The Unification of
Spanish Verbal and Non-Verbal Stress

First Generals Paper

Dec 17, 2013

By Julianne Doner

Supervisor: Elan Dresher
Second Reader: Bronwyn Bjorkman
Third Reader: Keren Rice
Abstract

In this paper, I provide an analysis of Spanish stress with the following three characteristics: (a) both verbal and non-verbal stress are accounted for in a single, unified, system, (b) the three syllable window for stress is accounted for in a principled way, and (c) the access that the stress algorithm has to the morphosyntactic structure is constrained. I do this by extending Roca’s (2005) account of variable edge parameters for stress in Spanish non-verbs to verbs, and by arguing that morphemes which mark for φ-features and for φ-features alone are outside of the domain of stress because they are prosodic adjuncts. I also give an account of how such a system developed out of the Latin stress algorithm and discuss the evidence for whether Modern Spanish is quantity sensitive.
Abbreviations

√    root
1    first person
2    second person
3    third person
ACC  accusative case
Agr  agreement
Asp  Aspect
F    future
FEM  feminine
Lt.  Latin
M    Mood
MASC masculine
n    noun head
NOM  nominative case
PL   plural
SG   singular
Sp.  Spanish
T    Tense
TAM  Tense/Aspect/Mood
Th   Theme (i.e., verb conjugational class)
σ    syllable
φ    φ-features (i.e., person, number, and gender)

Variable Edge Boundaries

LLR(S)  A left bracket ( to the left of the rightmost element in the stem
RLR(S)  A right bracket ) to the left of the rightmost element in the stem
RLR(W)  A right bracket ) to the left of the rightmost element in the word
RRR(S)  A right bracket ) to the right of the rightmost element in the stem
RRR(W)  A right bracket ) to the right of the rightmost element in the word
# Table of Contents

1 Introduction .......................................................................................................................... 7
   1.1 A Description of Spanish Stress ...................................................................................... 8
   1.2 Verbal and Non-Verbal stress ......................................................................................... 9
   1.3 The Syntax-Phonology Interface ..................................................................................... 11
   1.4 Overview ....................................................................................................................... 11

2 Non-verbs ............................................................................................................................ 12
   2.1 Desinences ....................................................................................................................... 12
   2.2 Roca’s (2005) Account of Non-verbs ............................................................................ 15
   2.3 Lexical Accent as Variable Edge Parameters ................................................................. 18
   2.4 The Rightmost Morpheme and Cyclicity ....................................................................... 19

3 Verbs ...................................................................................................................................... 23
   3.1 The Morphological Structure of Verbs ......................................................................... 23
   3.2 Variable Edge Parameters in Verbs ............................................................................... 24
      3.2.1 Penultimate Stress .................................................................................................... 24
      3.2.2 Smaller Edge Domains ............................................................................................ 25
      3.2.3 Word-Final Stress .................................................................................................. 27
      3.2.4 Summary ................................................................................................................ 29
   3.3 Verbal Desinences .......................................................................................................... 30
   3.4 Non-Finite Verbs ............................................................................................................ 33
   3.5 The Imperative ............................................................................................................... 33

4 The Three Syllable Window ................................................................................................. 35

5 Prosodic Adjuncts .................................................................................................................. 36
6 Alternative Approaches ................................................................................................................. 39
  6.1 Roca (1992) .......................................................................................................................... 39
  6.2 Harris (1995) ...................................................................................................................... 42
  6.3 Oltra-Massuet and Arregi (2005) ....................................................................................... 45
    6.3.1 Verbs ............................................................................................................................. 46
    6.3.2 Non-verbs ..................................................................................................................... 50
    6.3.3 Discussion ..................................................................................................................... 54
  6.4 Roca (2006) ....................................................................................................................... 56

7 The Origins of Spanish Stress .................................................................................................... 57
  7.1 Stress in Latin ...................................................................................................................... 57
  7.2 From Latin to Spanish ...................................................................................................... 59
  7.3 Triggers for Change ............................................................................................................. 60
  7.4 Non-verb Stress ............................................................................................................... 61
    7.4.1 Unmarked Forms ......................................................................................................... 61
    7.4.2 Marked Forms ............................................................................................................. 63
    7.4.3 Supermarked Forms .................................................................................................. 63
  7.5 Verb Stress ....................................................................................................................... 65
    7.5.1 The Present Tense ...................................................................................................... 65
    7.5.2 The Imperfect ............................................................................................................. 65
    7.5.3 The Future and the Conditional ................................................................................. 66
    7.5.4 The Perfective Past ................................................................................................... 67
    7.5.5 The Imperative .......................................................................................................... 69

8 Quantity Sensitivity .................................................................................................................. 69
  8.1 Spanish Syllable Structure ................................................................................................. 71
    8.1.1 Onsets ......................................................................................................................... 71
8.1.2 Codas .................................................................................................................. 72
8.1.3 Nuclei.................................................................................................................. 72
8.1.4 Glides and Vowels.............................................................................................. 72

8.2 Word Form Constraints.......................................................................................... 75

8.3 Spanish as Opaquely Quantity Sensitive ............................................................... 77
  8.3.1 Quantity Insensitivity in Verbs........................................................................... 80

8.4 Spanish as Quantity Insensitive............................................................................. 81

8.5 Discussion ............................................................................................................... 83

9 Conclusion ............................................................................................................... 84

References .................................................................................................................. 85
1 Introduction

In terms of both simplicity and theoretical elegance, the ideal metrical algorithm should be able to account for all the forms of a language in a uniform system that is independent from other modules of grammar, and that, therefore, results in stress patterns that are entirely predictable from the phonological content of a word. By this characterization, Classical Latin had an ideal metrical algorithm, which applied to all words without exception, and through which all variation was accounted for by means of quantity sensitivity. Typically, accounts of the metrical structure of Spanish, which developed out of Latin, have backed away from the ideal in several respects. For example, Roca (2005) proposes a metrical algorithm which accounts for all of Spanish non-verbal stress, even highly irregular learned forms and borrowings. However, he also argues that verbal stress ought to be accounted for by an entirely independent algorithm. Although empirically there are differences in metrical structure between verbs and non-verbs in several languages, this is a fact that we should attempt to restrict, and to explain through the mechanics of the syntax-phonology interface, rather than take as a matter of course. Roca’s (2005) account contrasts with Oltra-Massuet and Arregi’s (2005) account of stress, which can account for the vast majority of Spanish forms with only minor variations between verbs and non-verbs. Their account has two drawbacks: first, it has less empirical coverage of non-verbs than Roca (2005); and second, it requires the metrical algorithm to have direct access to the complete morphosyntactic structure, contravening strong modularity.

In this paper, I present an account of Spanish metrical structure that comes much closer to the ideal than previous accounts, giving a single unified analysis of both verbs
and non-verbs, and making use of only one piece of non-phonological information: the location of the agreement morpheme boundary. This analysis is an extension of Roca’s (2005) account of Spanish non-verbs in which he argues that the stress domain is lexically marked. I extend his analysis to verbs, and argue that this lexically determined stress domain varies in whether it includes or excludes φ-feature morphemes. This variability arises because, unlike other morphemes, the agreement morpheme is an adjunct in the prosodic structure in Spanish. Furthermore, I show how these irregularities in the metrical system developed out of the ideal Classical Latin system as a result of phonological change which obscured the predictability of stress assignment.

1.1 A Description of Spanish Stress

Stress in Spanish can fall on the ultimate, penultimate, or antepenultimate syllable.¹

This is known as the three-syllable window, and results in a three-way contrast, as illustrated in the minimal pairs in (1).

(1) a. so.li.ci.tó ‘s/he solicited’ (Harris 1995: 869)
    b. so.li.ci.to ‘I solicit’
    c. so.li.ci.to ‘solicitous’

In nouns, stress can be contrastive, as shown by the minimal pair in (2).

(2) a. sa.bá.na ‘savannah’ (Roca 2005: 349)
    b. sá.ba.na ‘bed sheet’

Interestingly, the surface position of stress in most forms does not alternate when the plural morpheme is affixed, as shown in (3).

(3) a. a.ni.má.l ‘animal’
    b. a.ni.má.l.es ‘animals’

¹ Only primary stress will be considered here. Spanish secondary stress is not lexical, or obligatory, but is used rhetorically (Hualde 2012) and is determined at the phrasal level (Buckley 2012).
Verbs, on the other hand, are traditionally described as having paradigmatic stress, with a certain stress pattern being associated with a particular tense, aspect, and mood specification. For example, some verbal paradigms have stress on the same syllable regardless of person and number specifications, either on an inflectional morpheme, as in the conditional paradigm for *cantar*² ‘to sing’ in (4), or the theme vowel, as in the imperfect, also in (4).

(4)  
<table>
<thead>
<tr>
<th></th>
<th>Conditional</th>
<th>Imperfect</th>
<th>(O&amp;A 2005: 50, 53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>cant-a-ria</td>
<td>cant-a-ba</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>cant-a-ria-s</td>
<td>cant-a-ba-s</td>
<td></td>
</tr>
<tr>
<td>3SG</td>
<td>cant-a-ria</td>
<td>cant-a-ba</td>
<td></td>
</tr>
<tr>
<td>1PL</td>
<td>cant-a-ria-mos</td>
<td>cant-a-ba-mos</td>
<td></td>
</tr>
<tr>
<td>2PL</td>
<td>cant-a-ria-is</td>
<td>cant-a-ba-is</td>
<td></td>
</tr>
<tr>
<td>3PL</td>
<td>cant-a-ria-n</td>
<td>cant-a-ba-n</td>
<td></td>
</tr>
</tbody>
</table>

Other paradigms show uniform penultimate stress, as shown for the present tense in (5).

(5)  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>(O&amp;A 2005: 59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>cánt-o</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>cánt-a-s</td>
<td></td>
</tr>
<tr>
<td>3SG</td>
<td>cánt-a</td>
<td></td>
</tr>
<tr>
<td>1PL</td>
<td>cant-á-mos</td>
<td></td>
</tr>
<tr>
<td>2PL</td>
<td>cant-á-is</td>
<td></td>
</tr>
<tr>
<td>3PL</td>
<td>cánt-a-n</td>
<td></td>
</tr>
</tbody>
</table>

Spanish orthographic convention is to mark irregular stress, where regular stress is considered to be the penultimate syllable on words ending in vowels, ≤n>, or ≤s>, or the final syllable on words ending in consonants other than ≤n> or ≤s>. In this paper, I will depart from the orthography by marking stress in all words.

1.2 **Verbal and Non-Verbal stress**

My analysis is based on Roca’s (2005) account of Spanish non-verbal stress, in which he assumes that verb and non-verb stress in Spanish conform to different algorithms.

² Throughout this paper, unless otherwise indicated, I use the verb *cantar* ‘to sing’ in the examples.
and cites several others who do the same (Harris 1969, 1983, 1995, Hooper and Terrell 1976, Núñez Cedeño 1985, Roca 1992). Although he accepts that attempts to unify verbal and non-verbal stress are commendable, he states that all of the previous “attempts have fallen short of success, because of the complexity and arbitrariness of the additional machinery required” (Roca 2005: 347). And yet, my proposal accounts for verbal stress using no more machinery than Roca (2005) himself uses for non-verbal stress.

There are several reasons why a unified stress system is preferable. Most importantly, using the same algorithm for both verbs and non-verbs results in a simpler system than having two different algorithms. Furthermore, some way to distinguish which algorithm should be used in which context would also be necessary, especially when considering forms which are somewhat ambiguous between noun and verb, such as gerunds and other non-finite verb forms. As we will see later, these forms can often be accounted for under either the verbal or the non-verbal algorithm, which is itself an indication that the two algorithms are similar enough that we might expect them to be able to be subsumed under one unified algorithm. Additionally, there are other similarities between verbal and non-verbal stress which suggest that they might both be derived within the same system; for both word categories, stress can fall only on one of the final three syllables of the word, and certain inflectional endings do not cause a stress shift for most forms for both word categories. Finally, Latin had a unified stress system for both verbs and non-verbs (Roca 1999, 2005), and, therefore, in the absence of evidence indicating that this has changed, we should operate under the assumption that the stress system remains unified.
1.3 The Syntax-Phonology Interface

Oltra-Massuet and Arregi (2005) present an analysis of Spanish stress in which brackets in the metrical structure are inserted with reference to the morphosyntactic structure. Although it is clear that some reference to morphological structure is necessary to adequately account for stress assignment in Spanish, the amount of access to morphosyntactic structure that the stress assignment module has should be constrained in some way. For one, once an utterance has been linearized and organized into Prosodic Word units, which must happen before the stress assignment algorithm applies (cf. Embick and Noyer 2001), the hierarchical morphosyntactic structure should no longer be available, making a system like the one proposed by Oltra-Massuet and Arregi (2005) impossible. If nothing else, a system which minimizes its access to other modules of grammar is simpler and more constrained, and thus preferable.

1.4 Overview

In this paper, I present a unified account of stress in Spanish verbs and non-verbs, based on Roca’s (2005) account of the non-verbal stress patterns in Spanish by allowing for variable edge parameters, described in §2. In §3, I show how these same variable edge parameters can account for stress in verbs as well. Combining my account of verbs with Roca’s for non-verbs, both of which are independently motivated, leads to a unified stress system. In §4, I show how Roca’s (2005) analysis and my extension thereof can account for the three-syllable window for stress in a principled way. This is followed by a discussion in §5 of how morphological boundaries are visible to the stress assignment algorithm because they are prosodic adjuncts. In §6, four alternative accounts of Spanish stress are discussed: (a) the account of verbs in Roca (1992), which Roca (2005) suggests
should still form the basis for a modern account of Spanish verbal stress, (b) Harris (1995), an important precursor to current approaches to Spanish stress, (c) the main competitor to Roca’s account, Oltra-Massuet and Arregi (2005), and (d) Roca’s (2006) Optimality Theory account of non-verbs. In §7, I show how stress in Spanish developed out of the Latin system of regular, quantity-sensitive stress. In §8, I will discuss the question of quantity sensitivity in Spanish. Finally, §9 concludes.

2 Non-verbs

2.1 Desinences

In Spanish, the desinence is a word-final morpheme in non-verbs which is often associated with gender specifications and which is normally outside of the domain of stress.

As mentioned earlier, stress in Spanish can fall on the ultimate, penultimate, or antepenultimate syllable. Of these possibilities, the most unmarked stress pattern among non-verbs is for vowel-final words to have penultimate stress and consonant-final words to have final stress, as shown in the table in (6).

3 Note that these markedness relations are very nearly reproduced in the orthography, where stress is unmarked on penultimate syllables in words ending in vowels, <n>, or <s>, and on final syllables in words ending in consonants other than <n> or <s>.
Markedness\(^4\) and stress in non-verbs (Roca 2005: 350)\(^5\)

<table>
<thead>
<tr>
<th></th>
<th>Majority</th>
<th></th>
<th>Minority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unmarked</td>
<td>Marked</td>
<td></td>
</tr>
<tr>
<td>V#</td>
<td>penult</td>
<td>amigo</td>
<td>88.00%</td>
</tr>
<tr>
<td></td>
<td>antepenult</td>
<td>álamo</td>
<td>11.10%</td>
</tr>
<tr>
<td>C#</td>
<td>final</td>
<td>amór</td>
<td>97.80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hooper and Terrell (1976) noted that the distinction between vowel- and consonant-final words described above and a significant number of its exceptions can be accounted for if the desinence (sometimes also called the class marker) is extrametrical. The desinence is usually, but not necessarily, an unstressed final vowel. They are lexically determined, and arguably semantically empty. Certain desinences tend to be associated with a certain gender, but there are enough exceptions to these tendencies for Roca (1990) to argue that they be considered independently. Historically, most desinences are descended from the Latin theme and case markings (Roca 2005), and, in fact, they occur across all of the Romance languages (Roca 1999). The desinence-stem distinction is independently motivated by the loss of the desinence in derivational processes, shown in (7).

(7)  
<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Diminutive</th>
<th>(Roca 2005: 361)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>rám-a</td>
<td>ram-itá</td>
<td>‘branch’</td>
</tr>
<tr>
<td>b.</td>
<td>sáp-o</td>
<td>sap-itó</td>
<td>‘toad’</td>
</tr>
</tbody>
</table>

On the other hand, many vowel-final words, such as those in (8), have a zero-desinence, as shown by the fact that the word-final vowel is not lost in derivational processes. Most zero-desinences appear on borrowed words (Harris 1995).

