Five common, yet apparently unrelated phonological processes that occur in human language are: debuccalization (e.g. /s/ → [h]), vocalization (e.g. /l/ → [ɨ]), nasal absorption (e.g. /on/ → [ð]), velarization (e.g. /n/ → [ŋ]), and deletion (e.g. /k/ → [∅]). What connection could there exist among these processes that a single grammar would use all of them for the same purpose, when their outcomes are in fact so disparate? The apparent unrelatedness of these processes turns out to be merely illusory as one starts to look at them from the angle of syllable structure. All of the above-mentioned processes most commonly affect consonants assigned to the syllable coda; seldom do they prey on consonants assigned to the syllable onset. The fact that these processes tend to operate in the same structural context is closely tied to a positional asymmetry commonly found among the languages of the world, which involves the left and right syllable edges. While those languages that allow consonants to appear at both the left and right edges of the syllable often restrict the type of consonant that may sit at the right syllable edge, they are quite willing to accept most, if not all of the consonants of their sound inventories at the left edge of the syllable.

In this paper I develop a constraint-based analysis (Prince and Smolensky 1993, McCarthy and Prince 1995) of the various processes that affect syllable-final consonants in a rustic variety of Spanish spoken in the northern region of the Dominican Republic. For this purpose I adopt Itô and Mester’s (1994, 1999) proposal to view syllable wellformedness conditions such as ONSET, NO-CODA, NO-DIHTHONG, and crucially, the CODA-CONDITION, as alignment constraints that govern the association of consonants and vowels with syllabic
positions and vice versa. This approach reveals that debuccalization, vocalization, absorption, velarization, and deletion are the various ways in which syllable-final consonants in this Spanish dialect harmonize with a single universal imperative: the requirement that the head of every consonantal segment (e.g. the CPlace node) be aligned with the left edge of a syllable. In a grammar where this wellformedness condition takes precedence over featural faithfulness, placeless and place-sharing structures are the only forms a consonant may take in order to be able to occupy to the right edge of the syllable. The proposed analysis offers a principled motivation for all of the processes under study and provides strong support for ALIGNMENT, CRISP-EDGE, MAX(Feature), and DEP(Feature) constraints.

1. Restrictions on syllable codas in Northern Rustic Dominican Spanish

The term Northern Rustic Dominican Spanish (NRDS) will be used here to refer to a variety of Spanish spoken by the illiterate people of the northern region of the Dominican Republic. Although better known as ‘Cibaeño’, I adopt the term Northern Rustic Dominican Spanish because this dialect is spoken beyond the borders of the north central region of the country (El Cibao),¹ and also because it is not the speech of all people in that region, but only of those who belong to the lower cultural levels (Jimenez Sabater 1975, Golibart 1976).²

The best-known feature of NRDS is its strong tendency to implement liquid consonants in syllable-final position as a high front vocoid (e.g. [pəj.ˈsə.lə] < /parsela/ ‘plot’, [ə.ni.ˈməʝ] < /animal/ ‘animal’). Such vocalization is so characteristic that Dominicans refer to the speech of the uneducated people of the northern part of the country as hablar con i ‘to speak with [i]’. Liquid gliding, as Guitart (1980) dubbed this process, has awaken great interest among Spanish linguists, who have generated a substantial body of literature in their
effort to describe and explain this phenomenon (Henriquez Ureña 1940, Navarro Tomás 1956, Jimenez Sabater 1975, Golibart 1976, Alba 1979, Guitart 1980, Rojas 1982, Harris 1983, and Nuñez-Cedeño 1997). But while all of these studies agree that liquid gliding is a type of weakening whose motivation has to do with the fact that the liquid consonant is in syllable-final position, none of them has determined what exactly is the property of the right syllable edge that causes this weakening, nor has any previous study attempted a unified account of the strong tendency exhibited by NRDS to weaken and lose syllable-final consonants in general.

As it turns out, liquid gliding in NRDS is just one of several processes geared to undermine consonants in the syllable coda; and thereby promote the emergence of open syllables. In addition to vocalization, coda consonants in NRDS are subject to processes such as debuccalization (e.g. [súh.to] < /susto/ ‘scare’), nasal absorption (e.g. [o.se] < /onse/ ‘eleven’), and deletion (e.g. [a.sé.to] < /asepto/ ‘I accept’), none of which ever affects consonants in syllable-initial position. Because vocalization is but one of several strategies used to deal with syllable-final consonants, a full understanding of the general instability that consonants exhibit in this syllabic position forces us to consider not only the sound class of liquid consonants, but the entire consonantal system of the language. As the data in (1-9) show, NRDS exhibits a strong tendency to reduce all consonants syllable finally.

Let us consider first the case of syllable-final liquids, which not only vocalize, but may also undergo deletion, (1). Yet, although both vocalization and deletion may take place, the former process occurs far more frequently (Jimenez Sabater 1975, Golibart 1976). To facilitate the presentation of the data, only the relevant syllable of the word is included in the phonetic transcription of the examples below.
Despite its high productivity, there are three contexts in which vocalization would be expected, but it does not take place (Golibart 1976). When preceded by a high front vowel, a syllable-final liquid consonant undergoes deletion, but not vocalization, (2). When assigned to the coda of an unstressed final syllable, deletion is also the only option, (3). Lastly, when the liquid consonant is final in an unstressed monosyllabic word, it is faithfully preserved if the following word begins with a vowel, nonetheless, vocalization or deletion does take place if the following word begins with a consonant, (4). The obvious reason for this is that before a vowel-initial word, the liquid consonant is syllabified as an onset, whereas before a consonant-initial word, it must be syllabified as a coda.

(2)  /firme/ →  [fi]  ‘firm’
     /salir/ →  [li]  ‘to leave’
     /silba/ →  [si]  ‘s/he whistles’
     /filтро/ →  [fi]  ‘filter’
Moving on to syllable-final nasals, the words in (5) show that they adopt the place of articulation of a following stop consonant within the same word. On the other hand, a nasal that is followed by a non-stop consonant may be implemented in three different ways. It may be pronounced as (i) a velar nasal, (ii) as the anusvara \([N]\), which is a nasal consonant without a specific place of articulation, or (iii) it may be absorbed by the preceding vowel, (6). These are also the three possible realizations of a nasal consonant in word-final position, (7).

(3) /dólar/ \(\rightarrow\) [dó.la] ‘dollar’
/asukar/ \(\rightarrow\) [a.sú.ka] ‘sugar’
/arbol/ \(\rightarrow\) [áx.βo] ‘tree’
/karsel/ \(\rightarrow\) [ká.j.se] ‘prison’

(4) /por eso/ \(\rightarrow\) [po.re] ‘because of that’
/el otro/ \(\rightarrow\) [e.lo] ‘the other one’
/por todo/ \(\rightarrow\) [po.j] \(\sim\) [po] ‘because of all’
/el primero/ \(\rightarrow\) [e.j] \(\sim\) [e] ‘the first one’
D’Introno and Sosa (1984:2-3) describe the anusvara as a relaxed variant of a velar nasal in which the articulatory gesture of the tongue is weakened, and there is no real closure between the articulars, but an approximation with a minimum of articulatory movement. Being deprived of stricture features (Trigo 1988), velum lowering is the only supralaryngeal component of the anusvara, which is why it sounds like ‘a very weak and reduced’ velar nasal (Jimenez Sabater 1975:117).

With regard to fricative consonants, /s/ is by far the most frequent sound of the set of Spanish fricatives that Latin American Spanish dialects accept syllable finally (e.g. /f, s, x/). Words containing syllable-final /f/ or /x/ are rather scarce in the language, and it turns out that /x/ never emerges in NRDS because this dialect uses /h/ instead. The data in (8) show that speakers of NRDS deal with syllable-final fricatives in two different ways. Most frequently, the fricative consonant is completely lost, although occasionally, it is merely debuccalized.
To conclude this survey, consider the case of stop consonants. Despite their lower sonority, which makes them more costly syllable codas, stops have not yet completely vanished from syllable-final position. The main source of syllable-final stops in Spanish are grupos cultos ‘cultivated clusters’, which have been preserved especially in the speech of the mid and high classes. Given that the members of a grupo culto do not have the sonority gradient that Spanish requires for two consonants to form a licit complex onset, the preservation of grupos cultos such as /ks/, /kt/, /dm/, /tn/, /bs/, /bt/, etc., requires that the first consonant of the cluster be parsed as a syllable coda, which is the pattern found in Academic Spanish dialects throughout the Spanish speaking world (e.g. [ak.si.deɾ.nətə] < /aksidente/ ‘accident). In NRDS, however, syllable-final stops are most often deleted, although occasionally, they are preserved as a high front vocoid, (9). The latter allophone is especially revealing because it is proof that prior to deletion, there is an intermediate weakening stage, in which stops lose their consonantality. Furthermore, this shows that although vocalization is the preferred strategy used in NRDS to avoid the emergence of liquid consonants in the coda, this process does not target liquid consonants exclusively (Jimenez Sabater 1977).
(9)  /əksidNʧə/  \rightarrow  [a] \sim [aj]  \quad \text{‘accident’}

/leksioN/  \rightarrow  [le] \sim [lej]  \quad \text{‘lesson’}

/korekt/o/  \rightarrow  [re] \sim [rej]  \quad \text{‘correct’}

/admirat/  \rightarrow  [a] \sim [aj]  \quad \text{‘to admire’}

/etniko/  \rightarrow  [e] \sim [ei]  \quad \text{‘ethnic’}

/absolut/o/  \rightarrow  [a] \sim [aj]  \quad \text{‘absolute’}

/obtener/  \rightarrow  [o] \sim [oi]  \quad \text{‘to obtain’}

/konsept/o/  \rightarrow  [se] \sim [sei]  \quad \text{‘concept’}

/korupt/o/  \rightarrow  [ru] \sim [ruj]  \quad \text{‘corrupt’}

That syllable-final consonants have not yet been lost from underlying representations is supported by the fact that the weakening processes illustrated above do not always apply. In careful speech, as when the speaker strives to sound like an educated person, syllable-final consonants may be faithfully preserved (e.g. [pak.tə] < /paktə/ ‘pact’, [fjes.ta] < /fieste/ ‘party’, [mal] < /mal/ ‘bad’, [a.mor] < /amor/ ‘love’, etc.). Furthermore, there are regular alternations such as those in (10), which involve a word-final consonant that is deleted when the word is in singular form, but reappears when the word is pluralized. Thanks to the vowel that is added in the process of generating the plural form, the offending consonant can be preserved as a syllable onset.

