Exceptional hiatuses in Spanish

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This paper provides a close examination of how Spanish speakers syllabify sequences of vocoids of rising sonority within the lexicon (e.g., *piano* 'piano', *persiana* 'blind' or *historia* 'history'). A survey with 246 words administered to 15 Peninsular Spanish speakers has enabled us to examine in a quantitative way the strength of prosodic and morphological conditions on the appearance of the so-called exceptional hiatuses (Navarro Tomás 1948; Hualde 1999, 2005; Colina 1999). The data in our study reveals that the word initiality effect is not as strong as stated in the literature and that there are large differences between speakers: within the same dialect, half of the informants have the word-initiality effect in words such as *piano* 'piano' or *diálogo* 'dialogue', while the rest have practically generalized the presence of a diphthong in this position. Interestingly, morpheme boundary effects are found in conservative speakers and their conditions differ depending on the paradigm: (a) in nominal forms, gliding is blocked when there is an intervening morpheme boundary and when the glide is a high back vowel (*virt*[u.ˈo]*so* 'virtuous' vs. *od*[ˈjo]*so* 'hateful', *act*[u.ˈa]*l* 'present' vs. *cord*[ˈja]*l* 'cordial'); (b) in verbal paradigms, gliding is blocked when there is an intervening morpheme boundary and when the high vowel can be stressed in some form of the paradigm (*conf*[i.ˈa]*r* 'to trust', *confío* 'I trust' vs. *camb*[ˈja]*r* 'to change', *cambio* 'I change'). In general, the situation indicates that language change is in progress and that, for some speakers, the presence of lexical items that are pronounced with a hiatus is gradually disappearing. The article presents an analysis in terms of a correspondence-based OT analysis which captures the prosodic and analogical forces governing this process together with the inter-speaker variation found in the data.

Keywords: Spanish vowel contacts, Spanish diphthongs and hiatuses, paradigmatic effects, morpheme boundary effects, prosodic and prominence effects, microvariation

0. Introduction

Sequences of unstressed high vowel plus vowel have tended to contract into diphthongs in all Romance languages. French and Italian, for example, display a systematic tendency to diphthongize these sequences in all word positions (Fr. *croire* [ˈkʁwaʁ] 'to believe', *soigner* [swaˈɲe] 'to soothe', It. *piano* [ˈpjano] 'piano', *fiasco* [ˈfjasko] 'fiasco'; see Tranel 1987, Saltarelli 1970).[1] In Catalan, vowel sequences of rising sonority tend to be pronounced as diphthongs in many contexts: *quasi* [ˈkwazi] 'almost', *estació* [əstəˈsjo] 'station', *camioneta* [kəmjuˈnɛtə] 'van', *àvia* [ˈaβjə] 'grandmother' (Cabré & Prieto 2004). The same is true in Spanish: *paciencia* [paˈθjen̪θja] 'patience', *precio* [ˈpɾeθjo] 'price', *camión* [kaˈmjon] 'truck'). In this language, the so-called historical rising diphthongs *ie*, *ue*, which arose as a systematic development of stressed mid-low vowels [ɛ, ɔ] in Vulgar Latin (*ferru* > *hierro* 'iron'; *ovu* > *huevo* 'egg') are systematically syllabified as diphthongs in all prosodic contexts.

Even though the presence of historical diphthongs might be interpreted as an important source of pressure to obtain gliding everywhere, exceptional hiatuses are found in Peninsular Spanish. The following near-minimal pairs have been obtained from many speakers: *pl*[ˈje]*gue* 'fold' vs. *cl*[i. ˈe]*nte* 'client'; *d*[ˈwe]*lo* 'mourning' vs. *d*[u. ˈe]*to* 'dueto'; *s*[ˈje]*ndo* 'being' vs. *r*[i.ˈe]*ndo* 'laughing'.[2] Within the Western Romance area, Catalan and Spanish are probably the languages that display the strongest antidiphthong effects in some specific contexts. Some studies have pointed out that the presence of hiatuses in both languages is conditioned by prosodic and analogical factors (see Navarro Tomás 1948; Hualde 1999, forthcoming; Colina 1999 for Spanish; and Cabré & Prieto 2004 for Catalan). For example, both languages have been reported to prefer hiatuses in word-initial position: Cat. *t*[i.ˈo] 'log', *m*[i.ˈɔ]*l* 'mewl', *d*[u.ˈa]*na* 'custom', *v*[i.ˈɔ]*la* 'viola', *d*[i.ˈa]*ble* 'devil', *d*[i.ə]*dema* 'diadem'; Span. *p*[i.ˈa]*no* 'piano', *cl*[i. ˈe]*nte* 'client', *r*[i.ˈe]*l* 'track', *r*[i.ˈe]*ndo* 'laughing', *d*[i.ˈu]*rno* 'diurnal'). On the other hand, Spanish has been reported to favor the presence of a hiatus when a morpheme boundary is present (e.g., *respet*[u.ˈo]*so* 'respectful', *virt*[u.ˈo]*so* 'virtuous', *man*[u.ˈa]*l* 'manual', *punt*[u.ˈa]*l* 'punctual') or when a stressed high vowel is present in the morphological

1. In French, the only systematic exception is due to a special segmental restriction which disallows a glide after a complex onset composed of a stop or a fricative followed by a liquid. As F. Dell (1980: 218) shows "/iV/ is realized as [ijV] after an onset+/l/ groups and as [yV] everywhere else: *oublier* [ubliye], *étudier* [etüdye], *quatrième* [katriyem], *troisième* [trwazyɛm]". In Italian, some studies have reported the existence of paradigmatic effects, that is, hiatuses may be maintained if a related word has the stress on the high vowel. For instance, there is a contrast between *sp*[ˈja]*nti* 'you unroot' (< **splantare*) and *sp*[i.a]*nti* 'people who spy' because of [sˈpia] 'spy' (Hualde & Prieto 2002 for more references).

2. We must also keep in mind that sequences of two different high vocoids are generally pronounced as rising diphthongs. As Hualde (2005: §5.4) notes, "*viuda* 'widow' rhymes with *suda* '(s)he sweats', and not with *vida* 'life', which indicates that the nuclear vowel is /u/; whereas *cuida* '(s)he keeps after' rhymes with *vida* 'life'. This is always true for closed syllables (i.e., *Luis* [ˈlwis] 'Louis') but we find some cases of falling diphthongs in open syllables (i.e., *muy* [ˈmuj] 'very'). In Catalan, this works in the opposite way (*viuda* 'widow' and *cuina* 'kitchen' rhyme with *vida* 'life' and *pruna* 'plum', but of course only assonantally).

paradigm (*f*[i.ˈa]*r* 'to trust', cf. *fían* 'trust.3pl.Pr.Ind'; *gu*[i.ˈa]*ba* 'guide.3sg.Pst.Imp', cf. *guía* 'guide').

The aim of this study is to provide a broad empirical description of the distribution of hiatus and diphthongs in sequences of vocoids of rising sonority within the lexicon. The data comes from a survey with 246 words administered to 15 speakers of Peninsular Spanish. The questionnaire was carefully designed to test the effects of within-word position, prominence status, syllable structure and morphological and paradigm factors on gliding decisions. The effects under examination are the following: (1) word-initial positional effect: that is, gliding tends to be blocked in word-initial position (e.g., *p*[i.ˈa]*no* 'piano', *d*[i.a]*dema* 'diadem'), except for the historical diphthongs (e.g., *p*[ˈje]*dra* 'stone', *f*[ˈwe]*go* 'fire'); (2) morphological and paradigm effects, that is, gliding tends to be blocked when a morpheme boundary is present and when the high vowel is stressed in morphologically related words (e.g., *conf*[i.ˈa]*r* 'to trust', cf. *confío* 'I trust 1sg.Pr.Ind'; *act*[u.ˈa]*r* 'to act', cf. *actúo* 'I act 1sg.Pr.Ind'). The results reveal that not all speakers evidence a word-initiality effect nor a morpheme boundary effect on the presence of exceptional hiatuses. While 8 out of 15 speakers have the word-initiality effect somewhat active (they display between 26% and 48% of hiatuses in words such as *piano*), the rest of the speakers syllabify as diphthongs between 52% and 100% of the cases in the same position.

For ease of presentation, we will distinguish between a conservative variety — for those speakers that show less than 50% of diphthongs — and an innovative variety for the other group of speakers. There is no clear separation between speakers of an innovative variety (which displays a more consistent tendency to glide formation in all positions) and speakers of a conservative variety (which keeps unexpected hiatuses in certain positions). Instead, we find a more gradual situation: while the lower average from the innovative group displays 51.9% of diphthongs in word-initial position, the higher average from the conservative group is 48.1% of diphthongs in the same position. It is worth pointing out that there is evidence that some lexical items were produced with a diphthong in Classical Spanish, as early as the XVIIth century (e.g., *rienda* 'rein', *ruiseñor* 'nightingale', *liviana* 'light', *Santiago* 'proper name', *furioso* 'furious', *violeta* 'violet', *diosa* 'Goddess', etc).[3]

With respect to the influence of morphological factors, Spanish has been claimed to have general sensitivity to the presence of morpheme boundaries and paradigm pressure effects (Hualde 1999, Colina 1999, Pensado 1999). Yet our data reveals that these effects are different in the nominal and the verbal paradigms: while in nominal paradigms they are circumscribed to specific vowel sequences u+ˈV (*virt*[u.ˈo]*so* 'virtuous' vs. *od*[ˈjo]*so* 'hateful', *act*[u.ˈa]*l* 'present' vs. *cord*[ˈja]*l* 'cordial'), in verbal paradigms the antihiatus environments need the joint presence of a morpheme boundary and a stressed high vowel in other forms of the paradigm (*conf*[i.ˈa]*r* 'to trust', *confío* 'I trust' vs. *camb*[ˈja]*r* 'to change', *cambio* 'I change').

3. We thank Joan Mascaró for providing us with these examples from Lope de Vega (Montesinos' edition).

The second part of this article presents a prosodic/identity constraint analysis of the hiatus/diphthong distribution in Peninsular Spanish (Prince & Smolensky 1993; McCarthy & Prince 1994, 1995; Benua 1995). This analysis will allow us to capture the interplay between both prosodic and morphological requirements together with the idiolectal variation present in the data. In OT terms, the difference between innovative and conservative speakers will be interpreted as the generalization of a prosodic constraint in the innovative variety. At the same time, idiolectal variation will be interpreted as the set of analogical/correspondence relationships each speaker establishes with other words in the lexicon.

The paper is organized as follows. Section 2 presents the methodology used to gather the data and the main corpus used for this study. Section 3 presents quantitative results on hiatus/diphthong pronunciations together with a discussion of the prosodic patterns found in the data. Section 4 compares Spanish with Catalan and summarizes the main similarities and differences found between the two. Finally, Section 5 presents an analysis of the data within the Optimality/Correspondence Theory framework, focussing especially on how exceptional hiatuses and idiolectal differences are accounted for.