---

\(^4\) Roca’s use of markedness appears to refer only to frequency, without making any deeper theoretical claims.

\(^5\) The examples in this chart are glossed as follows: amigo ‘friend,’ álamo ‘poplar,’ menú ‘menu,’ amór ‘love,’ almíbar ‘syrup,’ and régimen ‘diet, regime.’
Finally, the desinence may be more than simply a vowel. For example, the word in (9) has a desinence of the form –ís. As with all desinences, it is lost when derivational suffixes, such as –ane, are added.

(9) cút-is ‘facial skin’
cut-áné-o ‘pertaining to facial skin’

Nearly all consonant-final words have final stress, which is explained in most previous analyses by the fact that they are nearly all without a desinence. However, a desinence can be suffixed to them, such as the plural in (10a) or the gender marker in (10b). In these cases, the additional morpheme will not cause a stress shift.

(10) a. animál animáles ‘animal(s)’
b. portugués portuguésa ‘Portuguese (MASC/FEM)’

Non-verbal desinences include, then, the plural marker and the noun gender markings. In my analysis of verbal stress, discussed in §3, I find that the person and number agreement morphemes are also extrametrical. A generalization about Spanish stress, then, is that the extrametrical desinences are φ-morphemes, marking person, number, and gender, and include both the gender and plural markings in nouns and the agreement morpheme in verbs.

Roca (2005) notes that Halle and Idsardi (1995) remain somewhat vague as to the domain of stress assignment in their framework. The domain is determined by a rule which marks the edge of the metrical structure with a parenthesis, but this edge marking rule is only defined as being determined by “the left/right-most metrical element in the string”
(Roca 2005: 352) without indicating which string is being referred to. Roca (2005) thus proposes that, in Spanish, the stress domain is in fact parametrized. Most words restrict the stress domain to the stem, excluding the desinences, whereas others take the entire Prosodic Word as the stress domain. In Oltra-Massuet and Arregi’s (2005) Spanish stress assignment algorithm, on the other hand, the stress domain is determined by morphosyntactic constituents, since the edge bracket is projected by certain functional heads. Both approaches use the edge marking to exclude the desinences. In this paper, I follow Roca’s characterization of the stress domain.

2.2 Roca’s (2005) Account of Non-verbs

Halle and Idsardi (1995) present a derivational approach to metrical structure which constructs metrical grids by projecting syllable heads and organizing them into constituents. Roca adopts this approach to metrical structure, with one major modification—he allows for variable edge parameter settings on Line 0 (11i), which vary based on where the parenthesis is inserted and on which string they take as their base (the settings which are variable are marked with an X). This edge rule, then, demarks the edge of the stress domain by inserting a bracket which makes any following syllables extrametrical. The rest of the parameter settings are as shown in (11). The Iterative Constituent Construction (ICC) rule in (ii) parses the syllables into binary feet, proceeding leftwards from the right edge. Finally, the head rule in (iii) turns those feet into trochees by projecting the leftmost element as head. The edge and head rules for line 1 in (iv) and (v) then project the head of the rightmost trochee, making it the primary stress in the word, while the conflation rule in (vi) removes all of the secondary stresses. Finally, the edge
marking rule is limited by the avoidance constraint in (vii), which prevents the final syllable from being projected into line 1 if it is a desinence.

(11) Line 0
(i) Edge: XXR (Put an X bracket to the X side of the rightmost element)
(ii) ICC: L (insert a left bracket after every 2\textsuperscript{nd} element proceeding leftwards)
(iii) Head: L (the head is on the left)

Line 1
(iv) Edge: RRR
(v) Head: R
(vi) Conflation: line 1
(vii) Constraint: *(x# iff x corresponds to a desinence

The most unmarked edge parameter settings are LLR(S) (a left bracket to the left of the rightmost element in the stem), where the stem excludes the desinence, as shown in (12).\textsuperscript{6}

This results in penultimate stress in words with a desinence and final stress in words without, which corresponds with the most frequent patterns shown in the table in (6).

(12) \( x \)
\( \langle x \ x \rangle \) (Roca 2005: 359)
\( \text{a vár\o} \) ‘miser’
\( \text{si li cós} \) is ‘silicosis’
\( \text{a ni mál} \) ‘animal’

A more marked, albeit still fairly common, pattern is RRR(S), shown in (13). Note that the plural marking is outside of the stem, and so its affixation does not affect the metrical grid.

This results in antepenultimate stress in words with a desinence and penultimate stress in words without.

\textsuperscript{6} Here, and following, the parenthesis inserted by the edge settings is in bold and the edge of the stem is marked by a square bracket. Most non-bolded brackets in the metrical structure are inserted by the ICC.
There are also three attested but rare supermarked patterns: RRR(W), RLR(W), and RLR(S), where (W) denotes that the stress domain is the word, rather than the stem. The forms in (14) and (15) illustrate the RRR(W) and RLR(W) settings, respectively. Since the stress domain is the entire word for these forms, the surface position of stress does shift when the plural morpheme is added.

(14) a. x
x \(x\)
ca rác ter]
\(x\)
ca rac tér] es ‘character(s)’

b. x
x \(x\)
(\(x\)
\(x\))

(15) a. x
\(x\) \(x\)
ré gi men]
\(x\)
re gi men] es ‘diet(s), regime(s)’

b. x
\(x\) \(x\)
\(x\) \(x\)
(\(x\) \(x\))

Finally, the RLR(S) pattern is illustrated in (16). Even though the stress domain for this form is the stem, the position of the stress alternates in the plural. This is because only the edge marking is sensitive to the stem or word domain stress assignment parameters, whereas the ICC always begins at the word edge. In words such as omicrónes in (16b), the parenthesis marking the edge is two syllables away from the actual word edge, allowing enough room for the ICC to build an entire foot to its right. Since this foot is the rightmost foot in the word, it projects and receives surface stress.

(16) a. x
\(x\) \(x\)
ó mi cron]
\(x\)
o mi crón] es ‘omicron(s)’

b. x
\(x\) \(x\)
\(x\) \(x\)
(\(x\) \(x\))

Note that there are very few supermarked forms, and that they are sometimes considered learned, and are often listed in prescriptivist grammars, although they also
include a number of place names of Germanic origins (such as Washington, Manchester, and Amsterdam). They are all consonant-final and lack a desinence.

Roca (2005) shows that the three other logically possible permutations of the edge parameter, LRR(S), LLR(W), and LRR(W), either insert vacuous brackets or create forms which violate the constraint listed in (11).

### 2.3 Lexical Accent as Variable Edge Parameters

These variable edge parameters for stress must somehow be marked in the lexicon, since they are not predictable. There are many logically possible forms that this lexical marking may take. While Idsardi (1992) assumes that lexical marking takes the form of morphologically triggered applications of Edge Marking, Halle and Idsardi (1995) assume that lexical accent is the result of morphologically triggered Syllable Boundary Projection, as stated in (17), although they note that either approach, or even both, might be correct.

(17) Syllable Boundary Projection (Halle and Idsardi 1995: 407)\(^7\)
Project the \{left/right\} boundary of certain syllables onto line 0.

Contrary to Halle and Idsardi’s (1995) approach, I am assuming, crucially, that the lexical specifications are realized by some diacritic on the applicable morphemes which triggers the appropriate Edge Marking over the course of the derivation. While merely including a bracket in the lexical representation of a particular morpheme may be simpler to represent, it does not make the correct predictions in the case of Spanish. For example, for the stem carácter, there cannot be a bracket associated with a particular syllable, since the syllable which receives prominence alternates depending on the presence of the plural morpheme.

---

\(^7\) Note that Halle and Idsardi (1995) also use Syllable Boundary Projection to derive quantity sensitivity. This might then predict that lexical accent and quantity sensitivity cannot both be active in the same language.
Rather, the stem is marked as requiring a right bracket to the right of the rightmost element in the word, which ends up being the second syllable in the singular, but the third syllable in the plural. This is shown again in (18), repeated from (14), above.

(18)  

\[
\begin{array}{ccc}
\text{a.} & \text{x} & \text{x} \\
\text{b.} & \text{x} & \text{x} \\
\text{ca rác ter] & ca rac tér} & \text{es} & \text{‘character(s)’}
\end{array}
\]

\(\text{(Roca 2005: 370)}\)

2.4 The Rightmost Morpheme and Cyclicity

In the case of polymorphemic words, including inflected verbs, it is possible for there to be contradictory lexical edge markings for stress. Since the stress algorithm of Spanish is, in nearly all of its steps, right-headed, it seems likely that, in these cases, the lexical specifications of the rightmost morpheme, excluding the desinence, should also determine the stress for the entire word. If we consider compound words, it appears that that is, in fact, the case. This is shown by the contrast between the phrase in (19a) and the compound word in (19b), in which the rightmost stress is the one which surfaces.

(19)  

\[
\begin{array}{ccc}
\text{a.} & \text{láva plátos} & \text{‘s/he washes dishes’} \\
\text{b.} & \text{lavaplátos} & \text{‘dishwasher’}
\end{array}
\]

\(\text{(Hualde 2012: 161)}\)

However, Roca (1999) shows that, at some point in the derivation, the first word in a compound does bear stress. This can be seen because, in Spanish, there is an idiosyncratic, lexically specified alternation between the stressless mid vowels \[o e\] and the stressed diphthongs \[we je\]. In compounds, the first word will surface in its diphthongal variant, as shown in (20).

(20)  

\[
\begin{array}{ccc}
\text{cuenta-gótas} & \text{‘eyedropper’} & \text{(lit. count-drops)} \\
\text{hierba-buéna} & \text{‘mint’} & \text{(lit. herb-good)}
\end{array}
\]

\(\text{(Roca 1999: 742)}\)
There is also a class of derivational morphemes which have an effect on stress assignment. These include the superlative -isim and the two pre-stressing suffixes -ic and -(c)ul, as shown in (21) and by the alternation in (22).

(21) a. buen-isim-o ‘very good’ pur-isim-a ‘very pure’ (Hualde 2012: 155)  
b. mág-ic-o ‘magic’ foné-t-ic-a ‘phonetics’  
c. ridí-cul-o ‘ridiculous’ libél-ul-a ‘dragonfly’

(22) a. sílaba ‘syllable’  b. silábico ‘syllabic’

These can all be accounted for if the derivational suffix is marked with the RRR(S) parameter setting, as shown in (23).

(23) x  
    x (x x) x  
    pu r-í sim] a ‘very pure’  
    fo né t-ic] a ‘phonetics’  
    lí bé l-ul] a ‘dragonfly’

In all of these cases, it is again the suffix—the rightmost morpheme—which determines the surface stress pattern of these words.

In some cases, there is not enough room for the lexical marking to surface. Roca (2005) argues that this causes the stress alternation between métro and kilómetro. The morpheme metr- is pre-stressing by means of a RRR(S) edge parameter setting, just as are the suffixes shown in (21) above. This can be seen in the derivation for kilómetro in (24a). However, in the clipped variant métro, shown in (24b), there is not enough room for an entire trochaic foot to be built to the left of the edge bracket, and so a unary foot is built instead, resulting in penultimate stress, rather than the normal RRR(S) antepenultimate stress.

(24) a. x  
    x (x x) x  
    ki ló metr] o ‘kilometre’

b. x  
    x (x x) x  
    métr] o ‘metre’
Interactions between stress and other processes which are affected by stress assignment, such as the diphthongization process described above, make it clear that stress assignment is cyclic for certain derivational morphemes, but not for others. For example, in words like *buenísimo*, in (21a) above, stress assignment is first applied to the root *bon-*, followed by diphthongization, the suffixation of the superlative and the re-application of stress assignment. This allows the diphthongal allomorph of the root to surface, even though the stress is not realized. On the other hand, words like *bondad* ‘goodness’ are not derived cyclically, as is apparent by the fact that diphthongization does not apply.

The cyclicity of a morpheme appears to correlate with its position in the morphosyntactic structure. De Belder et al. (2009) argue that there is a cross-linguistic contrast between two morphosyntactic positions for diminutive suffixes. The first, which is non-cyclic, merges with the root, and thus may produce a non-compositional meaning, be phonologically irregular, and be not fully productive. The second, which is cyclic, attaches higher in the structure, as part of the noun’s functional domain, and is therefore fully productive, with a compositional meaning, and is phonologically regular. This is demonstrated by the fact that productive derivational suffixes, such as the diminutives -*(c)*ito, -zuelo, and -(c)*illo, the superlative -ísimo, and the augmentative -azo, generally occur with the diphthongal varieties of the roots, showing that stress is determined cyclically, whereas the less productive suffixes, such as -al, -(i)dad, and
-ero, occur with the monophthongal allomorphs (Eddington 2012), showing that stress is not determined cyclically for these suffixes. Furthermore, as mentioned earlier, most derivational suffixes do not normally take stems which contain the theme vowel. However, there are a few exceptions, which must, therefore, be suffixed higher in the syntactic structure than the desinence. These are all cyclic. For example, the suffix –mente, which forms adverbs, takes feminine adjectives as its stem (e.g., buenamente ‘well,’ lit. ‘goodly’). Likewise, Harris (1983) shows that the choice of allomorph of the diminutive –(c)ito is dependent on the theme vowel, as shown by the contrast in (25).  

(25) a. cort[е] cortecito (*cortito) ‘(a) cut’ (noun) (Harris 1983: 93)  
   b. cort[о] cortito (*cortecito) ‘short’ (adjective)  

It thus seems as though both cyclicity and productivity are a result of a higher structural position for the suffix.

Hence, in the case of complex words which contain multiple morphemes with lexical specifications for edge marking, it appears that the rightmost morpheme is the one which determines the surface position of stress, both for cyclic morphemes and non-cyclic morphemes.

---

8 Interestingly, some suffixes, such as -oso and -ista, show some variation in whether diphthongization occurs or not (Eddington 2012).
9 De Belder et al. (2009) also argue that the higher diminutive be phonologically regular, which is surprising considering the –ito ~ -cito allomorphy shown here. This may be an exception since the allomorphy is conditioned morphologically rather than phonologically.
3 Verbs

3.1 The Morphological Structure of Verbs

Verbs in Spanish normally consist of four parts, in the following order: (a) a root, (b) a theme vowel, (c) tense, aspect, and mood (TAM) inflection, and (d) an agreement morpheme.

Spanish has three verbal theme vowels, $a$, $e$, and $i$, which mark the first, second, and third conjugation classes, respectively. In some cases, $e$ and $i$ conflate, alternating with each other and with the diphthong $ie$.

The most common forms of the agreement morphemes are as shown in (26).

\[(26) \quad 1SG \quad \emptyset \quad 2SG \quad s \quad 3SG \quad \emptyset \quad 1PL \quad mos \quad 2PL \quad is \quad 3PL \quad n\]

These are invariant across all of the TAM paradigms except the perfective and the imperative.

Extending Roca’s (2005) account to verbs raises the question of what the verbal analogue to the non-verbal desinence is. An obvious choice would be the theme vowels, since, just as the nominal gender class markers, they mark for inflectional classes, and could be some sort of verbal gender. However, the verbal theme vowel is stressed in some of the paradigms, which would be nearly impossible if it were extrametrical. These may not be able to function as desinences simply because they are too far from the word edge. On the other hand, the agreement morpheme is word-final, is never stressed, and also shares some featural content with the non-verbal desinences—\(\emptyset\)-features. Setting aside the
verbal agreement morphemes as extrametrical in the same way that the non-verbal desinences are set aside allows us to derive all of the verbal stress paradigms within an extension of Roca’s (2005) framework, in a unified approach to verbal and non-verbal stress.

3.2 Variable Edge Parameters in Verbs

Roca (2005) suggests that the stress algorithm of Spanish verbs should be similar to his analysis in Roca (1992), in which he posits that certain syllables are lexically marked as prominent, as will be discussed in §6.1. Nevertheless, the variable edge parameter approach works equally well for verbs as for non-verbs, thus allowing for a unified system. The verbal system of Spanish can be accounted for if we posit that different TAM morphemes each have different edge settings, and that the agreement morpheme acts as an extrametrical desinence.

