] word-initially.

The second is provided by a popular language game played in Lima, which involves metathesis of syllables:

- (33) a. base [r]aya ‘stripe’
 b. slang ya[r]a
 c. *ya[r]a

Underlying /r/ is prohibited word-initially, hence it must surface as a trill in the unmetathesized word, but in the metathesized word /r/ is not word-initial, so it can be pronounced as a flap.

As can be seen from the examples in (32) diachronically prefixed words can surface with a rhotic flap. However, with synchronic, semantically transparent bound roots words, base-initial /r/ always realizes as [r] (e.g. from Peperkamp 1997):

- (34) a. [religioso] [antireligioso] ‘religious – anti-religious’
 b. [recto] [semirecto] ‘right – angle of 45 degrees’

The fact that the base rhotic in words like those in (34) undergoes r-strengthening as if it were word-initial leads Peperkamp (1997) to claim that this process also applies at left edges of prosodic words, just like *e*-epenthesis. Thus both processes provide evidence that bound roots and the stems with which they combine do not form a single prosodic word.

Having argued that the stems in the compounds under examination do not form a single prosodic word, I have to explicit where they are attached in the prosodic hierarchy. For this account I mainly follow Cardoso (2003). The compounds in (26) contain two stems. I assume that since the elements in the compounds are stems, they are lexical words and so they can form their own prosodic word. It remains to know whether these prosodic words are attached directly to the phonological phrase or they form a recursive prosodic word. I suggest that the second option correctly accounts for the facts. The main argument is that they carry only one stress, on the second member (see Hualde to appear). If they were linked directly to the phonological phrase, they should bear each stress (c.f. /ombre-rana/ [ómbre]_{Pwd} [rána]_{Pwd} ‘frogman’). Thus, the structure of the compounds in (26) and the relevant constraints are (cf. Peperkamp 1997):

- (35) a. [[stem]_{Pwd} [stem]_{Pwd}]_{Pwd}
 b. ALIGN (Lex, L/R; Pwd, L/R): the left/right edge of every lexical word must coincide with the left/right edge of some prosodic word.
 c. ALIGN(Pwd, L/R; Lex, L/R): the left/right edge of every PW must coincide with the left/right edge of some lexical word.
 d. EXHAUSTIVITY: No C_i immediately dominates a constituent C_j , $j < i-1$.
 e. NON-RECURSIVITY: No C_i must dominate a C_i .

ALIGN (Lex, L/R; Pwd, L/R) mandates that every lexical word begins at the left edge of a prosodic word and ends at the right edge of a prosodic word (McCarthy & Prince 1993), thereby ensuring that both members of the compound bear the status of a prosodic word. ALIGN(Pwd, L/R; Lex, L/R) (McCarthy & Prince 1993) expresses the notion that each prosodic word must contain a lexical word. EXHAUSTIVITY and NON-RECURSIVITY concern dominance within the prosodic hierarchy. EXHAUSTIVITY penalizes the skipping of levels. For instance, a Pwd cannot immediately dominate a syllable because it skips the foot. NON-RECURSIVITY prohibits recursion, i.e. the domination of a category by a category of the same level; for example no Pwd dominates another Pwd. I provide the ranking of the constraints in (35) together with ALIGN (Mwd, L/R; Pwd, L/R) in (36):

- (36) AL (Mwd, L/R; Pwd, L/R), AL (Lex, L/R; Pwd, L/R), AL (Pwd L/R, ; Lex L/R,) >>
EXH >> * RECURSIVITY

According to the structure in (35a), the surface form a compound violates * RECURSIVITY, since a Pwd dominates another Pwd. So this constraint is dominated. EXHAUSTIVITY is also dominated for an independent reason: syllables are not iteratively parsed into feet in Spanish. The other constraints are all satisfied by the winner candidate, so they cannot be hierarchized. The effects of the ranking are shown in (37):

(37)

/barbi + etʃo/	AL(Mwd; Pwd)L/R	AL(Lex; Pwd)L/R	AL(Pwd; Lex) L/R	EXH	* REC
a. [barbietʃo] _{Pwd}		*!			
b. barbi [etʃo] _{Pwd}	*!	**	**	*	
c. [barbi [etʃo] _{Pwd}] _{Pwd}		*!			*
d. [[barbi] _{Pwd} [etʃo] _{Pwd}] _{Pwd}					**

Candidate (a) is excluded mainly because it incurs a violation of AL(Lex, L/R; Pwd, L/R) since the left edge of the stem *hecho* ‘done’ does not coincide with the left edge of a Pwd and the right edge of the stem *barbi-* ‘beard’ does not coincide with the right edge of a Pwd. Candidate (b) is also not optimal mainly because the left edge of the Mwd *barbihecho* is not aligned with a Pwd. Candidate (c) does not satisfy the requirement of lexical words: the right edge of a *barbi-* is not aligned with the right edge of a Pwd. Finally candidate (d) is chosen as it only violates the lower ranked constraints.