1. Methodology and questionnaire.

In order to better understand the conditions which favor and disfavor glide formation in sequences of unstressed high vowel + vowel, we administered a questionnaire with 246 common words to 15 speakers of Peninsular Spanish (see the complete questionnaire in the Appendix). The lexical items included in the questionnaire covered the following eight main types of word prosodic configurations (see Table 1). Table 1 also presents examples of the eight configuration types and the number of items included in the questionnaire for each type of configuration. The first four word types (groups 1 to 4) contain the target vocoid sequence in word-initial position: in group 1 the vowel sequence is in a potential monosyllabic word (e.g., *Dios* 'God'), in group 2 the sequence is in word-initial stressed position (e.g., *diana* 'target') and in groups 3 and 4 in word-initial unstressed position. The difference between groups 3 and 4 is the distance between the beginning of the word and the stressed syllable. The last four word types (groups 5 to 8) contain the vocoid sequence in word-medial and in word-final position (both stressed and unstressed). Note that the first vocoid in the sequence of two vocoids VV is always a high vowel. Also bear in mind that CV in parentheses expresses syllable optionality, and optional complex onsets and codas are not represented. Finally, compounds and prefixed words (30 examples) and falling sonority sequences (6 examples) are also included in the questionnaire and will be analyzed separately.

We selected words with different prosodic patterns and different mophological and segmental shapes. No word in the questionnaire contains the so-called historical diphthongs *ie*, *ue* because speakers diphthongize such historical words without any excepcion, showing a complete unsensitivity to all prosodic and segmental conditions that block glide formation. Historical diphtongs arose as a systematic development of

open *e, o* in stressed position in Vulgar Latin (ferru > *hierro* 'iron'; ovu > *huevo* 'egg'). Such diphthongs alternate with the corresponding mid vowels in stressed positions: *d*[we]*le* '3sgIP' – *doler* 'to hurt', *d*[je]*nte* 'tooth' dental 'dental', *pr*[we]*ba* 'proof', *probar* 'to prove', *apr*[je]*to* '1sgIP' *apretar* 'to press'.[4]

Table 1. Prosodic word configuration types (and number of items) included in the questionnaire.

	Prosodic word types	Examples	Number of words in the database
1	C[i,u]	*Dios* 'God' *Luis* 'Louis'	18
2	C[i,u]V'.CV	*miope* 'short-sighted' *diálogo* 'dialogue'	27
3	C[i,u]V.CV'.(CV)	*diadema* 'diadem' *violín* 'violin'	24
4	C[i,u]V.CV.CV'.(CV)	*diagonal* 'diagonal' *violinista* 'violinist'	12
5	CV.C[i,u]V'.(CV)	*camión* 'truck' *persiana* 'blind'	56
6	(CV).CV.C[i,u]V. CV'.(CV)	*avioneta* 'aeroplane' *evaluarán* 'they will evaluate'	30
7	CV.CV.C[i,u]V'.(CV)	*material* 'material' *delicioso* 'delicious'	25
8	(CV).CV'.C[i,u]V	*historia* 'history' *ingenua* 'naive.fs'	18

In order to test the effects of syllable structure and morphological factors, we carefully controlled that each group of words in Table 1 contained enough examples with complex onsets, morphological boundaries and morphologically-related items. For example, within group 1, 4 items contained a morpheme boundary and underlying stress (*dual* 'dual', *criar* 'to raise', *fiar* 'to trust', *liar* 'to tie') and 5 items a complex onset (*cruel* 'cruel', *prior* 'prior', *criar* 'to raise', *truhán* 'crook', *trial* 'dirtbike race'). Within group 2, 6 items contained a morpheme boundary and underlying stress (*fiable* 'trustworthy', *viaje* 'trip', *diario* 'daily', *riada* 'flood', *fianza* 'security', *cruento* 'bloody') and 4 complex onset (*cliente* 'client', *cruento* 'bloody', *triunfo* 'triumph', *criollo* 'creole').

The informants were asked to parse the target items into syllables according to their phonological intuitions. In general, speakers showed clear intuitions about syllabification: a lexical item was always parsed with either a diphthong or a hiatus by a given speaker and only in some isolated cases were both solutions possible. We assume that if the speaker's syllabification intuition of the vowel sequence was a hiatus this means that the speaker can produce such sequence with a hiatus in slow speech.

4. Yet, not all historical diphthongs show this contrast (for instance: *miedo* 'fear' *miedoso* 'fearful'), nor all stressed mid vowels turned into historical diphthongs (for instance, *temo* '1sgIP' — *temer* 'to fear').

This indeed does not preclude that this vowel sequence may also be pronounced with a diphthong in faster speech rates. However, crucially, pronunciation of this sequence with hiatus is possible.

In the first interviews, we asked informants to slowly read the database while we were annotating and transcribing whether we heard a pronunciation with a diphthong or with a hiatus: yet the main problem with this methodology was that our parsing of the data was 'erroneous' in some cases. Typically, we classified as diphthongs vowel sequences that were considered to be hiatuses by the speaker. Thus the informants' intuitions were often more conservative than our perception. Indeed, Face & Alvord (2004) report some degree of confusion in a recent perception experiment: when listeners were presented with hiatuses in words that inherently contained a diphthong (and the other way around), there was a tendency to perceive a diphthong. As Face & Alvord (2004:561) point out "there is a tendency to perceive diphthongs rather than hiatuses when there is conflicting evidence [acoustic vs. lexical information] as to which is present in a given word."

Even though recent production studies agree that the acoustic difference between Spanish diphthongs and hiatuses lies in the mean duration values of the two vocoids (Aguilar 1999, Hualde & Prieto 2002), there is overlap in durational values for both categories: that is, even though in general the mean duration of hiatuses is longer than the mean duration of diphthongs, some groupings have durational values that are in between and that could be ambiguous to the hearer. Speech rate is also a confounding factor that clearly influences the duration of the vowel sequences. In sum, this provides evidence that it is not completely safe to rely on production and perception data to describe the distribution of hiatuses and diphthongs in Spanish. In this study, we are especially interested in describing the speakers' intuitions obtained through linguistic judgments. We leave the production and perception mechanisms of hiatus vs. diphtongs for a future study.

Fifteen speakers of Peninsular Spanish answered the questionnaire. They come from Madrid (7 speakers), Valencia (2 speakers), Barcelona (5) and Granada (1). We checked that all informants from Catalan areas had Spanish as their mother tongue.[5] The majority of speakers ranged from ages 19 to 30 (only four of them were older than 30). They were language students and professors, thus we are confident that they have enough linguistic training to perform syllabic parsing. After having analyzed the data, we can reasonably say that there are no significant differences between the Spanish varieties spoken in the different cities (mainly between Madrid and Barcelona) and that the results are quite consistent across regional varieties. For example, within the same dialect we find speakers of the same age for whom the word-initiality effect is somewhat active and others who have completely generalized the presence of a diphthong in this position.

5. We should note that Barcelona (and Valencia) speakers have at least some knowledge of Catalan. They were selected as a function of their linguistic background and language usage: they have Spanish as their first language and speak mainly Spanish with relatives and friends.

2. Exceptional hiatuses in Spanish

It should first be noted that the hiatus/rising diphthong lexical distribution within the lexicon in Peninsular Spanish is subject to a certain amount of idiolectal variation: two speakers of the same dialect and age do not always agree about which words can be produced with a diphthong. That is why we will first report on general tendencies and degree of variation found in the data. Table 2 reports the results of the syllabification intuitions task for each group: the main result, reported in the third column, is the mean percentage of words syllabified with a diphthong in each of the main word prosodic configurations under study. For group 1, not all data was included to calculate the means: we realized that complex onsets and morphological boundaries systematically blocked glide formation in group 1 for some speakers and thus we excluded these words from the data set. Finally, as a raw measure of the dispersion of the data, the last column reports the minimum and maximum percentages of words pronounced with a diphthong by a given speaker.

Table 2. Mean percentage of diphthong/hiatus solutions according to word configuration type.

Group	Prosodic word type	Mean percentage of reported diphthongs	Minimum/ maximum percentage of reported diphthongs
1	*Di<u>o</u>s* 'God', *Luis* 'Louis'	87.9%	72.2–100%
2	*mi<u>o</u>pe* 'short-sighted' *di<u>á</u>logo* 'dialogue'	58.2%	25.9–100%
3	*di<u>a</u>dema* 'diadem' *vi<u>o</u>lín* 'violin'	70.5%	33.3–100%
4	*di<u>a</u>gonal* 'diagonal' *vi<u>o</u>linista* 'violinist'	93.3%	75–100%
5	*cami<u>ó</u>n* 'truck' *persi<u>a</u>na* 'blind'	75.9%	60.7–100%
6	*avi<u>o</u>neta* 'airplane' *eval<u>ua</u>rán* 'they will evaluate'	91.3%	73.3–100%
7	*materi<u>al</u>* 'material' *delici<u>o</u>so* 'delicious'	80%	68–100%
8	*histori<u>a</u>* 'history' *ingen<u>ua</u>* 'candid.fs'	97.7%	83.3–100%

Even though inter-speaker variation is quite high, the results in Table 2 reveal the existence of a contrast between two groups of data, namely, words belonging to group 2 and, to a lesser extent, group 3, and the rest. Groups 2 and 3 are the ones that show a larger data dispersion, meaning that while some speakers report only a weak preference for the presence of diphthongs, others report diphthongs quite consistently. Note that groups 2 and 3 have the rising sequence in initial position and only differ from group 1 in word length. Groups 2 and 3 also differ from group 4 in that a stressed

syllable is located right after the target vowel sequence (group 3) or one syllable to the right (group 4).

By contrast, the rest of the words (groups 4, 5, 6, 7, and 8) show a quantitative preference to pronounce the items with a diphthong consistently across speakers and manifest the general gliding tendency found in Spanish (*d*['ja]*gonal* 'diagonal' (4), *pers*['ja]*na* 'blind' (5), *av*['jo]*neta* 'airplane' (6), and *mater*['ja]*l* 'material' (7)). Even though at first sight it might look like the difference in diphthong production between groups 3 (70.5%) and 5 (75.9%) is small, it is worth pointing out that the dispersion degree in both groups is noticeably different: from a maximum of 100% of diphthongs to a minimum of 33.3% in group 3 compared with a minimum of 60.7% in group 5. That is, to some extent, speakers in the conservative range show an initiality effect in group 3, while in group 5 all speakers have generalized the syllabification with a diphthong. Moreover, we have to take into account that more than a half of the words in group 5 have a morpheme boundary in between the vocoid sequence (30 out of 56 words) and 11 of them have a /u/+V sequence (see Section 3.4 "Morpheme boundary effects" for the relevance of this effect on the hiatus/diphthong distribution); by contrast, only 4 words out of 24 in group 3 contain a morpheme boundary (*cri+atura* 'creature', *pi+edad* 'pity', *pi+adoso* 'pious', *du+alista* 'dualist').

2.1 Word initiality effects

As has been reported by Hualde (1999, 2005) and Colina (1999), general anti-diphthong environments are those in word-initial position: *v*[i.'o]*la* 'viola', *d*[i.'a]*blo* 'devil', *c*[i.a]*nuro* 'cyanide'. By contrast, glides are preferred in word-medial and word-final positions (e.g., *histor*[ja] 'history', *id*['jo]*ma* 'language'). The contrasting pairs in (1) demonstrate the existing contrast between vocoid sequences located at the beginning of the word (left-hand column) and those located in word-medial position (right-hand column). As we will see later, this initial effect is circumscribed to sequences where the position of the lexical stress is right next to the high vocoid or one syllable away (*v*[i.o]*lín* 'violin' vs. *v*[jo]*linista* 'violinist') and to sequences that are not potentially monosyllabic (e.g., *d*[i.'a]*na* 'target' vs. *D*['jo]*s* 'God').