3.2.1 Penultimate Stress

The irregular perfective past, the present indicative, and the present subjunctive all have penultimate stress throughout the entire person/number paradigms, regardless of the length of the agreement suffixes. This is illustrated in (27).10

<table>
<thead>
<tr>
<th>(27)</th>
<th>Present indicative</th>
<th>Present Subjunctive</th>
<th>Irregular Perfective Past</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>√ Th Agr</td>
<td>√ Th Agr</td>
<td>√ Th Agr</td>
</tr>
<tr>
<td>1SG</td>
<td>cánt o</td>
<td>cánt e</td>
<td>quis e</td>
</tr>
<tr>
<td>2SG</td>
<td>cánt a s</td>
<td>cánt e s</td>
<td>quis í ste</td>
</tr>
<tr>
<td>3SG</td>
<td>cánt a</td>
<td>cánt e</td>
<td>quis o</td>
</tr>
<tr>
<td>1PL</td>
<td>cánt á mos</td>
<td>cánt é mos</td>
<td>quis í mos</td>
</tr>
<tr>
<td>2PL</td>
<td>cánt á is</td>
<td>cánt é is</td>
<td>quis í steis</td>
</tr>
<tr>
<td>3PL</td>
<td>cánt a n</td>
<td>cánt e n</td>
<td>quis íé ron</td>
</tr>
</tbody>
</table>

(OM&A 2005: 58-59)

10 The present indicative and subjunctive forms are for the verb *cantar* ‘to sing,’ while the irregular perfective past is for the verb *querer* ‘to like,’ which undergoes root suppletion.
The fact that the stress surfaces a uniform distance from the word edge despite agreement morpheme length in these three paradigms suggests that the stress domain is the entire word. The paradigm can thus be derived with the edge marking settings RRR(W),\(^\text{11}\) which inserts the parentheses shown in bold, below. The other parentheses are inserted by the ICC. This is illustrated in (28).

(28) a. x b. x
    (x x) x (x x)
    cán to can tá mos
    1SG present 1PL present

3.2.2 Smaller Edge Domains

The imperfect indicative and the imperfect subjunctive have the same word shapes as each other, as illustrated in (29).

(29)  

<table>
<thead>
<tr>
<th></th>
<th>Indicative(^\text{12})</th>
<th>Subjunctive</th>
<th>(OM&amp;A 2005: 50-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>√ Th T Agr</td>
<td>√ Th T Agr</td>
<td></td>
</tr>
<tr>
<td>1SG</td>
<td>cant á ba</td>
<td>cant á ra</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>cant á ba s</td>
<td>cant á ra s</td>
<td></td>
</tr>
<tr>
<td>3SG</td>
<td>cant á ba</td>
<td>cant á ra</td>
<td></td>
</tr>
<tr>
<td>1PL</td>
<td>cant á ba mos</td>
<td>cant á ra mos</td>
<td></td>
</tr>
<tr>
<td>2PL</td>
<td>cant á ba is</td>
<td>cant á ra is</td>
<td></td>
</tr>
<tr>
<td>3PL</td>
<td>cant á ba n</td>
<td>cant á ra n</td>
<td></td>
</tr>
</tbody>
</table>

\(^\text{11}\) Since there are only two word shapes attested in each of these paradigms, there are actually several alternate ways to derive this surface stress pattern, including LLR(S), RLR(S), and LLR(W). In all of these cases, the bracket that results in the surface stress is inserted by the ICC, with the edge bracket being either redundant, or further to the left than the ICC, or prevented by the constraint blocking brackets between the desinence and the stem. Thus, the RRR(W) parameter is the one I adopt, as it is the simplest.

\(^\text{12}\) Note that the imperfect indicative takes a different inflectional ending in the –er and –ir conjugations. In those, the tense morpheme takes the form –ia instead of the –aba used in the first conjugation, shown above. However, the word shapes are the same across all three conjugations, and they all share the same metrical structure. Just as the stress is consistently realized on the a in the first conjugation, it is consistently realized on the i in the second and third.
In these paradigms, the stress does not alternate with the addition of inflectional morphemes, just as non-verbs do not normally alternate with the addition of the plural.

When considering only non-verbs, the stress domain smaller than a word was characterized as the stem, that is, the word excluding the desinence. As discussed earlier, the theme vowel, as it has much in common with the non-verbal desinences, is a possible candidate for the verbal desinence. However, in the verbal paradigms in (29), the theme vowel (which happens to be the accented one in these cases) cannot be excluded from the stress domain if we are to derive the attested stress patterns. If it is excluded, the only way for stress to surface on it is by means of the ICC. This cannot be the case, though, as the ICC is only capable of stressing the penultimate syllable, and, in the first and second person plural forms, it is in fact the antepenultimate syllable which is stressed. Conversely, if we designate the agreement morphemes –mos ‘1PL’ and –is ‘2PL’ as not being part of the stem, the edge settings RRR(S) will correctly derive the attested forms, as shown in (30).

(30)  a.  x  
   x (x x)  
   can tá ba]  
   1/3SG imperfect  

   b.  x  
   x (x x) x  
   can tá ba] mos  
   1PL imperfect  

These two syllables are set aside as the only two syllables in these paradigms which contain only φ-features. The other two agreement morphemes, the 2SG –s and the 3PL –n, are also arguably outside of the domain of stress, yet excluding them has no effect, since neither contain a stressable syllable nucleus. Note that this is the only way to derive these
two paradigms within an extension of Roca’s framework, assuming that an entire TAM
verbal paradigm has the same edge settings.\textsuperscript{13}

The conditional, shown below, can also be derived with the same parameter setting,
RRR(S), and with the same two extrametrical morphemes, \textit{–mos} ‘1\textsuperscript{PL}’ and \textit{–is} ‘2\textsuperscript{PL}’.

\begin{verbatim}
(31) √ Th T/M Agr
    1SG cant a ría Agr
    2SG cant a ría s
    3SG cant a ría
    1PL cant a ría mos
    2PL cant a ría is
    3PL cant a ría n
\end{verbatim}

\begin{verbatim}
(32) a. x x (x x) x
    can ta rí a] mos
    1/3SG conditional

b. x x (x x) x
    can ta rí a] mos
    1PL conditional
\end{verbatim}

3.2.3 Word-Final Stress

The perfective past has the form illustrated in (33).

\begin{verbatim}
(33) √ Th/(T) Agr
    1SG cant é
    2SG cant á ste
    3SG cant ó
    1PL cant á mos
    2PL cant á steis
    3PL cant á ron
\end{verbatim}

Since the stress lands on the word final syllable in the first and third person singular, those
morphemes cannot be part of the desinence,\textsuperscript{14} as they would then not be able to get stressed
without breaking the constraint listed in (11), repeated below as (34).

\begin{verbatim}
(34) Constraint: *(x# iff x corresponds to a desinence. (Roca 2005: 376)
\end{verbatim}

\textsuperscript{13} This assumption is based on the fact that the stress patterns seem to be associated with
particular tense, aspect, and mood morphemes.

\textsuperscript{14} Note that syllables which are specified as \textit{x#} in line 0 must not be able to get stress in
Spanish, in order to derive words with antepenultimate stress, such as \textit{regímenes} in (15b)
or \textit{ómicron} in (16a).
Since Spanish is made up of trochees, the only way to get final stress on these final syllables is with a unary foot. To get a unary foot, we need the edge parameter settings need to be LLR. To derive the correct stress pattern with LLR edge settings for all the forms, the agreement morphemes –ste ‘2SG’, -mos ‘1PL’, -steis ‘2PL’, and –ron ‘3PL’ must all be outside the stress domain. The perfective past would thus be derived as in (35).\(^{15}\)

\[
\begin{array}{ccc}
(35) & a. & x \\
& b. & x \\
& x & (x & x \\
& can tê] & can tâ] & mos \\
& 1SG perfective & 1PL perfective
\end{array}
\]

Although these are not the prototypical agreement morphemes, there are historical reasons for thinking that they encode only φ-features, as I will show in the following section.

The future paradigm has a similar pattern, with word-final vowels receiving stress, as shown in (36).

\[
\begin{array}{cccc}
(36) & \checkmark & \text{Th} & \text{T} & \text{Agr} \\
& 1SG & cant & a & ré \\
& 2SG & cant & a & rá \ s \\
& 3SG & cant & a & rá \\
& 1PL & cant & a & ré mos \\
& 2PL & cant & a & ré is \\
& 3PL & cant & a & rá n
\end{array}
\]

Thus, it must also have LLR(S) edge settings, with the agreement morphemes remaining outside of the stress domain, as shown in (37).

\[
\begin{array}{ccc}
(37) & a. & x \\
& b. & x \\
& (x & x & (x & x \\
& can ta ré] & can ta ré] & mos \\
& 1SG future & 1PL future
\end{array}
\]

\(^{15}\) It is also possible to derive this set of paradigms with the parameter LLR(W), in conjunction with the constraint against inserting a left bracket to the left of the desinence. This alternative requires the same set of morphemes to act as desinences. I adopted the above analysis as it is simpler.
3.2.4 Summary

I have posited the edge parameter settings in (38) for Spanish, where the stem stress domain excludes the theme vowel and plural marking in non-verbs and the agreement morpheme in verbs.

(38)

<table>
<thead>
<tr>
<th></th>
<th>Non-verbs</th>
<th>Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLR(S)</td>
<td>Unmarked</td>
<td>Future Perfective Past (Regular)</td>
</tr>
<tr>
<td>RRR(S)</td>
<td>Marked set</td>
<td>Conditional Imperfect (Indicative and Subjunctive)</td>
</tr>
<tr>
<td>RRR(W)</td>
<td>Supermarked caracter ~ caractéres</td>
<td>Present (Indicative and Subjunctive) Irregular Perfective Past</td>
</tr>
<tr>
<td>RLR(W)</td>
<td>Supermarked régimen ~ regímenes</td>
<td>--</td>
</tr>
<tr>
<td>RLR(S)</td>
<td>Supermarked ómicron ~ omicrónes</td>
<td>--</td>
</tr>
</tbody>
</table>

Note that the edge parameter setting is normally determined by roots in non-verbs but by inflectional affixes in verbs. This is a result of the length of the inflectional affix, and how stress is controlled by the rightmost morpheme. In non-verbs, inflectional suffixes are never longer than a single syllable, whereas they often are longer in verbs, causing the root to be outside of the three-syllable window, unable to bear stress. Furthermore, there are many inflectional suffixes capable of bearing edge parameter settings in verbs, all of which appear further to the right than the root, over-riding any edge parameter settings on the root. On the other hand, the class of inflectional suffixes on non-verbs happens to be equivalent to the class of desinences. It thus appears that, as well as appearing outside of the domain of stress, these morphemes are also not able to bear lexical edge parameter settings.
3.3 Verbal Desinences

The over-arching generalization characterizing the stem stress domain across both verbs and non-verbs is that morphemes which mark for φ-features and for φ-features alone are outside of the domain of stress, while fusional morphemes that simultaneously mark for φ-features and some other feature are inside the stem. Although this approach essentially makes all the words in every paradigm the same length in terms of the edge parameter settings, a variable edge domain still creates a system which is fairly constrained—there is but a single possible solution for most of the paradigms—but that is still able to account for all of the attested forms.

The non-verbal class markers and the verbal theme vowels are quite similar, as they are both class markers. However, it is clear that they do not share the same status. This may be because the verbal theme vowel is rarely at the right edge of the word, whereas the noun class markers always are (with the possible exception of when the plural marking intervenes).

Since the verbal agreement markers listed in (26), repeated below as (39), are invariant across the majority of the verbal paradigms, it is clear that these mark only for person and number, and do not include any tense, aspect, or mood, features, thus conforming to my generalization that only morphemes which contain only φ-features are outside of the domain of stress.

(39)

\[
\begin{array}{ll}
1\text{SG} & \emptyset \\
2\text{SG} & s \\
3\text{SG} & \emptyset \\
1\text{PL} & mos \\
2\text{PL} & is \\
3\text{PL} & n
\end{array}
\]
On the other hand, the perfective agreement morphemes are more problematic. Consider again the perfective paradigm, repeated below as (40).

(40) √ Th/(T)\(^{16}\) Agr (OM&A 2005: 57)

1SG cant é
2SG cant á ste
3SG cant ó
1PL cant á mos
2PL cant á steis
3PL cant á ron

Although it is rather uncontroversial that the 1PL morpheme –mos marks for φ-features alone, the other agreement morphemes are all unique to the perfective past, and so arguably contain tense or aspectual features, as well. However, these morphemes did not develop historically out of TAM morphemes, and so it is plausible to expect them to not contain TAM features synchronically, either. Rather, they are allomorphs of the regular agreement morphemes that appear in the context of the perfective.

The Modern Spanish –ar perfective developed out of the –v- perfectives in Latin (Lloyd 1987), shown in (41) for the verb amare ‘to love.’

(41) √ Th T Agr (Panhuis 2006: 48)

1SG am a v ī
2SG am a v istī
3SG am a v īt
1PL am a v imus
2PL am a v istis
3PL am a v ērun

Over time, the –v- was dropped, leaving only the theme vowel –a- followed by the agreement inflection. The 1SG and 3SG agreement markers coalesced with the theme vowel, forming the modern –é and –ó. The rest all underwent regular phonological change to

\(^{16}\) These morphemes are the theme vowel for all but the 1SG and the 3SG, in which the theme vowel is fused with tense and agreement features.
become the modern forms. Thus, the 1SG and 3SG are fused theme vowels and agreement markers, and do not mark for φ alone, and, as expected, are inside of the stem. All of the extrametrical morphemes developed out of agreement morphemes, and so it is reasonable to posit that they remain so.

The –er and the –ir forms, exemplified below by the verbs temer ‘to fear,’ and partir ‘to leave,’ respectively, developed less regularly.

<table>
<thead>
<tr>
<th>(42)</th>
<th></th>
<th>Th/(T)</th>
<th>Agr</th>
<th></th>
<th>Th/(T)</th>
<th>Agr</th>
<th>(OM&amp;A 2005: 57)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td></td>
<td>tem</td>
<td>í</td>
<td></td>
<td>part</td>
<td>í</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td></td>
<td>tem</td>
<td>í</td>
<td>ste</td>
<td>part</td>
<td>í</td>
<td>ste</td>
</tr>
<tr>
<td>3SG</td>
<td></td>
<td>tem</td>
<td>íó</td>
<td></td>
<td>part</td>
<td>íó</td>
<td></td>
</tr>
<tr>
<td>1PL</td>
<td></td>
<td>tem</td>
<td>í</td>
<td>mos</td>
<td>part</td>
<td>í</td>
<td>mos</td>
</tr>
<tr>
<td>2PL</td>
<td></td>
<td>tem</td>
<td>í</td>
<td>steis</td>
<td>part</td>
<td>í</td>
<td>steis</td>
</tr>
<tr>
<td>3PL</td>
<td></td>
<td>tem</td>
<td>íé</td>
<td>ron</td>
<td>part</td>
<td>íé</td>
<td>ron</td>
</tr>
</tbody>
</table>

There are two main differences. First, for the 3SG morpheme, instead of it coalescing, the theme vowel –i- became an on-glide to the agreement morpheme. This has the same consequences for stress, since a glide does not project a syllable nucleus and cannot be stressed. Secondly, the 3PL –ie- had two historical sources. It sometimes developed regularly from the Classical Latin theme vowels. In other cases, it developed through analogy from dedi, the reduplicated perfective form of dare, which then reduced to /je/ (Lloyd 1987). Thus, historically, the –ie-, in some cases, is an allomorph of the theme vowel, and, in others, is formed by analogy, with indeterminate feature specifications. As such, the morphological analysis shown above is justified.

---

17 With one exception; the Old Spanish 2pl –stes changed to –steis out of analogy with the regular 2pl agreement morphemes. This should have had no effect on the featural composition of the agreement morpheme.

18 There is an underlying contrast between glides and vowels in Spanish, as discussed in §8.1.4.
3.4 Non-Finite Verbs

This unified stress algorithm can also account for non-finite verbs if they take the edge setting LLR(S), the unmarked setting for non-verbs and a possible setting for verbs, with the participial –do and the gerundive –ndo behaving as desinences. This is shown in (43) for the verb purificar ‘to purified’.