5.2.2.2 Syllabification of HV at word boundaries

Having described the morphological and phonological structure of the relevant compounds in Spanish, I proceed to explain why hiatus obtain at the boundary of two stems forming a compound.

The explanation is similar to the one offered for hiatus at word-initial position: easy perceptibility of words edges in order to facilitate word segmentation and demarcation of edges. That is to say, hiatus at word boundaries is a cue for the identification of the left edge of the second member of the compound. This is supported by observing the behaviour of the HV sequence at word boundaries and word-internally. Recall that the cluster in question is always syllabified as a diphthong word-internally, even if V is stressed (c.f. [se.mjó.ti.ka]

‘semiotics’), but when the sequence is placed at word boundaries, then hiatus arises (c.f. [se.mi.é.xe] ‘semi-axle’). Thus, a person hearing HV as a diphthong will interpret it as inserted in one morphological word, whereas if heard in a hiatus, it will be construed as a word boundary.

As in the case of word-initiality, hiatus has cognitive consequences. It is assumed that lexical access proceeds from left to right; successful word recognition is usually attained before the end of the word has been heard (Maroldt 1995). Therefore word-initiality is crucial for lexical retrieval. For an optimal lexical retrieval, it is necessary to leave stems clearly recognizable. Heterosyllabification of HV at word boundaries when V is stressed then results in an enhancing help for the recognizability of stems.

I now formally implement hiatus in this context. Gliding is blocked at the left edge of the inner prosodic word when V is stressed. I attribute this to an alignment constraint that makes sure that a stem final vowel of the left root forms a separate syllable from a stem initial vowel of the right root. I propose that this alignment constraint targets syllabic nuclei: ¹⁵

- (38) ALIGN (St, Syll-Nuc)LEFT: the left edge of every stem must coincide with the left edge of a syllabic nucleus.

This constraint states that the left edge of stems must be aligned with the left edge of a syllabic nucleus. In order to be satisfied, the initial vowel of the second member of a compound cannot share its nucleus with a preceding vowel. The only way for the preceding vowel to be parsed is to prosodise in its own syllable. The result is hiatus. Since this is the configuration obtained in the cases at examination, which results in an onsetless syllable, the alignment constraint dominates ONSET:

(39)

/semI+exe/	ALIGN(St, SyllNuc)L	ONS	ALIGN-(St, σ)L
a. [[se.mj] _{Pwd} [é.xe] _{Pwd}] _{Pwd}	*!		*
b. ^σ [[se.mi.] _{Pwd} [é.xe] _{Pwd}] _{Pwd}		*	

The examples in (6c-d) repeated in (40) show that when stress does not fall in the initial vowel of the right root, HV in compounds is syllabified in a diphthong:

- (40) a. /bok-i-abierto/ [bo.kja.bjér.to] ‘surprised’
 /barb-i-espeso/ [bar.bjes.pe.so] ‘thick-bearded’
 b. /anti-aereo/ [an.tja.é.re.o] ‘anti-aircraft’
 /pluri-empleado/ [plu.rjem.ple.á.do] ‘person that holds more than one job’

The final vowel of the first stem is associated to the first vowel of the second one. I appeal again to *EXTENDED LAPSE in order to account for diphthongization in this configuration. Recall that this constraint forbids the occurrence of more than two pretonic syllables. If the items in (40) were pronounced with hiatus there would be three pretonic syllables (e.g. *bo,*

¹⁵ Note that the alignments constraints introduced in (35) are not adequate enough for the account of hiatus: other compounds (e.g. /xentil-ombre/[xen.ti.l]_{Pwd}[óm.bre]_{Pwd}_{Pwd}, ‘gentleman’ /sur-este/ [su.r]_{Pwd}[és.te]_{Pwd}_{Pwd} ‘southeast’) violate them in order to comply with ONSET, which indicates that the latter constraint dominates the alignment constraints.

qui, and *a*). The fact that the final vowel of the left root does not have its own nucleus indicates that *EXTENDED LAPSE is ranked above ALIGN(St, SyllNuc)L:

(41)

/antI+aereo/	*EXT LAPSE	ALIGN(St,SyllNuc)L	ONSET
a. \varnothing [an.tj] _{Pwd} [a.é.re.o] _{Pwd} _{Pwd}		*	
b. [an.ti.] _{Pwd} [a.é.re.o] _{Pwd} _{Pwd}	*!		*

The ranking in (41) demonstrates that it is more harmonic to form a diphthong so as to eliminate pretonic syllables than to have stems and nuclei aligned at word boundaries.