(1)

Word-initial		Word-medial	
c[i.'a]*tica*	'sciatica'	*as*['ja]*tica*	'Asian.fem'
d[i.'a]*na*	'target'	*med*['ja]*na*	'median'
cr[i.'o]*llo*	'creole'	*patr*['jo]*tico*	'patriotic'
b[i.'o]*logo*	'biologist'	*rad*['jo]*logo*	'radiologist'
m[i.'o]*pe*	'short-sighted'	*id*['jo]*ma*	'language'
r[i.'a]*da*	'flood'	*barr*['ja]*da*	'neighborhood'

In our data, group 2 and (to a lesser degree) group 3 are the ones that show the widest data dispersion in the database: while several speakers reported diphthongs in 29.2% and 33% respectively of words in this group, other speakers reported diphthongs in 100% of words. Table 3 shows the mean percentage of diphthong solutions in word-initial position for prosodic word types 2 and 3 separated by speaker. The

results for group 2 (*pi.a.no* 'piano', *di.a.na* 'target') are shown in the first column and the results for group 3 (*di.a.dema* 'diadem', *vi.o.lín* 'violin') in the third column. First, large speaker differences are found in both groups of words, so that we can roughly identify conservative and innovative speakers for the regional varieties under consideration. For example, for words in group 2 around half of the speakers (7) belong to an innovative range (between 100% and 51.9% of words had diphthongs, with an average of 82.5%) while the other half belong to a conservative range (between 48.1% and 25.9%, with a mean percentage of 37.2%). Words in group 3 are pronounced more generally with a diphthong: in this case, 13 out of 15 speakers have more than 50% of words with diphthongs, with an average of 70.4% of diphthong pronunciation across speakers.

Table 3. Mean percentage of diphthong identification in groups 2 and 3, separated by speaker. Coding used for speakers: B=Barcelona area; Gr=Granada; M=Madrid area; V=Valencia.

	Group 2 "piano"	**Group 3 "diadema"**
Speaker	**% reported diphthongs**	**% reported diphthongs**
1 B	48.1%	58.3%
2 B	25.9%	91.6%
3 B	100%	95.8%
4 B	44.4%	41.6%
5 B	51.9%	62.5%
6 M	100%	100%
7 M	66.6%	79.1%
8 M	33.3%	54.1%
9 M	100%	91.6%
10 M	33.3%	58.3%
11 M	59.2%	79.1%
12 M	40.7%	33.3%
13 Gr	100%	95.8%
14 V	40.7%	62.5%
15 V	29.2%	54.1%

The results in Table 3 indicate that we are faced with not a clear separation into two groups of speakers (innovative vs. conservative), but rather with a gradation. There is one group of speakers which tends to syllabify the majority of words with a diphthong (and belong to a more innovative variety) and another group which keeps the unexpected hiatuses in word-initial positions (and thus belongs to a more conservative variety), but there are also speakers in the middle range. From the behavior of words of type 3 (e.g., *diadema*), we can conclude that word-initiality effects are progressively becoming weaker (as they are weaker in this position for all speakers).

There are several systematic exceptions to word-initial hiatuses for all speakers. A first systematic exception (and exceptional hiatuses in general) are words which contain the so-called historical diphthongs *ie* and *ue* such as *d*[ˈje]*nte* 'tooth' *pr*[ˈwe]*ba* 'proof'. Although significant differences can be observed between the historical

diphthongs *ie* and *ue* and the corresponding sequences of vocoids in initial position for some speakers in some specific words (*b*[i.ˈe]*la* 'connecting rod', *cl*[i.ˈe]*nte* 'client', *r*[i.ˈe]*l* 'track'), we should acknowledge that historical diphthongs might have acted as segmental attractors,[6] as the presence of diphthongs is quite general in equivalent sequences such as (*V*[ˈje]*na* 'Vienna', *c*[ˈje]*ncia* 'science', *s*[ˈwe]*ter* 'sweater', *d*[ˈje]*ta* 'diet', *s*[ˈwe]*co* 'Swedish').

A second exception to word-initial hiatuses is found in potential monosyllabic words (group 1), which tend to be pronounced with a diphthong (*Dios* 'God', *Juan* 'John', *fiel* 'faithful', *miau* 'mew', *Luis* 'Louis'). Table 4 shows the mean percentages of diphthong solutions in potential monosyllabic words separated by speaker. We have excluded from the data set those words which contain a morphological boundary (*fiar* 'to trust', *liar* 'to tie') and words with a complex onset (*cruel* 'cruel', *prior* 'prior', *truhán* 'crook'), which some speakers systematically syllabify with a hiatus. In the table, the informants that showed sensitivity to morphological boundaries and complex onsets are marked with an asterisk:

Table 4. Mean percentage of diphthong identification in group 1, separated by speaker. Coding used for speakers: B=Barcelona area; Gr=Granada; M=Madrid area; V=Valencia.

	Group 1 "Dios"
Speaker	**% reported diphthongs**
* 1 B	90%
* 2 B	100%
3 B	100%
4 B	72.2%
* 5 B	100%
6 M	94.4%
7 M	94.4%
*8 M	80%
9 M	100%
*10 M	90%
11 M	80%
*12 M	90%
13 Gr	88.8%
*14 V	80%
*15 V	60%

We have to point out that those words with a gender or epenthetic vowel in group 2 with a paradigmatic relationship with words without it in group 1 have the same behavior. That is, paradigms such as *dios* (m.sg.), *diosa* (f.sg), *dioses* (m.pl.), *diosas* (f.pl.);

6. As Hualde points out (1999:194), the group of words with *ie*, *ue* from diphthongization of mid vowels "is large enough (…) to analogically attract other words".

Luis (m.), *Luisa* (f.) or *fiel* (m./f.sg.), *fieles* (m./f.pl.) are all pronounced with a glide as the unmarked form (masculine or singular) in group 1.[7]

It is important to highlight that the informants that show sensitivity to morphological boundaries and complex onsets in potential monosyllabic words (e.g., *truhán* 'crook', *liar* 'to tie') are those that belong to the 'conservative' range in words belonging to group 2 (e.g., *piano*), that is, those speakers that tend to keep exceptional hiatuses in word-initial position. The reader will observe that speakers marked with an asterisk in Table 4 are the ones that have the lowest percentage of diphthongs in Table 3. Only two informants show disagreement: while informant 5B has diphthongs in 51.9% of words belonging to group 2 (the lowest in the innovative group), he shows clear sensitivity to morpheme boundaries and complex onsets; similarly, informant 4B reported diphthongs in 44.4% of items in group 2 and shows sensitivity to complex onsets and morpheme boundaries in 5 out of 8 items in this group. In relation to group 3, except for 2 conservative speakers, the rest show a clear preference for a diphthong (> 50%), indicating that word-initiality effects are weaker in this group of words. In general, the speakers who display lower percentages of diphthong production in group 3 correspond to the same conservative speakers who showed this effect in group 2. Only informant 2B displays a contradictory result (25.9% diphthongs in group 2 vs. 91.6% diphthongs in group 3).

2.2 Distance-to-stress effects

Distance of the vocoid sequence from the main word stress is another factor which conditions glide formation: the greater the distance, the greater the tendency to pronounce a diphthong. We have seen that indeed for some speakers a hiatus appears word-initially when the stress is located in the vowel next to the high vowel (*d*[i.ˈa]*logo* 'dialogue', *d*[i.ˈa]*metro* 'diameter') or at most one syllable to the right (*d*[i.a]***fragma*** 'diaphragm', *c*[i.a]***nu**ro* 'cyanide'; see also group 4 in Table 2). Yet once the stress moves further to the right the same sequence is pronounced with a diphthong (*d*[ja]*go**nal*** 'diagonal', *d*[ja]*cro**ní**a* 'diachrony', *c*[ja]*nu**rato*** 'cyanide', *d*[ja]***pasón*** 'diapason', *d*[ja]*posi**t**iva* 'slide'). The productivity of this pattern can be seen in (2) — NB: the stressed syllable is marked in boldface:[8]

7. As shown by Kenstowicz (2005), another case of paradigm uniformity in Spanish is the process of diminutive formation. For example, *cit* is the diminutive allomorph for both the masculine and feminine forms of *ratón*/*ratona* 'mouse' (*ratoncito* 'mouse' (dim.m.) and *ratoncita* 'mouse' (dim.f.) are the diminutive), in spite of the different syllabic form of the corresponding bases (*ra.ton* vs. *ra.to.na*).

8. Distance-to-stress effects in Spanish have also been reported in previous studies. Hualde (1999, 2005:§5.4.1) points out that "many Castilian speakers syllabify for instance *d*[i.ˈa]*logo* 'dialogue', *d*[i.a]*logo* 'I dialogue', but *d*[ja]*logar* 'to dialogue'; or *d*[i.ˈa]*metro* 'diameter' but *d*[ja]*metral* 'diametral'. This condition may also operate in cases of morphologically-conditioned hiatuses so that the hiatus of *du-o* 'duet' is preserved in *du-al* 'dual', *du-eteo* 'duet' and *du-alismo* 'dualism', but not in *dualidad* 'duality' where the stress is further away".

(2)	*d*[i.ˈa]*logo*	*d*[i.a]***log****a*	*d*[ja]***log****ar*	*d*[ja]***log****aré*
	'dialogue'	'engage-in--dialogue.3sg.Pr.Ind'	'engage-in--dialogue.Inf'	'engage-in--dialogue.1sg.Fut'
	d[i.ˈa]*blo*	*d*[i.a]***bó****lico*	*d*[ja]***bo****lismo*	*d*[ja]***bo****lical*
	'devil'	'diabolical'	'satanism'	'diabolical'
	v[i.ˈo]*la*	*v*[i.o]***lín***	*v*[jo]***lini****sta*	*v*[jo]***lonce****lista*
	'viola'	'violin'	'violinist'	'cellist'
	d[u.ˈa]*l*	*d*[u.a]***lis****ta*	*d*[wa]***li****dad*	*d*[wa]***liza****ción*
	'dual'	'dualist'	'duality'	'dualisation'

This tendency is again clear in words that have a high stressed vowel in morphologically related words, as is shown in (3).

(3)	*p*[ˈi.o]	*p*[je]***dad***	*p*[ja]***dosí****simo*
	'pious'	'pity'	'very pious'
	b[ˈi.o]	*b*[i. ˈo]*logo*	*b*[jo]***logí****a*
	'bio'	'biologist'	'biology'
	d[ˈi.a]	*d*[i.ˈa]*rio*	*d*[ja]*ria****men****te*
	'day'	'daily'	'daily'
	cr[ˈi.o]	*cr*[i.a]***tu****ra*	*cr*[ja]***tu****rita*
	'child'	'creature'	'little creature'
	d[ˈu.o]	*d*[u.a]***lis****ta*	*d*[wa]***li****dad*
	'duet'	'dualist'	'duality'

Our questionnaire contained 12 words of type 4, that is, word-initial sequences with the lexical stress located one syllable to the right of the target vowel sequence. The average percentage of diphthong production in this group is quite high, 93.3%, as expected. Table 5 shows the mean percentage of diphthong solutions obtained for groups 2 (*piano*) and 4 (*diagonal*), listed by speaker. If we compare the syllabification intuitions in the two groups we see that in group 4 glide formation is active for every speaker, even for speakers in the 'conservative' range who showed 'sensitivity' to initial position. The results in Table 5 show that 8 speakers syllabified 100% of the vowel sequences of words in group 4 as diphthongs and the rest reported a consistently high presence of diphthongs (the lowest percentage was 75%).

It is worth pointing out that the lowest average of diphthong identification (75%) represents 3 examples out of a total of 12 words. Moreover, the specific words which represent exceptions are not consistent across speakers, with only one word emerging twice as a hiatus (*piamontés* 'person from the Piemonte region' can be interpreted as a compound).