(43)  

\[
\begin{array}{cccc}
\text{x} & \text{x} & \text{x} & \text{x} \\
\text{pu} & \text{ri} & \text{fi} & \text{cár} & \text{Infinitive} \\
\text{pu} & \text{ri} & \text{fi} & \text{câ} & \text{do} & \text{Participle} \\
\text{pu} & \text{ri} & \text{fi} & \text{câ} & \text{ndo} & \text{Gerund} \\
\end{array}
\]

(OM&A 2005: 67)

One thing to note about this analysis is that it is not entirely obvious that the –ndo encodes \(\varphi\)-features, and so might not be a desinence.\(^{19}\) This form is still easily accounted for, since other parameter settings, such as RRR(W) would still be able to derive the surface form. However, it is hard to tell exactly what is going on, since there are no possible alternations in the form of the gerund. That the final syllable in the participle is a \(\varphi\)-feature desinence is clearly seen in its function as an adjective, in which it undergoes an alternation between -a and -o caused by gender agreement.

3.5 The Imperative

There remains only one verbal paradigm unaccounted for: the imperative, as shown in (44), below.

(44)  

\[
\begin{array}{ll}
2SG & \text{cánta} \\
2PL & \text{cantád} \\
\end{array}
\]

(OM&A 2005: 63)

\(^{19}\) Diachronically, the gerunds are descended from the accusative case of the Classical Latin future passive participles (Lathrop 1996). So, historically, the word-final o has the same historical source as the desinence in many other nouns, and should pattern the same.
Since there are only two forms in the imperative, each with a different stress pattern, it is very difficult to determine the underlying metrical structure of these forms. Additionally, the second person plural form is unique in two ways. First, it is only in use in peninsular Spanish. Thus, in Latin America, the imperative paradigm has uniform penultimate stress, which can easily be derived in a variety of ways. Second, this is the only inflectional suffix in all of Spanish that results in a word-final consonant other than /s/ or /n/. Furthermore, the coda consonant /d/ is very often reduced. Note also that both of these forms have unmarked stress in terms of the orthographic rules of Spanish.

Since neither form exhibits an independent imperative morpheme which could carry a lexical specification for stress for the entire paradigm, and since both forms are formed by the suffixation of a single atomic morpheme which encodes both agreement and mood, I assume that both forms have independent lexical specifications for stress, each associated with their respective inflectional morphemes. For the singular, it would be RRR(W), and for the plural, it would be LLR(S). Further evidence that these two forms belong to separate paradigms comes from the fact that they behave differently when negated (Ausín 2013).

However, there are several alternative ways in which the imperative paradigm could be explained. First, it could be argued that the final vowel in the second person singular is a theme vowel, and as it is word-final, it is a desinence, and therefore extrametrical. The imperative paradigm would thus have stem-final stress, derived by a LLR(S) edge parameter. Second, this contrast could be explained by resorting to quantity sensitivity, as will be explained later, in §8. Thirdly, I could also argue that the consonant /d/ cannot truly be a coda consonant, due to the restrictions on coda consonants in Spanish,
and so must have some sort of phantom vowel following it. This would thus result in a uniform penultimate paradigm, perhaps derived by a RRR(W) edge parameter setting.

4 The Three Syllable Window

Most Romance languages, including Spanish, conform to a three-syllable window for stress (Roca 1999). This originated in Latin, where it was derived by means of trochees, final extrametricality, and quantity sensitivity. Penults could get stressed if they were heavy, and final syllables could get stressed in monosyllables, and the antepenults would be stressed otherwise (Roca 1999). In Spanish and the other Romance languages, however, unlike in Latin, final extrametricality is not systematic, since final syllables can be stressed in polysyllabic words. Likewise, Spanish differs from Latin in not having a vowel length distinction, and so stressed penults are not always heavy. Thus, the three-syllable window in Spanish must be derived some other way.

The three-syllable window in Spanish must be more than simply a coincidence or historical artefact, as even borrowed words and proper names are modified to conform to it (Roca 2005). Additionally, Harris (1995) notes that native speakers judge nonce words with stress outside the three-syllable window as impossible words of Spanish.

The three-syllable window is derived straightforwardly from Roca’s (2005) and my use of variable edge parameters. Even if there were some bracket on some syllable outside of the three-syllable window, for whatever reason, it could never be pronounced because the ICC would always create a more rightward foot which would get stress. Note that the ICC on its own, without variable edge parameters, could only derive either a two-syllable window immediately on a word’s edge, or a two-syllable window one syllable away from
the word’s edge. But, in Spanish, any of the three syllables closest to the word edge can be stressed, but no others. Roca (1999) also argues that trochees are necessary in order to derive the three-syllable window, in order for the metrical structure to reach the antepenultimate syllable, which can be stressed if a trochee is followed by an extrametrical syllable. With iambs, on the other hand, stress could only fall on the final or the penultimate syllable, even if we allow for an extrametrical syllable.

5 Prosodic Adjuncts

In this section, I argue that the reason φ-morphemes behave differently than other morphemes in Spanish in terms of stress assignment is because they are prosodic adjuncts. These morphemes sometimes behave as if they are inside the Prosodic Word, and sometime behave like they are outside. This is characteristic of elements which are structural adjuncts. Van Oostendorp (2000, 2006) has an analogous analysis of Dutch inflectional affixes, in which he claims that they are visible for syllabification but not for stress assignment because they are prosodic adjuncts. Van Oostendorp (2000, 2006) further argues that the Dutch inflectional suffixes consist only of unmarked phonemes because complex phonological information is not licensed in prosodic adjunct positions. Spanish φ-morphemes are likewise phonemically restricted, as they are all monosyllabic, and they all end in either a vowel, an –s or an –n.\(^{20}\) Likewise, as discussed earlier, it appears as though desinences are not able to be marked with a lexical edge parameter setting, presumably because such lexical markings are not licensed in adjunct position.

\(^{20}\) Based on these facts, we can also infer that the 2PL imperative marking –d is not a prosodic adjunct, as a d is not licensed in adjunct position anywhere else. This morpheme must then also contain features other than φ, such as tense or mood.
Selkirk (2011) argues that prosodic structure is based on, but different from morphological structure. Primary evidence comes from the fact that prosody is influenced by non-syntactic factors, such as speech rate, and the fact that there are requirements outside of the syntax that influence the prosodic structure, such as the requirement in some languages that words be binary. However, the prosody is based on morphosyntax, as the prosody is constructed by matching certain syntactic units to certain prosodic units. For Dutch, van Oostendorp (2006, 2000) argues that inflectional affixes are adjuncts in the prosodic structure because they are adjuncts in the morphological structure, and the prosodic structure mirrors the morphological structure. In Spanish, on the other hand, the φ-morphemes in question do not have syntactic heads of their own, at least in the verbal complex. Rather, they appear as features on other heads as a result of agreement. They are realized as separate morphemes because processes of fission apply prior to Vocabulary Insertion, separating the features of a single head into multiple morphological units to be realized by different morphemes. When the prosody attempts to mirror the morphological structure, it gets stumped by these morphemes, and thus adjoins them into the structure instead of giving them a constituent of their own. Although there is likely a variety of φ-heads within nominal structure, it is possible that their features are realized on the noun head itself through agreement, as well, rather than through head movement. That this is the case is supported by the fact that nominal class markers in Spanish are idiosyncratic and do not directly correspond to gender. If this is the case, it is expected that they undergo fission and are realized as prosodic adjuncts, along with the verbal φ-morphemes.

Another analysis which is of interest was proposed under Distributed Morphology by Embick and Noyer (2007). They propose that certain features or nodes, including the
agreement morpheme and theme vowel in Latin verbs, are not added until PF. These are known as ornamental morphology or dissociated morphemes, and get their values through agreement or concord processes. It would thus follow that such morphemes behave differently at PF. However, there are three reasons why I do not think the ornamental morphology analysis is correct in this case. First, it appears as though subject-verb agreement is syntactically active in Romance. For example, Alexiadou and Anagnostopoulou (1998) argue that the agreement morpheme on verbs check the EPP in pro-drop Romance. Second, the presence of fusional morphemes which encode both for agreement and for unambiguously syntactic elements, such as tense, aspect, and mood, and which are always within the domain of stress indicates that the agreement morphology is present both at the time of stress assignment and at Vocabulary Insertion. Finally, both Roca (2005) and I have argued that some forms, such as the present tense, take the entire word, including agreement, as their domain for stress assignment, and, even in words which take the stem as their stress domain, portions of the stress assignment algorithm are sensitive to the agreement morpheme. For example, the ICC can see the plural morpheme in omicrónes. Thus, the agreement morpheme must already be there at stress assignment; however, the morpheme boundary is different somehow, such that it is visible. My proposal that the agreement morpheme is a prosodic adjunct, on the other hand, is consistent with these facts.

Pronoun clitics and the agreement morphemes share many characteristics, including the fact that they both encode for φ-features alone, and yet they behave differently in terms of stress assignment. Whereas agreement morphemes sometimes behave as though they are part of the stress assignment domain, clitics are always outside the domain of stress in
Spanish. The clitics must be in a separate domain than the agreement morpheme domain since words with word-level stress assignment (such as the present tense) still put the clitics outside the stress domain, as in cánta-me-lo ‘sing it to me.’ This may be simply because cliticization occurs after stress assignment. Alternatively, clitics may also be prosodic adjuncts, but adjoined higher in the structure than the agreement morphemes.

6 Alternative Approaches

6.1 Roca (1992)

Roca (2005) does not develop an analysis for Spanish verbs, but rather suggests that the verb stress algorithm would be similar to the one proposed in Roca (1992). It is developed in the framework of Halle and Vergnaud (1987), a precursor to the Idsardian framework used in Roca (2005). Note that portions of Roca’s (1992) analysis would be problematic if it were updated to the Idsardian system.

Roca (1992) argues that the Spanish verb consists maximally of 4 morphemes: the root, the theme vowel, the tense/aspect/mood (TAM) marker, and the person/number agreement marker. The TAM and the agreement markers are optional, but the theme vowel is obligatory. In the few cases where the theme vowel is not realized, he suggests that this is because it has been deleted or has been ablauted.21

There are three possible locations for Spanish stress, as shown in the table below.

21 Note that he does not independently argue for the deletion or the ablaut of the vowels, however.
The basic stress algorithm is as in (46).

Spanish verbal stress procedure (Roca 1992: 281)

<table>
<thead>
<tr>
<th>Parameter settings:</th>
<th>Line 0</th>
<th>Line 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head terminal</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Bound</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Headedness</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Directionality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Constituent conflation:* lines 1 and 2

This allows the derivation of the three basic patterns, as will be described below.

In paradigms with theme vowel stress, the theme vowel has a lexical accent. This is shown in (47) for the imperfect indicative. In his system, lexical accent is marked on a specific syllable in the lexicon (marked below with an asterisk), such that that syllable must be a constituent head on line 0.

(47) a. \( \text{x} \)
     \( (\text{x } \text{x}) \text{x} \)
     \( \text{*} \)
     can tás ba

b. \( \text{x} \)
     \( (\text{x } \text{x}) \text{x} \text{x} \)
     \( \text{*} \)
     can tás ba mos

The perfective follows the same system; however, in the 1SG and the 3SG, the final vowel has been ablauted, and so its identity as a theme vowel is obscured. This is shown for the 1SG in (48).

(48) \( \text{x} \)
     \( (\text{x } \text{x}) \)
     \( \text{*} \)
     can té
In forms where stress is borne by the TAM markers, the TAM marker also has a lexical accent. Since it is to the right of the theme vowel, and since line 1 is right-headed, it gets surface stress. This occurs in two paradigms. The future marker –re/-ra as well as the conditional marker –ria both bear lexical accents, as shown in (49).

\[
\begin{array}{c|c|c|c}
\text{Line 2} & \text{x} & \text{x} \\
\text{Line 1} & \text{(x x)} & \text{(x x)} \\
\text{Line 0} & \text{(x x)} & \text{(x x)} & \text{(x x)} & \text{(x x)} \\
\text{Lexical Accents} & * & * & * & * \\
\end{array}
\]

(Roca 1992: 282)

\[
\text{cant a ré} \quad \text{cant a rí a}
\]

Future 1SG \quad Conditional 3SG

Finally, forms with penultimate stress, including the present indicative and subjunctive, are derived by means of final extrametricality, as formalized by the rule in (50).

\[\text{a. In the present, make the word-final element extrametrical.} \]
\[\text{b. } x \rightarrow <x> / \_\_ \#_{\text{PRES}} \text{ line 0} \]

This applies vacuously when there is another syllable following the theme vowel (51b); conversely, in cases such as (51a), the theme vowel is extrametrical and so cannot get stressed, despite its lexical accent. This is odd, but permissible, under Halle and Vergnaud’s (1987) framework, but under an Idsardian approach, lexical accents and extrametricality are both derived by inserting brackets, and so this approach would not be possible.

\[
\begin{array}{c|c|c|c|c}
\text{Line 2} & \text{x} & \text{x} \\
\text{Line 1} & \text{(x x)} & \text{(x x)} & \text{(x x)} & \text{(x x)} \\
\text{Line 0} & \text{(x x)} & \text{(x x)} & \text{(x x)} & \text{(x x)} \\
\text{Lexical Accents} & * & * & * & * \\
\end{array}
\]

(Roca 1992: 283)

\[
\text{a. } x \quad \text{b. } x
\]
\[
\text{x} <x> \quad \text{(x x)} <x> \\
* \quad * \\
\text{cán ta} \quad \text{can tá mos}
\]

1SG present \quad 1PL present
Not all of the verb forms are discussed in this paper; he is missing the imperfect subjunctive, the irregular perfective past, the imperative, and non-finite verbs. However, it is simple to extend the analysis to account for at least the imperfect subjunctive and the irregular perfective past, which follow the theme vowel and the penultimate stress patterns, respectively.

Roca’s use of lexical accent creates coincidences when the patterns seem systematic. For example, all of the theme vowels carry lexical accent. In principle, then, there could be a fourth theme vowel which is exactly like one of the others, except that it does not bear a lexical accent. In an Idsardian framework, lexical accent is not marked by a diacritic directly on a certain syllable, as Roca (1992) does here, but by a bracket. In the non-verbs, Roca (2005) uses the variable edge parameters to replace lexical accent.

6.2 Harris (1995)

Harris (1995) also develops an account of Spanish stress in the framework of Halle and Vergnaud (1987), although it is easily adaptable to Halle and Idsardi’s (1995) framework. Harris uses a single basic stress algorithm, with some variations for verbs and two types of lexical accent. His basic stress algorithm for Spanish non-verbs is as in (52), below.

(52) a. Project ● for each nuclear X  
    b. Project ( for o[ ... XN X ... ] in nonverbs  
    c. Edge: RRR  
    d. ICC: R to L  
    e. Head: L  
    f. Delete unpaired (  
    g. Constraint: *(#

The main difference between Roca’s (2005) algorithm and this one is that Roca’s unmarked edge parameter setting was LLR, whereas Harris’ is RRR. These two different
edge parameter settings are able to derive the same surface patterns due to their differences in the way they state the final extrametricality constraint. In Roca’s algorithm, the constraint applies only to desinences, but in Harris’, it applies universally (52g). This forces Harris to argue that there are silent desinences in words with final stress. Both systems, then, derive stem-final stress, which is usually equivalent to penultimate stress in the unmarked case.

Some examples of non-verbs derived according to Harris’ algorithm are shown in (53). The example in (53a) illustrates a word with only light syllables, *mexicano* ‘Mexican,’ while the one in (53b) illustrates a word with only heavy syllables, *cantantes* ‘singers.’ Penultimate stress is derived in both.

\[
\begin{array}{cccc}
\text{(53) a.} & \text{(a)} & \text{(c)} & \text{(d)} \\
& \text{x x x x} & \text{x x x x} & \text{x (x x)} \\
& \text{me xi ca no} & \text{me xi ca no} & \text{me xi ca no} \\
\text{b.} & \text{(a)} & \text{(b) and (g)} & \text{(c)} & \text{(e) and (f)} \\
& \text{x x x} & \text{x (x x)} & \text{x (x x)} & \text{x x (x x)} \\
& \text{can tan tes} & \text{can tan tes} & \text{can tan tes} & \text{can tan tes} \\
& \text{(Harris 1995: 875)}
\end{array}
\]

As will be discussed in more detail in §8, Harris (1995) argues that, although Spanish non-verbs are quantity sensitive, verbs are quantity insensitive. This is the main difference between his algorithm for non-verbs, in (52), above, and his basic algorithm for verbs, shown in (54).

\[
\begin{array}{cccc}
\text{(54) a.} & \text{Project ● for each syllable head} & \text{(Harris 1995: 874-5)} \\
b. & \text{Edge: RRR} \\
c. & \text{ICC: R to L} \\
d. & \text{Head: L} \\
e. & \text{Delete unpaired (} \\
f. & \text{Constraint: *(●#}
\end{array}
\]
Rather than each nuclear segment, including on-glides in diphthongs, projecting into the metrical structure, as in (52a), only the syllable heads project in verbs (54a). As well, heavy syllables do not project brackets into the metrical structure in verbs, as they do in non-verbs (52b).