6. Conclusion

We have seen that hiatus in AS does not appear only when H is stressed. The HV sequence can also be heterosyllabic in some specific environments. Hiatus occurs at word initial position and between word boundaries. These positions are important for word segmentation and recognition. Hiatus in these contexts constitutes a prosodic cue so that these processes are facilitated. However, when the stressed syllable is far from the HV sequence, the perceptual cue provided by hiatus is overridden so that the number of unstressed syllables is reduced. The fact that hiatus surfaces in contexts with precise properties contradicts the view that the cases under study are instances of prosodic and morphological arbitrariness and exceptionality. I have shown that the syllabification of HV at least in these environments is systematic and predictable.

Acknowledgements

I would like to thank Iggy Roca, Lisa Travis, Heather Goad and Glyne Piggott for helpful comments.

Gustavo Beritognolo
 McGill University
gberitognolo@yahoo.com

References

- Aguilar, Lourdes (1999). Hiatus and Diphthong: Acoustic Cues and Speech Situation Differences. *Speech Communication* 28, pp.57-74.
- Beckman, Jill (1997). Positional Faithfulness, Positional Neutralisation and Shona Vowel Harmony. *Phonology* 14, pp.1-46.
- Cabr , Teresa & Pilar Prieto (2006). Exceptional Hiatus in Spanish. Sonia Colina and Fernando Mart nez Gil (eds.), *Optimality-theoretic Advances in Spanish Phonology*. John Benjamins Amsterdam/Philadelphia (submitted)
- Carreira, Mar a (1991). The Alternating Diphthongs of Spanish. A Paradox Revisited. H ctor Campos and Fernando Mart nez Gil (eds.), *Current Studies of Spanish Linguistics*. Georgetown University Press, Washington D.C., pp. 407-445.
- Casali, Roderick (1996). *Resolving Hiatus*. Doctoral Dissertation, UCLA, Los Angeles.
- Colina, Sonia (1997). Identity Constraints in Spanish Resyllabification. *Lingua* 103, pp.1-23.