(10)  |  Singular  |  Plural  |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>/dolər/  \rightarrow  [la]</td>
<td>[la.re]</td>
<td>‘dollar’</td>
</tr>
<tr>
<td>/arbol/  \rightarrow  [βo]</td>
<td>[βo.łe]</td>
<td>‘tree’</td>
</tr>
</tbody>
</table>
Although there are no equivalent alternations involving word-internal consonants, the fact that NRDS strongly disfavors syllable-final consonants is unquestionable, and it must be accounted for whether one assumes that the deleted/weakened coda consonants are part of underlying representations or not. In fact, Richness of the Base (Prince and Smolensky 1993) requires us to consider the possibility that such consonants may be part of input forms, in which case their weakening/loss would be the result of complying with grammatical constraints. This is indeed the stance I adopt here for even if one chose to assume that underlying representations are free of coda consonants, it would still need to be explained why of the seventeen phonemic consonants that NRDS has (e.g. /c, p, t, k, b, d, g, f, s, h, m, n, ŋ, y, l, r, r/), the only consonantal sounds that surface systematically in syllable-final position are [h], [n], [ŋ]. Furthermore, if coda consonants were assumed to be missing from underlying representations, they would have to be arbitrarily inserted in those cases where they do surface, either as full or as reduced segments.

In conclusion, the sound patterns illustrated by the data in (1-9) confirm that NRDS has a strong tendency to weaken all consonants in syllable-final position. Both obstruent and sonorant consonants may be deleted in this context. Nevertheless, there is also evidence for an intermediate weakening stage, in which the offending consonant is vocalized,
debuccalized, or absorbed, depending on what type of consonant it is. It is my claim that the whole range of patterns of consonant weakening and loss found in NRDS may be subsumed under a single generalization: place-bearing consonants are prohibited in the syllable coda. It is precisely the enforcement of this coda condition that prevents all consonants except for [h], [n], [ŋ] from surfacing systematically at the right edge of the syllable. In this regard, it is important to mention that although the segment [ŋ] might appear to escape this generalization, the analysis developed below shows that this nasal allophone is actually in perfect compliance with the coda condition. The point will be made that consonants that fail to give up their place features in order to comply with the prohibition against place-bearing consonants in the coda have only one option: they must delete.

2. Consonant alignment

Applying an alignment-theoretic approach to syllable structure, the work of Itô and Mester (1994, 1999) and Piñeros (2001) reveals important generalizations that govern the association of segments with syllabic positions, and vice versa. Within Alignment Theory (McCarthy and Prince 1993), basic well-formedness conditions such as ONSET and NO-CODA, the principles used to account for the high frequency of CV syllables in the languages of the world, may be formulated as the requirement that each syllable edge be aligned with one of two basic kinds of segments: a consonant or a vowel. Redefined in terms of alignment, the constraint ONSET requires that every syllable be left aligned with a consonant, (11), whereas NO-CODA demands that every syllable be right aligned with a vowel, (12). The representation in (13) illustrates the fact that both syllable-to-segment alignment conditions, a form of downward alignment, are met by the unmarked CV syllable.
(11) **ALIGN-L(σ,C):** The left edge of every syllable must be aligned with a consonant.

(12) **ALIGN-R(σ,V):** The right edge of every syllable must be aligned with a vowel.

(13)

\[ \sigma \]

\[ C \quad V \]

Itô and Mester (1994, 1999) further develop this approach by allowing the reversal of the order of the arguments of these constraints, which gives rise to the notion of segment-to-syllable alignment. Reversing the arguments of **ALIGN-L(σ,C)** yields an alignment constraint that focuses on the consonant, (14), whereas reversing the arguments of **ALIGN-R(σ,V)** results in an alignment constraint that focuses on the vowel, (15). According to this type of upwards alignment, consonants must be left aligned with the syllable, whereas vowels must be right aligned with it. The representation in (16) shows that the unmarked CV syllable also abides by both segment-to-syllable alignment conditions.

(14) **ALIGN-L(C,σ):** Every consonant must be aligned with the left edge of a syllable.

(15) **ALIGN-R(V,σ):** Every vowel must be aligned with the right edge of a syllable.

(16)

\[ \sigma \]

\[ C \quad V \]

Focusing on consonant alignment, which is the type of alignment that is relevant to this study of NRDS, it is important to emphasize here that there is phonetic grounding for the constraint in (14) provided by the perceptual need for segments to be prominent vis-à-vis the
articulatory nature of consonantal segments. Because all consonants are endowed with some
degree of constriction, their association with the left syllable edge is most appropriate to
enhance their prominence, and thereby achieve greater perceptibility. This is due to the fact
that unlike its right edge, the left of the syllable guarantees that the constriction of the
consonant will be released. Released consonants are perceptually privileged due to phonetic
cues present in the release phase, which serve to signal contrastive consonantal features such
as state of the glottis and place of articulation (Kingston 1985, 1990, Kirchner 1996). This
property of onset consonants gives them a level of phonetic prominence much greater than
that of coda consonants, and is at the heart of various positional asymmetries commonly
found among the languages of the world, such as the possibility for a broader range of
phonological features and contrasts in the syllable onset than in the coda, and the tendency
for onset consonants to be the triggers of phonological processes whereas coda consonants
tend to be the undergoers. Within the Theory of Positional Faithfulness (Beckman 1999), the
greater phonetic prominence of onset consonants is used as justification to grant them a
privileged status in the grammar, which entitles them to enjoy the benefit of enhanced
phonological faithfulness. Independently of positional faithfulness, the fact that matters for
the purpose of this paper is that no structural position is more conducive to enhancing the
acoustic prominence of consonants than the left syllable edge, hence the natural preference of
this sound class to associate with this syllabic position. Hereafter, I refer to the universal
tendency for consonants to be left aligned with a syllable simply as ALIGN-C, which is
shorthand for ALIGN-L(C,σ).

ALIGN-C enables us to capture the various kinds of CODA-CONDITION attested in the
languages of the world in terms of positive statements that refer to specific consonant
features such as Cplace, marked Cplace, or major segment classes such as obstruents or sonorants (Itô and Mester 1994, 1999, Piñeros 2001). In the case of NRDS, the consonant-alignment constraint that is active is ALIGN-C(place).

(17) ALIGN-C(place): The place features of every consonant must be aligned with the left edge of a syllable.

Support for segregating place from the rest of consonant features is provided by the fact that it is a key property of consonants. Besides creating the most common type of contrast within the different consonant classes, place features are essential in producing the type of stricture that distinguishes consonants from vowels. Because the place node is in fact the constituent that functions as the head of the segment (Itô and Mester 1993), it is not surprising that place features are a common target of the syllable well-formedness constraint that monitors the proper alignment of consonantal segments.

The condition that the head of every single consonantal segment be aligned with the left edge of a syllable, ALIGN-C(place), cannot help running into conflict with DEP(seg) and MAX(seg), the faithfulness constraints that militate against the gain and loss of segments, respectively.

(18) DEP(seg): Every segment in the output must have a correspondent in the input.

(19) MAX(seg): Every segment in the input must have a correspondent in the output.

In NRDS, ALIGN-C(place) is interleaved between these two faithfulness constraints: DEP(seg) >> ALIGN-C(place) >> MAX(seg). As a consequence of this, proper consonant
alignment may be obtained at the expense of losing (e.g. deletion), but not of gaining structure (e.g. epenthesis). This point is illustrated in tableau (20) with the word /aros/ ‘rice’. Candidates (20a,c) show that the faithful preservation of the final consonant of this word is not possible because it would require incurring a violation of either ALIGN-C(place) or DEP(seg). By contrast, deleting the offending segment is optimal because it yields satisfaction of the two top ranking constraints, (20b).

(20) \( \text{DEP(seg)} \gg \text{ALIGN-C(place)} \gg \text{MAX(seg)} \)

<table>
<thead>
<tr>
<th>Input: /aros/</th>
<th>DEP (seg)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. a.ros</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>(\not\in) b. a.ro</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. a.ro.se</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Yet, it is also possible to prevent the emergence of misaligned Cplace features through lesser structural loss than sacrificing an entire segment. Because ALIGN-C(place) does not conflict with all coda consonants, but only with those that are endowed with place features, a grammar where this alignment constraint outranks MAX(seg) may still be able to preserve certain consonants in syllable-final position provided that (i) they are consonants that are deprived of place features (e.g. placeless), or (ii) consonants whose place features are aligned with the left edge of a syllable through another segment (e.g. place-sharing). Aside from them, such grammar will only allow non-consonantal segments to sit at the right syllable edge. In the following sections, I show how despite the high status that the constraint ALIGN-C(place) has in NRDS, this Spanish dialect still strives to preserve coda consonants through various strategies that enable them to cling to the syllable coda.
3. Consonant alignment and feature faithfulness

Following a proposal by Lombardi (1998, 1999, 2001), I assume that feature faithfulness is governed by the correspondence constraints DEP(Feature) and MAX(Feature), which she uses to replace IDENT(Feature) constraints in view of the fact that the latter type of constraint is unable to rule out unattested language types. Adopting this view of feature faithfulness, I propose to account for the processes of vocalization and debuccalization that occur in NRDS through the ranking ALIGN-C(place) >> MAX(Feature).