In Harris’ analysis, the marked patterns are derived by lexically marking certain morphemes to project a bracket to the left or to the right. For example, the imperfect and the imperfect subjunctive morphemes are lexically specified to insert a right bracket to their right, which triggers the extrametricality of any following morphemes. This essentially creates the exact same metrical structure as in Roca’s approach, as shown in (55) (cf. (30)). The only difference is that the bracket to the right of –ba is inserted due to the lexical rule above, rather than because of edge parameter settings.

(55)  

<table>
<thead>
<tr>
<th>a.</th>
<th>x</th>
<th>b.</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>(x</td>
<td>x)</td>
<td>x</td>
</tr>
<tr>
<td>can tá ba</td>
<td>can tá ba mos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3SG imperfect</td>
<td>1PL imperfect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-verbs with antepenultimate stress also bear this lexical specification. On the other hand, the future and the perfective past morphemes belong to another special lexical class, which insert a left bracket to the left of the leftmost metrical unit in the tense morpheme, which causes it to head a foot regardless of its word position. Again, this derives essentially the same metrical structure as Roca’s, as shown in (56) (cf. (35)). Again, the bracket preceding the past tense morpheme is inserted due to the above rule, rather than due to the edge settings.

(56)  

<table>
<thead>
<tr>
<th>a.</th>
<th>x</th>
<th>b.</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>(x</td>
<td>x)</td>
<td>x</td>
</tr>
<tr>
<td>can té</td>
<td>can tá mos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1SG perfective</td>
<td>1PL perfective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Both of these special rules are lexically associated with certain tense, aspect, and mood morphemes, which correctly predicts that these rules create contrasts between tenses. Furthermore, paradigms such as the future and the conditional, which intuitively pattern together with the same morpheme –r-, are derived by the same rule. However, there are several problems with this analysis. First, the presence of silent desinences is dubious, especially in the case of borrowed words, which never had a desinence, historically. Second, Harris introduces several systematic differences between the verbal and the non-verbal stress algorithms, whereas my analysis presents them in a much more unified manner. Finally, Harris’ analysis has less empirical coverage than Roca (2005), since he doesn’t account for the stress alternations in the plural of the supermarked forms.

6.3 Oltra-Massuet and Arregi (2005)

Oltra-Massuet and Arregi’s (2005) (henceforth OM&A) analysis of Spanish stress stems from Oltra-Massuet’s (1999) morphological analysis of Catalan, in which she accounts for the distribution and form of the different theme vowels of Catalan in the framework of Distributed Morphology. She makes three main claims that are carried over to Spanish in Arregi (2000) and OM&A (2005) without independent motivation. The first is that the theme vowels are composed of a set of features arranged in a markedness hierarchy. The second is a morphological well-formedness condition which requires that all non-defective syntactic functional heads have a Theme node adjoined to them. The third is that stress is projected from the morphosyntactic structure, and is therefore highly dependent on their particular morphological analysis of Spanish words. Although some details of their morphological analysis are questionable, even if we accept it, there are several problems with their approach.
6.3.1 Verbs

Oltra-Massuet and Arregi (2005) propose the stress algorithm for verbs in (57). The key component of this algorithm is in (57b), which inserts a parenthesis to the left of a syntactic head, T.

(57) Stress algorithm for Spanish verbs (OM&A 2005: 49)\(^{22}\)

a. Project a line 0 mark for each syllable nucleus.
b. Insert a right parenthesis to the left of T on line 0.
c. Project the rightmost mark of each line 0 foot onto line 1.
d. Insert a right parenthesis to the right of the rightmost mark on line 1.
e. Project the rightmost mark of each line 1 foot onto line 2.

The indicative and subjunctive imperfect both follow straightforwardly from the above algorithm. In the indicative, shown in (58), the –β– morpheme is the T head, and in the subjunctive, shown in (59), the –r– morpheme is the T head. As predicted, stress always immediately precedes the T head.

(58) x x x (OM&A 2005: 51)

<table>
<thead>
<tr>
<th>cant</th>
<th>ð</th>
<th>á</th>
<th>b</th>
<th>a</th>
<th>mos</th>
</tr>
</thead>
<tbody>
<tr>
<td>[√ [v Th]]</td>
<td>[[T Th] Agr]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1PL imperfect indicative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(59) x x x (OM&A 2005: 52)

<table>
<thead>
<tr>
<th>cant</th>
<th>ð</th>
<th>á</th>
<th>r</th>
<th>a</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>[√ [v Th]]</td>
<td>[[T Th] Agr]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2SG imperfect subjunctive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The future has a separate Future head F below T, as well as a T head. The T head is specified as [-Past]. When T is [-Past], it merges with Agr. Stress falls on the syllable preceding T/Agr, leading to the structure in (60).

\(^{22}\) This algorithm must also be augmented with a rule inserting lexically specified brackets, in order to account for all of the forms discussed here.
The conditional also has a separate Future head, and, as $T$ is specified as [+Past], there is no $T$/Agr fusion. Stress surfaces on the vowel preceding $T$, as shown in (61).

Note that OM&A (2005) treat the future and the conditional both as “future” tenses, with parallel underlying morphological and metrical structures. Roca (1992) also treats them both as morphological future tenses with similar metrical structures (cf. (47)), although in his account, which depends on lexical accent, the similarity of their metrical structure is coincidental. Morphologically, these two tenses share the same stem (the infinitive form), with the future taking the present tense inflectional morphemes, and the conditional taking the imperfect inflectional morphemes. In my account, these two verbal paradigms do not share the same edge parameters, and therefore, do not have parallel metrical structures. However, this is what we expect, given the right-headedness of Spanish stress. The rightmost element should be the one that determines the metrical properties of the form. In the conditional, this is the $-ia$ morpheme, which is shared with the imperfect, and, as expected, the conditional and the imperfect share the same stress pattern under my approach. The future and the present do not share edge parameter settings as it is unmarked.
on the present inflectional morphemes; the present RRR(W) setting is the default, and not lexically specified.

For the present indicative and subjunctive, OM&A argue that T and Agr merge since it is [-Past]. Stress in the 2SG, 3SG, and 3PL is one syllable retracted from what is predicted by OM&A’s algorithm, as shown in (62) for the indicative.

\[(62)\]

\[
\begin{array}{llll}
1SG & \text{cánt} & \emptyset & \emptyset & o \\
2SG & \text{cánt} & \emptyset & a & s \\
3SG & \text{cánt} & \emptyset & a & \emptyset \\
1PL & \text{cant} & \emptyset & \acute{\text{a}} & \text{mos} \\
2PL & \text{cant} & \emptyset & \acute{\text{a}} & \text{is} \\
3PL & \text{cánt} & \emptyset & a & \text{n} \\
& & [\sqrt{v} \text{ Th}] & T/Agr \\
\end{array}
\]

They thus propose the rule in (63), which results in the forms in (64).

\[(63)\]

\[
\text{Stress Deletion (in present tenses)\textsuperscript{24} (OM&A 2005: 61)}
\]

\[
x \rightarrow . / x \underline{______} ) #
\]

\[(64)\]

\[
a. \quad \text{x} \quad (\text{OM&A 2005: 60})
\]

\[
\begin{array}{llll}
\text{pårt} & \emptyset & \emptyset & o \\
& [\sqrt{v} \text{ Th}] & T/Agr & 1SG \text{ indicative}
\end{array}
\]

\[
b. \quad \text{x} \quad (\text{OM&A 2005: 61})
\]

\[
\begin{array}{llll}
\text{pårt} & \emptyset & e & s \\
& [\sqrt{v} \text{ Th}] & T/Agr & 2SG \text{ indicative}
\end{array}
\]

\[
c. \quad \text{x} \quad (\text{OM&A 2005: 60})
\]

\[
\begin{array}{llll}
\text{part} & \emptyset & \acute{\text{a}} & \text{is} \\
& [\sqrt{v} \text{ Th}] & T/Agr & 2PL \text{ subjunctive}
\end{array}
\]

\textsuperscript{23} This could also explain why the irregular perfective also takes the RRR(W) edge parameter settings. In the irregular paradigms, the lexical edge parameter is somehow removed, and the default emerges.

\textsuperscript{24} This rule has to be restricted to the present tense since the configuration it removes is permitted in, for example, the future.
The perfective past has very similar underlying structure to the imperfect, with the exception that T/Agr are merged. This is despite the fact that OM&A argue that T/Agr merger should happen when T is [-Past]. This is illustrated with the 2SG in (65).

\[
(65) \quad x \quad (\text{OM&A 2005: 57})
\]
\[
\begin{array}{c}
\text{can} & \emptyset & \text{ste} \\
\sqrt{v} & \text{Th}] & \text{T/Agr} & \text{2SG perfective}
\end{array}
\]

The 3SG form is an exception to OM&A’s analysis, since stress falls on the T/Agr morpheme. OM&A suggest that the 3SG perfective morpheme is lexically specified to project a line 0 parenthesis to its right. Line conflation then removes the secondary stress.

\[
(66) \quad x \quad (\text{OM&A 2005: 58})
\]
\[
\begin{array}{c}
\text{tem} & \emptyset & \text{ö} \\
\sqrt{v} & \text{Th}] & \text{T/Agr} & \text{3SG perfective}
\end{array}
\]

There is also a set of irregular perfective past verbs, such as the verb *querer* ‘to like/love,’ shown in (67).

\[
(67) \quad 1\text{SG} \quad \text{quise} \quad (\text{OM&A 2005: 58})
\]
\[
2\text{SG} \quad \text{quisiste}
\]
\[
3\text{SG} \quad \text{quiso}
\]
\[
1\text{PL} \quad \text{quisimos}
\]
\[
2\text{PL} \quad \text{quisisteis}
\]
\[
3\text{PL} \quad \text{quisieron}
\]

OM&A propose that these verbs are specially marked as being subject to the stress deletion rule in (63), resulting in the forms in (68). Recall that, in the imperfect, OM&A argue that the 3SG morpheme –*o* has a lexically specified left parenthesis, which is shown in (68b). These are both illustrated with forms of the verb *poner* ‘to put.’
There are two forms of the imperative, as shown in (69). The forms for all other persons are the same as in the subjunctive.

OM&A argue that, in the imperative, T and Agr fuse. The 2SG form is subject to the stress deletion rule, resulting in the derivation in (70).

The 2PL form, on the other hand, is regular, as shown in (71).

The reason why the stress deletion rule applies to one form, but not the other, is unexplained.

### 6.3.2 Non-verbs

OM&A (2005) propose that stress in non-verbs is derived using the rule in (72).
This differs from the verb algorithm since the parenthesis is inserted to the right of the functional node, whereas in the verb algorithm, it is inserted on the left. For nouns, the functional node which inserts the parenthesis is the category determining head $n$, as shown in (73).

(73)  

a. Vocalic class marker  

\[
\begin{array}{c}
\text{x} \\
\text{x } ) \text{x} \\
\text{més } \emptyset \text{ a } \text{‘table’} \\
\sqrt{\text{n}} \text{ Th}
\end{array}
\]

b. Zero-class marker  

\[
\begin{array}{c}
\text{x} \\
\text{x x) } \\
\text{ver } \text{dád } \emptyset \text{ ‘truth’} \\
\sqrt{\text{n}} \text{ Th}
\end{array}
\]

c. Zero-class marker and zero-$n$  

\[
\begin{array}{c}
\text{x} \\
\text{x x) } \\
\text{ca } \text{fè } \emptyset \emptyset \text{ ‘coffee’} \\
\sqrt{\text{n}} \text{ Th}
\end{array}
\]

d. VC class marker  

\[
\begin{array}{c}
\text{x} \\
\text{x ) } \text{x} \\
\text{vir } \emptyset \text{ us } \text{‘virus’} \\
\sqrt{\text{n}} \text{ Th}
\end{array}
\]

e. Inflected for plural (cf. (b))  

\[
\begin{array}{c}
\text{x} \\
\text{x x) } \text{x} \\
\text{ver } \text{dád } \text{e } \text{s } \text{‘truths’} \\
\sqrt{\text{n}} \text{ Th Pl}
\end{array}
\]

There are some cases where stress is further to the left than we would predict from the above algorithm. Those roots must be lexically marked. Even if they are lexically
marked, all the rules in their algorithm are right-headed, but the root is on the left. Thus, the clash avoidance rule in (74) is also necessary.\textsuperscript{25}

(74)\hspace{1em}\text{Clash Avoidance (OM&A 2005: 69)}
\text{*)x) (in non-verbal environments)}

This results in the forms in (75), where the bolded parentheses are the lexically marked ones, and *) refers to a parenthesis which should but cannot be inserted due to clash avoidance.

(75)\hspace{1em}a.\hspace{1em}Antipenultimate stress\hspace{1em}(OM&A 2005: 70-71)
\[
\begin{array}{c}
\text{co} \\
\text{ler} \\
\sqrt{n} \\
\text{Th}
\end{array}
\]
\[
\text{x) } x \text{ *) } x \\
\text{anger}
\]

\hspace{1em}b.\hspace{1em}Penultimate stress with zero-n
\[
\begin{array}{c}
\text{ces} \\
\text{ped} \\
\sqrt{n} \\
\text{Th}
\end{array}
\]

Finally, the supermarked forms must have two lexical accents, in addition to being subject to both a rule that deletes their final gridmark, as in (76), and the stress deletion rule in (77), which was first proposed to account for the present tense, in (63). This is all required in order to derive both the singular and the plural with the same distribution of lexical accents on the root.\textsuperscript{26}

\textsuperscript{25} OM&A claim that this rule also results in the three-syllable window for stress assignment—stress may appear in any of the three final syllables, but no others. However, Roca (2005) points out that it should be possible to combine this rule with the other stress retraction and deletion rules that OM&A propose over the course of their analysis, resulting in stress outside the three-syllable window. This is shown below, in (80).

\textsuperscript{26} OM&A only briefly discuss these forms in a footnote; it is Roca (2005) that works it out and presents the derivation.
(76) \( \sigma \)-head deletion (as formulated by Roca 2005)
\[ x \rightarrow \cdot / \_\_\# \]

(77) Stress deletion (OM&A 2005: 61)
\[ x \rightarrow \cdot / x \_\_\# \]

Thus, the derivation for \textit{régimen} proceeds as in (78a), and its plural counterpart \textit{regímenes} is derived as in (78b).

(78) a. lexical brackets \hspace{1cm} \sigma-head deletion \hspace{1cm} stress deletion/projection

\begin{align*}
\text{a)} & \quad \text{x) x) x} \\
\text{regi men} & \quad \text{x) x) .} \\
\text{\_ n Th} & \quad \text{x) x) \_ n Th} \\
\text{b)} & \quad \text{x) x) x x} \\
\text{regi men} & \quad \text{x) x) x .} \\
\text{es} & \quad \text{x) x) x es} \\
\text{\_ n Th} & \quad \text{x) x) x es} \\
\end{align*}

(Roca 2005: 374)

One further interesting case is the alternation between \textit{kilómetro} and \textit{métro}. OM&A argue that this is derived by means of a lexical bracket, as in \textit{metro}, so that it is pre-stressing. The lexical accent gets deleted when the form appears on its own, allowing the normal parenthesis to be inserted. This is an unusual analysis as the word-initial \textit{m} is not a syllable nucleus, and so would not normally be marked with a parenthesis. As mentioned before, however, Roca (2005) argues that \textit{metro} is RRR(S), but that only in the untruncated form is there sufficient syllables for that to surface.

Finally, OM&A (2005) argue that non-finite verbs behave morphologically like non-verbs, due to some functional “non-finite” (NF) head above the verbal layer. As with other non-verbs, a right parenthesis is inserted to the right of this functional head. This is shown for the verb \textit{purificar} ‘purify’ in (79).
This, of course, raises the question of why, exactly, non-finite verbs function like non-verbs. Specifically, why does the NF pattern with non-verbal functional heads rather than verbal ones?