2.3 Syllable structure and segmental effects

Evidence that syllable structure does not play a substantial role in gliding comes from examples showing that the structure of the onset is irrelevant for this process. Complex

Table 5. Mean percentage of diphthong identification in groups 2 (*piano*) and 4 (*diagonal*), separated by speaker. Coding used for speakers: B=Barcelona area; Gr=Granada; M=Madrid area; V=Valencia.

	Group 2 "piano"	**Group 4 "diagonal"**
Speaker	**% reported diphthongs**	**% reported diphthongs**
1 B	48.1%	100%
2 B	25.9%	100%
3 B	100%	100%
4 B	44.4%	91.6%
5 B	51.9%	100%
6 M	100%	100%
7 M	66.6%	100%
8 M	33.3%	91.6%
9 M	100%	100%
10 M	33.3%	75%
11 M	59.2%	83.3%
12 M	40.7%	91.6%
13 Gr	100%	100%
14 V	40.7%	91.6%
15 V	29.2%	75%

onset seems to block glide formation only in potentially monosyllabic words such as *tr*[ua]*n* 'crook', *pr*[io]*r* 'prior'. Examples in (4) show how glide formation of word-final sequences is not blocked by the presence of complex onsets (also true of word-medial cases such as *patr*[jo]*tismo* 'patriotism', *patr*[ˈjo]*tico* 'patriotic'). In fact, we also have examples of words with a complex onset that are pronounced with a diphthong where we would expect a hiatus (e.g., *tr*[ju]*nfo* 'triumph', *tr*[ju]*nfante* 'triumphant').

(4)

Final position (unstressed)		Final position (stressed)	
patr[ja]	'homeland'	*repatr*[ˈja]*r*	'to repatriate'
sobr[jo]	'temperate.masc'	*anfitr*[ˈjo]*n*	'host'
Calabr[ja]	'Calabria'	*Adr*[ˈja]*n*	'Adrian'
ebr[ja]	'drunk.fem.'	*Gabr*[ˈje]*l*	'Gabriel'
industr[ja]	'industry'	*industr*[ˈja]*l*	'industrial'
ampl[jo]	'broad.masc'	*Cebr*[ˈja]*n*	'last name'
panopl[ja]	'panoply'	*embr*[ˈjo]*n*	'embryo'
bibl[ja]	'Bible'	*histr*[ˈjo]*n*	'actor'
Medial position (unstressed)		**Medial position (stressed)**	
patr[jo]*tismo*	'patriotism'	*patr*[ˈjo]*ta*	'patriot'
ampl[ja]*ción*	'enlargement'	*patr*[ˈja]*rca*	'patriarch'
embr[jo]*nario*	'embryonnic'	*vidr*[ˈjo]*so*	'vitreous'
sobr[je]*dad*	'sobriety'	*Adr*[ˈja]*tico*	'Adriatic sea'
septentr[jo]*nal*	'northern'	*bibl*[ˈjo]*filo*	'bibliophile'
patr[ˈja]*rca*	'patriarch'	*histr*[ˈjo]*nico*	'histrionic'

Segmental factors might also play a role in the diphthong/hiatus contrasts under discussion. As noted before, common exceptions to initial prominence effects are words with *ie* or *ue* that are not historical diphthongs themselves (*V*[ˈje]*na* 'Vienna', *c*[ˈje]*ncia* 'science', *s*[ˈwe]*co* 'Swedish', *s*[ˈwe]*ter* 'sweater'). That suggests that historical diphthongs have acted as lexical attractors for the same non-historical vowel sequences, as we have said before. The tendency to pronounce *ie* and *ue* with a diphthong is also clear in Catalan, a language with non-historical rising diphthongs in the lexicon. In Catalan, the vowel combinations *ue*, *ie* are often produced as diphthongs in contexts where hiatus is the norm presumably because of Spanish influence (e.g., *suec* [ˈswɛk] 'Swedish', *Viena* [ˈbje.na] 'Vienna', etc.; see Cabré & Prieto 2004).

It is worth pointing out that not only the historical diphthongs *je*, *we* have acted as segmental attractors. Sequences of two high vowels *wi*, *ju* are generally pronounced as rising diphthongs, as it has been noted in the literature, even in initial position of the word, that is, in that position in which prominence acts as a gliding blocker. In order to confirm this tendency we passed a complementary questionnaire with 30 words (such as *buitre* 'vulture', *ciudad* 'city', *cuidado* 'care', *cuidas* 'to look after.2sgIP', *cuidar* 'to look after, Inf', *diurético* 'diuretic', *juicio* 'judgement', juicioso 'prudent', *Luisa* 'Louise', *piular* 'to cheep, Inf', *ruido* 'noise', *ruidoso* 'noisy', *ruina* 'ruin', *ruinoso* 'ruinous', *suicida* 'suicidal', *suicidio* 'suicide', *Suiza* 'Switzerland', *triunfo* 'triumph', *triunfar* 'to triumph, Inf', *viuda* 'widow', *viudez* 'widowhood', and others in non initial position). The general solution was a diphthong, except for the adverb *muy* 'very', which seems to be more resistant to this tendency.

Similarly, the back vowel /u/ is always a glide after a velar consonant as it has been pointed in the literature:[9] *guante* [ˈgwan̪te] 'glove', *cuando* [ˈkwan̪do] 'when', *ungüento* [uŋˈgwen̪to] 'ointment'. The sequence velar consonant + u constitutes another attractor and forces glide formation in lexical forms even in case that the high vowel has underlying stress: *evacúa* [eβaˈku.a] (3sgPI) '(s)he evacuates vs. *evacuar* [eβaˈkwaɾ] (Inf.) *evacuará* [eβakwaˈɾa] (3sgFut). Conversely, /u/ acts as a gliding blocker in cases that are generally pronounced with a glide, as we will see in the next section (*peruano* [peɾu.ˈano] 'Peruvian', *carruaje* [karu.ˈaxe] 'carriage'; compare *congruente* [koŋg ɾu.ˈen̪te] 'congruent' vs. *nutriente* [nuˈtɾjen̪te] 'nutrient').

Finally, some segments have been singled out in the literature as gliding blockers. Hualde (1999: 191) has noted "that hiatus is especially favored after word-initial [r] (*riel* [riˈel] 'track')". Yet this tendency is general neither in word-initial position (e.g., *ruido* [ˈrwiðo] 'noise', *ruina* [ˈrwina] 'ruin') or in word-final position (*fanfarr*[ja] 'bluster', *bandurr*[ja] 'bandurria'). In any case, further research is needed in order to determine the extent to which segmental subregularities might play a role in this process.

2.4 Morpheme boundary effects

It has been contended that Spanish glide formation shows sensitivity to the presence of morpheme boundaries and that a rising sonority sequence is usually pronounced with

9. As Hualde (1999:191) says, "After a velar, there is no hiatus involving /uV/".

hiatus if there is an intervening suffix boundary (see Hualde 1999, 2005). The results from our database show that, fairly consistently, stressed suffixes that are preceded by /u/ trigger a hiatus pronunciation (but not for all speakers) while those preceded by /i/ trigger a diphthong pronunciation: *actu+al* [aktu.ˈal] 'present' vs. *labi+al* [laˈβjal] 'labial'. Systematic exceptions to the general gliding tendency in group 5 for conservative speakers are the following: *aduana* 'customs', *estuario* 'estuary', *actual* 'current', *congruente* 'congruent', *carruaje* 'carriage', *peruano* 'Peruvian', *actuar* 'to act', and *usuario* 'customer'. (5) illustrates this contrast with the nominal suffixes *-oso,* and *-al*:

(5) Morpheme boundary effects

Preceded by *i-*		Preceded by *u-*	
lab[ˈja]*l*	'labial'	*man*[u.ˈa]*l*	'manual'
coloqu[ˈja]*l*	'colloquial'	*us*[u.ˈa]*l*	'usual'
mater[ˈja]*l*	'material'	*act*[u.ˈa]*l*	'current'
artific[ˈja]*l*	'artificial'	*virt*[u.ˈa]*l*	'virtual'
arter[ˈja]*l*	'arterial'	*punt*[u.ˈa]*l*	'punctual'
celest[ˈja]*l*	'celestial'	*sens*[u.ˈa]*l*	'sensual'
fil[ˈja]*l*	'filial'		
cop[ˈjo]*so*	'copious'	*virt*[u.ˈo]*so*	'virtuous'
nerv[ˈjo]*so*	'irritated'	*afect*[u.ˈo]*so*	'affectionate'
prec[ˈjo]*so*	'pretty'	*respet*[u.ˈo]*so*	'respectful'
val[ˈjo]*so*	'valuable'	*fruct*[u.ˈo]*so*	'fruitful'

The examples in (6) show that vowel contraction into a diphthong is quite systematic across morpheme boundaries separating the high front vowel from nominal suffixes such as *-ante, -ente*, and *-ación*, provided that such sequences are located in diphthong-favoring environments (see previous section)

(6)

-ante, -ente		*-ación*	
negoc[ˈja]*nte*	'businessman'	*humil*[ja]*ción*	'humiliation'
rad[ˈja]*nte*	'radiant'	*med*[ja]*ción*	'mediation'
defic[ˈje]*nte*	'deficient'	*concil*[ja]*ción*	'conciliation'
comed[ˈja]*nte*	'comedian'	*ampl*[ja]*ción*	'enlargement'
estud[ˈja]*nte*	'student'	*var*[ja]*ción*	'variation'
princip[ˈja]*nte*	'beginner'	*act*[wa]*ción*	'performance'
exped[ˈje]*nte*	'file'	*sit*[wa]*ción*	'situation'
var[ˈja]*nte*	'variant'	*eval*[wa]*ción*	'evaluation'
asfix[ˈja]*nte*	'suffocating'		

The antidiphthong effects of the sequence u+ˈV in nominal paradigms are quite consistent for conservative speakers. While hiatuses are observed in u+ˈV sequences, no hiatuses are found with unstressed sequences. So words such as *defectuoso* 'defective' and *habitual* 'customary' are found among the exceptions to this gliding pattern, whereas *insinuación* 'insinuation', *continuidad* 'continuity', *actualidad* 'present time', and *virtuosísimo* 'the most virtuous' are always syllabified with a diphthong, as has already been noted in the literature (Hualde 1990:190). This contrast between /u/ and /i/ can also be found in other Romance languages such as Catalan (Cabré & Prieto 2004) or

Romanian (Chitoran 2002a, 2002b). In general, /u/ is less prone to become a glide than /i/ in the same environment, except for those sequences preceded by a velar consonant (*Juana* 'Joan', *adecuar* 'to adapt'). Phonetic reasons seem to be at the origin of this tendency: as we know, the total duration of Spanish /i/+V diphtongs is shorter than the corresponding /u/+V diphthongs (e.g., *siete* 'seven' vs. *cueto* 'surname'; *idiota* 'idiot' vs. *cuota* 'quota'; Monroy Casas 1980:80). Crosslinguistically [jV] is more general than [wV]: in other words, glide formation seems to be subject to a universal ranking, that is *w >> *j.

On the other hand, Spanish has many more cases of suffixes preceded by /i/ than suffixes preceded by /u/, and thus we can conclude that the presence of a morpheme boundary is not the crucial factor in deciding whether a vocoid sequence is going to be pronounced with a diphthong or a hiatus. The only context that blocks gliding across morpheme boundaries is the potentially monosyllabic words such as those in group 1 (*fiar* 'to trust', *liar* 'to tie', *dual* 'dual') and other verbal forms (as we will see in Section 3.5). Thus in derived nominal forms the so-called morpheme boundary effects cited in the literature are basically limited to u+ˈV contexts.