- Colina, Sonia (1999). Re-examining Spanish Glides: Analogically Conditioned Variation Sequences in Spanish Dialects. Javier Gutiérrez-Rexach and Fernando Martínez-Gil (eds.), *Advances in Hispanic Linguistics* 1. Cascadilla, Somerville, MA, pp.121-134..
- Côté, Marie-Hélène (2000). *Consonant Cluster Phonotactics: A Perceptual Approach*. Doctoral Dissertation, MIT.
- Face Timothy & S. Alvord (2004). Lexical and Acoustical Factors in the Perception of the Spanish Diphthong, *Hispania* 87, pp.553-564.
- Gordon, Matthew (2002). A Factorial Typology of Quantity-Insensitive Stress. *Natural Language & Linguistic Theory* 20, pp. 491-552.
- Halle, Morris & Alec Marantz (1993). Distributed Morphology and the Pieces of Inflection. Ken Hale & Samuel Jay Keyser (eds.), *The View from Building 20: Essays in Linguistics in Honour of Sylvan Bromberger*. Cambridge, MA: MIT University Press, pp. 111-176.
- Harris, James (1969). *Spanish Phonology*. MIT Press, Cambridge, Massachusetts.
- Harris, James (1983). *Syllable Structure and Stress in Spanish*. MIT Press, Cambridge, Massachusetts.
- Harris, James (1985). Spanish Diphthongisation and Stress: a Paradox Revisited. *Phonology Year Book* 2, pp. 31-45.
- Harris, James (1991). The Exponence of Gender in Spanish. *Linguistic Inquiry* 22, pp. 27-62.
- Harris, James (2000). High Voids in Spanish Syllables, ms., MIT
- Harris, James & Ellen Kaisse (1999). Palatal Vowels, Glides and Obstruents in Argentinian Spanish. *Phonology* 16, pp. 117-190.
- Hualde, José Ignacio (1992). Acerca de las Semivocales en Español, ms. University of Illinois at Urbana-Champaign.
- Hualde, José Ignacio (1997). Spanish /i/ and Related Sounds: An Exercise in Phonemic Analysis. *Studies in Linguistic Sciences* 27: 2, pp. 61-79.
- Hualde, José Ignacio (1999). Patterns in the Lexicon: Hiatus with Unstressed High Vowels in Spanish. Javier Gutiérrez-Rexach and Fernando Martínez-Gil (eds.), *Advances in Hispanic Linguistics*. 1. Cascadilla, Somerville, MA, pp. 121-134
- Hualde, José Ignacio (2005). *The Sounds of Spanish*. Cambridge University Press, Cambridge.
- Hualde, José Ignacio (to appear) Stress Removal and Stress Addition in Spanish.
- Kenstowicz, Micheal (1995). Base Identity and Uniform Exponence: Alternatives to Cyclicity. ROA-103. <http://roa.rutgers.edu>
- Marantz, Alec (1997). No Escape from Syntax: Don't Try Morphological Analysis in the Privacy of Your Own Lexicon. *U. Penn Working Papers in Linguistics* 4:2, pp. 201-225.
- Maroldt, Karl (1995). Morphology: A Functional Interface. Hanna Pishwa & Karl Maroldt (eds.), *The Development of Morphological Systematicity* Gunter Narr Verlag, Tübingen, pp. 9-38.
- McCarthy, John & Alan Prince (1993). Generalized Alignment. G. Booij and J. van Marle (eds.), *Yearbook of Morphology*. Kluwer Academic, Dordrecht, pp. 79-153.
- McCarthy, John & Alan Prince (1995). Faithfulness and Reduplicative Identity. Jill Beckman, L. Walsh-Dickney and Suzanne Urbanczyk (eds.), *University of Massachusetts Occasional Papers in Linguistics* 18. GLSA, Amherst, MA, pp. 249-384.
- Moyna, María Irene (2000). *Compounding in Spanish: Patterns and Changes*, Doctoral Dissertation, University of Florida, Florida.
- Pena, Jesús (1999). Partes de la Morfología. Las Unidades del Análisis Morfológico. Ignacio Bosque & Violeta Demonte (eds.), *Gramática Descriptiva del Español*, vol.III. Espasa, Madrid, pp. 4993-5040.
- Pensado, Carmen (1999). Morfología y Fonología: Fenómenos Morfofonológicos. Ignacio Bosque & Violeta Demonte (eds.), *Gramática Descriptiva del Español*, vol.III. Espasa, Madrid, pp. 4423-4505.
- Peperkamp Sharon (1997). *Prosodic Words*. HIL dissertation 34, The Hague: Holland Academic Graphics.
- Pierrehumbert, Janet & David Talkin (1992) Syllable Structure and Word Structure: a study of triconsonantal clusters in English. Patricia Keating (ed.), *Phonological Structure and Phonetic Form*. Papers in Laboratory Phonology III, Cambridge University Press, Cambridge, pp. 168-188.
- Prieto, Pilar (1992). Truncation Processes in Spanish. *Studies in the Linguistics Sciences*, 22: 1, pp. 143-158.
- Prince, Alan & Paul Smolensky (1993). Optimality Theory: Constraint Interaction in Generative Grammar, ms. Rutgers University and University of Colorado, Boulder.
- Roca, Iggy (1997). There are no 'Glides', at Least in Spanish: an Optimality Account. *Probus* 9, pp. 233-266.
- Roca, Iggy (2005). Strata, Yes; Structure Preservation, No. Evidence from Spanish. Twan Gweerts, Ivon van Ginneken and Haike Jacobs (eds.), *Romance Languages and Linguistic Theory 2003*. John Benjamins, Amsterdam/Philadelphia, pp. 197-218.

- Roca, Iggy (2006). The Spanish Stress Window. Sonia Colina & Fernando Martínez Gil (eds.), *Optimality-theoretic Advances in Spanish Phonology*. John Benjamins, Amsterdam/Philadelphia.
- Rosenthal, Samuel (1994). *Vowel/Glide Alternation in a Theory of Constraint Interaction*. Doctoral Dissertation, University of Massachusetts, Amherst.
- Rosenthal, Samuel (1997). The Distribution of Prevoalcalic Vowels. *Natural Language and Linguistic Theory* 15, pp. 139-180.
- Simonet, Miguel (2006). Prosody and Syllabification Intuitions of [CiV] Sequences in Spanish and Catalan. S. Frota, M. Vigário and M.J. Freitas (eds.), *Prosodies*. Mouton de Gruyter, The Hague.
- Smith, Jennifer (2002). *Phonological Augmentation in Prominent Positions*. Doctoral Dissertation, University of Massachusetts, Amherst.
- Val Álvaro, José Francisco (1999). La Composición. Ignacio Bosque & Violeta Demonte (eds.), *Gramática Descriptiva del Español*, vol.III. Espasa Madrid, pp. 4757-4841.
- Varela Soledad & Josefa Martín García (1999). La Prefijación. Ignacio Bosque & Violeta Demonte (eds.), *Gramática Descriptiva del Español*, vol.III. Espasa Madrid, 4993-5040.