(21) DEP(Feature): Every feature in the output must have a correspondent in the input.
(22) MAX(Feature): Every feature in the input must have a correspondent in the output.

Because [consonantal] and [place] are the key features that are lost in the process of vocalizing or debuccalizing a consonant, the specific MAX(Feature) constraint that is outranked by ALIGN-C(place) is MAX(consonantal, place). Notice that these are precisely the features that cause a consonant to be at odds with ALIGN-C(place). Furthermore, it is important to realize that the loss of place features indirectly causes the loss of manner features such as [continuant], [strident], [lateral], etc., which are dependent on the action of the same articulator that implements place, and therefore, cannot survive the deactivation of the place articulator (McCarthy 1988, Keyser and Stevens 1994). Similarly, in the case of an obstruent consonant, the loss of its consonantality indirectly causes the loss of its obstruency because there is no such thing as an obstruent vowel. Yet, despite these side effects, the feature faithfulness constraint that must be crucially dominated by ALIGN-C(place) so that vocalization and debuccalization patterns may arise is MAX(consonantal, place).
Another important observation is that features such as [spread glottis], [constricted glottis], and [nasal] do not necessarily have to be lost under duress by $\text{ALIGN-C}(\text{place})$ because they are not stricture features, and therefore, they do not clash with this constraint. Here I follow Keyser and Stevens (1994:209) in their observation that the action of the glottis and the velum are two of four basic independent controls involved in the articulation of speech sounds. Hence it seems reasonable to assume that faithfulness to the features produced by these two articulators may be assessed independently of faithfulness to features produced by other articulators. As it turns out, in NRDS neither the glottis nor the velum may be activated or deactivated in the process of simplifying the structure of a consonant in order to prevent the misalignment of its place features. This means that the feature faithfulness constraints $\text{DEP}(\text{glottal, nasal})$ and $\text{MAX}(\text{glottal, nasal})$ outrank $\text{ALIGN-C}(\text{place})$. But because a consonant that is assigned to the syllable coda may be forced to undergo vocalization, debuccalization, or deletion, the constraint $\text{ALIGN-C}(\text{place})$ must outrank both $\text{MAX}(\text{consonantal, place})$ and $\text{MAX}(\text{seg})$. The ranking between these two faithfulness constraints must be left unspecified, as indicated by the broken line that separates them in the tableaus below, because compliance with $\text{ALIGN-C}(\text{place})$ may be obtained at the expense of violating either one of them.

Since it was already established that $\text{DEP}(\text{seg})$ is undominated, no epenthetic candidates will be considered in the evaluations hereafter. In tableau (23), candidate (23a) represents a faithful input-to-output mapping; nevertheless, it is ruled out by $\text{ALIGN-C}(\text{place})$ because the place features of its final consonant are not aligned with the left edge of a syllable. In order to remedy this situation, some structure in the input form must be sacrificed. With $\text{ALIGN-C}(\text{place})$ dominating both $\text{MAX}(\text{consonantal, place})$ and $\text{MAX}(\text{seg})$,
candidates 23(b-f) are all viable options. However, in the case of a fricative consonant, deleting this segment, (23b), or debuccalizing it to [h], (23c), are the best ways to get around ALIGN-C(place) because they do not require engaging/disengaging the glottis or the velum. By contrast, debuccalizing a fricative consonant to [ʔ] or [n], or vocalizing it to [i], would necessarily involve gaining or losing a feature implemented by one of those articulators, which is ruled out by the top-ranking constraints DEP(glottal, nasal) and MAX(glottal, nasal).

(23)  
\[
\text{DEP}(\text{gl, nas}), \text{MAX}(\text{gl, nas}) >> \text{ALIGN-C}(\text{pl}) >> \text{MAX}(\text{cons, pl}), \text{MAX}(\text{seg}).
\]

<table>
<thead>
<tr>
<th>Input: /aros/</th>
<th>DEP (gl, nas)</th>
<th>MAX (gl, nas)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. a.ros</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. a.ro</td>
<td></td>
<td></td>
<td></td>
<td>![c.g.]</td>
<td>![s.g.]</td>
</tr>
<tr>
<td>c. a.roh</td>
<td></td>
<td></td>
<td>![nas]</td>
<td>![s.g.]</td>
<td>![pl]</td>
</tr>
<tr>
<td>d. a.roʔ</td>
<td>![c.g.]</td>
<td>![s.g.]</td>
<td>![pl]</td>
<td></td>
<td>![pl]</td>
</tr>
<tr>
<td>e. a.roN</td>
<td>![nas]</td>
<td>![s.g.]</td>
<td>![pl]</td>
<td></td>
<td>![pl]</td>
</tr>
<tr>
<td>f. a.roj</td>
<td>![s.g.]</td>
<td></td>
<td>![pl]</td>
<td>![cons]</td>
<td>![pl]</td>
</tr>
</tbody>
</table>

Crucially, it is because the makeup of fricative consonants includes the feature [spread glottis] that when speakers of NRDS decide not to delete a fricative consonant in syllable-final position but simply to reduce it, such segment must be reduced to [h] rather than any other minimal sound. That the makeup of fricative consonants includes the feature [spread glottis] has been made clear by Kingston (1990), who stresses that the articulation of this consonant class requires a very wide glottal aperture so that there will be sufficient airflow through the glottis in order to produce turbulence downstream through the oral constriction, which is an essential condition to yield frication. In brief, under duress by
ALIGN-C(place), fricative consonants debuccalize to [h] because this is the minimal placeless fricative, as Besell (1992) has convincingly argued.

In the case of syllable-final stops, their debuccalization to a minimal consonant is not possible in NRDS. This is illustrated in tableau (24) with the word /pepsi/ 'Pepsi’, which despite its English origin is a common word in NRDS. Not only cannot a stop consonant debuccalize to [ʔ] or [n], but neither to [h] because this language does not have glottalized, prenasalized, or aspirated stops. In other words, because the stops of NRDS are plain, they have no underlying glottal or nasal features that could be preserved in the form of a minimal segment, (24b-d). In order to avoid the misalignment of the place features of a stop consonant, the only options available to this grammar are vocalization or deletion, (24e,f).

(24) \[ \text{DEP}(\text{gl, nas}), \text{MAX}(\text{gl, nas}) \gg \text{ALIGN-C}(\text{pl}) \gg \text{MAX}(\text{cons, pl}), \text{MAX}(\text{seg}) \]

<table>
<thead>
<tr>
<th>Input: /pepsi/</th>
<th>DEP (gl, nas)</th>
<th>MAX (gl, nas)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pep.si</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. peh.si</td>
<td>[s.g.]!</td>
<td></td>
<td></td>
<td>[pl]</td>
<td></td>
</tr>
<tr>
<td>c. peʔ.si</td>
<td>[c.g.]!</td>
<td></td>
<td></td>
<td>[pl]</td>
<td></td>
</tr>
<tr>
<td>d. pen.si</td>
<td>[nas!]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. pei.si</td>
<td></td>
<td></td>
<td></td>
<td>[pl] [cons]</td>
<td></td>
</tr>
<tr>
<td>f. pe.si</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

It is worth commenting that when applied to stops, vocalization is more costly than debuccalization because it involves the loss of a greater number of features. Note that whereas debuccalization only requires losing place and manner features, vocalization requires losing the obstruency of the stop consonant in addition to its place and manner.
Nonetheless, the fact that neither the glottis nor the velum may be activated/deactivated for the sake of Cplace alignment makes vocalization the only alternative to deletion when the consonant that is at stake is a plain voiced or voiceless stop.

That the outcome of vocalization is [i] rather than [u] is determined by the Place-Hierarchy (e.g. *Dorsal, *Labial >> *Coronal), which recognizes Coronal as the unmarked place of articulation, whereas Dorsal and Labial are viewed as equally marked for lack of conclusive evidence as to which one is more costly (Prince and Smolensky 1993). Since the vocoid that is used to provide an output correspondent for the underlying stop consonant bears its own place features, Max(seg) must dominate the Place-Hierarchy in the grammar of NRDS. To avoid clogging the tableaus, the only violations of the Place-Hierarchy that will be counted are those incurred by the output correspondent of the consonant that is assigned to the syllable coda.

(25) \[ \text{DEP}(gl, nas) >> \text{ALIGN-C}(pl) >> \text{MAX}(\text{cons, pl}), \text{MAX}(\text{seg}) >> \text{PL-HIERARCHY} \]

<table>
<thead>
<tr>
<th>Input: /pepsi/</th>
<th>DEP (gl, nas)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
<th>PLACE-HIERARCHY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pep.si</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. peʔ.si</td>
<td>[c.g.]!</td>
<td>[pl]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. peŋ.si</td>
<td></td>
<td>[pl] [cons]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. pej.si</td>
<td></td>
<td>[pl] [cons]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. pe.si</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Candidates (25c-d) are the finalists in this evaluation because they are the only ones that comply with the two top-ranking constraints. However, the key issue illustrated by this tableau is the rivalry between candidates (25c) and (25d), both of which resort to vocalization
in order to prevent the misalignment of the place features of a stop consonant. In spite of the fact that they resort to the same strategy, candidate (25d) has the advantage that, out of the three constraints that form the PLACE-HIERARCHY, it violates only one. Whether vocalization yields [i] or [u], the constraint *Dorsal has to be violated because the specifications for the features [high] and [back] that the featural makeup of vocalic sounds includes require the activation of the Dorsal node (Stevens and Keyser 1994, Halle 1995). The pivotal fact in this evaluation is that if the stop consonant is vocalized to [i] neither the Labial nor the Coronal nodes need be activated because no feature of [i] depends on those articulators. By contrast, if the stop consonant were vocalized to [u], not only would the Dorsal but also the Labial node have to be activated because in addition to specifications for the features [high] and [back], the articulation of [u] involves a specification for the feature [round], which is a dependent of the Labial node. In short, because MAX(place) is dominated by ALIGN-C(place), labial, coronal, and dorsal stops are unable to retain their place features; therefore, when speakers of NRDS choose to vocalize syllable-final stops instead of deleting them, all three types of stops surface as [i] because this is the vocoid with the least costly place of articulation.