We have also examined the behavior of some vocoid sequences of falling sonority. A clear gliding tendency is observed with such sequences when they are separated by a morpheme boundary (6 examples in our database): they are pronounced with a diphthong in 97.7% of the cases (*heroicidad* 'heroicity', *ingenuidad* 'ingenuity'). This situation contrasts with that of Catalan: in this language this morphological boundary prevents diphthong formation from applying in vowel sequences of falling sonority (*-dor*, *prove-ïdor* type).

As is well-known, compounds and prefixed words differ from suffixed words in both morphological and phonological behavior. The phonological behavior of vowel sequences across prefix and compound boundaries is close to what we might find across word-boundaries (phonological processes, sandhi processes, etc.; see Hualde 1989 for Spanish and Mascaró 1986 and Jiménez 1999 for Catalan), and thus we will consider this group of words as distinct from suffixed words. In our data, compounds and prefixed words made up a total of 30 examples. We found great variation in the data. Some speakers reported diphthongs everywhere except for cases with initial stress on the second word. Indeed, as Pensado (1999:4457) also argues, compounds may be pronounced with a hiatus when the second vowel in the sequence is stressed and less commonly if the second vowel in the sequence is unstressed. The examples in (7) illustrate the relevant contrasts with examples such as *barbihecho* (pronounced with hiatus) 'cleanshaven' vs. *barbiespeso* 'with a thick beard' (pronounced with a diphthong), *bienio* [bi.ˈenjo] 'two-year period' vs. *bianual* [bjaˈnwal] 'biennial'). In fact, only 3 informants reported less than 50% of diphthongs in unstressed position.

(7) Compounds

V2 stressed			V2 unstressed		
boqui**an**cho	[i.ˈa]	'wide-mouthed'	boqui**a**b**ier**to	[ja]	'open-mouthed'
barbi**he**cho	[i.ˈe]	'clean shaved'	barb**ie**s**pe**so	[je]	'with athick beard'
anti**á**cido	[i.ˈa]	'anti-acid'	anti**a**ci**dez**	[ja]	'anti-acidity'
tri**á**ngulo	[i.ˈa]	'triangle'	tri**a**ngu**lar**	[ja]	'triangular'

The data above confirms a consistent gliding tendency across prefix and compound boundaries except for cases with initial stress on the second word. This behavior of vowel sequences is similar to that of postlexical sequences in many Romance languages, including Catalan, Spanish, and Brazilian Portuguese (see Cabré & Prieto 2005 and references therein). However, further work will be needed in order to elucidate the conditions that govern the variation found in the data.

3.5 Paradigm and derivational effects

Let us now examine the strength of paradigm uniformity effects on diphthong/hiatus distribution in vowel sequences of rising sonority. The literature on exceptional hiatuses in Spanish has argued that a stressed high vowel in the morphological paradigm favors the presence of a hiatus. As Navarro Tomás (1948: 159) pointed out, "analogy favors the presence of a hiatus, especially in verbal forms where in the same paradigm one finds cases of stressed *i* or *u*: *guiaba* 'guide.3sg.Pst.Imp' (*guía* 'guide'); *liamos* 'tie.1pl.Pr.Ind' (*lías* 'tie.2sg.Pr.Ind'); *acentuar* 'to stress' (*acentúo* 'stress. 1sg.Pr.Ind'), *actuamos* 'perform.1pl.Pr.Ind' (*actúan* 'perform.3pl.Pr.Ind'), etc.".

In accordance with Navarro Tomás' observations, verbal roots ending in *i-* and *u-* that are stressed somewhere in the paradigm show a uniformity effect that blocks glide formation from applying (especially for conservative speakers). The examples in (8) show the contrast between this type of verbs (which are consistently pronounced with a hiatus) and those with a root ending in *i-* or *u-* that cannot be stressed in the paradigm, with a larger number of examples in the lexicon. In the latter cases, the hiatus solution is completely excluded (Cabré & Ohannesian 2005).

(8) Verbal paradigm effects

Hiatus (words with stressed *i-*, *u-* in paradigm)

act[u.ˈa]*r*	'to act'	cf. *actú.a*	'he/she acts'
acent[u.ˈa]*r*	'to stress'	cf. *acentú.o*	'I stress'
eval[u.ˈa]*r*	'to evaluate'	cf. *evalú.o*	'I evaluate'
punt[u.ˈa]*r*	'to score'	cf. *puntú.o*	'I score'
conf[i.ˈa]*ban*	'they trusted'	cf. *confí.an*	'they trust'
env[i.ˈa]*mos*	'we send'	cf. *enví.o*	'I send'
esp[i.ˈa]*ndo*	'spying'	cf. *espí.o*	'I spy'
gu[i.ˈa]*r*	'to guide'	cf. *guí.o*	'I guide'

Diphthong (unstressed *i-*, *u-* in paradigm)

averig[wa]*r*	'to find out'	cf. *averi.guo*	'I find out'
meng[wa]*r*	'to reduce'	cf. *men.guo*	'I reduce'
camb[ˈja]*r*	'to change'	cf. *cam.bio*	'I change'
envid[ˈja]*r*	'to envy'	cf. *envi.dio*	'I envy'
od[ˈja]*r*	'to hate'	cf. *o.dian*	'they hate'
asoc[ˈja]*r*	'to associate'	cf. *aso.cio*	'I associate'
aprec[ˈja]*r*	'to value'	cf. *apre.cio*	'I value'
limp[ja]*r*	'to clean'	cf. *lim.pian*	'he/she clean'

Let us note that verbal forms must meet three restrictions in order to yield a hiatus: (a) the verbal forms must contain a morpheme boundary between the verbal root and the inflective suffixes (*actu+ar* 'to act', *confi+ar* 'to trust'); that is why the verbal forms *dio* 'give.3sg.PassPerf' and *vio* 'see.3sg.PassPerf' are always pronounced with a diphthong (d_R+io, v_R+io), in contrast with *lió* 'tie.3sg.PassPerf' and *fió* 'trust.3sg.PassPerf' (li_R+o, fi_R+o); (b) the last high vowel of the verbal root has to be stressed in other members of the paradigm; (c) finally, the hiatus is maintained especially when the stress is located on the vowel that immediately follows the root (*act*[u.ˈa]*mos* 'perform.1pl.Pr.Ind', *conf*[i.ˈa]*mos* 'rely on.1pl.Pr.Ind'). Once the stress is moved to the right, the paradigm effects disappear (*act*[wa]*remos* 'perform.1pl.Fut'. *conf*[ja]*remos* 'rely on.1pl.Fut').

Strikingly, the effects in nominal derivational paradigms are quite different. As we have seen in Section 3.1 above, the antidiphthong effects across morpheme boundaries happen generally after root-final /u+/ (e.g., *man*[u.ˈa]*l* 'manual', *afect*[u.ˈo]*so* 'affectionate'), and not after root-final /i+/ (as in *lab*[ˈja]*l* 'labial', *cop*[ˈjo]*so* 'copious' or *arter*[ˈja]*l* 'arterial'). Yet there is a substantial difference between both cases, namely, the root-final front high vowel *-i* (e.g., *labi-al*) has a correspondence in the non derived word (e.g., *labi-o*), whereas this is not the case with the root-final back high vowel *-u*, which show allomorphy with the base (e.g., *manu-al*, base form *man-o*). Moreover, the examples in (9) show that even if root-final /i/s are stressed in the base form, derived forms are pronounced with a diphthong. This demonstrates that, contrary to what happens in verbal paradigms, underlying stress does not crucially affect the vocalic outcome in derived nominal forms. Conversely, deverbal forms can maintain the hiatus outcome for conservative speakers in cases such as *confianza*, *alianza, variante*. The theme vowel plays an important role here, as it happens with the verbal paradigms. Finally, when the stress moves to the right the effects of morpheme boundaries disappear and glide formation is always the solution.

(9) Denominal forms (words with stressed final-root *i-*)

Mar[ˈja]*no*	'Mariano'	cf. *María*	'Maria'
sangr[ˈje]*nto*	'bloody'	cf. *sangría*	'bleeding'
polic[ˈja]*l*	'police-related'	cf. *policía*	'police'
val[ˈjo]*so*	'valuable'	cf. *valía*	'value'
man[ˈja]*tico*	'eccentric'	cf. *manía*	'peculiarity'
gestor[ˈja]*l*	'agency-related'	cf. *gestoría*	'agency'
roc[ˈje]*ro*	'pilgrim to Rocío'	cf. *Rocío*	'Rocío'
abac[ˈja]*l*	'abbey-related'	cf. *abadía*	'abbey'
nav[ˈje]*ro*	'shipping'	cf. *navío*	'ship'

3. Spanish and Catalan exceptional hiatuses

The distribution patterns of rising diphthong vs. hiatus found in conservative speakers of Peninsular Spanish are partially similar to the situation of the innovative variety of Catalan reported by Cabré & Prieto (2004). In both languages, the presence of exceptional hiatuses is partially conditioned by prosodic and morphological factors.

Table 6 summarizes the main similarities and differences found between Peninsular Spanish and Catalan. The table compares the solutions of the innovative Catalan variety with the conservative Spanish variety. In general, both languages show sensitivity to some prosodic constraints, that is, preference for hiatus word-initially (*b*[i.ˈo]*logo* 'biologist' vs. *rad*[ˈjo]*logo* 'radiologist') and distance-to-stress effects (*d*[i.a]*fragma* 'diaphragm' vs. *d*[ja]*metral* 'diametral').

The two languages differ strongly in the non-observance of the minimal binarity effect (Cat. *miol* [mi.ˈɔl] 'mew' vs. Span. *Dios* [ˈdjos] 'God'): both conservative and innovative Spanish speakers consistently report diphthongs in this environment. In the next section, we will argue that the Spanish outcome is favored by the default status of the trochee in the language, which entails an avoidance of iambic feet such as *[di.ˈos]. Finally, Catalan and Spanish differ with respect to the effects of uniformity in morphologically related words: while conservative Spanish speakers report the presence of hiatus in related words with stressed final-root *i-* (namely, deverbal nouns and throughout the verbal paradigm: e.g., *conf*[i.ˈa]*nza* 'trust', *conf*[i.ˈa]*r* 'to trust', cf. *conf*[ˈi]*o* 'I trust'), this is not the case in Catalan (*conf*[ˈja]*nça*, 'trust', *conf*[ˈja]*r* 'to trust', cf. *conf*[ˈi]*o* 'I trust').

Table 6. Summary table comparing similarities and differences between Catalan and Spanish hiatus/diphthong distributions within the lexicon.

