PHONOLOGICAL REPRESENTATION OF SPANISH VIBRANTS

by

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ABSTRACT

Spanish has two rhotics: a tap [ɾ] and a trill [r]. Their distribution is interesting because they are found to be in contrast, in complementary distribution and in free variation depending on their position within the syllable and on the adjacent segments. I intend here to explore how to account for the observed distributions and to propose an appropriate phonological representation for these sounds. It will be claimed that the difference between a tap and a trill is prosodic in nature. I also explore the possibility of relating the facts that describe the distribution of r-sounds with those of the well-studied cases of stop/fricative alternations in the same language and whether a unified account of both phenomena is possible. In order to achieve this, I examine data from syllable structure, stress assignment, dialectal variation and historical development. The analysis put forth here is constructed within the theoretical frameworks of Moraic Theory (Hyman 1985, Hayes 1989), the Nuclear Moraic Model (Shaw 1992), Autosegmental Phonology (Goldsmith 1976) and Optimality Theory (Prince and Smolensky 1993).

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CHAPTER 1: INTRODUCTION

1.0 Introduction

This thesis presents a phonological analysis of the Spanish tap and trill. It proposes to derive both segments from a single underlying segment, arguing that the contrast between the two segments results from a prosodic difference: the trill being moraic. The present chapter begins the exposition with a phonetic description of the segments to be analysed and an introduction to their distribution.

Chapter 2 offers an overview of the proposals put forth so far.

Chapter 3 begins the analysis by laying out the proposal to account for the intervocalic cases of tap and trill. In Chapters 4 through 6, the proposal is extended to account for the realizations of /r/ in onset and in coda position.

Chapter 7 offers a unified analysis of the alternations exhibited by /r/ and the Spanish obstruents in onset position.

1.1 Phonetic Description

Navarro-Tomás (1950) defines the Spanish tap as an "alveolar vibrante simple" (p.115), and the trill as an "alveolar vibrante multiple" (p.121). A tap therefore consists exactly of one vibration; more than one vibration is automatically perceived as a trill. The articulation of the

trill may be prolonged and requires greater muscular tension than the one needed for the articulation of the tap (Navarro-Tomás 1950:123). In labeling these segments, there seems to be agreement in the use of the term "trill" to refer to the multiple vibrant. On the other hand, the Spanish single vibrant has been referred to as a flap by Harris (1969), while Maddieson (1984) labels it a voiced alveolar tap. A flap is defined by Ladefoged (1971) as produced by "one articulator striking another in passing" (p.46) while a tap is produced when "one articulator [is] thrown against another" (p.46). Ladefoged (1971) refers to Spanish as having a trill and a tap. In later work, Ladefoged (1982) refers to a Spanish flap, while noting that this term is used in his book to denote "what is sometimes called a tap, or a flap" (p.153). Maddieson (1984), in a footnote, indicates that the distinction between a tap and a flap is not clear to him and thus the terms have been used to denote a single group. I will use the term "tap" to refer to the Spanish single vibrant, without implying a preference for either term.

1.2 Styles of Pronunciation

Harris (1969) identified four styles of pronunciation in Spanish:

(1) Largo: very slow, deliberate, overprecise.
Andante: moderately slow, careful, but natural.
Allegretto: moderately fast, casual, colloquial.
Presto: very fast, completely unguarded.

Harris claims that these distinctions must be made in order to

account for many of the alternations observed in Spanish which are governed by factors such as the speed at which the words are pronounced, and the care with which the sounds are articulated.

This classification will prove very useful in the analysis presented here, especially when dealing with cases of /r/ in coda position. Based on Harris's classification, I will use the term "careful speech" to refer to his Andante style, "casual speech" to correspond to his Allegretto and Presto styles, and the term "emphatic" to denote affected language which is almost synonymous with his Largo, in that it denotes a deliberate and overprecise style, except that it need not be very slow.

1.3 The Data

As Harris (1983a) points out, there is a variety of phonetic realizations of /r/ in Spanish, ranging from velar fricatives and alveolar trills, to sibilant sonorants. Nevertheless, there is only one significant contrast as exemplified by the numerous pairs of words such as[1]:

(2) pero - perro 'but' - 'dog'
caro - carro 'expensive' - 'car'
torero - torrero 'bullfighter' - 'lighthouse keeper'

(Harris 1969:46,50)

fiero - fierro 'fierce' - 'iron'
mira - mirra '(s)he sees' - 'myrrh'
ahora - ahorra 'now' - '(s)he saves'

[1]Here, and in subsequent examples, the forms presented are followed by the source from which they were taken. Whenever there is no source indicated, the data is representative of Coastal Peruvian Spanish, as spoken by the author of this thesis.

In intervocalic position there is a contrast between a tap [ɾ], represented orthographically by <r> and a trill [r], written as <rr>.

This contrast between the tap and the trill seen in intervocalic position is not observed in any other context. In coda position, both tap and trill can be found[2]:

(3)	Casual Speech	Careful and Emphatic Speech	Gloss
a.	ma[ɾ]	ma[r]	'sea'
		(Alonso and Lida 1945:342; my gloss)	
b.	tie[ɾ].no	tie[r].no	'tender'
	pe[ɾ].la	pe[r].la	'pearl'
		(Navarro-Tomás 1950:119;my glosses)	
	a[ɾ].pa	a[r].pa	'harp'
	a[ɾ].bol	a[r].bol	'tree'
	a.ma[ɾ].go	a.ma[r].go	'bitter'
c)	ma[ɾ] cas.pio	ma[r] cas.pio	'Caspian Sea'
	Ce.sa[ɾ] fue	Ce.sa[r] fue	'Caesar went'
d)	Ce.sa[ɾ] a.yu.da	*Ce.sa[r] a.yu.da	'Caesar helps'
	ma[ɾ] e.ge.o	*ma[r] e.ge.o	'Ægean Sea'

The emergence of a tap or a trill is determined by the style of speech used and by the segment that follows it. The examples in (3), illustrate that in casual speech, an /r/ in coda position is realized as a tap. In careful and in highly emphatic speech (Harris 1983a:65) or as a "detalle cómico" (Navarro-Tomás 1950:119), the /r/ in coda position is realized as a trill except when followed by a vowel. This is illustrated by the forms in (3) where a trill surfaces in absolute final position

[2]A "." signals a syllable boundary.

(3a), if followed by a consonant within the same word (3b) or across a word boundary (3c). The forms in (3d) illustrate that a morpheme-final /r/ followed by a vowel may never surface as a trill.

In tautosyllabic clusters, only the tap is allowed:

(4) p[ɾ]ado, b[ɾ]avo, f[ɾ]asco, t[ɾ]apo, d[ɾ]ama, c[ɾ]ater

(Harris 1983a:63)

While a trill may never surface as the second element in a tautosyllabic cluster, the situation is the exact opposite in word-initial position (5a) and after a closed syllable (5b), where only the trill occurs:

(5)	(a).	[r]eto	*[ɾ]eto	'dare'
		[r]uta	*[ɾ]uta	'route'
		la [r]ata	*la [ɾ]ata	'the rat' (Harris 1983a:64)
		la [r]opa	*la [ɾ]opa	'the clothes' (Harris 1969:48)
		Costa [r]ica	*Costa [ɾ]ica	'Costa Rica'
		una [r]eina	*una [ɾ]eina	'a queen'
	(b).	al.[r]e.de.dor		'around'
		hon.[r]a		'honour'
		Is.[r]a.el		'Israel' (Harris 1969:49)

(5a) illustrates that the relevant environment is word initial not utterance initial. The codas of the syllables preceding the vibrant in (5b) are the only ones permitted in this environment. All other segments either form a complex onset with the vibrant as is the case with the obstruents (e.g. pra.do, dra.ma in (4) above) or, remain in coda position but assimilate in place to

the following consonant, as in the case of the nasals, where the assimilation derives a coronal nasal when followed by a coronal consonant such as /r/.

The distribution of the tap and the trill as exemplified by the data above, is illustrated in the following chart. A "√" mark indicates that a segment is allowed in that position, while a "*" signals that it is not. Other abbreviations used are: "σ" = syllable; "CLUSTER" = tautosyllabic cluster; "(c)" = casual speech; "(e)" = emphatic and careful speech.

Table 1: Distribution of Spanish Tap and Trill

	ONSET				RHYME	
		WORD MEDIAL				
	WORD INITIAL	after open σ	after closed σ	CLUSTER	WORD MEDIAL	WORD FINAL
ɾ	*	√	*	√	√	√
r	√	√	√	*	* (c) √ (e)	* (c) √ (e)

1.4 Excursus on Variability

There is considerable variation in the phonetic realization of Spanish sounds from one dialect to another, the vibrants being no exception. On the one hand, the tap, whether found intervocalically, e.g. *para* 'to', or in a tautosyllabic cluster, e.g. *tronco* 'log', exhibits "almost no dialect variation on this point, and very little variation in fine phonetic detail within a given dialect" (Canfield 1981, Harris 1983a). Gili (1921), in

a detailed study of the phonetic realizations of "la <<R>> simple" in dialects of Spain, finds that all of the cases of /r/ as the second element of a tautosyllabic cluster, a total of 94 tokens in his study, were realized with a single vibration with little, if any, phonetic variation.

The trill, on the other hand, exhibits some dialectal variation. It is often realized as an assibilated sound: [r̆] (Navarro-Tomás 1950, Quilis and Carril 1971). This realization is predominant in Guatemala, Costa Rica, the eastern Cordillera of Colombia, central Highland Ecuador, the altiplano of Peru and Bolivia, Paraguay, northern and western Argentina, Chile, and in highland Mexico (Canfield 1981, Harris 1969, Lipsky 1994).