But in addition to vocalization and debuccalization, there is another strategy that could be used in order to prevent the deletion of syllable-final consonants: assimilation. Note that if a stop consonant that is assigned to the syllable coda were to undergo total assimilation (e.g. *[patts] < /pakto/ ‘pact’) it would become in compliance with ALIGN-C(place). Although this would require the loss of place features, total assimilation seems like a very reasonable alternative to prevent the misalignment of Cplace features since it was already
established that the feature faithfulness constraint MAX(consonantal, place) is dominated by ALIGN-C(place). Nonetheless, total assimilation does not occur in NRDS. Following Itô and Mester (1994, 1999), I propose that it is the constraint CRISP-EDGE(σ) that rules out this possibility, (26). Because the geminate consonant that emerges from total assimilation would be straddled between two syllables causing this prosodic category to have non-crisp edges, (27), it is not possible for a coda consonant to assimilate to a following segment. That is to say that in NRDS the constraint CRISP-EDGE(σ) outranks ALIGN-C(place).

(26) CRISP-EDGE(σ): Syllables must have crisp edges.

(27) CRISP-EDGE(σ) violation:

\[
\begin{array}{c}
\sigma \\
p & a \\
\hline
\end{array}
\]

(27) DEP(gl, nas), CRISP-EDGE(σ) >> ALIGN-C(pl) >> MAX(cons, pl), MAX(seg)

<table>
<thead>
<tr>
<th>Input: /pakto/</th>
<th>DEP (gl, nas)</th>
<th>CRISP-EDGE(σ)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pakto</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. paʔ, to</td>
<td>[c.g.]*!</td>
<td></td>
<td></td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>c. pat, to</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>d. pai, to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[cons]</td>
</tr>
<tr>
<td>e. pa, to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Tableau (27) shows that although the processes of debuccalization, assimilation, vocalization, and deletion are all possible ways to comply with ALIGN-C(place), whenever the Cplace features that are in misalignment are those of a stop consonant, NRDS employs
only the last two processes because they are the only ones that do not result in violations of the constraints DEP(glottal, nasal) or CRISP-EDGE(σ). That CRISP-EDGE(σ) is the constraint that rules out assimilation in NRDS is confirmed by the behavior of syllable-final nasals, which is the topic investigated in the next section.

4. The preservation of nasality

Like fricatives and stops, nasal consonants in NRDS are forced to give up their place features when they are assigned to the syllable coda; however, they are the only consonants that may surface sharing the place features of another segment. This has to do with the fact that nasal consonants in preconsonantal position are subject to an assimilation constraint, (28), which forces NC clusters to bear a single place node. Support for assimilation constraints is provided by the fact that the sharing of features among segments contributes to enhance the perceptibility of the affected features by extending their domain (Steriade 1993, Kaun 1994), and it helps reduce the markedness of output forms by reducing the number of feature specifications. With regard to place assimilation, nasals are especially prone to share their place features with a following consonant because they lack important burst cues (Ohala and Ohala 1993), which makes their release phase more likely to be masked by the release phase of a following consonant.

(28) \textsc{Agree(NCplace):} The members of an NC cluster must agree in place features.

This assimilation constraint runs into direct conflict with \textsc{Crisp-Edge(σ)} given that the double linkage necessary to comply with \textsc{Agree(NCplace)} undermines the crispness of
syllable edges. To illustrate this point, consider a homorganic NC cluster such as [ŋf], which occurs in the Spanish word [emʃ.fer.mo] ‘sick’.

(29) **CRISP-EDGE(σ) violation:**

![Diagram](image)

Although the doubly-linked structure in (29) is commonly found in Academic Spanish dialects, it never occurs in NRDS as it is predicted by the partial ranking **CRISP-EDGE(σ) >> ALIGN-C(place)**, proposed in the previous section. Notwithstanding, this ranking seems to make the wrong prediction in the case of syllable-final nasals that are followed by a stop consonant within the same word, for in that case, the nasal consonant does adopt the place of articulation of the consonant it precedes, (5). I show next that the data in (5) are not a problem for the analysis proposed here because a nasal that is followed by a stop consonant within the same word does not actually surface as the first member of an NC cluster, but as the initial portion of a prenasalized stop consonant: **NC**.

In NRDS, nasals do not assimilate to a following consonant because **AGREE(NCplace)** is dominated by **CRISP-EDGE(σ)**. Furthermore, **AGREE(NCplace)** must also be dominated by **MAX(seg)** because it is not possible to prevent the emergence of heterorganic NC clusters at the expense of dropping one of the segments of the cluster. Nonetheless, because such clusters may be avoided by fusing the nasal consonant with an adjacent segment (e.g. nasal absorption), **AGREE(NCplace)** must outrank **UNIFORMITY**, (30), the faithfulness constraint that militates against coalescence (McCearhty and Prince 1995).
(30) **UNIFORMITY:** No segment in the output has multiple correspondents in the input.

The ranking of **AGREE**(NCplace) with respect to **MAX**(consonantal, place) may not be determined due to the fact that **AGREE**(NCplace) is neutralized by the higher-ranking constraint **CRISP-EDGE**(σ). In other words, because **CRISP-EDGE**(σ) is top-ranking, the quarrel between **AGREE**(NCplace) and **MAX**(consonantal, place) can never take place.

(31) **CRISP-EDGE**(σ) >> **ALIGN-C**(pl) >> **MAX**(seg) >> **AGREE**(NCpl)

<table>
<thead>
<tr>
<th>Input: /kanpo/</th>
<th><strong>CRISP-EDGE</strong>(σ)</th>
<th><strong>ALIGN-C</strong>(place)</th>
<th><strong>MAX</strong>(seg)</th>
<th><strong>AGREE</strong>(NCpl)</th>
<th><strong>MAX</strong>(cons, pl)</th>
<th><strong>UNIFORMITY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. kan.po</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
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<tr>
<td>b. kam.po</td>
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<tr>
<td>c. kan.po</td>
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<td>![image]</td>
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<tr>
<td>d. ka.mpo</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td></td>
</tr>
<tr>
<td>e. kā.po</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
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</tr>
<tr>
<td>f. ka.po</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
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<td></td>
</tr>
</tbody>
</table>

In tableau (31), the nasal consonant that is part of the input form is assumed to have a coronal point of articulation. The place features of this segment, however, may not be preserved because this consonant is assigned to the syllable coda, where it runs afoul of **ALIGN-C**(place), (31a). Candidate (31b) illustrates the fact that although assimilation to the following consonant would enable the nasal to comply with **ALIGN-C**(place) at the expense of violating **MAX**(consonantal, place), this option is precluded by **CRISP-EDGE**(σ). Debuccalizing the nasal consonant, which is also detrimental to **MAX**(consonantal, place), would enable the output form to satisfy both **CRISP-EDGE**(σ) and **ALIGN-C**(place), but this possibility is ruled out by **AGREE**(NCplace) because it would create an NC cluster whose
members do not share place features, (31c). Resolving the hetero-organic NC cluster through deletion is also unwarrantable because MAX(seg) outranks AGREE(NCplace), (31f). Hence the only escape hatch that remains is for the nasal consonant to fuse with a neighboring segment, (31d,e), which comes at the cost of violating UNIFORMITY. Whether the nasal is absorbed by the following consonant (e.g. progressive nasal absorption) or by the preceding vowel (e.g. regressive nasal absorption), some of its features must be lost. Nevertheless, if it is absorbed by the following consonant only its place features must be sacrificed, whereas if it is absorbed by the preceding vowel, both its place and consonantality must be lost. Consequently, a nasal that is followed by a stop consonant within the same word surfaces as the initial portion of a prenasalized stop because this allows it to be optimally preserved without running afoul of the assimilation and syllable wellformedness constraints, (31d).

Should one assume that the nasal consonant is underlyingly placeless, or that it bears place features other than coronal, the proposed constraint ranking yields the same result. Candidate (32d) is still preferred over (32e) because absorption of the nasal by the preceding vowel results in the loss of its consonantality, whereas its absorption by the following consonant would not amount to any feature loss if there were no place features to begin with.

\[
(32) \quad \text{CRISP-ED}(\sigma) \gg \text{ALIGN-C}(\text{pl}) \gg \text{MAX}(\text{seg}) \gg \text{AGR(NCpl)}, \text{MAX(cons, pl)} \gg \text{UNIFORMITY}
\]

<table>
<thead>
<tr>
<th>Input: /kanpo/</th>
<th>CRISP-ED(\sigma)</th>
<th>ALIGN-C(place)</th>
<th>MAX(seg)</th>
<th>AGREE(NCpl)</th>
<th>MAX(cons, pl)</th>
<th>UNIFORMITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. kan.po</td>
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<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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<tr>
<td>b. kam.po</td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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<tr>
<td>c. kan.po</td>
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<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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<td><img src="https://via.placeholder.com/15" alt="image" /></td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
</tr>
<tr>
<td>e. kā.po</td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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<tr>
<td>f. ka.po</td>
<td><img src="https://via.placeholder.com/15" alt="image" /></td>
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</tr>
</tbody>
</table>
The claim that in NRDS the sequence of a nasal consonant followed by a stop surfaces as a prenasalized stop consonant rather than as a homorganic NC cluster is supported by the observation made by Henton, Ladefoged and Maddieson (1992:71) that in the implementation of both of these sound structures the activity of the velum obeys the same timing pattern. In both cases, the velum is lowered during the onset phase in order to open the nasal passage, which remains open during the majority of the closure, but it is closed before the release, as a result of which both sound structures end with an oral burst component. This fact led these authors to conclude that it is unnecessary to distinguish prenasalized stops from homorganic nasal-plus-stop sequences at the phonetic level, although they acknowledge that there are good reasons to distinguish between the two structures at the phonological level. The analysis presented here concurs. In NRDS, homorganic NC clusters are phonologically ruled out by CRISP-EDGE(σ) despite the fact that they appear to emerge at the phonetic level when the second element of the sequence is a stop consonant. In actuality, such nasal-plus-stop sequences are not NC clusters, but prenasalized stops that are created through a process of progressive nasal absorption. Only under this interpretation, do all of the patterns exhibited by syllable-final nasals in NRDS fit together.