6.3.3 Discussion

Both Roca (2005) and OM&A (2005) develop their analysis in the framework of Idsardi (1992) and Halle & Idsardi (1995), and both make use of the stem-desinence distinction in non-verbs. However, where Roca has independent verb and non-verb stress algorithms, OM&A have a somewhat unified system, although they also require some verb and non-verb specific rules. My account is even more unified, as the same algorithm applies equally to all forms, regardless of word category. Roca’s approach is largely independent of morphosyntax, but OM&A’s is highly dependent on it, as they have brackets inserted directly by morphosyntactic structures. Mine, on the other hand, explains all apparent dependence on morphosyntactic structure by arguing for a difference in prosodic structure. This is preferable, since it limits the access that the phonology has to the morphosyntax. The relative markedness of the different forms is derived by parameter settings under Roca’s account and my extension thereof, whereas it is derived by means of lexical brackets and various ancillary rules in OM&A’s account. The three-syllable window for stress is derived in a principled way by Roca’s and my account, but in OM&A’s account, it is possible to break it. Roca (2005) demonstrates this with the
hypothetical word *Kálevalan*, which has no desinence and two lexical accents, shown in (80).

<table>
<thead>
<tr>
<th>lexical representation</th>
<th>σ-head deletion</th>
<th>[Roca 2005: 380]</th>
</tr>
</thead>
<tbody>
<tr>
<td>x) x x) x ∅ ∅</td>
<td>x) x) . ∅ ∅</td>
<td>ka le va lan n Th</td>
</tr>
<tr>
<td>ka le va lan n Th</td>
<td>ka le va lan n Th</td>
<td></td>
</tr>
</tbody>
</table>

Roca makes use of a binary trochee, which is continuous with Latin, where OM&A use an unbounded iamb. Perhaps most importantly, though, Roca’s empirical coverage, within non-verbs, is greater. OM&A do not account for either Roca’s RRR(W) class, such as *carácter ~ carácteres*, or his RLR(S) class, such as *ómicron ~ omicrónes*. OM&A only briefly mention the former, suggesting that its lexical bracket gets deleted in the plural, and do not mention the latter at all.

OM&A’s (2005) account is not without its problems. Firstly, independent support for their morphological analysis is necessary. Particularly, the pattern of when T and Agr merge or do not merge seems arbitrary; their proposed generalization that they merge when the verb is [-Past] only works some of the time. Likewise, the stress deletion rule, which applies to an odd collection of forms, including the present tenses, the irregular imperfect, the 2sg imperative, and a class of nouns, should be constrained in some principled way.

Thus, their analysis is dependent on a very specific and problematic morphological analysis and requires several additional rules. These rules also complicate the system and make it less than elegant.
6.4 Roca (2006)

Roca (2006) accounts for Spanish non-verb stress within an Optimality Theory (OT) framework (Prince and Smolensky 1993). It is in many ways similar to his derivational account in Roca (2005). The basic constraint ranking he argues for is shown in (81), and the constraints are defined in (82).

(81)  \( \text{AL-Σ}] >> \text{AL-vider], PARSE} \sigma >> \text{TROCH} \)

(82)  a.  \( \text{AL-Σ}]: \) the right edge of any foot coincides with the right edge of the stem  
      b.  \( \text{AL-vider}]: \) the stressed vowel is last in the stem  
      c.  \( \text{PARSE} \sigma]: \) syllables are parsed into feet  
      d.  \( \text{TROCH}]: \) feet are left-headed

This system derives desinence stresslessness since \( \text{AL-Σ}] \) outranks \( \text{PARSE} \sigma \). In both this system and in Roca (2005), stress is trochaic, because of \( \text{TROCH} \), and right-aligned, because of the two alignment constraints in (82a) and (82b).

Roca (2006) derives the marked stress pattern by proposing the additional constraint in (83), below.

(83)  \( \text{FTBIN}^\# \text{min*}: \) feet are minimally binary (in terms of moras)

This constraint is lexically specified as applying only to marked forms. It is ranked as in (84).

(84)  \( \text{AL-Σ}] >> \text{FTBIN}^\# \text{min*} >> \text{AL-vider}], \text{PARSE} \sigma >> \text{TROCH} \)

Since it requires binary feet and outranks \( \text{AL-vider}] \), it results in antepenultimate stress.

Likewise, supermarked forms are lexically specified as being subject to two more additional constraints, shown in (85).

(85)  a.  \( \neg \text{AL-Σ}^{**}: \) a foot and a stem are not right-aligned  
      b.  \( \neg \text{AL-Σ}^{***}: \) a foot and the edge of a word are not right-aligned
These constraints are ranked as in (86), and result in the primary-stressed foot to shift further from the right edge.

\[(86) \quad \neg AL\Sigma \|^* > > \neg AL\Sigma \|^* > > AL\Sigma ] > > \text{FtBin}^\# \text{min}* , \ AL\check{v} , \ \text{PARSE} \sigma > > \text{TROCH}\]

Note that the number of asterisks indicates which class of forms a constraint applies to. That is, a noun lexically marked with a single asterisk will be subject to \text{FtBin}^\# \text{min}* , whereas a noun with two asterisks will be subject to both \text{FtBin}^\# \text{min}* and \neg AL\Sigma \|^* , but not \neg AL\Sigma \|^* , and so forth.

Thus, this system has the same empirical coverage as Roca (2005), deriving the marked and supermarked forms by lexically specifying that they are subject to a different set of constraints. However, just as with Roca (2005), this system does not account for both verbs and non-verbs, but rather requires an independent account of verbs. Furthermore, he is forced to resort to anti-alignment constraints to account for the supermarked forms, which is questionable since anti-alignment constraints are motivated neither by markedness nor by faithfulness.

### 7 The Origins of Spanish Stress

#### 7.1 Stress in Latin

As it is a Romance language, Spanish is a descendant of Latin, and its stress system developed out of the Latin stress system. Stress in Latin was rather straightforward. If there was a heavy penult, it received primary stress; otherwise, the antepenult received stress. If the word was shorter than three syllables, the initial syllable received stress (Roca 1999: 659).
Roca (2005) derives Latin stress in the framework of Halle and Idsardi (1995) and Idsardi (1992) through the algorithm in (87). The Stress-by-Position (SBP) rule in (i) results in quantity sensitivity in Latin by inserting a parenthesis next to heavy syllables. The edge rule in (ii) demarcates the edge of the stress domain by inserting a bracket which makes the final syllable extrametrical. The avoidance constraint in (vii) also prevents the final syllable from projecting, even if it is heavy. The Iterative Constituent Construction (ICC) rule in (iii) parses the syllables into binary feet, proceeding leftwards from the right edge. Finally, the head rule in (iv) turns those feet into trochees by projecting the leftmost element as head. The edge and head rules for line 1 in (v) and (vi) then project the head of the rightmost trochee, making it the primary stress in the word, while the conflation rule in (viii) removes all of the secondary stresses.

(87) Stress in Classical Latin (Roca 2005: 354)

Line 0

(i) SBP: L(X) (put a left parenthesis to the left of a heavy syllable)
(ii) Edge: RLR (put a right bracket to the left of the rightmost element)
(iii) ICC: L (put a left bracket after every other element, proceeding leftwards from the right edge)
(iv) Head: L (project the leftmost element as head on the next line)

Line 1

(v) Edge: RRR
(vi) Head: R

Other

(vii) avoidance constraint: *x(x#
(viii) conflation: line 1

Roca (2005) illustrates this algorithm step-by-step with the form in (88).
7.2 From Latin to Spanish

Since the Classical Latin era, most Romance languages have lost contrastive vowel length and undergone various processes of syncope and apocope (Roca 1999). All of these changes would result in a change of the surface position of stress if the underlying stress algorithm had stayed the same. And yet, the surface stress has stayed in the same position for most forms in most Romance languages. Descriptively, Spanish stress differs from Latin stress in two ways: it has cases of word-final stress, whereas final extrametricality is exceptionless in polysyllabic words in Latin; and light penults can bear stress in words of more than two syllables, which is impossible in Latin (Roca 2005). In Latin, the three-syllable window for stress was derived by a combination of trochaic feet and final extrametricality. However, although final extrametricality was reanalyzed as desinence extrametricality, the three-syllable window for stress is maintained in Modern Spanish.

Roca argues that the stress algorithm for Latin underwent only a few changes in its development into Spanish non-verbs. The biggest change affected the line 0 edge rule in (85ii), which became lexically parametrized, allowing for both penultimate and antepenultimate stress, regardless of syllable weight. Secondly, the avoidance constraint in (85vii) was restricted to applying only if the final syllable was a desinence. As such, final...
stress is possible in words without a desinence. Finally, it is up for debate whether the SBP rule in (85i), which derives quantity sensitivity, still applies in Spanish. The arguments for and against quantity sensitivity will be discussed in §8.

7.3 **Triggers for Change**

Since he argues for different algorithms for verbal and non-verbal stress, and since Latin had a single system for both, Roca (2005) proposes that a series of changes in the verbal paradigms led to the differentiation between the two algorithms. First, in the past tenses, stress shifted to be uniform across the paradigm, and new future and conditional tenses were formed which also had uniform stress across their paradigm. However, it seems more plausible that the surface stress shift is the result of an underlying stress algorithm change, rather than that a spontaneous surface shift caused the algorithm to change. Thus, I propose that the stress algorithm changed in parallel for both verbs and non-verbs, due, at least in part, to the loss of contrastive vowel length, and the stress shifts which occurred in the verbs and the location of stress in the new tenses that were formed both conform to the new underlying stress algorithm.

Vowel length in Latin ceased to be contrastive before the fall of the Roman Empire, since, in Vulgar Latin, the vowel length distinction was gradually replaced by a vowel quality distinction (Lloyd 1987, Lathrop 1996). At this stage, the position of stress, which was entirely predictable in Latin, became opaque, since stress was no longer correlated with syllable weight. Rather than shifting the position of stress, and maintaining the stress algorithm, the surface position of stress was maintained in nearly all words, and the algorithm was reanalyzed.
At around the same time, syncope, the deletion of unstressed vowels, started to be applied more regularly. Syncope had been operational as an optional process since prehistoric Latin (Lloyd 1987); however, throughout the development of Latin into Spanish, it gradually increased in use until it became phonologically regular (Lloyd 1987). Syncope was already being used frequently in Vulgar Latin (Lathrop 1996, de Ridder 1977). At this point, then, penultimate stress would have became much more common. Words which had had a historical long vowel were stressed on the penult due to inertia from the Classical Latin system, while words which had been stressed on the antepenult frequently underwent syncope, deleting the penult, which again resulted in surface penultimate stress. This is shown in (89a) for a word with a historically long penult and in (89b) with a historically short penult.

(89) \[
\begin{array}{c|c|c|c}
\text{Classical Latin} & \text{Loss of} & \text{Syncope} & \text{Late} \\
\text{vowel length} & \text{Vulgar Latin} \\
\hline
a. & \sigma & \acute{\sigma} & \sigma & \sigma & \sigma & \sigma \\
\hline
b. & \acute{\sigma} & \sigma & \sigma & \sigma & \sigma & \sigma
\end{array}
\]

At this point, penultimate stress became the most common pattern, leading to the fact that the unmarked stress pattern in Modern Spanish results in penultimate stress.

In the next few sections, I will show how the Spanish stress pattern developed out of the Latin one for each of the non-verbal stress classes and each of the verbal paradigms.

7.4 Non-verb Stress

7.4.1 Unmarked Forms

The unmarked non-verb forms all developed entirely regularly out of their Latin predecessors. In Spanish, these have the LLR(S) edge parameter setting, which causes
them to surface with penultimate stress. Their Latin counterparts likewise had long penults, causing them to also have penultimate stress. Some examples are shown in (90).  

<table>
<thead>
<tr>
<th>Latin</th>
<th>Declension Class</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nom SG</td>
<td>NOM PL</td>
<td>ACC SG</td>
</tr>
<tr>
<td>amígus</td>
<td>amícī</td>
<td>amícum</td>
</tr>
<tr>
<td>měnsa</td>
<td>měnsae</td>
<td>měnsam</td>
</tr>
</tbody>
</table>

Interestingly, nearly all of the words which do not have a desinence in Modern Spanish are either borrowed (Roca 2006), or are descended from a Latin third declension noun, which had a suffixless, suppletive nominative singular form. That these words are desinenceless in Modern Spanish appears to be the result of the influence of the Latin nominative singular, which had no case inflection to serve as a historical origin for a desinence. These words would not have had final stress in the suppletive nominative singular; however, they would have had stress on the final syllable of the stem in the rest of the forms, which is where the stress still surfaces in Modern Spanish.

<table>
<thead>
<tr>
<th>Spanish</th>
<th>Latin</th>
<th>Declension Class</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM SG</td>
<td>NOM PL</td>
<td>ACC SG</td>
<td>ACC PL</td>
</tr>
<tr>
<td>amór</td>
<td>amor</td>
<td>amórēs</td>
<td>amórēm</td>
</tr>
<tr>
<td>animál</td>
<td>animal</td>
<td>animālia</td>
<td>animal</td>
</tr>
</tbody>
</table>

In considering these forms, it is also clear why the stress does not alternate in the plural in Modern Spanish. The surface position of stress is actually taken from the plural (and the singular of the forms from other cases), and spread due to paradigm levelling to the singular.

---

27 The Latin cognates to Spanish words here and following were determined using Munguía (2001), and their declined forms were based on Panhuis (2006) and Breslove and Hooper (1958). Stressed syllables are in bold.

28 There are also a few, such as mamá and papá, which are neither borrowed nor descended from the third declension. These are words which are common in child speech, which Roca (2006) claims has a preference for final stress.
7.4.2 Marked Forms

The marked forms in Modern Spanish have the RRR(S) edge parameter setting, which results in antepenultimate stress. These correspond to Latin words with light penults, as exemplified in (92), which would therefore also surface with antepenultimate stress.

<table>
<thead>
<tr>
<th>(92)</th>
<th>Spanish</th>
<th>Latin</th>
<th>Declension Class</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM SG</td>
<td>NOM PL</td>
<td>ACC SG</td>
<td>ACC PL</td>
<td>NOM SG</td>
</tr>
<tr>
<td>epístola</td>
<td>epístola</td>
<td>epistolae</td>
<td>epístolam</td>
<td>epístolās</td>
</tr>
<tr>
<td>sábana</td>
<td>sábanum</td>
<td>sabana</td>
<td>sábanum</td>
<td>sabana</td>
</tr>
</tbody>
</table>

As with the unmarked forms, words without a desinence tend to come from the third declension class. However, unlike those shown in (91), these had light penults in all the non-suppletive forms.\(^{29}\)

<table>
<thead>
<tr>
<th>(93)</th>
<th>Spanish</th>
<th>Latin</th>
<th>Declension Class</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM SG</td>
<td>NOM PL</td>
<td>ACC SG</td>
<td>ACC PL</td>
<td>NOM SG</td>
</tr>
<tr>
<td>crímen</td>
<td>crīmen</td>
<td>crīmina</td>
<td>crīmen</td>
<td>crīmina</td>
</tr>
<tr>
<td>lápiz</td>
<td>lapis</td>
<td>lapidēs</td>
<td>lapidem</td>
<td>lapidēs</td>
</tr>
</tbody>
</table>

7.4.3 Supermarked Forms

A number of the supermarked forms are learned, coming straight from written Classical Latin, skipping the phonological changes that were in effect in Vulgar Latin (Lathrop 1996, Roca 2006). Lathrop (1996) further claims that, although most Spanish nouns were descended from the Latin accusative forms, a few forms, including the supermarked espécimen, régimen, and carácter, were descended from the nominative.

One pattern does emerge when considering the development of the supermarked forms in Spanish; they all originated from Latin paradigms which had a stress alternation

\(^{29}\) The special –men 3rd declension class had syncretism between the nominative, the accusative, and the vocative in both the singular and the plural.
between the singular and the plural, leading to the alternations still present in Modern Spanish. This can be seen in the RRR(W) *carácter*, shown in (94), which was in the third declension in Latin.