In Puerto Rico, the eastern peninsula of the Dominican Republic and increasingly in the Caribbean coast of Colombia, a trill is realized as a velar fricative: [x], e.g. [x]amón *Ramón* 'Raymond', ca[x]o *carro* 'car' (Canfield 1981, Lipsky 1994).

Whatever the phonetic realization of the vibrants may be in a given dialect, the crucial point is that the contrast existing between a single vibrant and a multiple vibrant is maintained in virtually all dialects[3]. Therefore, a velar fricative in Puerto Rican, or an assibilated /r/ in Mexican Spanish, will only be heard in those positions where a trill surfaces in Standard

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[3]The two exceptions to this generalization are: Sephardic (De Granda 1978, Levy 1952) and Papiamento (Navarro-Tomás 1953) where the contrast between a simple and a multiple vibrant has been lost in favor of the simple one. Therefore, the constrast between words such as *carro* "car" and *caro* "expensive" has been eliminated in these dialects, both forms being phonetically identical: [kaɾo].

Castilian.

1.5 Summary

In this first chapter, an introduction focusing on the terminology to be used, and the data to be discussed has been offered. A look at the distribution of the simple and multiple vibrants in Spanish suggests that the tap and the trill behave as allophones of the same segment, yet at the same time contrast in one position, this one being intervocalically. These observations have given rise to proposals which suggest treating the tap and the trill as allophones of a single /r/ phoneme and consequently have inspired research on how to represent and account for their contrast in intervocalic position. In order to justify the need for yet another analysis dealing with the phonological representation of Spanish /r/, the existing proposals will be summarized in the following chapter.

CHAPTER 2: PREVIOUS ACCOUNTS

2.0 Introduction

There have been many studies centered on Spanish vibrants, ranging from their phonetic realization and dialectal variation to their historical development. The three proposals summarized in this chapter are, to my knowledge, the only studies focusing on the phonological representation of the tap and the trill. These will be reviewed in chronological order beginning with Harris (1969).

2.1 Harris (1969)

Harris (1969) proposes to represent both the trill and the tap as a single underlying segment /r/ in all environments, claiming that their surface realization is entirely predictable. /r/ is specified as:

(6) /r/

$$\begin{bmatrix} +\text{vocalic} \\ +\text{consonantal} \\ -\text{obstruent} \\ +\text{voice} \\ +\text{coronal} \\ +\text{anterior} \\ -\text{strident} \end{bmatrix}$$

In the only environment in which the tap and the trill are in contrast, i.e. intervocalically, Harris proposes to represent the tap underlyingly as /r/ (see (6) above) and the trill as /rr/, that is a sequence of two identical feature matrices.

Harris presents two arguments, which he labels (p.50) "highly convincing ones", in support of representing a trill as /rr/. The first argument presented is taken from the verbal paradigm. The future tense endings (simple future, indicative) are: *-ré, -rás, -rá, -remos, -reis, -rán* for the 1st, 2nd, 3rd, singular and plural persons respectively. These forms are always pronounced with a tap. The regular verb *hablar* 'to talk' for example, exhibits the following future forms: *habla*[ɾ]*é*, *habla*[ɾ]*ás*, etc. The irregular verb 'to love', on the other hand, exhibits a trill: *que*[r]*é*, *que*[r]*ás*, etc. Harris interprets these facts as deriving from a /rr/ which arises when the future ending is added to the verb stem: /quer+rás/. A weakness in this argument is that *querer* is the only verb - together with its derivatives *bienquerer, malquerer* - in a list of over 5000 Spanish verbs that shows such alternations. All other verbs whose stems end in -r preserve the infinitive ending vowel in the future forms and surface with a tap: *esperar* 'to wait', *espera*[ɾ]*é* 'I will wait', *morir* 'to die', *mori*[ɾ]*ás* 'you will die' (Alemany 1967).

For the second argument, Harris considers singular-plural pairs of nouns and adjectives such as the ones presented in Table 2 below.

Table 2: Singular-Plural Pairs

	A			B		C
SINGULAR	red	pan	amor	carne	grande	torre
PLURAL	redes	panes	amores	carnes	grandes	torres
GLOSS	"net"	"bread"	"love"	"meat"	"big"	"tower"

Harris assumes that the plural marker is -s and that all the singular forms end in -e. This final -e is deleted, he claims, when it is preceded by a single consonant, as in the case of *pan* (A in Table 2), but it is retained when preceded by more than one consonant, as in *grande* (B in Table 2). Therefore in the singular form *torre* (C above), the final -e must be preceded by more than one consonant to be able to trigger the retention of the final vowel. Harris takes these forms as evidence that the trill in *to[r]e* is in fact -rr-. Subsequent work on Spanish plurals (Saltarelli 1970, Harris 1987, also dealt with in Foley 1967) has led to the conclusion that the -e that Harris (1969) views as present underlyingly is in fact epenthetic. The main argument, however, as far as it provides support for considering a trill a /rr/, is not crucially affected by this reanalysis.

Harris assumes that the feature that differentiates a tap from a trill is [tense], with the trill being [+tense]. This feature is not specified in the matrix corresponding to /r/, as seen in (6) above, but is rather inserted by rules which are sensitive to the environment in which /r/ is found. The first rule that Harris proposes deals with the sequences of a consonant followed by /r/. Harris observes that when an /r/ is

preceded by /s/, /n/ or /l/, it may only surface as a trill, while if it is preceded by any other consonant, only the tap is obtained, e.g. al[r]ededor, Is[r]ael, en[r]edo, but p[ɾ]ado, c[ɾ]ater. In order to derive the trill that surfaces in this environment, Harris proposes a rule which inserts the feature [+tense] whenever an /r/ follows a [+coronal, +distributed] segment, i.e. [s], [n], and [l]:

(7)

$$/r/ \text{ ---> } [+\text{tense}] \; / \; \begin{bmatrix} +\text{cor} \\ +\text{distr} \end{bmatrix} \_\_\_\_\_$$

Another environment in which only the trill is allowed is word-initially. The rule responsible for providing a [+tense] specification in the case of word-initial /r/ also accounts for the cases of glides becoming obstruents at the beginning of a word, e.g. /yela/ 'it is freezing', realized as [y̆ela], where [y̆] is a fricative. These cases will be discussed in greater detail in chapter 6. The rule is formalized as shown in (8):

(8)

$$\begin{bmatrix} \alpha\text{voc} \\ \alpha\text{cons} \\ -\text{lat} \end{bmatrix} \text{ ---> } \begin{bmatrix} -\alpha\text{obstr} \\ \alpha\text{tense} \end{bmatrix} \; / \; \#\_\_\_\_\_$$

Finally, Harris proposes a rule that would ensure that an intervocalic /rr/ gets invariably realized as a trill. The rule shown in (9) below is responsible for phonetically interpreting a /rr/ as a trill:

(9) rr ---> [r]

An /r/ which does not satisfy the structural description of

any of the rules in (7-9) gets realized as a tap, since no changes apply to the feature matrix in (6).

In his later work (1983a), Harris maintains the position that there is a single underlying segment and that an intervocalic trill derives from a geminate cluster. The analysis is basically an improved version of Harris (1969), since syllable structure is taken into account in the formulation of the rules. Let us now turn to review his proposal.

2.2 Harris (1983a)

Harris maintains that an analysis of Spanish tap and trill must treat them as related phones. In order to gather support for such an analysis, Harris tries to find synchronic data that directly relate the tap and the trill to each other, but this is not an easy task. The best examples that Harris was able to find, are the morphemes *rec-*, *rup-*, *rub-* among others, whose first segment surfaces as a trill in word-initial position but as a tap word internally: [r]*uptura* 'rupture' - *e*[ɾ]*upción* 'eruption', [r]*ubor* 'blush' - *e*[ɾ]*ubescente* 'blushing'. The problem with these examples is that "their synchronic relatedness... is less than obvious" (Harris 1983a:65).

Harris points out that the proposal of deriving an intervocalic trill from an underlying /rr/, has attractive consequences in three areas. The first one is stress assignment. In the first chapter of the same work, Harris establishes the generalization that antepenultimate stress is

not allowed in Spanish words whose penultimate syllable contains a branching rhyme:

(10) telé.fo.no vs. *telé.fos.no
*telé.fol.po
*telé.boi.na
*telé.cau.sa
(Harris 1983a:10-11)

so.sié.go vs. *só.sie.go
*só.sei.go
*só.sen.go (Harris 1983a:110)

Sa.la.mán.ca *Sa.lá.man.ca
Ma.ra.cái.bo *Ma.rá.cai.bo
Ve.ne.zué.la *Ve.né.zue.la (Harris 1983a:112)

At the same time, it is observed that words such as *chamárra* 'jacket', that is words that contain a trill in this position, never display antepenultimate stress:

(11)

Penultimate stress		Antepenultimate stress	
[ɾ]	[r]	[ɾ]	[r]
avá[ɾ]a	chamá[r]a	cáma[ɾ]a	*cháma[r]a
señó[ɾ]a	camó[r]a	víbo[ɾ]a	*víbo[r]a
		(Harris 1983a:50)	
bolé[ɾ]o	cigá[r]o	cíta[ɾ]a	*cíga[r]o
Gená[ɾ]o	guitá[r]a	géne[ɾ]o	*guíta[r]a

Therefore, if the representation of a word like *chamá[r]a* were [ča.mar.ra], making the rhyme in the penultimate syllable a branching structure, there would be no need to explain why antepenultimate stress never occurs in these cases since this fact would follow automatically from the generalizations of stress assignment which are independently needed in the language.