To demonstrate how this proposal handles all the facts, I proceed to account for the behavior of syllable-final nasals when followed by a non-stop consonant, in which case, regressive rather than progressive nasal absorption is the strategy used to deal with the offending consonant so that a violation of the markedness constraint *NASCONTC may be prevented.

(33)  *NASCONTC: Nasalized continuant consonants are prohibited.

* [+continuant, +nasal]
Aerodynamic conditions governing the production of speech sounds provide phonetic grounding for this constraint. As Ohala (1983:205-06) points out, for air under pressure to be able to escape through one of the vocal tract valves, all other valves through which that air could be vented must be closed. ‘If another valve is open, then a noisy audible flow of air through the intended valve will be lessened or eliminated.’ This is precisely what causes articulations that involve continuous turbulent airflow through the oral cavity to be incompatible with velopharyngeal port opening. Fricative consonants are especially incompatible with nasality because the high oral pressure required to produce their frication is undermined by the presence of nasal venting, and although the detrimental effect of nasal venting on oral sonorant consonants is not as great given that their level of oral pressure is considerably lower, the fact that sonorant consonants are also endowed with an oral constriction still involves the release of some pressurized air, which becomes less audible if the velopharyngeal port is open. In contrast, nasal venting is not incompatible with vowels because their articulation involves negligible or no turbulent airflow at all. Neither is it incompatible with stop consonants because although their articulation involves very high levels of oral pressure, the oral valve is tightly sealed throughout the closure phase, which is the portion of the stop to which nasal venting is added.

The fact that in NRDS nasal consonants in syllable-final position do not adopt the place of articulation of a following segment when such segment is not a stop consonant follows from the undominated status of *NASCONTC. This is illustrated in tableau (34) with the words /konfia/ ‘s/he trusts’ and /onra/ ‘honor’. As it was noted above, with AGREE(NCplace) dominating UNIFORMITY, the emergence of hetero-organic NC clusters may be avoided by fusing the nasal consonant with an adjacent segment. However, unlike
the case of a nasal that is followed by a stop consonant, (cf. 31), when the consonant that follows the nasal is [+continuant], progressive nasal absorption results in a fatal violation of the markedness constraint *NASCONTc, besides inconsequential violations of lower-ranking MAX(consonantal, place) and UNIFORMITY, (34b,d). By contrast, although absorption of the nasal consonant by the preceding vowel forces the nasal to lose not only its place features but also its consonantality, regressive nasal absorption has the advantage that it does not give rise to a segment prohibited by *NASCONTc, (34a,c). To sum up, although a greater number of features are lost when a nasal consonant is absorbed by the preceding vowel than when absorption is by the following consonant, in NRDS progressive nasal absorption is limited to the context of a following stop due to the excessive markedness of nasalized continuant consonants. Elsewhere, regressive nasal absorption is favored.

(34)  *NASCONTc, CRISP-EDGE(σ) >> ALIGN-C(place) >> MAX(seg) >> AGR(NCplace),
      MAX(cons, place) >> UNIFORMITY

<table>
<thead>
<tr>
<th>Input: /konfia/</th>
<th>*NAS CONTc</th>
<th>CRISP-EDGE(σ)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>AGREE (NCpl)</th>
<th>MAX (cons, pl)</th>
<th>UNIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. kō.fī.a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl] [cons]</td>
<td>*</td>
</tr>
<tr>
<td>b. ko.REFERRED[ī].a</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl]</td>
<td>*</td>
</tr>
</tbody>
</table>

| Input: /onra/ |

| c. ō.ra         |            |               |                 |           |               | [pl] [cons]    | *    |
| d. o.Řa        |            |               |                 |           |               | [pl]           | *    |

Notwithstanding, nasal absorption is only one of three different strategies used in NRDS in order to deal with those syllable-final nasals that are followed by a non-stop consonant. In addition to regressive nasal absorption, nasal consonants in this context may
also undergo debuccalization or velarization, (6). In regards to the latter two processes, it is important to note that while debuccalization dovetails with the claim made here that the syllable wellformedness constraint ALIGN-C(place) prevents place-bearing consonants from surfacing at the right syllable edge, velarization seems to contradict this claim. Adopting a proposal made by Bullock (1995), I argue that the reason why nasal consonants that are followed by a non-stop consonant may surface as velar is because they are able to avoid violating ALIGN-C(place) by sharing the place features of the preceding vowel.

A nasal consonant that shares the place features of a vowel becomes velar because the main Vplace features (e.g. [high], [low], [back]) are dependents of the Dorsal node (Chomsky and Halle 1968, Stevens and Keyser 1994, Halle 1995). Since all place-bearing vowels must have a Dorsal node in order to be specified for height and backness, whenever a syllable-final nasal becomes place-linked to the preceding vowel it cannot surface as anything but velar. From this standpoint, the velarization of syllable-final nasals is the result of regressive place assimilation. This is possible in NRDS because unlike regressive place assimilation, which results in double linkage across syllable boundaries, (35), the double linkage created by regressive place assimilation occurs within the boundaries of a single syllable, (36). That is to say that whereas the structure in (36) is approved by top-ranking CRISP-EDGE(σ), that in (35) is not.

(35) Progressive assimilation results in cross-syllabic double linkage:
Regressive assimilation results in double linkage within a single syllable:

\[
\begin{array}{c}
\sigma \\
\searrow \\
e \\
\downarrow \\
\text{VPlace} \\
\nearrow \\
\eta \\
\text{Cplace} \rightarrow \emptyset
\end{array}
\]

Another important consequence of linking a syllable-final nasal to the place node of the preceding vowel is that, since the place features of the vowel are not dominated by a Cplace but by a VPlace node, such velar nasal becomes exempt from the constraint ALIGN-C(place). This analysis thus offers a principled explanation for the unexpected appearance of velar nasals in syllable-final position. Notwithstanding, it remains to be explained why this strategy is only available to nasals. Why, for example, are velar stops not possible syllable codas (e.g. *[ak.to] < /akto/ ‘act’), since it seems reasonable to expect that they would also share a Dorsal node with a preceding vowel?

In order to answer this question it is important to take into account that there exists a sympathetic relation between tongue-body raising and velum lowering (Bakovic 2000), which materializes only in articulations that involve both of these components. By itself, the raising of the tongue body that takes place in the articulation of vowel sounds does not result in full dorso-velar contact, but when the velum is lowered at the same time that the body of the tongue is raised, full contact between these two articulators may ensue. That is to say that when the articulation of a nasal consonant is overlapped upon that of a preceding vowel, the descending velum meets the ascending tongue body giving rise to a full dorso-velar closure: [ŋ]. By contrast, an ascending tongue body may not be met by a descending velum when the consonant that is overlapped upon the vowel is not nasal because during the
articulation of an oral segment the velum must remain raised in order to prevent nasal venting. With this understanding of the articulation of place-linked VN sequences, it is possible to conclude that velarization, viewed as a type of progressive place assimilation, is no less efficient in preventing the misalignment of the place features of nasal consonants than the processes of debuccalization and nasal absorption are, (37).

Adding the relevant candidates that were left out from tableau (34), the selection of the optimal output correspondent of a syllable-final nasal that is followed by a non-stop consonant proceeds as follows. ALIGN-C(place) prevents the syllable-final nasal from having its own place features because they would fail to be aligned with the left edge of a syllable, (37a). CRISP-EDGE(σ) makes it impossible to satisfy ALIGN-C(place) and AGREE(NCplace) by assimilating the nasal to a following consonant because this would give rise to double linkage across syllables, (37b). *NasContC rules out progressive nasal absorption because it would give rise to a highly marked segment, (37f). Furthermore, because compliance with AGREE(NCplace) may not be obtained at the expense of losing an entire segment, candidate (37g) is also discarded. This leaves only candidates (37c-e) on the competition; however, there is not an uncontestable winner among them because they all fail to satisfy both of the next two ranking constraints, which is what it would take for one of them to prove to be superior to the others. Candidate (37e) manages to get past AGREE(NCplace) by fusing the nasal with the preceding vowel, but the price of this is running afoul of both MAX(consonantal, place) and UNIFORMITY. Candidates (37c) and (37d), on the other hand, choose to reduce the number of violations of MAX(consonantal, place) and respect UNIFORMITY, nevertheless, this does not keep them from violating AGREE(NCplace). Because the ranking between MAX(consonantal, place) and AGREE(NCplace) is
undeterminable under dominance by CRISP-EDGE(σ), either of these three output forms is equally acceptable. As a matter of fact, a single speaker of NRDS may use either one of them (Jimenez Sabater 1975).