<table>
<thead>
<tr>
<th>(94)</th>
<th><strong>Spanish</strong></th>
<th><strong>Latin</strong></th>
<th><strong>Gloss</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SG</td>
<td>PL</td>
<td>NOM SG</td>
<td>NOM PL</td>
</tr>
<tr>
<td>carácter</td>
<td>caractéres</td>
<td>carácter</td>
<td>caractèrēs</td>
</tr>
</tbody>
</table>

Both of the RLR(W) forms, *régimen* and *espécimen*, belong to the special –men 3rd declension class, just as did *crímen*, shown in (93), above. However, where *crímen* had a long penult, and therefore did not have a stress alternation, both of the supermarked forms have a short penult, resulting in the contrast in stress patterns.

<table>
<thead>
<tr>
<th>(95)</th>
<th><strong>Spanish</strong></th>
<th><strong>Latin</strong></th>
<th><strong>Gloss</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SG</td>
<td>PL</td>
<td>NOM SG</td>
<td>NOM PL</td>
</tr>
<tr>
<td>régimen</td>
<td>regímenes</td>
<td>regimen</td>
<td>regimina</td>
</tr>
<tr>
<td>espécimen</td>
<td>especímenes</td>
<td>specimen</td>
<td>specimina</td>
</tr>
</tbody>
</table>

There are two RLR(S) words, *ómicron* and *júnior*. Since *ómicron* was borrowed from Greek, it gives us little evidence as to how the RLR(S) pattern developed out of Latin. On the other hand, *júnior* originated out of the comparative of *juvenis* ‘young.’ It is also part of the third declension. The table in (94) shows its masculine/feminine forms.

<table>
<thead>
<tr>
<th>(96)</th>
<th><strong>Spanish</strong></th>
<th><strong>Latin</strong></th>
<th><strong>Gloss</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SG</td>
<td>PL</td>
<td>NOM SG</td>
<td>NOM PL</td>
</tr>
<tr>
<td>júnior</td>
<td>juntióres</td>
<td>junior</td>
<td>junióres</td>
</tr>
</tbody>
</table>

Unlike most of the other 3rd declension words with a suppletive nominative singular, this paradigm was not levelled—the antepenultimate stress of the Latin nominative singular was continued to form the Modern Spanish singular, and the penultimate (or stem-final) stress of the nominative and accusative plurals was continued to form the Modern Spanish plural.
7.5 Verb Stress

7.5.1 The Present Tense

According to Lathrop (1996), the stress pattern of the present tense developed as follows. In Classical Latin, verbs could be stressed on either syllable of the verb root, since different persons had inflectional endings of different lengths. In Vulgar Latin, the stress levelled such that every root had consistent stress across the entire paradigm; however, different roots followed different patterns. The Vulgar Latin stress was maintained in Modern Spanish, but because of the application of syncope, this resulted in regular penultimate stress, derived by means of the RRR(W) edge parameter.

<table>
<thead>
<tr>
<th>(97)</th>
<th>CLASSICAL LATIN</th>
<th>VULGAR LATIN</th>
<th>MODERN SPANISH</th>
<th>GLOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>ápério</td>
<td>ápéro</td>
<td>ábro</td>
<td>‘to open’</td>
</tr>
<tr>
<td>2SG</td>
<td>ápéris</td>
<td>ápéris</td>
<td>ábres</td>
<td></td>
</tr>
<tr>
<td>3SG</td>
<td>ápérit</td>
<td>ápérit</td>
<td>ábre</td>
<td></td>
</tr>
<tr>
<td>1SG</td>
<td>succútio</td>
<td>sacúdo</td>
<td>sacúdo</td>
<td>‘to shake’</td>
</tr>
<tr>
<td>2SG</td>
<td>súccutis</td>
<td>sacúdes</td>
<td>sacúdes</td>
<td></td>
</tr>
<tr>
<td>3SG</td>
<td>súccutit</td>
<td>sacúdo</td>
<td>sacúde</td>
<td></td>
</tr>
</tbody>
</table>

7.5.2 The Imperfect

In both the indicative and the subjunctive imperfect, stress varied in Vulgar Latin, but then regularized to be on the same vowel in the same morpheme in Spanish, as shown in (98a) for the indicative, and (98b) for the subjunctive. In both cases, the stress on the

---

30 Lathrop does not provide any examples of or discuss the plural forms. This is unfortunate, since the plural forms have longer agreement morphemes, and are therefore more likely to participate in stress shifts. He also does not provide the 3SG Classical Latin forms; those are taken from Panhuis (2006).

31 There are actually two different forms that the imperfect subjunctive can take in Spanish. There is reportedly no semantic difference between them. They are very similar and share the same stress patterns. The one I’ve been writing about up to now is the other one from the one shown here.
first and second person plurals shifted back one syllable, as those forms had the longest inflectional endings.

(98) | **VULGAR LATIN** | **SPANISH** | ‘to call’ | (Lathrop 1996: 174)
---|---|---|---|---
a. 1SG clamába | llamába<br>b. clamábas | llamábas<br>c. clamábat | llamába<br>d. clamábamus | llamábamos<br>e. clamabátis | llamábais<br>f. clamábant | llamában

b. 1SG bibísse | bebiése | ‘to drink’ | (Lathrop 1996: 185)
---|---|---|---
1SG bibísses | bebiéses<br>2SG bibisset | bebiése<br>3SG bibissémus | bebiésemos<br>1PL bibissétis | bebiéseis<br>3PL bibissent | bebiése

Thus, both these forms underwent stress levelling at some point between Vulgar Latin and Old Spanish, taking on the RRR(S) edge settings.

7.5.3 The Future and the Conditional

The conditional mood is historically descended from a periphrastic construction involving the infinitive of the content verb and the imperfect form of the verb *haber* ‘to have’ (Lloyd 1987, Roca 1999), as shown in (99).

(99) | **VULGAR LATIN** | **OLD SPANISH**
---|---|---
1SG cántar + ía | cantaría<br>2SG cántar + ías | cantarías<br>3SG cántar + ía | cantaría<br>1PL cántar + íamos | cantaríamos<br>2PL cántar + íais | cantaríais<br>3PL cántar + ían | cantarían

Presumably, both words in the periphrastic construction were stressed in early Romance. When they synthesized, one of the stresses had to be dropped. The rightmost stress survived, as is normal for compound words, resulting in a RRR(S) form, which stressed the tense morpheme. The conditional, along with the two imperfect forms discussed above, all
take the same edge parameter setting. Likely, at the point in which the conditional synthesized into a single word, the modern edge parameter settings of the imperfect had already been settled, which explains why both the conditional and the imperfect forms share the same stress patterns.

The future tense developed similarly to the conditional, developing this time out of a periphrastic tense construction involving the present tense of *haber*, and resulting in a LLR(S) stress pattern, as shown in (100).

<table>
<thead>
<tr>
<th>VULGAR LATIN</th>
<th>OLD SPANISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG cântar hé</td>
<td>cantaré</td>
</tr>
<tr>
<td>2SG cântar hás</td>
<td>cantarás</td>
</tr>
<tr>
<td>3SG cântar há</td>
<td>cantará</td>
</tr>
<tr>
<td>1PL cântar hemos</td>
<td>cantarémos</td>
</tr>
<tr>
<td>2PL cântar héis</td>
<td>cantaréis</td>
</tr>
<tr>
<td>3PL cântar hán</td>
<td>cantarán</td>
</tr>
</tbody>
</table>

Again, it is clear that it is the stress on *HABER*, the rightmost word, that was continued. However, because the present tense forms of *HABER* are reduced, containing, in some cases, only a single syllable, there was not enough room for the penultimate stress pattern that is normally the result of the present tense, RRR(W), to surface. Instead, the single-syllable forms bore stress on their only syllable head. After the periphrastic tense was melded into a single word, this was reanalyzed as the modern LLR(S) pattern.

7.5.4 The Perfective Past

There are two conjugational patterns that the perfective past can take—the regular and the irregular—each with their own stress pattern—LLR(S) and RRR(W), respectively. This is shown for the regular verb *temer* ‘to fear’ and the irregular *querer* ‘to want’ in (101).
Diachronically, the irregular perfective is based on the Classical Latin weak perfective paradigms, whereas the regular perfective was based on the strong perfective paradigms. The weak and the strong forms were distinguished by length of the inflectional markers, and therefore, stress, and so the fact that they have different stress patterns in modern Spanish is unsurprising.

There were many different conjugational patterns that the perfective could take in Classical Latin. By Vulgar Latin, all of the strong perfects, which later developed into the regular preterite, consisted of a root, followed by the theme vowel and a single syllable agreement marker, as shown in (102).

At this point, because the agreement morpheme was of a uniform length, and all the forms had regular penultimate stress, the stress pattern was ambiguous between RRR(W) and LLR(S). Since this time, however, the 1SG and 3SG agreement morphemes have fused with the theme vowels, and thus were no longer counted as desinences. At that point, the regular
preterites retained the LLR(S) setting, while the irregular ones retained the RRR(W), resulting in the modern stress patterns.

### 7.5.5 The Imperative

Although the edge parameter settings for the imperative are difficult to determine, due to the fact that the paradigm contains only two forms, it is clear that these two forms developed regularly out of their Latin counterparts, as can be seen below for the verb *llamar* ‘to call.’

(103)  
<table>
<thead>
<tr>
<th>Classical Latin</th>
<th>Modern Spanish (Peninsular)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2SG clamā</td>
<td>lláma</td>
</tr>
<tr>
<td>2PL clamāte</td>
<td>llamád</td>
</tr>
</tbody>
</table>

Because there are only two forms, it could be that there was not enough impetus to cause this paradigm to develop a pattern, like the others verbal paradigms did, resulting in separate lexical specifications for each form.

### 8 Quantity Sensitivity

Classical Latin did not have lexical accent, but was instead quantity sensitive (Roca 2005, de Ridder 1977). However, Classical Latin also had a distinction between long and short vowels, which was lost in the Vulgar Latin period (de Ridder 1977). The loss of a contrast between long and short vowels would have resulted in opacity in stress assignment and led to the development of lexical accent. Words which were formerly minimal pairs for vowel length became minimal pairs for stress alone. In some approaches to learnability (such as in Dresher 1999, 1994), this—words of the same length and grammatical category, and with the same pattern of heavy and light syllables, having different stress
contours—would constitute the trigger in language acquisition for the child to hypothesize lexical accent, which, in this account, at least, takes the form of variable edge parameters. An interesting question, then, becomes whether the rules of quantity sensitivity were altogether replaced with lexical accent, or if, instead, quantity sensitivity has survived in some form in Modern Spanish.

The case for quantity sensitivity is less than straightforward. Harris (1995) argues that Spanish is quantity sensitive in non-verbs, but quantity insensitive in verbs. It is preferable to have words of all types conform to the same stress rules. Roca, on the other hand, argues against quantity sensitivity for Spanish in 1990, but explicitly remains agnostic as to the nature of quantity sensitivity in his later papers in 1999 and 2005. The main basis for positing quantity sensitivity is in the word form constraints presented below, which surface as a strong tendency for antepenultimate stress to not occur in words with a heavy penult. Roca (1999) points out that this could be a historical gap which is left over from Latin’s quantity sensitivity, and that the distribution of stress in Romance forms cannot be used to infer quantity sensitivity, since, diachronically, they are inherited from Latin, and synchronically, independently derivable without reference to syllable weight. However, he also notes that this tendency could equally be the result of some formal constraint.

I will begin by describing the syllable structure of Spanish in §8.1. I will then present the main evidence for quantity sensitivity in Spanish in §8.2. Then, in §8.3, I will consider how Spanish might be accounted for as a quantity sensitive (QS) system, and in §8.4, I will consider how Spanish might be accounted for as a quantity insensitive (QI) system. Spanish is notoriously ambiguous as to whether or not it is quantity sensitive,
leading many researchers, including Roca, to change their mind about the quantity
sensitivity of Spanish or even remain agnostic. Thus, I will conclude in §8.5 with a
comparison of the two approaches, showing that Spanish is rather ambiguous as to whether
or not it is quantity sensitive synchronically.

8.1 Spanish Syllable Structure

8.1.1 Onsets

Colina (2012) states that onsets are not required in Spanish, although preferred.
Permitted onset clusters include combinations of a stop or /f/ with a liquid, except */dl/ and
*/tl/. It is a well-known fact of Spanish that word-initial /s/ + obstruent clusters trigger /e/
epenthesis. This is unusual, since other illegal onsets in Spanish are resolved by means of
deletion. Based on this fact, as well as the distribution of /s/ in coda clusters, Colina (2012)
proposes that /s/ is adjoined into the syllable structure.

Epenthesis can explain one form which bears exceptional stress. The present tense
in Spanish normally has uniform penultimate stress; however, the verb estar ‘to be’ bears
final stress in some forms of the present, as shown in (104).

(104) 1SG estoy 2SG estás 3SG está 1PL estamos 2PL estás 3PL están

This exceptional pattern occurs because the initial /e/ in these forms is inserted by
epenthesis, and is thus either defective and unable to bear stress, or inserted after stress
assignment occurs. The Spanish verb estar is descended from the Latin verb stāre ‘to
stand’ (Munguía 2001), and contrasts with words such as the demonstrative pronoun ésto,
with stress on the initial /e/. In words such as these, the initial /e/ is not inserted by epenthesis, but is instead descended from a Classical Latin /i/, as shown in (105), and can therefore bear stress.

(105) īṣtud > ésto (Lathrop 1996: 124)

8.1.2 Codas

Codas are severely restricted in Spanish (Colina 2012). Permitted codas include only nasals homorganic to the following consonant and the coronal consonants /l r s θ/. In formal registers, oral stops neutralized for [voice] and [continuant] are also acceptable. Word-finally, codas are further restricted to include only /l n r s θ/, except in borrowings. The coda position does not license place of articulation or voice features. The voiced stop /d/ is often reduced to be realized as [ð θ t] or even deleted. The only clusters permitted are glides followed by consonants, or an /s/ following any consonant.

8.1.3 Nuclei

In Spanish, sequences of two vowels are preferentially syllabified as a diphthong. However, if one is a stressed high vowel, the two vowels are pronounced in hiatus, as in día ‘day’ (Colina 2012) or oír ‘to hear.’ Post-consonantal prevocalic glides are part of the nucleus, while postvocalic glides are in the coda (Colina 2012).

8.1.4 Glides and Vowels

Harris (1995) argues that Spanish has an underlying contrast between glides and vowels which does not always surface.\(^\text{32}\) This can be seen in (106), where the orthographic

\(^{32}\) This contrast is necessary regardless of whether Spanish is QS or not.
<u> cannot be a vowel that projects, or else this word would violate the three-syllable window.

(106) \( \begin{array}{c} x \\ (x \ x) \ x \\ \text{lau da] no } \text{‘laudanum’} \end{array} \) (Harris 1995: 881)

The root in (107), on the other hand, shows an alternation between a glide and a high vowel. In the third singular present verb form in (107a), the vowel is stressed due to the edge settings RRR(W), and so surfaces as a vowel. In the noun form in (107b), the high vowel is unstressed\(^{33}\) and in hiatus, and so surfaces as a glide, but still projects into the metrical grid.

(107) a. \( \begin{array}{c} x \\ (x \ x \ x) \\ \text{re pa tri] } \text{a} \\ \text{‘s/he repatriates’} \end{array} \) (Harris 1995: 882)

b. \( \begin{array}{c} x \\ (x \ x) \ x \\ \text{pá tri] } \text{a} \\ \text{‘homeland’} \end{array} \)

This contrasts with the final <i> in the root carici-, shown as a present tense third person singular verb in (108a) and as a noun in (108b)\(^{34}\). We know that the <i> must be underlyingly a glide, since we know that the edge settings for present tense verbs are RRR(W).

(108) a. \( \begin{array}{c} x \\ (x \ x \ x) \\ \text{a ca rá ci]a} \\ \text{‘s/he caresses’} \end{array} \) (Harris 1995: 882)

b. \( \begin{array}{c} x \\ (x \ x) \\ \text{ca rá ci]a} \\ \text{‘(a) caress’} \end{array} \)

As such, we can conclude that segments which are underlyingly glides always surface as glides, and they do not project their own x in the metrical grid. On the other hand, segments which are underlyingly high vowels can surface either as high vowels or as

\(^{33}\) I assume a RRR(S) edge parameter setting here.
\(^{34}\) I’m assuming the noun has the unmarked edge parameter value of LLR(S).
glides, depending on the context. These vowels do project into the metrical grid, regardless of their surface representation, and will count as one of the three syllables in the three-syllable window for stress assignment\(^{35}\) (Harris 1995).