	Central Catalan (innovative variety)	**Peninsular Spanish (conservative variety)**
Word-bisyllabicity effects	**yes** (Ll[u.ˈi]s 'Louis', *m*[i.ˈɔ]*l* 'mewl')	**no** (L[ˈwi]s 'Louis', *D*[ˈjo]*s* 'God')
Word-initiality effects	**yes** (*b*[i.ˈɔ]*leg* 'biologist' vs. r*ad*[ˈjɔ]*leg* 'radiologist')	**yes** (*b*[i.ˈo]*logo* 'biologist' vs. *rad*[ˈjo]*logo* 'radiologist')
Distance-from-stress effects	**yes** (*d*[i.ˈa]*ble* 'devil' vs. *d*[jə]*bolical* 'diabolical')	**yes** (*d*[i.ˈa]*blo* 'devil' vs. *d*[ja]*bolical* 'diabolical')
Related word leveling effects	**no** (*conf*[ˈja]*r* 'to trust' vs. *conf*[ˈi].*o* 'I trust'; *conf*[ˈja]*nça*, *act*[ˈwa]*r* 'I act' vs. *act*[ˈu]*o* 'I act')	**yes** (*conf*[i.ˈa]*r* 'to trust' vs. *conf*[ˈi].*o* 'I trust'; *conf*[i.ˈa]*nza*, *act*[u.ˈa]*r* 'I act' vs. *act*[ˈu]*o* 'I act')
Morpheme-boundary effects	**no** (*lab*[ˈja]*l* 'labial', *glor*[ˈjo]*s* 'glorious', man[j]àtic)	**no** (except of /u/+; e.g., *lab*[ˈja]*l* 'labial', *glor*[ˈjo]*so* 'glorious', man[j]ático)
Historical rising diphthongs	**no** (*mel* 'honey', *foc* 'fire')	**yes** (*miel* 'honey', *fuego* 'fire')

Thus, the following are two important differences between the presence of exceptional hiatuses in Catalan and in Spanish: (1) the minimal binarity effect on words (Cat. *miol* [mi.ˈɔl] 'mew', Ll[u.ˈi]s 'Louis' vs. Span. *Dios* [ˈdjos] 'God', L[ˈwi]s 'Louis'); (2) the paradigm uniformity effects in verbal forms (Cat. *conf*[ˈja]*r* 'to trust', *act*[ˈwa]*r* 'to act' vs. Span. *conf*[i.ˈa]*r* 'to trust', *act*[u.ˈa]*r* 'to act') and leveling effects in deverbal nouns (Cat. *conf*[ˈi]*o* 'I trust'; *conf*[ˈja]*nça* Span. *conf*[ˈi]*o* 'I trust'; *conf*[i.ˈa]*nza*); (3) finally, the

word-initiality effects are stronger in Catalan: while our Catalan informants displayed a high percentage of hiatuses in this position, Spanish speakers differed greatly with regard to the observance of the initiality effect.

4. An OT analysis of the data

The data reviewed in the preceding sections has made manifest the fact that the pronunciation of rising vocoid sequences in Peninsular Spanish is undergoing a change in progress: the distribution of exceptional hiatuses reported by the literature is restricted for many speakers to isolated lexical items. Only half of our informants appear to be sensitive to the word-initiality effect, and most of them are sensitive to it to a lesser degree (e.g. the behavior of group 3 in words such as *diadema*, where the presence of a diphthong has been generalized). The goal of this section is to account for the conservative Peninsular Spanish system as shown by half of our informants in terms of hierarchy constraints. The innovative system can be obtained with a reranking and lowering of the constraints that prevent glide formation.

In relation to the phonemic status of vocoid sequences, we claim that glides in sequences of rising sonority are derived from vowels except for the historical diphthongs *ie*, *ue*. We cannot predict the occurrence of such diphthongs. Thus *fuego* 'fire', *viento* 'wind', *trueno* 'thunder', *pliegue* 'fold' are always realized with a diphthong and nothing can prevent it. If we consider the historical diphthongs *ie*, *ue* to be underlying we will have no trouble explaining their presence in these positions (see also Chitoran 2002a, 2002b for Romanian).[10] As mentioned above, glide formation is generally blocked in initial position (e.g., *diana* 'target', *biólogo* 'biologist', *cliente* 'client'), except for monosyllabic words such as *Dios* 'God'. Glide formation is also blocked in this initial position in syllables with complex onsets (cf. *prior* 'prior', *truhán* 'crook'). With regards to the position of prevocalic glides as belonging to the onset or to the nucleus, we do not assume any strict position because we can find arguments that support to both positions (Harris 1983, 2000, Harris & Kaisse 1999, Roca 1997). In any case, the position of glides within the syllable is not a crucial assumption in our analysis.

Glide formation is triggered by a general instantiation of the Onset Principle. Within OT, Onset expresses the general prosodic restriction that every syllable must have an onset and motivates the strong preference for CV syllables rather than V syllables. To express the fact that only high vowels becoming glides in this context, we assume that the restriction against having high vowels in the margins of the syllable (*M/$V_{[+high]}$) is dominated by Onset, while the restriction against having non-high vowels in the margins (*M/$V_{[-high]}$) dominates the constraints just mentioned (for similar strategies for Catalan, see Cabré & Prieto 2004; for Romanian, see Chitoran 2002a, 2002b). This explains the stronger resistance displayed by low vowels to become glides, even under syllabic pressure. The table in (10) shows that the ranking

10. Historical diphthongs have to be marked in some way in the lexicon due to the fact that they show a complete insensitivity to all prosodic and segmental conditions that block glide formation.

*M/V$_{[-high]}$ > Onset > *M/V$_{[+high]}$ correctly predicts the optimal output *cam*[ˈjo]*n* 'truck'. Even though we are aware that syllable and metrical structure are constructed in parallel and might also interact with the constraints presented in this section, we are not dealing with the constraints which assign metrical structure and stress and just assume that they are already present in our input form. Input forms are shown in orthographical form and contain morphological boundaries and stress.

(10) cami'on

Candidates	*M/V$_{[-high]}$	Onset	*M/V$_{[+high]}$
a. cam[io]n		*!	
☞ b. cam[ˈjo]n			*

The abovementioned set of ordered constraints explains the preference for an unstressed high vowel followed by another vowel to become a glide in the phonetic form. In fact, as we have seen in Section 3.1, this tendency is quite systematic in all contexts except when the vowel sequence is in word-initial position (e.g., *piano* 'piano', *viola* 'viola').[11] We argue that the greater phonological salience typical of word-initial positions, which is quite pervasive crosslinguistically, is preventing the occurrence of glide formation. As Beckman (1997: 2) points out, "positional faithfulness constraints call for output preservation of underlying contrasts in specific psycholinguistically prioritized or perceptually prominent linguistic positions". We express this fact through a faithfulness constraint (Max$_{INIT-\mu}$) which requires every word-initial mora to have a corresponding output.[12] In languages such as Spanish or Catalan, a secondary prominence can be observed in the assignment of rhythmic stresses on the word-initial syllable (see Harris 1983 for Spanish, Prieto & van Santen 1996, Prieto 2003).

The greater prosodic prominence of word initial positions might be rooted in articulatory constraints on gestural dynamics. Recent phonetic research has demonstrated that consonant gestures are controlled more tightly (that is, they exhibit less temporal overlap) word-initially than word-medially (Byrd 1996, Chitoran, Goldstein & Byrd 2002). In general, the same thing is true of [CiV] sequences in Romanian (Chitoran & Hualde 2002). Following recent literature on the idea that sound change will occur in least noticeable contexts first (Steriade 2001), we will claim that contexts where the change would be more salient (that is, word-initially) are more resistant to glide formation. In other words, glide formation is more prone to occur in contexts

11. Hualde wonders "What could be the reason for this preference for hiatus in initial position, which goes against the general 'anti-hiatus' preference in the language? Here I must confess ignorance. It could be that there is some phonetic or other reason for it, having to do, for instance, with articulatory ease or with parsing. Or, on the contrary, the reason could be an accident of lexical distribution, starting from a small bias in this direction and progressively the strong becoming stronger." (Hualde 1999:193–4).

12. The Faithfulness constraint Max$_{INIT-\mu}$ can be understood as a condition within the family of Positional Faithfulness Constraints. Other mechanisms that have been used to refer to this initial faithfulness are IDENTσ for Spanish (Colina 1999) and UNIFORMITYv (Jiménez 1999), which maintains the syllabic properties of vowels.

where the change is least noticed and less prone to occur in contexts where the change would be more salient.

The following table shows how the highest position of $\text{MAX}_{\text{INIT-}\mu}$ correctly predicts the tendency to pronounce hiatus in words such as *miope* [mi.ˈope] 'target' or *diálogo* [di.ˈaloɣo] 'dialogue'.

(11) di'an+a

Candidates	$\text{MAX}_{\text{INIT-}\mu}$	ONSET	$*\text{M/V}_{[+high]}$
☞ a. m[i.ˈo]pe		*	
b. m[ˈjo]pe	*!		*

di'alog+o

Candidates	$\text{MAX}_{\text{INIT-}\mu}$	ONSET	$*\text{M/V}_{[+high]}$
☞ a. d[i.ˈa]logo		*	
b. d[ˈja]logo	*!		*

To account for the presence of an obligatory back glide after a velar consonant (*c*[ˈwa]*tro* 'four', *J*[ˈwa]*na* 'John.fem', *adec*[ˈwa]*r* 'to accommodate'), we propose the existence of a segmental constraint which disallows the presence of a high back vowel after a velar consonant, namely, $*\text{C}_{\text{velar}}\text{uV}$. There are some contexts in which the vowel and the corresponding glide alternate (e.g., *lic*[ˈu.o] 'liquify.1sg.Pr.Ind' > *lic*[ˈwa]*r* 'to liquify'; *evac*[ˈu.a]*s* 'evacuate.2sg.Pr.Ind' > *evac*[ˈwa]*r* 'to evacuate'; *adec*[ˈu.a] 'accommodate.1,3sg.Pr.Subj' > *adec*[ˈwa]*r* 'to accommodate'), providing evidence in favor of its non-phonemic status.[13] The constraint $*\text{C}_{\text{velar}}\text{uV}$ dominates $\text{MAX}_{\text{INIT-}\mu}$. The tableau in (12) illustrates how the candidate *c*[u.ˈa]*tro* is not chosen because it crucially violates this segmental constraint.

(12) cuatr+o

Candidates	$*\text{C}_{[\text{velar}]}\text{uV}$	$\text{MAX}_{\text{INIT-}\mu}$
a. c[u.ˈa]tro	*!	
☞ b. c[ˈwa]tro		*

When a rising sonority vocoid sequence with no preceding consonant is located in word-initial position (*yuca* 'yucca', *yogur* 'yogurt', *yema* 'yoke', *yanqui* 'yankee', *yambo* 'iamb')[14] it always becomes a diphthong. In these cases, the prominence of the first mora competes with a consecutive double violation of the ONSET Principle which we formalize as ONSET+ONSET. We have to distinguish between *diana* 'target' (with only one violation of onset) and *yarda* 'yard' (with a double violation of onset). Thus,

13. Even though Spanish has not completely generalized the position of verbal root stress on the last vowel (*'cambi+o* 'change.1sg.Pr.Ind' *vs. con'fi+o* 'rely on..1sg.Pr.Ind') as Catalan has (*can'vi+o* 'change.1sg.Pr.Ind'; *con'fi+o* 'rely on..1sg.Pr.Ind'), the forms with root stressed of verbs such as *licuar*, *adecuar* have popularly generalized final stress (cf. *lic*['ua] 'liquify.3sg.Pr.Ind', *adec*['ua] 'accommodate.3sg.Pr.Ind') (see also Hualde 2005).

14. The only exception for some speakers is the word *hiato* 'hiatus'.

Onset+Onset dominates $\text{Max}_{\text{INIT-}\mu}$ (*yarda* vs. *diana*), which in its turn dominates Onset (Onset+Onset >> $\text{Max}_{\text{INIT-}\mu}$ >> Onset). The following tableau shows that *yambo* surfaces with a glide because otherwise it would violate the higher-ranked constraint Onset+Onset, as follows:

(13) yamb+o

Candidates	Onset+Onset	$\text{Max}_{\text{INIT-}\mu}$	Onset
☞ a. [ja]mbo		*	
b. [ia]mbo	*!		**

As we have seen in Table 2, another systematic exception to word-initial hiatuses is potentially monosyllabic words (e.g., *Dios* 'God', *Luis* 'Louis'), except for words with a complex onset or a morphological boundary (*truhán* 'crook', *prior* 'prior', *fiar* 'to trust', *liar* 'to tie'). We interpret this phenomenon as a manifestation of the strong dispreference of Spanish for iambic forms. The preference for trochees in Spanish in contrast with Catalan is very well-known and is manifested in truncated and hypocoristic forms (see Prieto 1992 for Spanish and Cabré 1993 for Catalan).[15] The default status of the trochaic foot in the language, Trochee, can also be observed in stress assignment (Harris 1983, Ohannessian 2004, Roca 1997). Thus we can safely assume that Trochee[16] is located quite high in the Spanish hierarchy and indeed it dominates $\text{Max}_{\text{INIT-}\mu}$. This explains the opposite behavior of two types of words (type 1: *Dios* vs. type 2: *diana*), as we can see in (14).