(37) *NASC\text{CONT}, CRISP-EDGE(σ) >> ALIGN-C(place) >> MAX(seg) >> AGR(NCplace),
      MAX(cons, place) >> UNIFORMITY

<table>
<thead>
<tr>
<th>Input: /konfia/</th>
<th>*CONT NASC</th>
<th>CRISP-EDGE(σ)</th>
<th>ALIGN-C</th>
<th>MAX (seg)</th>
<th>AGREE (NCpl)</th>
<th>MAX (cons, pl)</th>
<th>UNIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. kon.fi.a</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. kon.fi.a</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl]</td>
<td></td>
</tr>
<tr>
<td>c. kon.fi.a</td>
<td></td>
<td></td>
<td>*</td>
<td>[pl]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. kon.fi.a</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>[pl]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. kô.fi.a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl] [cons]</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>f. ko.ﬁ.a</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl]</td>
<td>*</td>
</tr>
<tr>
<td>g. ko.ﬁ.a</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The reader can verify that even if one were to assume that the nasal consonant in the input form is placeless or bears place features other than coronal, the proposed constraint ranking yields the same result.

To account for the fact that a nasal consonant in word-final position also loses its place features, despite its potential to be parsed as a syllable onset in the following word, I rely on an alignment constraint that focuses on the right edge of the prosodic word.

(38) ALIGN-R(PWd,σ): The right edge of the prosodic word must be aligned with the right edge of a syllable.
Because ALIGN-C(place) is dominated by ALIGN-R(PWd,σ), the proper alignment of the place features of a word-final consonant may not be obtained by parsing it as the onset of the first syllable of a following word that starts with a vowel (e.g. *[so.nο.čo] < /son očo/ ‘they are eight’), as it does occur in Academic Spanish dialects. Instead, a word-final nasal consonant is forced to share the place features of the preceding vowel, (39c), fuse with it, (39e), or undergo debuccalization, (39d). The symbol | is used to signal the word boundary.

(39) ALIGN-R(PWd,σ), CRISP-EDGE(σ) >> ALIGN-C(place) >> MAX(seg) >> AGREE(NCplace), MAX(cons, place) >> UNIFORMITY

<table>
<thead>
<tr>
<th>Input: /son očo/</th>
<th>ALIGN-R (PWd,σ)</th>
<th>CRISP-EDGE(σ)</th>
<th>ALL-C (place)</th>
<th>MAX (seg)</th>
<th>AGREE (NCpl)</th>
<th>MAX (cons, pl)</th>
<th>UNIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. son.</td>
<td>o.čo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. so.n</td>
<td>o.čo</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. son.</td>
<td>o.čo</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. son.</td>
<td>o.čo</td>
<td>*</td>
<td></td>
<td>[pl]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. sō.</td>
<td>o.čo</td>
<td></td>
<td></td>
<td>[pl] [cons]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. so.</td>
<td>o.čo</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ALIGN-R(PWd,σ) is also responsible for the fact that word-final nasals preceding a word that begins with a stop consonant may not undergo progressive nasal absorption (e.g. *[pa nɟu.ro] < /pan ɟuro/ ‘hard bread’) since this would also force the right edge of the prosodic word to be misaligned with the right edge of a syllable, (40f). To put it in a different way, ALIGN-R(PWd,σ) is the reason why the type of consonant that follows a syllable-final nasal is important to determine its phonetic implementation word internally, but
not word finally. Candidates (40c-e) are optimal because they are the only ones that manage
to preserve the nasal consonant without violating the alignment and crisp-edge constraints.

\[
(40) \quad \text{ALIGN-R(PWd,}\sigma), \text{ CRISP-EDGE(}\sigma) \gg \text{ALIGN-C(place)} \gg \text{MAX(seg)} \gg \\
\text{AGREE(NCplace), MAX(cons, place)} \gg \text{UNIFORMITY}
\]

<table>
<thead>
<tr>
<th>Input: /pan duro/</th>
<th>ALIGN-R (PWd,\sigma)</th>
<th>CRISP-EDGE(\sigma)</th>
<th>ALI-C (place)</th>
<th>MAX (seg)</th>
<th>AGREE (NCpl)</th>
<th>MAX (cons, pl)</th>
<th>UNIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pan.\text{</td>
<td>d}u.ro</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| b. pan.\text{|d}u.ro | | | *! | | | | *
| c. pan.\text{|d}u.ro | | | | | * | [pl] | |
| d. pan.\text{|d}u.ro | | | | | * | [pl] | |
| e. p\tilde{a}.\text{|d}u.ro | | | [pl] [cons] | | | | *
| f. pa.\text{|\text{'}d}u.ro | *! | | | | | | *
| g. pa.\text{|d}u.ro | | | | | *! | | |

This analysis dovetails with the observation made by Jimenez Sabater (1975) that the
nasal allophones [ŋ], [ɲ], and [\text{\text{V}}] have become ways to signal the end of the word in this
language. Because a word-final nasal may not be transferred into the onset position of the
initial syllable of a following word, numerous distinctive contrasts such as [pi.\text{\text{\text{'}}}ta.\betaa.|na.\betaeh] < /pintaba naber/ ‘s/he painted ships’ vs. [pi.\text{\text{\text{'}}}ta.\betaa.|a.\betaeh] < /pintaban aber/ ‘they painted
birds’, which hinge on the syllabification of the nasal consonant that sits at one of the
converging word boundaries, have appeared in NRDS, whereas in Academic Spanish dialects
such phrases are totally homophones (e.g. [pi.\text{\text{\text{'}}}ta.\betaa.|na.\betaes] ‘s/he painted ships’ / ‘they
painted birds’). In fact, this word-demarcation effect imposed in NRDS by the top-ranking
constraint align-PWd,σ affects not only nasals but all word-final consonants (41), which without the option of syllabifying as the onset of the initial syllable of a following word must undergo one of the various weakening processes to comply with align-C(place).

(41) NRDS Academic Spanish
/komer aros/ →  [ko.meʃ a.roh]  [ko.me ra.ros]  ‘to eat rice’
/papel asul/ →  [pa.peʃ a.suiʃ]  [pa.pe la.sul]  ‘blue paper’
/asen eso/ →  [a.ʃeʃ e.so]  [a.se ne.so]  ‘they do that’
/vos alʃa/ →  [bo aʃ.ʃa]  [bo saʃ.ʃa]  ‘loud voice’
/klub aʃleʃiko/ →  [klu aʃ.ʃeʃi.ko]  [klu baʃ.ʃeʃi.ko]  ‘athletic club’

I conclude this section by highlighting the fact that in NRDS nasals are the only syllable-final consonants that are able to escape deletion since even when their structural position is lost; their nasality survives absorbed by an adjacent consonantal or vocalic segment. That absorption is limited to this consonant class may be due to the fact that [nasal] is the only manner feature that is implemented by an articulator whose control is independent of the articulators that implement stricture features; hence the possibility of using this manner feature in both vocalic and consonantal articulations.

5. The gliding of liquids

In order to comply with align-C(place), liquid consonants in syllable-final position have only two options: vocalization or deletion, (1). Like in the case of stops, debuccalization is not available to liquids because their featural makeup does not include glottal or nasal features that could be preserved in the form of a minimal segment, (42b-d).
Furthermore, assimilation of the liquid consonant to a following segment is precluded by CRISP-EDGE(σ) because these are segments that belong to different syllables, (42e). Consequently, syllable-final liquids end up in the same situation as syllable-final stops. They can only meet the demands of ALIGN-C(place) by turning into vocoids or disappearing altogether, (42f,g).

(42) \text{CRISP-EDGE(σ), DEP(gl, nas) >> ALIGN-C(place) >> MAX(seg) >> MAX(cons, pl)}

<table>
<thead>
<tr>
<th>Input: /alarma/</th>
<th>CRISP-EDGE(σ)</th>
<th>DEP (gl, nas)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. a.lar.ma</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. a.la?.ma</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>c. a.lah.ma</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>d. a.lan.ma</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>e. a.lam.ma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl]</td>
</tr>
<tr>
<td>f. a.lai.ma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[cons] [pl]</td>
</tr>
<tr>
<td>g. a.la.ma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Like in the case of stops, (24e), the vocalization of liquid consonants involves losing not only their consonantality but also their place. This is evinced by the fact that the articulator node under the Place node of both [l] and [r] is Coronal, whereas that of [i], as in all vowels, is Dorsal. But one aspect in which syllable-final liquids behave differently from syllable-final stops is that whereas the former undergo vocalization more often than deletion, the latter fall prey of deletion more often than vocalization. As a possible reason for this, I point out that while the vocalization of a stop consonant inevitably causes the loss of its obstruency, the vocalization of a liquid consonant does not require being unfaithful to the
feature [sonorant]. With fewer feature specifications being lost, preserving the offending consonant as a non-identical segment may be deemed better for liquids than stops.

Nonetheless, there are two cases when vocalizing a syllable-final consonant is completely ruled out in favor of deletion, (2-3). I adopt the wellformedness constraint NLV (Rosenthall 1994) in order to account for the fact that vocalization always fails when the syllable-final consonant is preceded by a high front vowel, (e.g. [fi.me] < /firme/ ‘mountain top’, [i.na.sjo] < /ignasio/ ‘proper name’).

(43) NLV: Long vowels are prohibited.

Because two adjacent identical vowels that are parsed by the same syllable are actually a single vowel that is linked to two moras (Hyman 1985, McCarthy and Prince 1986), it follows that if a syllable-final consonant that is preceded by the vowel [i] were turned into the vocoid [i], this process would give rise to a long vowel. The fact that it is not possible to prevent the misalignment of Cplace features at the expense of creating a long vowel means that NLV dominates ALIGN-C(place). In fact, NLV must be undominated in this grammar as evinced by the fact that NRDS, and Spanish in general, lack long vowels. According to this, it is simply to prevent the creation of a long vowel that vocalization is avoided whenever the consonant that runs afoul of ALIGN-C(place) is preceded by the segment [i], (44c,f). Tableau (44) shows that this is true of both liquids and stops.
Another important fact that this analysis reveals is that when vocalization does take place (e.g. [koɾ'to] < /koɾ'to/ ‘short’), it causes a weight increase on the syllable that parses the affected segment. Note that although Spanish consonants are not moraic at the underlying level, the high front vocoid that results from vocalization is associated with a mora. As a consequence of this, the syllable that parses that segment becomes bimoraic.