The second area affected is that of the derivational and inflectional forms of nouns and adjectives. Spanish noun and adjective stems which end in a cluster of "[-syllabic]" (sic)

segments, must be followed by a terminal element -a, -o, or -e, e.g. dulce (*dulc) 'sweet', carta (*cart) 'letter', alumno (*alumn) 'pupil' (Harris 1985a). It is observed as well that there are no cases like *amo[r]/*amo[r]es*. If one views a trill as a single segment, the absence of these forms is purely accidental. If on the other hand, one accepts Harris's proposal and considers a trill as a cluster of segments, i.e. -rr-, then the absence of these words is accounted for.

Finally, the third area concerns the future tense of the verb *querer* already discussed in the review of Harris (1969) above.

The rules that Harris (1983a) proposes to derive the data presented are:

(12) (i) /r/ ---> [r] / [+cons] ____
R

R=rhyme

(ii) /r/ ---> [r] / X°[___

X°=word initial

(iii) /r/ ---> ϕ / ___[r]

(iv) /r/ ---> [r] in emphatic speech
R

(Harris 1983a:70)

Rule (i) ensures that every /r/ in onset position following a closed syllable, that is a syllable whose rhyme contains a [+consonantal] segment, is realized as a trill, e.g. *Enrique* 'Henry' [en.ri.ke], *Israel* [is.ra.el]. Rule (ii) accounts for the absence of a tap in word initial position, e.g. *ropa* 'clothes' [ropa]. Rule (iii) applies in combination with rule

(i) to derive the cases of intervocalic trill. An intervocalic trill results, in Harris's analysis, from an underlying /rr/ which has undergone the application of rules (i) and (iii). Rule (i) applies first turning the second /r/ into a trill. The application of this rule yields an intermediate structure of the form -r[r]- which triggers the application of rule (iii). The following derivation illustrates the application of the rules in (12) needed to generate the contrast between a tap and a trill in intervocalic position:

(13)

	perro 'dog'	*pero* 'but'
UR	/perro/	/pero/
Syllabified	per.ro	pe.ro
Rule (i)	per[r]o	n/a
Rule (iii)	pe[r]o	n/a
Output	[pero]	[peɾo]

Lastly, rule (iv) is posed to handle the cases of highly emphatic speech in which an /r/ in a rhyme is realized as a trill, e.g. *Martes* 'Tuesday' [mar.tes].

These rules are, as Harris himself points out, an improvement over those proposed in (1969). Given that syllable structure is taken into account, Harris is able to offer a unified analysis of the intervocalic trill and the trill after a closed syllable while maintaining his original proposal that an intervocalic trill is indeed an underlying /rr/.

2.3 Lipsky (1990a)

Lipsky (1990a) criticizes an analysis that treats trills as a geminate /rr/. Even though he begins by acknowledging the

advantages considered by Harris for such an approach, Lipsky gives the following reasons to consider the trill as a single phonological unit:

(a) /r/ may be optionally realized as a trill in rhyme position as a means of expressing emphasis. As established by Harris (1983a), Spanish contains a three-segment rhyme rule which excludes rhymes containing more than three elements, e.g. *supuesto* 'supposed', vs. **supuersto*. In order to respect this constraint, an alternation such as *su.pe[ɾ]s.ti.cion - su.pe[r]s.ti.cion*, where a tap alternates with a trill in emphatic speech, cannot be increasing the number of elements on the skeletal tier.

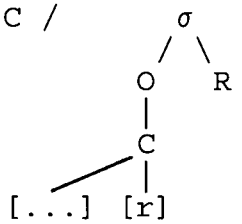
(b) No two-element consonant cluster is permitted word-finally in native Spanish lexical items. In emphatic speech where a word final -r is realized as a trill, a representation such as /rr/ would violate this generalization. Word-internally two consonant rhyme clusters must only be of the form -Cs, /rr/ would violate this constraint as well.

(c) Spanish allows /Cr/ as syllable onset only when C is an obstruent. A trill in onset position, were it to be represented as /rr/, would constitute a violation of this generalization.

Lipsky's proposal consists of representing Spanish rhotics, whatever their environment, as a single skeletal slot, linked to the features that define /r/ (although he never clarifies what precisely these might be). A trill is then obtained through the application of a rule (viz. (14) below), while a tap is obtained

by blocking the application of the same rule. The rule Lipsky proposes applies after syllabification, adjoining a skeletal slot to the left of the feature matrix representing /r/:

(14) ϕ---> C /



(Lipsky 1990a:162)

This slot is automatically assigned in any position where the Spanish syllabic template allows a dual structure whose second element is /r/, namely in onset position, provided that the syllabic template is not already filled as in the case of tautosyllabic clusters such as tr-, fr-, etc. The adjoined matrix is then filled in through a rule of autosegmental spreading and a phonetic interpretation rule converts the dual structure to a trill. According to this rule all /r/'s in onset position will be realized as trills unless they are the second element of a tautosyllabic cluster.

The optional reinforcement of a tap to a trill in rhyme position is accounted for through a rule of slot adjunction, like the one illustrated in (14), with the modification that the slot is added to the right of the existing segment. Both slot adjunction rules which generate a trill represent a "maximal utilization of the two potential C-slots" (Lipsky 1990a:160) allowed by the Spanish syllabic template.

Lipsky claims that the outputs of these rules are not subject to the criticisms in (a-c) above, because

lengthening/gemination is effected via adjunction of a completely unspecified skeletal slot and therefore does not violate syllable-building rules. The features are assigned to the empty slot by means of spreading from the existing feature matrix. This spreading applies at a level where it does not interfere with co-occurrence restrictions defined at deeper levels.

In order to deal with the cases where an intervocalic tap is found, Lipsky proposes to represent it as an /r/ which is lexically preattached to the corresponding skeletal slot. It is this preattachment which precludes the application of any rule, in this case the adjunction rule in (14), which makes critical reference to association lines.

2.4 Summary

The obvious contributions towards the study of Spanish r-sounds provided by the analyses summarized above, are in the area of data presentation and analysis. Both Harris and Lipsky offer a very clear exposition of the relevant contexts in which the alternations are observed and point out the controversial issues. Furthermore, Harris (1983a) offers some insightful comments on how his analysis of the trill may have desirable consequences in the areas of stress assignment and syllable structure. However, even though the correct surface forms are obtained in all of the analyses just mentioned, no explanation as to the motivation for these alternations is offered. They

appear to provide little insight into the driving forces, that is the general principles active in the grammar, that are responsible for these alternations. Questions such as why is a trill preferred in onset position over the tap?; What, if anything, do the positions word-initial and following a closed syllable have in common, in order to exclude the tap?; What guarantees that geminates occur only intervocalically?; or why is the trill disallowed in clusters? among others, still need to be addressed. I will attempt to address these outstanding questions in the sections that follow.

CHAPTER 3: INTERVOCALIC /r/

3.0 Introduction

The presentation of the proposal developed in this thesis begins with an analysis of the case where the tap and the trill are in contrast, namely in intervocalic position. I have opted to present these cases first because they constitute the biggest obstacle in considering the tap and the trill as surface realizations of the same underlying segment. It will be argued that the contrast observed on the surface results from a phonological distinction which is prosodic in nature. The proposed representations will find support in the areas of syllable structure, stress assignment, and historical development.

3.1 A Prosodic Difference

As was shown by the data in (2) above, the tap and the trill contrast in intervocalic position. I propose to represent this contrast structurally by representing an intervocalic trill as a moraic /r/ underlyingly, where /r/ is a [+sonorant, +consonantal, coronal, +continuant] segment[4]. An intervocalic trill would then be an ambisyllabic segment, acting as coda of

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[4]Justification for the use of these, and only these features, will be offered in Chapter 5, where these features will play a crucial role in the analysis of the interaction between /r/ and other segments.

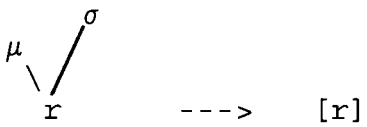
a previous syllable and as onset of a following one. The representation of *carro* 'car' would then be (leaving other details about the representation of vowels aside for the moment):

(15) UR

where /r/= [+son, +cons, COR, +cont]

An intervocalic /r/ would then be phonetically realized as a trill if it is found in the following configuration:

(16)



This representation is supported by evidence from three areas: syllable structure, stress assignment and historical development. Let us turn now to examine the evidence.

3.2 Syllable Structure

Harris (1983a) presents a thorough description of the syllable structure of Spanish. Two of the generalizations made by Harris which are relevant to the analysis proposed here are:

(i) prevocalic glides, if not syllable-initial, are part of the rhyme not the onset.

(ii) rhymes may contain a maximum of 3 segments.