(14) Dios

Candidates	Trochee	$\text{Max}_{\text{INIT-}\mu}$	Onset
☞ a. d[ˈjo]s		*	
b. d[i.ˈo]s	*!		*

diana

Candidates	Trochee	$\text{Max}_{\text{INIT-}\mu}$	Onset
☞ a. d[i.ˈa]na			*
b. d[ˈja]na		*!	

But *truhán* 'crook' or *prior* 'prior' are pronounced with a hiatus, at least for conservative speakers. The structure *CCG only is shown active when is combined with $\text{Max}_{\text{INIT-}\mu}$, that is, when an output violates both constraints.[17] Thus we need a constraint conjunction *CCG + $\text{Max}_{\text{INIT-}\mu}$ to block glide formation from applying in these words, as shown in the following tableau.

15. There are no hypocoristic iambic forms in Spanish in general. The common forms *mamá* and *papá* are French loanwords which coexist with the traditional *mama* and *papa*.

16. We have to combine Trochee with a constraint such as Parse Foot in order to block an iambic minimal word.

17. The constraint *CCG is also used by Jiménez (1999:68) for Catalan. We owe this constraint conjunction proposal to M. Kenstowicz.

(15) prior

Candidates	*CCG + $\text{MAX}_{\text{INIT-}\mu}$	TROCHEE	$\text{MAX}_{\text{INIT-}\mu}$	ONSET
☞ a. pr[i.ˈo]r		*		*
b. pr[ˈjo]r	*!		*	

We have observed that verbal paradigms with roots ending in stressable *i* or *u* can maintain the hiatus (*act*[ˈu.o] 'perform.1sg.Pr.Ind', *act*[u.ˈa]*mos* 'perform.1pl.Pr.Ind', *conf*[ˈi.o] 'rely.1sg.Pr.Ind', *conf*[i.ˈa]*mos* 'rely.1pl.Pr.Ind').[18] We interpret this as a case of output to output faithfulness applying across different forms of the verbal roots. Within the Optimal Paradigm proposal, this faithfulness relationship is understood as follows: "The stem (shared lexeme) in each paradigm member is in correspondence relation with the stem in every other paradigm member. (…) There is no distinctive base — rather, every member of a paradigm is a base of sorts with respect to every other member." (McCarthy 2001:5). For this study, we assume that the constraint OPMAX_{V} guarantees uniformity effects among outputs belonging to root paradigms. Similarly, a uniform pronunciation obtains across nominal paradigms such as *dios, diosa, dioses, diosas*, following the pattern of the unmarked masculine singular form — note that the plural forms correspond to group 2 in Table 1 and, correspondingly, a pronunciation with hiatus would be predicted. The following three tableaux exemplify some cases from the paradigm of the verb *confiar* 'to rely' with stressed final-root high vowel (e.g., *confío* [koŋˈfio]), from the paradigm of the verb *cambiar* 'to change', with unstressed final-root high vowel (e.g., *cambio* [ˈkambjo]), and finally, an example of a nominal paradigm such as *dios* d[ˈjo]s, *dioses* d[ˈjo]ses. In the first two cases the constraints TROCHEE and $\text{MAX}_{\text{INIT-}\mu}$ are not relevant. Nevertheless, they are relevant for nominal paradigms such as *dios*, *dioses*, as shown below, where we need TROCHEE to force gliding on the word *dios*.

(16) confí+o, confí+ár, confí+ámos, confí+ába …

Candidates	OPMAX_{V}	TROCHEE	$\text{MAX}_{\text{INIT-}\mu}$	ONSET
☞ a. conf[i.ˈa]ba				*
b. conf[ˈja]ba	*!			

cámbi+o, cámbi+ár, cámbi+ámos, cámbi+ába …

Candidates	OPMAX_{V}	TROCHEE	$\text{MAX}_{\text{INIT-}\mu}$	ONSET
☞ a. camb[ˈja]ba				
b. camb[i. ˈa]ba	*!			*

18. As mentioned above, in order for gliding to be blocked the morpheme boundary has to be between the verbal root and the inflective suffixes. That is why the verbal forms dio 'give.3sg.PassPerf' and vio 'see.3sg.Past' are always pronounced with a diphthong (dR+io, vR+io), in contrast with lió 'tie.3sg.Past' and fió 'trust.3sg.PassPerf' (liR+o, fiR+o).

diós, diós+es …

Candidates	OPMax$_V$	Trochee	Max$_{INIT-\mu}$	Onset
a. d[i.ˈo]s, d[i.ˈo]ses		*!		* *
b. d[ˈjo]s, d[i.ˈo]ses	*!		*	*
c. d[i.ˈo]s, d[ˈjo] ses	*!	*!	*	*
☞ d. d[ˈjo]s, d[ˈjo] ses			* *	

In our view, the blocking of glide formation in nominal roots ending in /u-/ and followed by stressed sufixes such as *-aje, -oso, -al, -ario* must be accounted for in a different way. Examples such as *virtu+oso* 'virtuous', *defectu+oso* 'defective', *carru+aje* 'carriage', *vestu+ario* 'clothes', *usu+ario* 'user', *actu+al* 'current', *virtu+al* 'virtual' are pronounced with hiatus by Spanish conservative varieties, whereas other examples with the same sufixes attached to roots ending in /i/ are pronounced with a diphthong (e.g., *copi+oso* 'copious', *nervi+oso* 'irritated', *furi+oso* 'violent', *besti+ario* 'bestiary', *incendi+ario* 'incendiary', *labi+al* 'labial', *fili+al* 'filial', *material* 'material'). This contrast shows that we are facing a segmental requirement: in general, /u/ is less prone to gliding (except when preceded by a velar consonant). This tendency has also been found in Catalan (Cabré & Prieto 2004). We consider this segmental requirement to be only a minor faithfulness constraint as it applies to very few cases (the number of roots ending in /u/ is lower than those ending in /i/, making these cases quite exceptional). As we have seen in Section 2.4, the tendency for /i/+V diphthongs to be shorter than /u/+V diphthongs (e.g., *siete* 'seven' vs. *cueto* 'surname'; *idiota* 'idiot' vs. *cuota* 'quota') might be the phonetic reason behind this tendency.

With the conditions presented so far (*CCG+Max$_{INIT\mu}$ >> OPMax$_V$, Trochee >> Max$_{INIT-\mu}$ >> Onset), we account for the distribution of diphthongs and hiatuses in the most part of the output forms. Still, these requirements do not account for the distance-to-stress effects. As we have seen in the preceding sections, all cases of exceptional hiatuses become glides when stress moves to the right. It looks as if there is a tendency to reduce the length of the pretonic sequence once the distance between the beginning of the word and the position of the stress is increased. This apparent syllable-counting effect has been interpreted as a prosodic tendency that disfavors a succession of more than two syllables, which will be named *Lapse (Cabré & Prieto 2004, Wheeler 2005). This constraint, together with its counterpart *Clash, have been shown to be active in the prosodic phonology of different languages. In this paper, instead, we will argue that a more general principle (through the constraint Prosodic Prominence) might be able to both account for this fact and also better motivate the general behavior of gliding crosslinguistically.[19] As is well known, a variety of factors have an influence on vowel shortenings and lengthenings, and thus influence the tendency to glide formation in certain positions. As mentioned before, a variety of phonetic studies have shown that syllables in prominent positions (stressed positions,

19. We owe this suggestion to M. Kenstowicz.

word-initial positions, or monosyllabic words) are phonetically longer than syllables in corresponding non-prominent positions. Following Steriade (2001), we interpret that a longer acoustic duration in prominent positions makes syllables more perceptible and thus speakers tend to reject gliding in prominent positions; conversely, it is easier that speakers accept gliding in less salient non-prominent positions. In other words, production and perceptual reasons are at the basis of this phenomenon. Following this line of argumentation, we propose a Faithfulness condition called PROSODIC PROMINENCE which agglutinates three prominence conditions that apply to syllables in terms of acoustic duration: (1) syllables in stressed positions are more prominent than syllables in unstressed positions (they are longer and thus more perceptible); (2) syllables in word-initial position are more prominent than syllables non-initial positions; and (3) syllables in short stems are more prominent than syllables in longer stems. Summarizing, the following prominence hierarchies obtain: *stressed* >> *unstressed*, *word-initial* >> *non word-initial*, *short stem* >> *long stem*. The prominence level of a given syllable is obtained through a computation of these three pairs of prominence levels. If the syllabic prominence obtained is high, this will be a clear indicator that glide formation should be blocked. In general, blocking of glide formation is only possible when these three prominent conditions apply to the same syllable. As a consequence, syllables where the change would be more salient (that is, stressed positions, word-initial positions, short words) will be more resistant to glide formation.

This computation of the level of prominence automatically obtains the desired results. In a word like *dia* 'day', the word-initial syllable has the maximum concentration of prominence, as the three conditions obtain . By contrast, in a word like *violinista,* the word-initial syllable is 'weakened' by the fact that it belongs to a longer word. Thus the application of condition 3 ("syllables in short stems are more prominent than syllables in longer stems") guarantees that the longer the word, the greater the tendency to pronounce a diphthong, as generally the distance from the beginning of the word to the stressed syllable is longer in longer stems. Speaker variation also follows from the fact that the computation of the prominence level obtains an increasing gradation in prominence strength. We have seen that indeed for some speakers a diphthong also appears word-initially when the stress is located in the vowel next to the high vowel, like in the word *diablo*. The next step down in prominence strength is found when the word is one syllable longer, like in the case of *violín*, where the majority of speakers produce a diphthong.

The constraint PROSODICPROM dominates $\text{MAX}_{\text{INIT-}\mu}$ and the other constraints that block glide formation, guaranteeing that the initial high vowel will become a glide when the vowel does not belong to a long word. The tableaux in (17) illustrate the contrast between *diablo* 'devil'and *violinista* 'violinist'.

(17) diáblo

Candidates	PROSODICPROM	$\text{Max}_{\text{INIT-}\mu}$	ONSET
d[ja]blo		*	
☞ d[i.a]blo			*

viólínísta

Candidates	ProsodicProm	$Max_{INIT-\mu}$	Onset
v[i.o]linista	*!		*
☞ v[jo]linista		*	

If we take some examples from the verbal paradigms *fiar* 'to entrust', *confiar* 'to trust', and *desconfiar* 'to distrust', it is clear that ProsodicProm dominates $OpMax_V$. Clearly, glide formation applies when the stress is away from the word-initial position despite the fact that the high vowel of the root is stressed in some forms of the paradigm. Conversely, the hiatus is maintained in words where the stress is located close to the prominent word-initial position. Note that all other constraints are irrelevant in the tableau in (18).