This contrast is necessary in my analysis. The \(<i>\) in the standard 2\(^{PL}\) agreement morpheme -is must be underlyingly a vowel, in order to derive RRR(W) present tense, as in cantáis (indicative) and cantéis (subjunctive). This contrasts with the \(<i>\) in the 2\(^{PL}\) agreement preterite morpheme –steis, which must be underlyingly a glide in order to derive the irregular preterite, with the RRR(W) edge parameter settings, as in pusísteis. This morpheme has different origins than the standard 2\(^{PL}\) agreement morpheme, and so this contrast is not problematic. It must also be a glide because, otherwise, the regular perfective past would have two syllables in the desinence, which would cause the stress to alternate, as occurs in the plural of ómicron. The rest of the verbal paradigms are constrained to the stem-domain, and, since this segment is part of the desinence, it isn't relevant to stress assignment.

More recently, many phonologists (Colina 2012, Hualde 1997, 1999, Roca 1991, 1997, 2006) have argued against there being an underlying contrast between glides and vowels. However, they have done so based on theoretical reasons. They have all had to resort to some sort of lexical marking which, in essence, distinguishes high vowels in terms of projection in the metrical structure in order to account for all of the empirical facts,

\(^{35}\) In the examples throughout this paper, I maintained the orthographic representation of vowels and glides. Whether an orthographic high vowel is underlyingly a glide or a vowel can be identified by whether or not it projects into the metrical grid, and whether it appears in its own syllable.
including contrasts such as those described above. Hualde (1997) even documents the three-way minimal pair in (109).

(109) a. [pjé] 'foot' (Hualde 1997: 64)
b. [pi.é] 'I chirped'
c. [pie] '(that) s/he chirp (subjunctive)'

Whatever the nature of this lexical contrast, it is clear that it exists. MacLeod (2007) notes that native speakers have robust intuitions about the diphthong/hiatus contrast, although there is variation across contexts, between speakers, between dialects, and even within speakers. Although the contexts in which this contrast is possible may be limited, the contrast is still necessary to give a full account of Spanish phonology.

8.2 Word Form Constraints

Harris (1995) notes that there are certain word shapes in which the three-syllable window is narrowed, shown in (110). In general, a heavy syllable in either of the last two syllables blocks antepenultimate stress, where a heavy syllable consists of a branching nucleus or rime, and a word-final glide blocks penultimate stress.

(110) a. *CVC.CV
b. *CV.CV.CV

These constraints are not only accidental gaps, as native speakers don’t judge hypothetical words with such forms as being possible Spanish words (Harris 1995).37 They also cannot

36 The word ómicron, although not exactly the same word shape, does have antepenultimate stress with a final heavy syllable, and so would not be predicted to be grammatical based on these constraints.

37 Roca (2005, 2006) mentions several proper names, such as, Frómista, Témperley, and Sámuelson, as well as borrowings such as hockey [xókei] and volleyball [bóleibol], which
be simply inherited from Latin, since the weight of the final, extrametrical, syllable was irrelevant in Latin, and, thus, the word forms in (110d-f) are, in fact, the expected grammatical result of the Latin algorithm for stress, suggesting that, perhaps, quantity sensitivity in fact expanded in Spanish. Harris (1995) also shows that these constraints apply to the stem only—they exclude inflectional morphology. This is shown in the words with antepenultimate stress in (111), which would all break the constraint in (110e) if inflectional affixes were also considered.

(111)  
a.  ca.ni.ba.l-es  ‘cannibals’  
b.  a.ná.li.s-is  ‘analysis’  
c.  so.li.ci.tá.-ba.mos  ‘we solicited’

Furthermore, there are also gaps in these constraints. If these constraints were the result of some straightforward quantity sensitive pattern, we would also expect the word forms in (112) to be unacceptable.

(112)  
a.  CV.CVC  e.g., ú.til  ‘useful,’ lú.nes  ‘Monday’  (cf. (108c,e,f))  
b.  CV.CV.CVG  (cf. (108b,e,f))

Roca (1990, 1999) points out that there are also similar constraints against antepenultimate stress in words with palatals. This constraint is also a result of quantity sensitivity in Latin, since palatals in Spanish are descended from either consonant clusters, which resulted in heavy syllables, as shown in (113a-c), or vowel sequences, which counted as syllables in the three-syllable window, as shown in (113d-e).

would be exceptions to these constraints, suggesting that these constraints are violable under at least some conditions, and possibly are no longer productive and are being lost altogether. Unfortunately, Harris provides few details of the study, nor does he cite any published data.

38 I haven’t been able to find an example of this, so it may not be possible; however, it was missing from Harris’ (1995) list of constraints.
(Roca 1999: 698-699)

<table>
<thead>
<tr>
<th></th>
<th>Latin</th>
<th>Spanish</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>cabállu</td>
<td>caballo</td>
<td>horse</td>
</tr>
<tr>
<td>b.</td>
<td>filíctu</td>
<td>helécho</td>
<td>fern</td>
</tr>
<tr>
<td>c.</td>
<td>autúmnu</td>
<td>otóñu</td>
<td>autumn</td>
</tr>
<tr>
<td>d.</td>
<td>castánea</td>
<td>castaña</td>
<td>chestnut</td>
</tr>
<tr>
<td>e.</td>
<td>aránea</td>
<td>araña</td>
<td>spider</td>
</tr>
</tbody>
</table>

<ll> = [ʎ], <ch> = [tʃ] in Spanish

Synchronously, this constraint cannot be accounted for by means of quantity sensitivity.

Roca (1990) argues that there must then be some way to account for constraints such as these without referring to syllable weight, and that it should be able to cover both the restrictions on stress in words with palatals, and in words with heavy penults.

### 8.3 Spanish as Opaquely Quantity Sensitive

Abstracting away from how to determine whether a syllable is heavy or light in Spanish, we can derive the fact that antepenultimate stress is prohibited when either the final or penultimate syllables are heavy with the rule in (114).

(114) Insert a left bracket ( to the left of a heavy syllable.

This rule will prevent the constraints in (110) from being violated. Furthermore, in nearly all of the cases where the surface stress pattern is modified from what it would be in a QI system, the resulting surface pattern is indistinguishable from the unmarked LLR(S) pattern. As shown in (111), these constraints only apply to the stem. Rule (114) is also prevented from applying to desinences because of the constraint in (34), repeated below as (115), which disallows the insertion of left parentheses to the left of a desinence.

(115) Constraint: *(x# iff x corresponds to a desinence.  (Roca 2005: 376)

This constraint would block any desinence which consists of a heavy syllable from getting stressed. I am assuming that even when the stress domain is the entire word for a particular form, the constraint in (115) still applies. If, on the other hand, the final syllable in the stem
is heavy, there would be a left parenthesis inserted to its left by both the unmarked edge rule LLR(S) and the heavy syllable. The weight of any syllables further to the left is irrelevant, as only the rightmost parenthesis results in a stress. Thus, the rule in (114) can only change the surface stress pattern of the marked and the supermarked forms, and only to a form indistinguishable from the unmarked pattern. For example, (116a), below, shows a RRR(S) word with a stem-final heavy syllable. The example in (116b) shows the equivalent LLR(S) form. In a word with only light syllables a RRR(S) word would instead surface as in (116c).

(116) a.  x  b.  x  c.  x
    x  (x)  x  (x  x)
    L  H]  L  L]  L  L]
    RRR(S)  LLR(S)  RRR(S)

The one case where the edge marking parenthesis and the weight parenthesis interact to create a form which is different from the unmarked pattern is when the penultimate syllable of a supermarked RLR(S) word is heavy, as shown in (117a). In this case, it is indistinguishable from the marked RRR(S), shown in (117b). A RLR(S) word with only light syllables, however, would surface as in (117c).

(117) a.  x  b.  x  c.  x
    x  (x  x)  x  (x  x)
    L  H  L]  L  L  L]  L  L  L]
    RLR(S)  RRR(S)  RLR(S)

The fact that words with heavy syllables behave in a way indistinguishable from the unmarked pattern, and, in one exception, the marked pattern, but never the supermarked patterns, could explain why the relative frequency of these word form patterns is so uneven.
One other benefit of a quantity sensitive system is that it may account for the
imperative, as the paradigm consists only of two forms, both of equal length. They are
shown in (118).

(118) 2SG  cánta  
       2PL  cantád  (OM&A 2005: 63)

What is most problematic about these forms is that, although they come from the same
paradigm, and so would be assumed to bear the same edge features, and, although they are
of the same length, they have different stress patterns. This can be explained through
quantity sensitivity, since the syllables are not of the same weight. They would thus be
derived as in (119), assuming RRR(W) edge parameters, which is the most common
pattern for verbs.

(119) a.  x  
        (x  x)  
        H L  
        cán ta]  [omícron  
       2SG imperative  

One word form which remains mysterious under this account is the RLR(S) word
ómicron, shown above in (16), and repeated here, in (120). In (120a), I show the attested
stress pattern with the metrical grid suggested by Roca (2005), and which I adopted earlier
in this paper. However, the rule in (114) would predict there to be a parenthesis to be
inserted to the left of the final, heavy syllable, resulting in the grid shown in (120b).

(120) a.  x  
        (x  x )x  
        ó mi cron]  o mi crón]  ‘omícron’  
       (Roca 2005: 372)

To derive the attested form, we need to somehow delete the parenthesis inserted by rule
(114). The final syllable cannot be a desinence, as it surfaces as stressed in the plural form,
so the constraint in (115) does not apply. Some constraint prohibiting word-final unary feet would have many exceptions, in both the verb and non-verb paradigms.

Under this QS approach to Spanish stress, there is only negative evidence for QS. That is, the only evidence for QS is that certain types of words are impossible. Often, it is assumed that children cannot make use of negative evidence when acquiring a language, or, at least, that they can only make use of negative evidence if they have a reason to look for it. If children do not use negative evidence, then they must at some point in their acquisition assume that Spanish is QS. Lexical accent, on its own, can account for all of the positive data in Spanish, but QS cannot. Therefore, if we assume a cue-based parameter-setting learning algorithm (as in Dresher 1999, 1994), then we must conclude that children consistently try QS before lexical accent, and that when QS doesn’t account for all of the data but is not inconsistent with it, they don’t discard it, but only add lexical accent to their analysis.

8.3.1 Quantity Insensitivity in Verbs

Nonetheless, Spanish verbs appear to be quantity insensitive. Harris (1995) notes that, in some dialects of Spanish, the present subjunctive has antepenultimate stress. In the variable edge boundary system, this can be derived by an edge parameter setting of RRR(S), as shown below in (121) for the verb limpiar ‘to clean.’

(121)  

\[
\begin{array}{c}
(x \\ x) \\
(x \\ x) \\
H \\
H \\
H \\
lim \\
pie \]
\end{array}
\text{mos} \\
1\text{PL subjunctive}
\]

\text{Harris 1995: 876}
Words such as these break the constraint in (110a), as all three syllables are heavy.\(^{39}\)

Nonetheless, as this occurs in only a subset of dialects, and since there is only negative evidence against QS in Spanish, it is possible that this set of dialects is QI.

Harris (1995) also argues that the verbal paradigms in standard Spanish cannot be quantity sensitive, either. However, of the evidence he presents, only one form is problematic under my account, shown in (122). Note that the root-final vowel is underlingly a glide [j]. As a present tense verb, it would have the edge parameter RRR(W).

\[
\begin{array}{c}
(122) \\
(x \\
(x \\
lim \
pia \]
\end{array}
\]

(Harris 1995: 876) 3SG present

In this form, the word-final syllable, having a branching nucleus, should attract stress, and result in the form in (123).\(^{40}\)

\[
\begin{array}{c}
(123) \\
(x \\
(x \\
H \
H \\
*lim \
pia \]
\end{array}
\]

8.4 Spanish as Quantity Insensitive

In short, the main evidence for QS in Spanish is the constraints from Harris (1995), first listed in (110), and repeated, once again, here, as (124).

\[^{39}\] Even if we exclude the final syllable from the analysis, as it is an agreement morpheme, the antepenultimate syllable should not get stressed, as it is followed by another heavy syllable.

\[^{40}\] This does not directly correspond to any of the constraints in (110). I suppose it is another gap in the constraints.
However, all except constraint (124f) can be explained by the three-syllable window. 

Recall that the constraints in (124) applied only to the stem, as illustrated by the words in (111), and repeated here as (125).

(125) a. ca.ní.ba.l-ès ‘cannibals’
    b. a.ná.li.s-is ‘analysis’
    c. so.li.ci.tá.-ba.mos ‘we solicited’

Recall, further, how the three syllables of the three-syllable window usually consist of the desinence plus two syllables from the stem. According to Roca’s (2005) characterization of the three-syllable window, stress on the antepenultimate syllable of the stem would only be possible under the supermarked edge parameter RLR(S), as in ómicron, whose derivation is repeated below in (126) from (16).

(126) a. x (x x )x ó mi crón] es ‘omicron(s)’
    b. x (x x )x o mi crón] es ‘omicron(s)’

Thus, all of the forms in (122), with the exception of (124f), are independently predicted to be rare, since they apply to the stem domain only. The fact that they all also contain a heavy syllable is just a coincidence. Recall that ómicron was problematic to a QS account. Under a QI account, on the other hand, its occurrence is unsurprising. It seems plausible that, when presented with a hypothetical word in isolation, native speakers, having no basis for positing multiple morphemes, would assume that the word has a zero-desinence and unmarked (or at least not supermarked) edge parameter settings, accounting for the productive judgments against the constraints in (124).
All of the word-shape constraints in (124) thus follow from Roca’s (2005) characterization of the three-syllable window, except for (124f). It is possible that (124f) is impossible because stems that end in glides are rare in Spanish, and so word-final glides, as in (124f), are analyzed as being underlyingly high vowels. In that case, the constraint in (124f) should be written as in (127), with antepenultimate stress, and would be excluded for the same reason as all of the other constraints.

(127) *CV.ĆV.V

As well, the constraint gaps from (112), repeated here as (128), are explained.

(128) a. CV.ĆV.C e.g., ú.til ‘useful,’ lú.nes ‘Monday’ (cf. (119c,e,f))
b. CV.ĆV.CV.G (cf. (119b,e,f))

The word shape in (128a) is perfectly acceptable under a variable edge parameter approach. The one in (128b) is more problematic; however, as I have not been able to find any examples of it, it may not, in fact, be possible.

8.5 Discussion

The quantity insensitive account of the constraints described in the previous section is much simpler than the QS analysis, requiring no additional rules, and accounting for both verbs and non-verbs in a unified system. There are a few minor beneficial consequences of the QS system which we lose with the QI analysis. In the QS system, we derived the stress contrast between the two forms of the imperative by the weight of the two syllables. Under a QI system, this again becomes a mysterious pattern. All in all, variable edge boundaries appear to not only predict the three-syllable window, but are also able to explain the word shape constraints found in Spanish, as well.

Either side of the quantity sensitivity debate in Spanish is a defensible position. It seems rather dubious that we are able to account for all or nearly all of Spanish without
reference to syllable weight, if Spanish were indeed quantity sensitive. On the other hand, if the word form constraints described in §8.2 indeed operate productively within the grammar, then we should not ignore that. Since there is so little evidence for quantity sensitivity in Spanish, I think that a nonce word experiment to determine the extent of this productivity would be quite illuminating in this matter; however, that is beyond the scope of this paper.

9 Conclusion

With the addition of variable edge parameters to Idsardian metrical theory, and the generalization that φ-morphemes are extrametrical due to their status as prosodic adjuncts, the problematic stress pattern of Spanish becomes much easier to derive. This stress algorithm operates uniformly on verbs and non-verbs, which is both more constrained and simpler than an account which requires independent algorithms for the two different word types. As well, the reliance of the metrical theory on the morphosyntactic structure is constrained, requiring only that the location of the agreement morpheme boundary be preserved in the prosodic structure. Finally, the three-syllable window for stress is explained in a principled way.

Although the empirical facts of language make it clear that morphosyntactic structure can and does influence phonological form, in this research, I proposed that this influence must both be constrained systematically, and explained by the mechanics of the syntax-phonology interface. I then showed that both constraint and explanation are possible in an account of metrical theory in Spanish.
References