The first generalization finds support in the facts of Spanish stress. Harris observes that antepenultimate stress is

possible in Spanish words, if the penult is open (17a) or if it contains a complex onset (17b):[5]

(17) a. te.lé.fo.no

b. te.lé.gra.fo (Harris 1983a:10, 11)

On the other hand, antepenultimate stress is impossible if the penult is closed by a consonant (18a), or by a glide (18b), and more interestingly, if the vowel in the penult is preceded by a glide (18c):

(18) a. *te.lé.fos.no, *te.lé.fol.po

b. *te.lé.boi.na, *te.lé.cau.sa

c. *te.lé.fio.no, *te.lé.fie.no, *te.lé.fua.no

(Harris 1983a:10-11)

Syllable initial glides are not considered part of the rhyme since they automatically become the onset of the syllable, e.g. /ma.io/ ---> [ma.jo] 'May', /iegua/ ---> [je.gua] 'mare' (Hualde 1991). By assuming that syllable initial glides are onsets and not part of the rhyme, we predict that Spanish should allow antepultimate stress in words whose penultimate syllable is of the form: glide+vowel. This is precisely what we find, e.g. *ná.ya.de* 'water nymph', *onomatopé.yi.co* 'onomatopoeic', *cón.yu.ge* 'spouse' (Alemany 1967). Given this difference between a glide which is in syllable initial position and one that is not, the term "prevocalic glide" will be used here to denote only a glide which is not syllable initial.

An account of the pattern exemplified by (17) and (18) is

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[5]The relevant syllables are shown underlined.

possible if one assumes that the underlined syllables in (18) form a unified group. By considering prevocalic glides as part of the rhyme, Harris is able to make the following generalization:

(19) "Antepenultimate stress is impossible if the penult contains a branching rhyme" (Harris 1983a:12)

The second generalization is reached by working out all the possible combinations that can make up a Spanish rhyme. Harris concludes that Spanish allows:

(20) i. single segment rhymes - i.e. formed by a single vowel; e.g. pa.to, ta.pa

ii. two segment rhymes[6]

e.g. VG au.tor, lei

VL sal, mar.tes

VN com.pra, sar.tén

VO seg.men.to, red

GV nue.vo, a.pio, ciudad, bui.tre[7]

iii. three segment rhymes

e.g. GVG buei

GVL fuer.te, fiel

GVN siem.pre, Juan

GVO diag.no.sis, Go.liat, mues.tra

VGs claus.tro

VLs pers.pi.caz

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[6]V=vowel; G=glide; L=liquid; N=nasal; O=obstruent.

[7]A sequence of two high vowels always generates a GV rhyme.

VNs trans.por.tar

VOs abs.trac.to

Systematically disallowed are:

(20′) i. three segment rhymes of the form:[8]

*VGL *aul.tor

*VGN *seim.pre

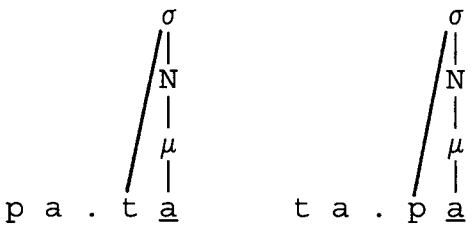
*VGO *daig.no.sis

ii. Any four segment rhyme:

*VGLs, GVLN, GVGO, GVOs, etc.

In order to incorporate the generalizations of syllable structure and stress to the analysis of Spanish r-sounds pursued here, I will offer a reinterpretation of the syllable structure facts within the framework of Moraic theory (McCarthy and Prince 1986, Hayes 1989a) and the Nuclear Moraic model (Shaw 1992). The syllables in (20i) above would contain a simple onset followed by a single nuclear mora (μ):

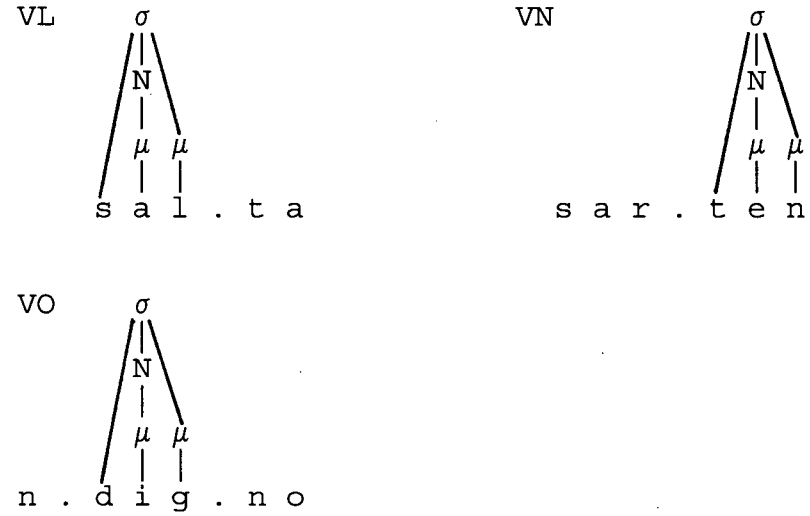
(21)



[8]There are a few exceptions to this generalization. These are: vein.te "twenty", trein.ta "thirty" and aun.que "even though" which contain rhymes of the form VGN, and au[k.s]ilio "aid", the only form found exhibiting a VGO rhyme. These apparent counterexamples are regarded by Harris as "lexically deviant forms" (Harris 1983a).

The syllables in (20ii) contain rhymes which are made up of two segments. I claim here that both segments are moraic. Motivation for considering them bimoraic rhymes is furnished by the stress facts. As discussed in the previous sections (see examples in (10) and (18) above), antepenultimate stress is not possible if the penult contains a branching rhyme such as those exemplified in (20ii). This observation could be explained by the fact that in quantity-sensitive languages, heavy syllables attract stress (Kenstowicz 1994:562) and given that the mora is the unit representing the contrast between light and heavy syllables (Hayes 1989a:254), the heaviness of the penultimate syllable would be expressed by means of the two moras it contains. Vowels would be underlyingly specified as moraic, while codas would be assigned a mora by the application of "Weight by position rule" (Hayes 1989a). Leaving aside for a moment the rhymes that contain glides, the structural representation of the rhymes in (20ii) would then be:

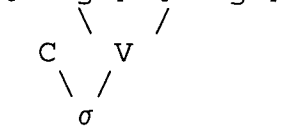
(22)



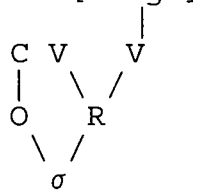
The types of rhymes in (20ii) that involve glides are: GV

and VG. We know so far that both rhymes must be bi-moraic in order to account for the stress facts. There is however a difference between the two: VG rhymes cannot be followed by a tautosyllabic segment (i.e. they do not allow a coda), while GVC rhymes are perfectly acceptable (Carreira 1991), e.g. fuer.te, siem.pre. The proposal put forth here consists in representing both cases, GV and VG, as a sequence of two moras. The alternative offered by Carreira (1991) is to represent GV rhymes, within the framework of CV theory (Clements and Keyser 1983), as a mono-skeletal structure, while VG rhymes are bi-skeletal:

(23) GV



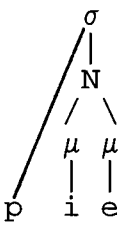
VG

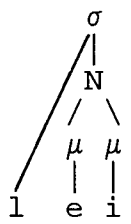


The analysis of these rhymes proposed by Carreira (1991) predicts that a VG rhyme would pattern with all the other two segment rhymes (i.e. VC), since they too are bi-skeletal, to the exclusion of those of the form GV. But this is not what is observed with respect to the restrictions on proparoxytone stress, where VG, GV and VC pattern together. Therefore, I opt for an analysis of these sequences that represents both of them as bi-moraic. There are four possible structures, exemplified by the forms *pie* 'foot' (GV), and *lei* 'law' (VG):

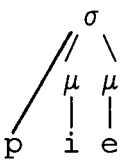
(24) GV VG

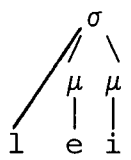
(a) (a′)



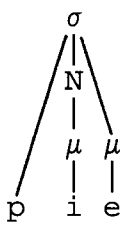


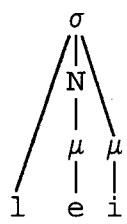
(b) (b′)



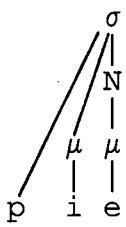


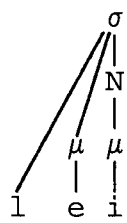
(c) (c′)





(d) (d′)





The structures in (24a, a′) and (24b, b′) make no distinction between the two moras, allowing for the existence of long vowels. This is an undesirable result because Spanish does not allow long vowels[9]. The structures in (c) and (d), on the other hand, do make a distinction between the two moras, based on their nuclear or non-nuclear status. I opt for structures (24d) and (24c′) for the following reasons: (i) stress always

[9]Except in affected speech which will be discussed in Chapter 4.

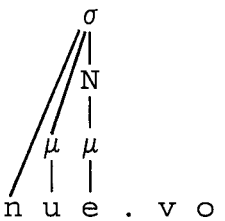
falls on the vowel, never on the glide. This is an indication that the vowel should be associated to the nuclear mora since it is this one which projects the syllable; (ii) if the nuclear status of the mora was not underlyingly specified, the more sonorous segment, in this case the vowel, would be chosen as the nucleus of the syllable, according to the sonority cycle and principles of core syllabification (Clements 1990). However, there is evidence that the nuclear status of the mora must be underlyingly specified at least in some cases. Let us consider the following pairs of words:

(25) a.	sáu.ce	vái.na	mé.dia
b.	sa.ú.co	ta.í.no	me.lo.dí.a
	'willow'	'sheath'	'sock'
	'alder tree'	'ethnic group of Puerto Rico'	'melody'

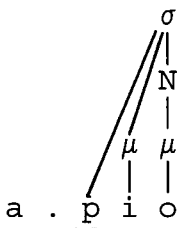
The cases in (25b) would have to specify in underlying representation that the high vowel is nuclear, so as to avoid it from being realized as a glide: *sáu.co, *me.ló.dia.