Vocalization gives rise to a bimoraic syllable

The increase in syllable weight caused by vocalization is closely tied to the only other case in which syllable-final liquids undergo deletion, but fail to undergo vocalization, (3). Whenever the liquid consonant that is assigned to the syllable coda is the final segment of a
word that receives non-final stress, deletion is the only strategy used to avoid the misalignment of the place features of that consonant (e.g. [dó.la] < /dólar/ ‘dollar’, [á.i.βo] < /arbo/. ‘tree’).

Bearing in mind that a complete account of Spanish stress is beyond the scope of this paper, I limit myself to arguing that the reason why vocalization is avoided in this context is because the mora that would be gained through this process would cause the main-stressed foot to be illformed. For this purpose, I introduce the following prosodic constraints, which regulate the wellformedness of the main-stressed foot of Spanish words.

(46) FOOT-FORM constraints:

WSP: If heavy, then stressed. (Prince 1990)

Ft-BIN: Feet should be analyzable as binary either in syllables or moras. (Prince 1990)

ALIGN-HEAD(Ft,L): The left edge of the main-stressed foot must be aligned with the left edge of a stressed syllable.

“The main stressed foot must be a trochee”

(After McCarthy and Prince 1994)

ALIGN-HEAD(PWd,R): The right edge of the main-stressed foot must be aligned with the right edge of the prosodic word.

“The main-stressed foot must be final in the word”

(After McCarthy and Prince 1994)

That this set of prosodic constraints opposes the vocalization of a liquid consonant whenever this is the final segment of a word that receives non-final stress is supported by the
fact that in all words that obey this stress pattern such consonant would be assigned to the syllable that acts as the tail of the main-stressed foot (e.g. *[ðó.laɾ], *[áɾ.βol]). If vocalization were allowed to apply to that consonant, it would cause the main-stressed foot to contain an unstressed heavy syllable (e.g. *[ðó.laʝ], *[ái.βoʝ]). This is prohibited by the prosodic constraint WSP, which in conjunction with F-T-BIN, reduces the inventory of wellformed metrical feet to the set LH, HL, LL, H (Prince 1990). That is to say that L and HH are less harmonic foot types because they cannot help violating either F-T-BIN or WSP. A possible solution would be to project the main-stressed foot solely on the penultimate syllable (e.g. *[ðó.laʝ], *[ái.βoʝ]), but this still would not prevent a violation of F-T-BIN when the penult is light, and it would inevitably give rise to a violation of ALIGN-HEAD(PWd,R) given that the main-stressed foot would be separated from the right edge of the word by one syllable. Alternatively, stress could be shifted to the final syllable of the word (e.g. *[ðo.ˈlai], *[ˈai.ˈβoi]), but the disadvantage of this is that it would keep the main-stressed foot from being left-headed, as required by ALIGN-HEAD(Ft,L). Furthermore, although the possibility of building the main-stressed foot using only the final syllable of the word would not give rise to any of these problems (e.g. *[ðo.ˈlai], *[ˈai.ˈβoi]), it is preempted by the fact that all such words bear a lexical mark that keeps them from bearing final stress (Harris 1983, Dunlap 1991, Rosenthal 1994, Piñeros 2000, among many others). As most studies on Spanish stress have concluded, some lexical marking is necessary for words of this type because they are unpredictable exceptions to the unmarked stress pattern, according to which words ending in a heavy syllable are assigned final stress (e.g. [ka.ˈɾeɾi] < /kaɾeɾi/ ‘tortoise shell’, [a.ˈmoɾi] < /amoɾi/ ‘love’).
Using FOOT-FORM as an abbreviation for the constraints in (46), my proposal is that this cluster of prosodic principles outranks ALIGN-C(place). As a consequence of this, vocalization may not be used to prevent the misalignment of Cplace features when the additional mora that this process introduces distorts the main-stressed foot of words that are marked in the lexicon as exceptions to regular stress assignment, (47b,d). Because deletion does not cause an increase in syllable weight, whenever the word is prosodically marked, it is better to comply with ALIGN-C(place) by deleting the offending word-final consonant so that the FOOT-FORM constraints may be satisfied as well, (47c,e).

\[
(47) \quad \text{FOOT-FORM} >> \text{ALIGN-C(place)} >> \text{MAX(seg)} >> \text{MAX(cons, pl)}
\]

<table>
<thead>
<tr>
<th>Input: /dólar/</th>
<th>FOOT-FORM</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [(dó.lar)]</td>
<td>![]</td>
<td>![]</td>
<td>![]</td>
<td>![]</td>
</tr>
<tr>
<td>b. [(dó.lai)]</td>
<td>![]</td>
<td>![]</td>
<td>[cons] [pl]</td>
<td></td>
</tr>
<tr>
<td>c. [(dó.la)]</td>
<td>![]</td>
<td>![]</td>
<td>![]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input: /anhel/</th>
<th>FOOT-FORM</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. [(án.hel)]</td>
<td>![]</td>
<td>![]</td>
<td>![]</td>
<td></td>
</tr>
<tr>
<td>d. [(án.hei)]</td>
<td>![]</td>
<td>![]</td>
<td>[cons] [pl]</td>
<td></td>
</tr>
<tr>
<td>e. [(án.he)]</td>
<td>![]</td>
<td>![]</td>
<td>![]</td>
<td></td>
</tr>
</tbody>
</table>

By contrast, in words that follow the unmarked stress pattern (e.g. [pa.péi] < /papel/ ‘paper’, [ga.nái] < /ganar/ ‘to win’), FOOT-FORM favors the vocalization of a word-final consonant over its deletion. This is because in the case of a prosodically unmarked word, deleting the final consonant would cause the main-stressed foot to change from H to L, which amounts to a violation of FT-BIN, one of the FOOT-FORM constraints, (48c,e). Preserving the
word-final consonant as a vocoid, on the other hand, has the advantage that it makes it possible to satisfy ALIGN-C(place) while the foot remains H and in compliance with all of the FOOT-FORM constraints, \((48b,d)\).

\[
\text{(48)} \quad \text{FOOT-FORM} \gg \text{ALIGN-C(place)} \gg \text{MAX(seg)} \gg \text{MAX(cons, pl)}
\]

<table>
<thead>
<tr>
<th>Input: /papel/</th>
<th>FOOT-FORM</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [pa.(pél)]</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [pa.(péj)]</td>
<td></td>
<td></td>
<td></td>
<td>[cons] [pl]</td>
</tr>
<tr>
<td>c. [pa.(pé)]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input: /ganar/</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>c. [ga.(nár)]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. [ga.(náj)]</td>
<td></td>
<td></td>
<td></td>
<td>[cons] [pl]</td>
</tr>
<tr>
<td>e. [ga.ná]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lastly, the possibility that a liquid consonant escape both vocalization and deletion when it is the final segment of an unstressed monosyllabic word, \((4)\), is a direct consequence of the fact that only words that bear primary stress are actual prosodic words.\(^{11}\) Because articles (e.g. /el/ ‘the, masc. sg.’), prepositions (e.g. /por/ ‘for/by’), and other prosodically weak lexical categories are not prosodic words, but simply clitics, they are not subject to the constraint ALIGN-R(PWd,\(\sigma\)), which as I showed in the previous section, makes it impossible for a word-final consonant to be parsed by the initial syllable of a following word, \((39b)\). Hence, when a clitic ending in a consonant leans on a following vowel-initial word, its final segment may be parsed by the initial syllable of that word since this does not contravene ALIGN-R(PWd, \(\sigma\)). This is illustrated in tableau (49) with the phrase /el oso/ ‘the bear’.
Whereas candidate (39b) manages to satisfy all of the constraints by preserving all segments and parsing all consonants as syllable onsets, its competitors fall in violation of at least one constraint. Nonetheless, this escape hatch is not available to clitics if the word they are leaning on begins with a consonant (e.g. /el poso/ ‘the well’) because there would no onset position available. In such case, the final consonant of the clitic cannot escape ALIGN-C(place), and it must yield to it either by vocalizing or deleting, (49f,g).

\[
(49) \quad \text{ALIGN-R(PWd,}\sigma), \text{CRISP-EDGE(}\sigma) \gg \text{ALIGN-C(place)} \gg \text{MAX(seg), MAX(cons, pl)}
\]

<table>
<thead>
<tr>
<th>Input: /el oso/</th>
<th>ALIGN-R (PWd,\sigma)</th>
<th>CRISP-EDGE(\sigma)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. el.o.so</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. e.lo.so</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ei.o.so</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[pl]! [cons]</td>
</tr>
<tr>
<td>d. e.o.so</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input: /el po.so/</th>
<th>ALIGN-R (PWd,\sigma)</th>
<th>CRISP-EDGE(\sigma)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. el.po.so</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. ei.po.so</td>
<td></td>
<td></td>
<td></td>
<td>[pl]! [cons]</td>
<td></td>
</tr>
<tr>
<td>g. e.po.so</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

That this analysis is on the right track is confirmed by the fact that not only pro-clitics ending in a liquid consonant, but all consonant-final pro-clitics (e.g. /los/ ‘the, masc. pl.’, /sus/ ‘his/her/their, pl.’ /kon/ ‘with’, /sin/ ‘without’, /en/ ‘in’) obey this generalization. To illustrate this point, consider the phrase /sus ohos asules/ ‘his/her/their blue eyes’. As this analysis predicts, the clitic-final /s/ may be faithfully preserved as the onset of the following word, (50c,d), but the word-final /s/’s must both delete, or at least debucalize, in order to comply with ALIGN-C(place) without running afoul of ALIGN-R(PWd,\sigma).
(50) \[ \text{ALIGN-R(PWd,}\sigma), \text{CRISP-EDGE(}\sigma) \gg \text{ALIGN-C(place)} \gg \text{MAX(seg), MAX(cons, pl)} \]