(18)

	ProsodicProm	$OPMax_V$
☞ a. fí.o / fi.ámos / fi.arémos		*
b. fí.o / fi.ámos / fjarémos	*!	*
c. fí.o / fjámos / fjarémos	*!	
☞ a. confí.o / confi.ámos / confjarémos		*
b. confí.o / confi.ámos / confi.arémos	*!	*
c. confío / confjá.mos / confjarémos	*!	
☞ a. desconfí.o / desconfjámos / desconfjarémos		*
b. desconfí.o / desconfi.ámos / desconfi.arémos	*!	
c. desconfí.o / desconfi.ámos / desconfjarémos	*!	*

(19) summarizes the hierarchy of prosodic conditions that account for the situation found in the conservative varieties of Peninsular Spanish. As shown above, ProsodicProm is the strongest constraint in the hierarchy, followed by $OpMax_V$ and Trochee. Both the segmental constraint $*C_{[velar]}uV$ and the prosodic constraints Onset+Onset are only active when these exceptional cases appear.

(19) ProsodicProm >> $OpMax_V$, Trochee >> $Max_{INIT-\mu}$ >> Onset >> $*M/V_{[+high]}$

On the basis of this hierarchy we can also explain what has happened in innovative varieties: the constraints blocking glide formation have weakened and slipped down in the hierarchy. Isolated exceptions found among some speakers will be interpreted as lexicalized items rather than active prosodic restrictions.

As we have already noted, the hiatus/diphthong distribution exhibits another type of microvariation, namely variation across speakers. Even though speakers of the same Spanish variety share a tendency to diphthongize in certain prosodic contexts, they also present somewhat different surface distributions of hiatuses and diphthongs across lexical items. It is evident that while simple constraint reranking accounts for parametric dialectal differences, it cannot explain this type of variation present in the data.[20] In

20. As McMahon (2000a:235) has argued, constraint reranking contributes to a view of synchronic language systems as static linguistic stages and language change as a sudden shift from one linguistic stage to another: "The status of OT as a model operating with completely ranked constraints, each

this vein, there have been some recent attempts to derive variation in synchronic phonology within OT. One of the most common solutions adopted has been to weaken the requirement for total ranking of constraints (Anttila 1997, Anttila & Cho 1998, Nagy & Reynolds 1997). Taking up a suggestion by Prince & Smolensky (1993) about "crucial nonranking",[21] Anttila (1997) takes the view that "crucial nonranking" reflects variation in the empirical domain. Unless specifically blocked, absence of ranking will appear as a possibility provided by the theory. Similarly, Nagy & Reynolds (1997: 37) propose the existence of "floating constraints, whereby some particular constraint within a single grammar may be represented as falling anywhere within a designated range in the ranking hierarchy". This lack of decision between candidates generates alternative or optional outputs of a given input, but, as Anttila (1997) observes, this does not allow common frequency or subregularity effects to be captured.

Clearly, Spanish glide formation data is not subject to free variation, as it is not the case that a speaker can alternatively pronounce *p*[i.ˈa]*no* and *p*[ˈja]*no* (this only occurs very sporadically). Rather, certain prosodic patterns display clear quantitative tendencies and, within each group, each speaker decides which set of words will be pronounced with a diphthong or a hiatus. The unranked or floating constraint solution is not able to account for the "net of lexical relationships" which are established by each speaker nor to make explicit quantitative predictions on the output because we are not dealing with a phenomenon of grammatical undeterminacy.

Intuitively, idiolectal variation in the case at hand responds to the difference between analogical relationships that each speaker establishes between different lexical items. One possible reason for the emergence of these "individualized grammars" is that gliding is not a perceptually salient phenomenon in connected speech, which can easily induce speakers to start establishing a particular net of lexical relationships. We propose to encode the expression of this type of variation by resorting to differences between individual speakers in the establishment of analogical relationships between lexical items. We will adopt Itô & Mester (1997: 439) instantiation of this idea within Correspondence Theory: each speaker is able to set up a series of idiosyncratic correspondence relations between different lexical items which become active in the evaluation process. Thus, some lexical idiosyncratic marking is needed to explain idiolectal variation (and expressed by the presence of the relevant correspondent in the evaluation tableau). It might well be that some identity and analogical patterns emerge in this net of lexical relationships within each particular grammar.

hierarchy converging unambiguously and categorically on a single output for each input form, would seem to preclude the analysis of variation."

21. "We asume that the basic hypothesis is that there is some total ranking which works; there could be (and typically will be) several, because a total ranking will often impose noncrucial dominance relations (noncrucial in that either order will work). It is entirely conceivable that the grammar should recognize nonranking of pairs of constraints, but this opens up a possibility of crucial nonranking (neither can dominate the other; both rankings are allowed), for which we have not yet found evidence. Given present understanding, we accept the hypothesis that there is a total order of domination on the constraint set; that is, that all nonrankings are noncrucial." (Prince & Smolensky 1993:51).

6. Conclusion

We have shown that the process of glide formation in rising sonority sequences in the conservative variety of Peninsular Spanish can be accounted for in terms of a correspondence-based OT analysis (McCarthy & Prince 1994, 1995; Benua 1995). In this variety, the presence of exceptional hiatuses can be regarded as a process closely conditioned by prosodic and analogical conditions: exceptional hiatuses basically appear in word-initial position (*p*[i.ˈa]*no* 'piano') and as a result of uniformity effects in paradigmatically-related words (*conf*[i.ˈa]*r* 'to trust', cf. *confío* 'I trust'). By contrast, vowel sequences in word-medial and word-final positions are quite systematically reported as diphthongs (*cam*[ˈjo]*n* 'truck', *cam*[ˈjo]*neta* 'van'). With respect to the morpheme boundary effects, the data reveal that they differ depending on the paradigm: while in nominal items gliding is blocked when there is an intervening morpheme boundary and when the glide is a high back vowel (*virt*[u.ˈo]*so* 'virtuous' vs. *od*[ˈjo]*so* 'hateful', *act*[u.ˈa]*l* 'current' vs. *cord*[ˈja]*l* 'cordial'), in verbal paradigms, gliding is blocked when there is an intervening morpheme boundary and when the high vowel can be stressed in other forms of the paradigm (*conf*[i.ˈa]*r* 'to trust', cf. *confío* 'I trust' vs. *camb*[ˈja]*r* 'to change', cf. *cambio* 'I change').

Regarding the prosodic conditions, we have argued that a general phonetically grounded constraint called Prosodic Prominence is able to better motivate the general behavior of gliding crosslinguistically. As is well known, a variety of phonetic studies have shown that syllables in prominent positions (stressed positions, word-initial positions, or monosyllabic words) are phonetically longer than syllables in non-prominent positions. This constraint has the function of evaluating the prominence level of a given syllable taking into account the following three comparisons: *stressed* >> *unstressed*, *word-initial* >> *non word-initial*, *short word* >> *long word*. Following Steriade (2001), we interpret that a longer acoustic duration in prominent positions makes syllables more perceptible and thus speakers tend to reject gliding when the three prominence conditions are met; conversely, it is easier that speakers accept gliding in less salient non-prominent positions. As a consequence, contexts where the change would be more salient will be more resistant to glide formation.

We are aware that we need more than 15 informants from different generations and more than 246 words to state that there is a change in a specific direction in the distribution of diphthongs / hiatuses in Spanish, this is out of the scope of this paper. Nevertheless the results show a situation with many more diphthongs that literature has reported and with great variation. One of the first descriptive findings of this article is that there are clear differences between speakers in the surface distribution of exceptional hiatuses. First, half of the speakers have practically generalized the presence of a diphthong in word-initial position and in morphological environments: for example, only half of the informants have the word-initiality effect in words such as *piano* 'piano' or *diálogo* 'dialogue' (+50% hiatus), and practically all speakers have generalized the presence of a diphthong in words such as *diadema* (with the stress located one syllable after the vowel sequence). Similarly, paradigm effects are practically null for some innovative speakers. This situation reveals that Spanish shows a strong

tendency to onglide formation for many speakers. We have also hypothesized that this tendency has been favored by the prior existence of frequent historical diphthongs coming from the "breaking" of mid vowels, which have acted as lexical attractors for other vowel sequences of rising sonority within the lexicon. It is not surprising that Spanish represents a more advanced stage of diphthongization than Catalan, a language which does not have historical diphthongs (see Cabré & Prieto 2004).

Finally, interspeaker variation in the data has been accounted for by assuming that each speaker is able to set up a set of idiosyncratic correspondence relations between different words which are active in the evaluation process. This intuitively accounts for the fact that the emergence of these individualized grammars in the hiatus/diphthong distribution patterns responds to the different analogical relationships each speaker establishes between different lexical items.

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Appendix 1. Cuestionario

Nombre: _____ Edad: _____

Procedencia geográfica: _____

(Pronuncie las palabras siguientes con una elocución normal y separe las sílabas fonéticas resultantes con un guión. Cuando aparezca algún diptongo en sílaba átona de vocoides altas, señale el núcleo silábico con un acento)

reimprimir	reinstaurar	reiniciar
reunir	reubicar	reinstalar
bianual	biunívoco	bienio
triángulo	triangular	triunvirato
preuniversitario	semiótico	semiesfera
semiexperto	semialcalino	contraindicación
contraindicar	sobrehumano	sobreintoxicación
antiestético	antialcalino	antiácido
antiasmático	pluriempleo	intrauterino
boquiabierto	estadounidense	francohispano
comerciante	obediente	coloquial
material	celestial	artificial
defectuoso	delicioso	valeriana
italiano	Sebastián	anfitrión
escorpión	estudiante	calumniar
heroicidad	laicismo	continuidad
homogeneidad	espontaneidad	ingenuidad
mediación	aviación	foniatría
propietario	embrionario	apasionante
cristianismo	pediatría	ambiental
avioneta	idiomático	misionero
aduana	copioso	foniatra
confianza	congruente	avión
camión	misión	caviar
guardián	precioso	pensión
cordial	arterial	bestial
actual	social	trivial
labial	colegial	filial
maniático	radiólogo	asiático

idioma	patriarca	pediatra
ambiente	peruano	genuino
boniato	patriota	barriada
idiota	radiante	ambiente
embrión	Daniel	Gabriel
silueta	carruaje	maniobra
estuario	usuario	cristiano
jesuita	bestial	Adrián
bandurria	historia	Cecilia
mutua	patria	fatua
perpetua	ingenua	continua
demonio	asiduo	sobrio
amplio	biblia	ebrio
novia	bestia	odio
Dios	Lyon	riel
dual	prior	truhán
fuel	dio	vio
ruin	bies	fiar
cruel	criar	trial
Juan	Luis	liar
miope	sueco	piano
diana	dieta	viola
diálogo	diácono	diócesis
Viena	viaje	triunfo
quieto	ruina	fianza
diablo	diario	criollo
cliente	cruento	ciática
fiable	liana	Suiza
Juana	riada	biela
miopía	piedad	piadoso
diadema	dialecto	dualista
violín	violento	diamante
criatura	pionero	Piamonte
cianuro	biológico	diabólico
diagnosis	suicidio	diabetes
lionesa	pianista	clientela
triunfante	Priorato	ruinoso
diagonal	diapositiva	diocesano
violentar	triunfador	fluorescencia
diapasón	prioridad	violinista
piamontés	biología	diamantino
insinuar	insinuaremos	insinuación
habituar	habitual	habituaremos
evaluar	evaluación	evaluarán
continuar	continuidad	continuación
conciliar	conciliador	conciliación
aliar	alianza	aliado

variante	variación	variabilidad
repatriar	reconstruir	construiremos
actuar	actuaremos	actuación
ampliar	ampliación	ampliarán
confiar	confianza	confiaria
saciar	expiar	expiación