The GV rhymes, also called rising or "light" diphthongs are here postulated to consist of a prenuclear mora followed by a nuclear mora:

(26) nue.vo



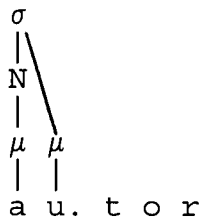
a.pio



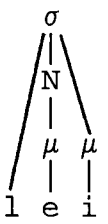
(data from Harris 1983a:14)

while VG rhymes, also called falling or "heavy" diphthongs in turn are formed by a nuclear mora followed by a non-nuclear one:

(27) au.tor



lei



(data from Harris 1983a:14)

The absence of rhymes of the form *VGC still needs to be accounted for. The relevant generalization seems to be that Spanish places a restriction on the types of moras that may form a sequence. This generalization may be captured by placing a constraint on the maximum number of moras allowed in a Spanish syllable:

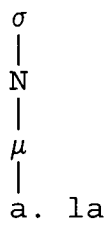
(28) Maximal mora content in a Spanish syllable

Spanish allows at most one nuclear mora, one pre-nuclear mora and one post-nuclear mora.

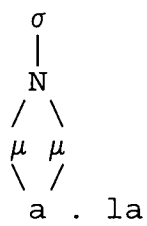
This generalization is easily captured within the framework of the Nuclear Moraic Model (Shaw 1992). It would be difficult, if not impossible, to capture the generalization in (28) without making the distinction between nuclear and non-nuclear moras, since the common restriction against trimoraic syllables (*$[\mu\mu\mu]_\sigma$) does not account for the grammaticality of the first syllable of the word *siem.pre* 'always' illustrated in (29.a.4) below.

A result of (28) would be that only the syllable types in (29a) are permitted while the ones in (29b) are disallowed:

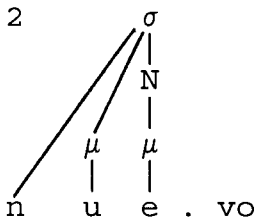
(29) a.1



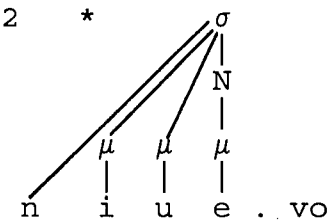
b.1 *



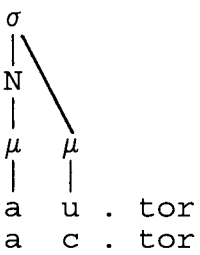
a.2



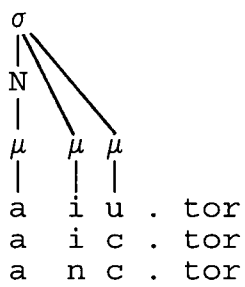
b.2 *



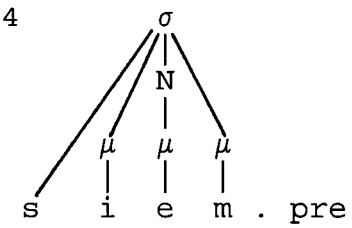
a.3



b.3 *



a.4



An apparent counterexample to the ungrammaticality of (29b.3) are cases such as abs.trac.to, e[ks].te.rior, and trans.por.tar, where two post-nuclear segments are allowed. The condition in these cases is that the second post-nuclear segment be an /s/. These clusters are frequently simplified in normal pronunciation to [as].trác.to, [es].te.riór and [tras].por.tár (Hualde 1991, Navarro-Tomás 1950). Even though they might be disfavored, these clusters are nevertheless heard in careful styles of conversation and our grammar must be capable of generating them. The special status of /s/ has been treated in

various ways: by defining it as having "special status" (Harris 1983a), by positing a rule of "s-adjunction" (Hualde 1991), or by considering it an appendix to the syllable (Halle and Vergnaud 1980).

The treatment of /s/ adopted here is one that considers it a mora-bearing segment when in coda position. The "special status" of /s/ is evidenced by the fact that it is permitted to violate the constraint in (28) as illustrated by the first syllable of the word trans.por.te, where two post-nuclear moras are allowed. I contend that /s/ must be considered moraic in these contexts, and not simply an appendix to the syllable. If the special behaviour of /s/ were to be encoded by representing it as an appendix to the syllable, thus defining it as a non-mora-bearing unit, one would expect it to attach to any type of syllable. However, this is not the case: /s/ may only surface after a post-nuclear mora if the total mora count of the syllable to which it attaches is maximally two; if the total mora count of the syllable is three (i.e. a pre-nuclear mora, a nuclear mora and a post-nuclear mora), /s/ cannot surface in that syllable. Spanish therefore allows syllables of the form VNs, VGs, VOs, but disallows any of the following combinations *GVNs, *GVGs, *GVOs:

(30)	VNs	mons.truo	'monster'	*GVNs	*muons.truo
	VGs	claus.tro	'cloister'	*GVGs	*cliaus.tro
	VOs	subs.tan.cia	'substance'	*GVOs	*siubs.tan.cia

This observation may be interpreted to mean that the presence of /s/ is contributing to the weight of the syllable (i.e. /s/

contributes a mora) and that the language allows (28) to be violated only in those cases in which the resulting syllable contains the maximum of three moras, disallowing an association of /s/ where it would generate a syllable containing four moras.

In any case, it is not surprising that /s/ happens to be the segment that violates the constraint in (28) since cross-linguistically "the most frequent 'violators' [of core syllable structure] are fricatives, chief among them [s]" (Vennemann 1988). It is reasonable then to consider the cases involving /s/ as marginal violations of (28) and assume that this constraint holds of Spanish core syllables only.

Let us look now at the distribution of r-sounds with respect to Spanish diphthongs. The following chart illustrates the distribution of tap and trill in onset position, when following a syllable that contains a diphthong:[10]

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[10]These diphthongs are the ones listed by Seco (1986) as permissible Spanish diphthongs. However, as Roca (1991) points out, "practically all the facts of syllabicity between adjacent vocoids in Spanish are heavily dialect-dependent" (606). For example Roca's syllabification of the word "riachuelo" according to his own dialect is ria.chue.lo (610), while my judgement of the syllabification of the same word would be ri.a.chue.lo.

Table 3: Distribution of /r/ following a Diphthong

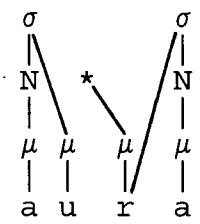
	Diphthongs	*Other consonants*	*tap [ɾ]*	*trill [r]*
A	ai	bai.le	ai.re (7)	--- (0)
	ei	a.cei.te	frei.ra (4)	--- (0)
	oi	oi.go	boi.ra (2)	--- (0)
B	au	cau.sa	jau.rí.a (15)	--- (0)
	eu	deu.da	Eu.ro.pa (9)	--- (0)
	ou	bou	--- (0)	--- (0)
C	ie	sie.te	fie.ra (12)	tie.rra (6)
	ue	cue.va	nue.ra (11)	pue.rro (1)
D	io	dio.sa	de.te.rio.rar (7)	pio.rre.a (1)
	uo	cuo.ta	--- (0)	--- (0)
E	ia	an.cia.no	dia.rio (10)	dia.rre.a (3)
	ua	sua.ve	cua.res.ma (16)	gua.rra (13)
F	ui	cui.da.do	güi.ra (2)	--- (0)
	iu	ciu.dad	Piu.ra (8)	--- (0)

N.B. Figures in parentheses show the total number of underived words found in the Spanish lexicon that exhibit these configurations (Corominas 1954, Alemany 1967, Sociedad General Española de Librería 1985)

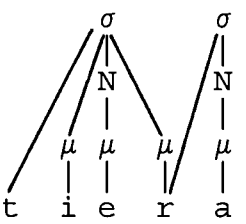
As established in (29) above, the diphthongs in A and B do not allow a coda consonant in Spanish. Under the Nuclear Moraic Model, ((27) above), these diphthongs are represented as a nuclear mora followed by a non-nuclear one. These sequences therefore, contain the maximum number of post-nuclear moras a syllable may have, explaining why the diphthongs in A and B above do not allow coda consonants. In Table 3, we also observe that the trill never occurs after these diphthongs. This apparent gap would be accounted for under the analysis proposed here with no further stipulations: since the trill is

underlyingly moraic, it is forced, in intervocalic position, to be ambisyllabic. In the configuration in question, that is after a heavy diphthong, the trill is unable to associate with the preceding syllable, because this one is already filled to its maximal capacity. This is illustrated in (31a) by the hypothetical form *aurra, in which the intervocalic trill is unable to associate to the preceding syllable. (31b) in contrast, shows the well-formed *tierra* 'earth', where a light diphthong is followed by a trill:

(31) a.



b.



In this section, it has been argued that the proposal to represent an intervocalic trill as an underlyingly moraic /r/, provides us with advantages in the area of syllable structure, allowing us to account for the absence of a trill after a heavy diphthong in a principled and systematic way.