<table>
<thead>
<tr>
<th>Input: /sus ohos asules/</th>
<th>ALIGN-R (PWd,σ)</th>
<th>CRISP-EDGE(σ)</th>
<th>ALIGN-C (place)</th>
<th>MAX (seg)</th>
<th>MAX (cons, pl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sus.o.hos.</td>
<td>a.su.les</td>
<td></td>
<td></td>
<td><em>!</em>**</td>
<td></td>
</tr>
<tr>
<td>b. su.so.ho.s</td>
<td>a.su.les</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. su.so.hoh.</td>
<td>a.su.leh</td>
<td></td>
<td></td>
<td>[pl]! [cons]</td>
<td></td>
</tr>
<tr>
<td>d. su.so.ho.</td>
<td>a.su.le</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

6. Conclusion

In this paper I have developed an analysis that accounts for the multiplicity of patterns emerging from the strong tendency of NRDS to weaken all consonants in syllable-final position. Adopting the family of segment-to-syllable alignment constraints proposed by Itô and Mester (1994, 1999) and employed by Piñeros (2001), I have argued that the motivation for the various processes that target syllable-final consonants in NRDS is the universal requirement that the head of every consonantal segment (e.g. the CPlace node) be aligned with the left edge of a syllable: ALIGN-C(place). To comply with this syllable wellformedness constraint, the segments that are used to implement underlying stop, fricative, nasal, and liquid consonants that are assigned to the syllable coda are exactly those that remain after each one of these consonant classes has been ridden of its Place and/or Consonantality. All consonants assigned to the syllable coda that fail to dispense of those features have no choice but delete.

In NRDS, whenever an underlying consonant is not followed by a sonorant segment, the only syllabic position to which it can be assigned is the right syllable edge. However, the preservation of Place and/or Consonantality of this segment is challenged by ALIGN-C(place), which is a dominant principle in this grammar. Vocalization and debuccalization
are the two most straightforward ways to bring coda consonants in compliance with ALIGN-C(place) because any consonant that turns into a vowel or loses its place features automatically becomes exempt from this constraint. The representations in (51) illustrate how the application of these two processes avoids the misalignment of the CPlace node of a consonant that is placed at the right syllable edge.

\begin{equation}
(51) \quad \text{a. Debuccalization of a misaligned C:} \quad \text{b. Vocalization of a misaligned C:}
\end{equation}

\[
\begin{array}{c}
\sigma \\
C \quad V \quad C \\
\uparrow \\
\text{Cplace} \\
\end{array}
\quad \quad 
\begin{array}{c}
\sigma \\
C \quad V \quad C \rightarrow V \\
\uparrow \\
\text{CPlace} \rightarrow \emptyset \\
\end{array}
\]

In NRDS, debuccalization is limited to fricative and nasal consonants because all other consonantal segments that are part of the sound inventory of this language lack features produced by the action of the glottis or the velum, which are articulators whose control is independent of the articulators that implement stricture features (Keyser and Stevens 1994). Therefore, when the articulators that implement Cplace and Cplace-dependent features are deactivated, only fricatives and nasals have features that may be preserved as minimal segments (e.g. [h] and [n]). Although vocalization involves the loss of an even greater number of features than debuccalization, it is the only alternative to deletion that is available to the liquids and plain voiced and voiceless stops of this language.

A third logical possibility to reconcile coda consonants with ALIGN-C(place) is assimilation. Nevertheless, progressive assimilation is ruled out from the phonology of NRDS by the constraint CRISP-EDGE(σ), which takes precedence over ALIGN-C(place).
Because a coda consonant that gives up its place features to share those of the consonant that fills the onset position of the following syllable causes the output form to contain non-crisp syllable edges, progressive assimilation is never permitted in this grammar.

(52) Progressive assimilation of a misaligned C results in non-crisp syllable edges:

By contrast, regressive assimilation is an optimal way to satisfy ALIGN-C(place) without running afoul of CRISP-EDGE(σ) given that the syllable-final consonant ends up sharing the place features of a segment within the same syllable. It is because the preceding segment is a vowel, whose place features are not dominated by a Cplace, but by a VPlace node, that the coda consonant is able to pass undetected by ALIGN-C(place).

(53) Regressive assimilation of a misaligned C is approved by CRISP-EDGE(σ):

Nasals, however, are the only consonants that may undergo regressive place assimilation because only in their case does the articulatory overlapping entailed by
assimilation yield a cooperative effect between two active articulators that amounts to a consonantal closure. When the articulation of a nasal consonant is overlapped upon that of a preceding vowel, velum lowering and tongue body raising cooperate to produce a full dorso-velar contact: [ŋ].

In addition to debuccalization and regressive place assimilation, misaligned nasal consonants may also resort to absorption as a way to comply with ALIGN-C(place). When the nasality of a syllable-final nasal consonant is absorbed by the consonant that occupies the onset position of the following syllable, a prenasalized consonant is formed. Because this is a single segment that is parsed exclusively by the onset of one syllable, this process does not conflict with the constraint CRISP-EDGE(σ). Notwithstanding, it is imperative that the consonant that absorbs the nasal be a stop, for otherwise the emerging segment would fall in violation of the markedness constraint *NASCONTC.

(54) Progressive absorption of a misaligned N results in a prenasalized C:

Lastly, a nasal consonant in syllable-final position may escape ALIGN-C(place) through absorption by a preceding vowel. I have suggested that the reason why nasals are the only segments that may be absorbed by either consonants or vowels is because [nasal] is the only manner feature that depends on an articulator whose control is independent of those articulators that implement stricture features.
(55) Regressive absorption of a misaligned N results in a nasalized vowel:

\[
\begin{array}{c}
\sigma \\
C & \rightarrow & [\text{nasal}] & C \rightarrow \emptyset \\
\uparrow & \text{Cplace} & \text{VPlace} & \text{CPlace}
\end{array}
\]

The hypotheses presented above converge to provide a principled explanation for the entire array of patterns of consonant weakening/loss displayed by NRDS. Apparently unrelated processes such as debucalization, vocalization, assimilation, nasal absorption, and deletion ensue from one single driving force: ALIGN-C(place).

The insight gained through this analysis provides strong support for Itô and Mester’s (1994, 1999) alignment approach to syllable structure as well as their proposal to decouple ALIGNMENT and CRISP-EDGE constraints. Piñeros (2001) proposal to account for vocalization processes through ALIGN-C constraints, and Lombardi’s (1995a,b) use of MAX(Feature) and DEP(Feature) constraints to evaluate feature faithfulness also receive support from the findings presented here. Furthermore, this analysis has revealed a principled motivation for the processes of prenasalization and nasal absorption that no previous analysis has put forward. Nasal consonants in syllable-final position give rise to prenasalized consonants and/or nasalized vowels as a result of being forced to give up their own place features. This proposal also opens the way for future research within the field of Spanish Linguistics interested in accounting for one the most salient phonological properties that distinguish Spanish dialects, which is the implementation of syllable-final consonants.
Bibliography


Notes

1 Besides El Cibao, NRDS is spoken all along the northern coast, from the westmost city of Montecrisiti, on the border with Haiti, to the west half of the Samaná Peninsula, located on the east side of the island.

2 The problem with the term ‘Cibaeño’ is then that there are Cibaeños who do not speak ‘Cibaeño’ and there are also non-Cibaeños who do speak it.

3 At this point I am assuming that nasal consonants in preconsonantal and word-final position are coronal at the underlying level. Alternatively, one could assume that they are placeless /N/. Either way, the analysis proposed in Section 4 is able to account for the full range of patterns exhibited by syllable-final nasals.

4 Castilian Spanish also accepts /θ/ in syllable-final position, but as in all Latin American Spanish dialects, this segment is absent from the sound inventory of NRDS.

5 I demonstrate in Section 4 that the apparent word-internal NC clusters that occur in words such as [kampo] ‘field’ are actually prenasalized stops, hence the nasal consonant is not in syllable-final position.

6 Further support for the view that NRDS has not completely lost syllable-final consonants is provided by hypercorrections such as those below. In an attempt to sound educated, speakers of NRDS may pronounce the high front vocoid of words that normally contain a falling diphthong as a liquid consonant.

<table>
<thead>
<tr>
<th>Normal</th>
<th>Hypercorrected</th>
</tr>
</thead>
<tbody>
<tr>
<td>/aseite/</td>
<td>[sej]</td>
</tr>
<tr>
<td>/peine/</td>
<td>[pej]</td>
</tr>
<tr>
<td>/oigo/</td>
<td>[oi]</td>
</tr>
<tr>
<td>/boi/</td>
<td>[boi]</td>
</tr>
<tr>
<td>/stoi/</td>
<td>[toj]</td>
</tr>
<tr>
<td>/seis/</td>
<td>[seij]</td>
</tr>
</tbody>
</table>

7 The other two are the adjustment of the stiffness of the vocal folds, and the movement of the articulatory structures in the oral cavity.

8 Total assimilation does take place in the dialect spoken in the southern part of the Dominican Republic, where forms like [patajo] are perfectly possible.

9 This pattern is not observed in stop consonants because Spanish has no words with non-final stress that end in an obstruent. In all words with non-final stress that end in a consonant, this consonant is sonorant (e.g. [(már.mol)] < /marmol/ ‘marble’). I am using the standard notation of signaling foot edges with parentheses and word edges with square brackets.

10 In the case of words ending in a consonant, the final syllable is heavy not because the word-final consonant is underlyingly moraic, but because it may be coerced to become moraic through weight by position, which is a result of constraint interaction (Hayes 1989, Rosenthal and van der Hulst 1999).

11 This follows from the fact that a prosodic word must have a foot as its head; however, for a foot to exist there must be a stressed syllable to act as the foot head.