3.3 Stress assignment facts

Several analyses built within the framework of Metrical Theory (Hayes 1981) have been proposed to account for the generalizations of Spanish stress (Harris 1983a, García-Bellido 1983, Den Os and Kager 1986, Roca 1988, Roca 1991, to name only

a few). These various approaches differ from one another in whether extrametricality is considered active in Spanish, whether feet are left or right-headed, whether Spanish is to be regarded as a quantity-sensitive language or not, and in the extent to which patterns that diverge from the general pattern are to be generated by the stress assigning algorithm or are to be considered lexically marked exceptions. What remain constant are the following generalizations:[11]

(32) a) Stress can only be oxytone, paroxytone, or proparoxytone, never removed farther to the left. e.g. órgano 'organ', but orgánico 'organic' not *órganico.
b) The least-marked stress is paroxytone; e.g. cáma 'bed', ventána 'window'.
c) Proparoxytone stress is impossible if the penultimate syllable is heavy; e.g. *ánciano, *ácento, *íncauto, but an.ciá.no, a.cén.to, in.cáu.to.
d) Or if the last syllable contains a diphthong; e.g. *cánario, but ca.ná.rio.
e) Proparoxytone stress is heavily marked if the last syllable is closed. e.g. régimen 'regime', Júpiter 'Jupiter', ómicron 'name of Greek letter'. N.B. these are the only three existing forms.
f) Paroxytone stress is impossible if the last syllable contains a rising diphthong. e.g. convóy 'convoy', caréy 'tortoise shell'.
g) Oxytone stress is unmarked if the last syllable is closed. e.g. canción 'song', sutíl 'subtle'.

(Roca 1988:398)

Harris (1983a) observed a "dependency between r-type segments and stress placement" which was illustrated in section 2.2 above, where his analysis is reviewed. The generalization is that in Spanish there are no words with antepenultimate

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[11]These generalizations hold of all lexical words except in the case of verbs where stress is morphologically conditioned (Harris 1987, Roca 1992).

stress whose last syllable begins with a trill. According to the generalization in (32c), antepenultimate stress is disallowed if the penultimate syllable is heavy. Under the analysis put forth here, where the intervocalic trill is moraic, the observations about stress assignment made by Harris are precisely what we would expect given that the intervocalic trill being moraic, always generates a coda in the preceding syllable making this syllable heavy and thus blocking antepenultimate stress.

3.4 Historical data

The historical development of the intervocalic trill provides further support for representing it as an underlyingly moraic /r/ since it has been shown to have developed historically from Latin geminate /r/ (Alarcos Llorach 1965, De Granda 1966a, Lapesa 1981, Malmberg 1965, Menéndez Pidal 1934).[12]

Latin had geminate segments which were in contrast with the simple segments in intervocalic position. Castilian Spanish preserved the distinction existing between the geminates and the corresponding simple consonants, while other dialects did not. In the case of the Latin geminate sonorants, either (i) the

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[12]This section is not intended to be a thorough review of the historical development of Spanish. A few issues which are relevant to the claims made in the present work will be discussed. For a closer look at the history of the Spanish language, the reader is referred to the above-mentioned sources.

geminates were simplified while the simple segments in intervocalic position were deleted; or (ii) the simple segments were preserved with the geminates subsequently changing their point of articulation (Alarcos Llorach 1965)[13]. An example of the development in the direction of (i) is the case of the western Galician-Portuguese dialect, where intervocalic Latin -ll- > -l- and -nn- > -n-, while Latin -l- and -n- were lost. Castilian Spanish on the other hand, developed in the direction of (ii): Latin -l- and -n- are preserved while Latin geminate -ll- and -nn- change point of articulation and are realized as palatals (Catalán 1954). The following examples illustrate these developments:

(33)

LATIN		GALICIAN PORTUGUESE		CASTILIAN		
-nn-	anno	-n-	ano	-ñ-	año	'year'
-ll-	caballu	-l-	cabalu	-λ-	caba[λ]o	'horse'
-n-	manus	-ϕ-	mao	-n-	mano	'hand'
-l-	colore	-ϕ-	cor	-l-	color	'color'

(Foley 1977, Lapesa 1981)

In the case of -rr-, the intervocalic Latin geminate did not change place of articulation, unlike the other sonorants, but rather the opposition was maintained by making use of the contrast "flojo/tenso" (Alarcos Llorach 1965:83, also in Harris 1969). Under the analysis proposed here, it is claimed that the contrast between a tap and a trill constitutes an isolated opposition within the modern Castilian Spanish phonological

[13]The only exception to these developments was Latin -mm- which merged with -m-.

system due to the fact that /-rr-/, unlike the other geminates, preserved its underlying mora.

3.5 Summary

In this section, it has been argued that the proposal to represent an intervocalic trill as an /r/ lexically specified as moraic, is consistent with generalizations independently obtained in three areas of Spanish phonology: syllable structure, stress assignment and historical development. In the following section, we analyze the behaviour of /r/ in coda position and explore the possibility of extending the analysis advanced so far to account for the trill which surfaces in this syllable position.

CHAPTER 4: TRILL IN CODA POSITION

4.0 Introduction

The analysis presented in the previous chapter argued that an underlyingly moraic /r/ was realized as a trill. In this chapter, it will be argued that an /r/ which is moraic by virtue of being in coda position, also surfaces as a trill. In chapter 1, it was noted that an /r/ in coda position surfaced as a trill in careful as well as in emphatic speech. In this chapter, it will be argued that the representation of a trill in careful speech must be distinct from the one in emphatic speech. Finally, the absence of a trill in word-final position when followed by a vowel-initial word will be accounted for.

4.1 Careful Speech

In careful speech, an /r/ in coda position is realized as a trill, unless it is in word-final position, followed by a vowel-initial word. This was illustated in the examples in (3), the relevant cases repeated here as (34):

(34)	Careful and Emphatic Speech	Gloss
a.	ma[r]	'sea'

(Alonso and Lida 1945:342; my gloss)

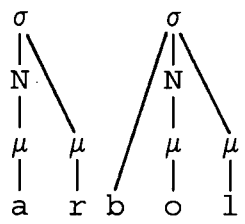
b.	tie[r].no	'tender'
	pe[r].la	'pearl'

(Navarro-Tomás 1950:119;my glosses)

	a[r].pa	'harp'
	a[r].bol	'tree'
	a.ma[r].go	'bitter'
c)	ma[r] cas.pio	'Caspian Sea'
	Ce.sa[r] fue	'Caesar went'
d)	*Ce.sa[r] a.yu.da	'Caesar helps'
	*ma[r] e.ge.o	'Ægean Sea'

Leaving the cases in (34d) aside for the moment, since they will be dealt with in section 4.3 below, the structure of a vibrant in coda position is the following:

(35)



[ár.ßol]

The emergence of a trill is precisely what the analysis proposed in the previous chapter predicts, since a morpheme-internal trill in intervocalic position and a trill in coda position share the property of being moraic.

4.2 Emphatic Trill

I have decided to treat the cases of a trill in coda position which arises in careful speech as distinct from the cases that arise under emphasis. The reasons for this approach are the following: (i) emphasis does not affect the trill alone, but has consequences for other segments in syllable-final position; (ii) emphasis applies regardless of the speed at which the sounds are uttered, i.e. emphasis may be present in casual or careful speech; (iii) emphasis only affects the syllable that

receives main stress.

The realization of /r/ in coda position as a trill in careful speech has been discussed in section 4.1 above. Therefore this section will be restricted to the discussion of the representation of a trill which surfaces in coda position under emphasis in casual speech. The implicit assumption is that the analysis of emphasis obtained in this section extends itself to account for emphasis in careful speech as well. Even though a trill in coda position is not a common occurrence in casual speech, as Terrell (1976) reports[14], our analysis must nevertheless be able to account for the presence of a trill as a result of emphasis.

In emphatic contexts, Spanish speakers articulate the stressed syllable in the word that is being emphasized with greater intensity and duration. Canellada and Kuhlmann (1987) conclude that "la intensidad por sí sola no marca el acento. Es la duración lo que marca el acento" (p.68). This description coincides with the one offered by Dogil (1979), who considers that all four perceptual clues, pitch modulation, duration, intensity and segmental quality, are present in emphatic stress, yet the primary clue to emphasis is duration. Therefore, if emphasis is indeed phonologically encoded, and I argue that it is, differences in duration should be observed. This is precisely the case. If the syllable being emphasized is open,

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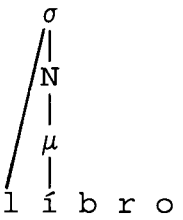
[14]Terrell (1976), in his study of /r/ in Cuban Spanish, reports that emphatic reinforcement is almost unknown in syllable final position.

the vowel is perceived as long, e.g. libro as [lí:ßɾo]. As Navarro-Tomás (1950) explains, Spanish vowels are always short except in the cases of "lenguaje afectado o enfático" where they can be long (pp.200-201). If the syllable being emphasized is closed by a coda consonant, the emphasis is perceived as consonant lengthening, "alargamiento de las consonantes" (Navarro-Tomás 1946:50).

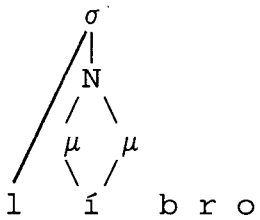
The durational difference observed in the cases of emphatic speech can be explained by interpreting emphasis as the addition of a mora in the phonology. The addition of a mora in an open syllable links to the vowel making it long,

(36) a. Casual speech



[lí.ßɾo]

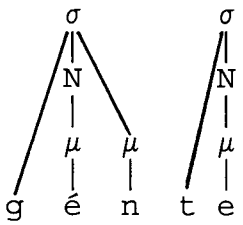
b. Emphatic speech



[lí:.ßɾo] 'book'

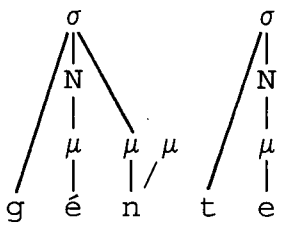
In the case of closed syllables, and since coda consonants are moraic to begin with (see stress facts in section 2.2 and 3.3 above), the added "emphatic" mora can not associate to the syllable because the latter is filled to its maximum capacity,

(37) a. Casual Speech



[xén.te]

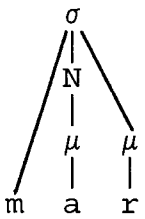
b. Emphatic Speech



[xén:.te] 'people'

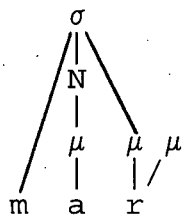
In those cases where the coda consonant is an /r/, the addition of an emphatic mora generates the following structure:

(38) a. Casual Speech



[maɾ]

b. Emphatic Speech



[mar] 'sea'

The trill, therefore, that surfaces under emphasis in (38b) is also moraic in accord with the analysis advanced so far. The cases of (38a), where a moraic /r/ surfaces as a tap will be examined in Chapter 5.

An alternative approach to dealing with emphasis is to regard it as a purely phonetic reflex, assuming no change in phonological structure. If one assumes this option, one could propose that emphasis is a result of articulating the sounds with more tension than normal. This tension would render an /r/ which phonetically corresponds to the trill according to the definitions given by Navarro-Tomás (1950) and Harris (1969), but would not derive the lengthening observed in the cases of syllable-final vowels and consonants. I therefore opt for the view of considering emphasis as a phonological process.

In this section I have examined the behaviour of /r/ in coda position under emphasis in casual speech. It has been argued that syllable-final segments are realized as long under emphasis. In the case of /r/, a trill surfaces. However, this

is only observed if the syllable-final /r/ is followed by a consonant. In the following section, cases of word-final /r/ followed by a vowel-initial word are examined.

4.3 Resyllabification

In casual speech, syllable boundaries do not always coincide with word boundaries (Harris 1983a, Canellada and Kuhlmann 1987, Fernández-Ramírez 1985). In fact, whenever a word ending in a consonant is followed by a vowel initial word, the final consonant is resyllabified as the onset of the following syllable,

(39) a. "estos años" es.to.sa.ños

b. "un árbol" u.nár.bol

(Fernández-Ramírez 1985:74)

c. Los otros estaban en el avión

(Harris 1983a:43)

When a word final -r followed by vowel initial word is syllabified as onset of the following syllable, it always surfaces as a tap, never as a trill, even in emphatic speech. This is illustrated by the following examples,

(40) a. "mar verde" ma[ɾ] verde alternates with
ma[r] verde in emphatic speech.

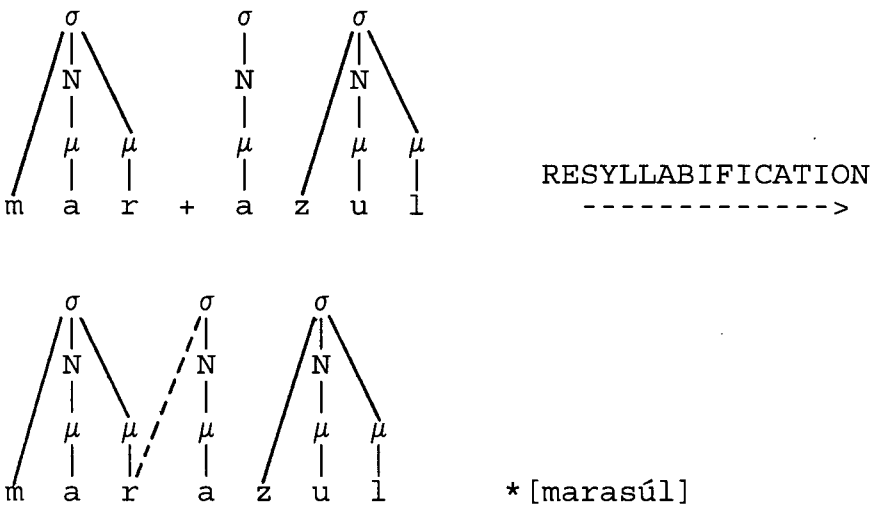
b. "mar azul" ma[ɾ] azul in casual and emphatic,
*ma[r] azul is impossible.

(Harris 1983a:70)

If we view (40b) as two fully syllabified words which, when

concatenated, induce resyllabification, a problem for our analysis arises. This problem originates from the assumption that the final /-r/ in *mar* is moraic at the point in which it is resyllabified as onset of the next onsetless syllable. This resyllabification might be expected to generate a moraic doubly linked structure which would surface, under the analysis proposed here, as a trill:

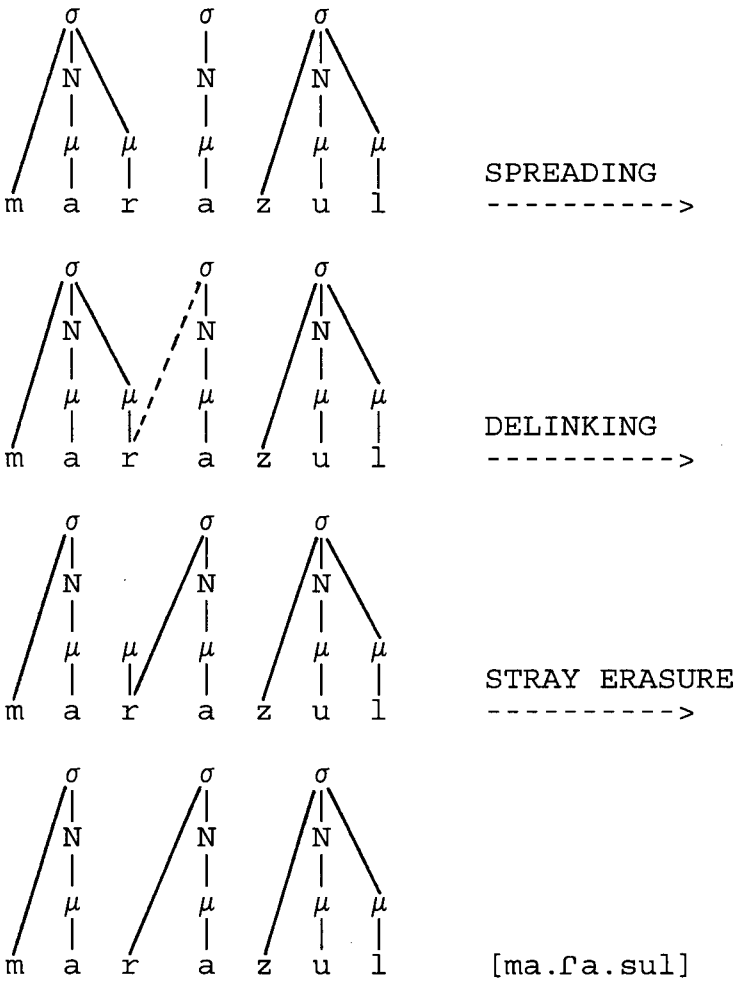
(41) INPUT TO CONCATENATION



This is clearly an undesirable result that our theory must deal with. One way of accounting for the fact that a final /-r/ when resyllabified as an onset always surfaces as a tap, crucially never as a trill, is by adopting D'Introno, Ortiz and Soza's (1987) analysis of resyllabification in Spanish: they propose that resyllabification is the result of a rule of rightward spreading of a "rhyme consonant in word final position to the empty onset position of the following word" (p.97) with consequent delinking of its original association to the rhyme. This process is schematized below for the case of "mar azul"

with some adjustments to the representation, imposed by the theory of syllable structure adopted here:

(42)



The analysis of Spanish resyllabification proposed in (42) encounters a serious problem which centers on the issue of motivating and constraining the application of the rule of delinking. Given that the configuration obtained after the application of the rule of spreading, is a well-formed Spanish segment, namely the trill, what general principle of well-formedness could be posited to motivate the application of the

rule of delinking? At the same time, what would constrain the rule from applying to an intervocalic trill? I argue that a solution to account for these cases is furnished by the constraint-based approach of Optimality Theory (McCarthy and Prince 1993, Prince and Smolensky 1993).

Unlike the step-by-step derivational approach, such as the one exemplified in (42) above, Optimality theory, henceforth OT, is not concerned with the "history" of a given output (i.e. the derivation) but with the final form (i.e. the output). Within an OT based approach, it is claimed that there are only two phonological representations: the input and the output. For every given input, there is a set of possible candidate forms which are generated by the function GEN. These candidates are then evaluated by the function EVAL which determines the optimal form based on the interaction of various constraints. All these constraints are claimed to be part of Universal Grammar (UG), yet the order in which they are ranked with respect to each other is set in a language-particular basis. Because constraints are violable, the output form may or may not violate a constraint but emerges as the optimal candidate because it incurs the least serious and the smallest number of violations.

An OT analysis of Spanish resyllabification would evaluate the sequence of words "mar azul" not word by word, but as a whole. The constraints needed to illustrate how the optimal candidate is obtained are the ones listed in (43) below. All of these constraints are highly general and have been proposed by

Prince and Smolensky (1993:25,85):

(43) ONS — Every syllable has an onset.

NO CODA — Syllables must not have codas.

PARSE — Any material present in the input must be realized in the output.

FILL — Syllable positions must be filled with segmental material.

These constraints are ranked with respect to each other in the following way:

(44) a. PARSE >> NO CODA — The fact that we obtain a form "mar" and not "ma<r>" (where < > mark an unparsed segment) shows that Spanish would rather violate NO CODA than fail to parse material present in the input.

b. FILL >> ONS — Since Spanish allows onsetless syllables, e.g. "a.zul", ONS must be a violable constraint. Furthermore, since no default onset is epenthesized to satisfy ONS, one may conclude that a FILL violation is worse than a violation of ONS.

c. PARSE >> ONS — The output form obtained is "a.zul" and crucially not "<a>.zul" which shows that it is more important to PARSE than to satisfy the ONS constraint.

d. Final Ranking of Constraints:
PARSE, FILL >> ONS >> NO CODA
PARSE and FILL are undominated. ONS and NO CODA are violable. ONS is ranked above NO CODA according to Prince and Smolensky's (1993:94) syllable structure typology.

(44d) is by no means exhaustive. For example, given an input such as /klub lindo/ 'beautiful club', the ranking proposed in (44d) would predict the optimal output to be [klu.blin.do] where PARSE, FILL and ONS are unviolated, while incurring only one violation of NO CODA. This output is in fact ungrammatical. The actual form obtained is invariably [klub.lin.do] (Harris 1983a:43), where no resyllabification has taken place despite the fact that a /bl/ sequence constitutes a well formed syllable onset in Spanish, e.g. <u>bl</u>an.co 'white', do.<u>bl</u>ar 'to bend'. A constraint such as *COMPLEX (Prince and Smolensky 1993:87) would prevent the emergence of tautosyllabic clusters. If ranked below PARSE, to ensure no deletion, and above NO CODA, the desired results are obtained. Compare two possible outputs:

(45)

INPUT /klub lindo/	PARSE	FILL	ONS	*COMPLEX	NO CODA
☞ klub.lin.do					**
klu.blin.do				*!	*

The first candidate, [klub.lin.do], is optimal because it satisfies PARSE, FILL, ONS, and *COMPLEX with two violations of NO CODA, while the second candidate, *[klu.blin.do], although it only incurs one violation of NO CODA, is dispreferred because it violates a higher ranking constraint, namely *COMPLEX. This ranking would ensure that resyllabification does not generate clusters, explaining why resyllabification is only observed when

the second word begins with a vowel.

The tableau in (46a) illustrates the way in which the optimal candidate, signaled by a '☞' mark to its left, is determined. I have not included the constraints *COMPLEX and FILL SEGMENT, since they play no crucial role in this particular case. The constraint WEIGHT BY POSITION is postulated to ensure that coda consonants are always assigned a mora. This insertion in turn forces a violation of the constraint FILL MORA.

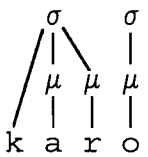
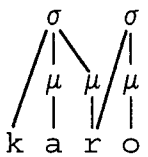
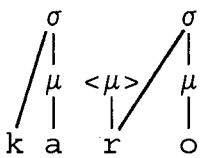
(46a)

INPUT μ μ μ mar azul	PARSE	WEIGHT BY POS	ONS	NO CODA	FILL MORA
σ σ σ μ μ μ μ μ m a r a z u l			*!	**	**
☞ σ σ σ μ μ μ μ m a r a z u l				*	*
σ σ σ μ μ μ μ μ m a r a z u l				**!	**
σ σ σ μ μ μ μ m a r a z u<l>	*!			*	*
σ σ σ μ μ μ m a r a z u<l>	*!				

The candidate that emerges as optimal is the one in which the final /r/ in /mar/ is parsed as onset and crucially not doubly-linked. The phonetics would interpret such a phonological structure as a tap and never as a trill.

In contrast, highly ranked PARSE forces the parsing of the mora associated to the morpheme-internal intervocalic /r/ which is present in the input in cases such as *carro*, causing it to invariably surface as a trill. The selection of the optimal candidate in these cases is illustrated in the tableau in (46b):

(46b)

INPUT μ μ μ k a r o	PARSE	WEIGHT BY POS	ONS	NO CODA	FILL MORA
 σ σ μ μ μ k a r o			*!	*	
☞  σ σ μ μ μ k a r o				*	
 σ σ μ <μ> μ k a r o	*!				

The second candidate emerges as the optimal one since it crucially does not incur a violation of the constraints PARSE (in this case PARSE MORA) and ONSET.

4.4 Summary

In this chapter, I have argued that the proposal that a trill is the phonetic realization of a moraic /r/ is able to account for the cases of syllable-final /r/ in careful and emphatic speech. It has been shown that a final /r/ which surfaces as a tap when resyllabified as an onset in casual speech, presents no problems to the proposal put forth here.

In the chapter that follows, cases of syllable-final /r/ in casual speech will be examined.

CHAPTER 5: TAP IN CODA POSITION

5.0 Introduction

Syllable final position has traditionally been labeled a "weak position" (Hooper 1975), one which "is associated with phenomena of neutralization in Spanish in general" (Guitart 1976, also in Harris-Northall 1990). It is not surprising then to find that in this environment, the tap and the trill are neutralized. According to the analysis of Spanish /r/ advanced so far, a trill is the phonetic realization of a moraic /r/. Such a proposal predicts that, since /r/ in coda position is also moraic, it should surface as a trill. However, in casual speech, a non-emphatic /r/ in coda position is realized as a tap. In this chapter, it will be argued that these cases may be reconciled with the main proposal put forth in this thesis.

Given that the interaction between /r/ and other segments will play a central role in the analyses proposed in this chapter, I have devoted the first section to laying out the assumptions I make with regards to feature specifications and representations. This is followed by six sections, each one dealing with the description and analysis of data on dialect variation, which show coda position to be an environment in which liquids are unstable, being subject to deletion, assimilation, gliding, aspiration, assibilation, and lateralization. A special case of /r/ in coda position, namely

the intervocalic trill, is also examined with respect to the application of the processes discussed in the previous sections. The last section takes a closer look at /r/ in coda position which is phonetically realized as a tap in casual speech.

5.1 Castilian Spanish Consonant Inventory

The following table shows the inventory of Spanish consonants followed by the features that I assume present underlyingly. The segments in parentheses, do not occur in all dialects:

Table 4. Inventory of Spanish Consonants

p	+cons, LAB, -cont
b	+cons, LAB, +vce
t	+cons, COR, -cont
d	+cons, COR, +vce
č	+cons, COR, -ant, -cont
(ɟ)	+cons, COR, -ant, +vce
k	+cons, DORS, -cont
g	+cons, DORS, +vce
f	+cons, LAB, +cont
(θ)	+cons, COR, +cont, +distr
s	+cons, COR, +cont, +stri
(ž)	+cons, COR, +cont, -ant, +vce
x	+cons, DORS, +cont

r	+son,+cons,COR,+cont
l	+son, COR, +lat
m	+son, +cons, LAB, +nas
n	+son, +cons, COR, +nas
ñ	+son, +cons, COR, +nas, -ant
(h)	-son, +cons
(λ)	+son, +cons, COR, +lat, -ant

ant=anterior; cons=consonantal; cont=continuant; COR=coronal; distr=distributed; DORS=dorsal; LAB=labial; lat=lateral; nas=nasal; son=sonorant; stri=strident; vce=voice.

I would like to comment on the specifications of the feature [continuant] that I have included in Table 4. I assume that the voiced obstruents are unspecified for continuancy since the alternation between Spanish voiced stops and fricatives is determined by the the context in which they occur. These cases will be dealt with in Chapters 6 and 7. The value for continuancy for nasals and laterals has not been specified underlyingly since it can be assigned by complement rules of the form:

(47) If [+nas] then [-cont]

If [+lat] then [-cont]

The specification of the laterals as [-cont] will become crucial in the derivation of forms such as ca[ld]o 'broth', where a voiced obstruent underlyingly unspecified for continuancy, surfaces as [-cont][15]. In such cases [l] patterns with the nasals which also trigger the emergence of a stop in forms such as ca[nd]ela. Again, these cases will be dealt with in Chapter 6. The [-cont] specification of [l] is not sufficient however; the feature [+lat] is also needed, as will be seen in section 6.7, to account for the cases in which an /l/ shares place features with a following /r/ as in the case of alrededor.

I have also adopted a feature geometry that regards [sonorant] and [consonantal] as terminal features, directly dependent of the root (Sagey 1986), as opposed to defining

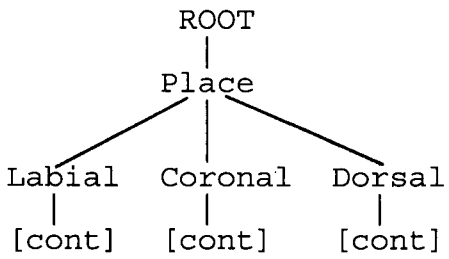
---

[15]For a detailed argumentation in support of the [-cont] status of [l] in this cases, see Tatò (1981).

these two features as constituting the root itself (McCarthy 1988). The preference of one over the other will become evident in the analysis of /r/ assibilation offered in section 5.7 below.

I also assume the feature geometry proposed by Padgett (1994:468) where the feature [continuant] is a dependent of the Place node:

(48)



This modification is suggested by Padgett (1994) in order to capture the interaction between place features and continuancy such as the one observed in the cases of stops alternating with fricatives in Spanish.

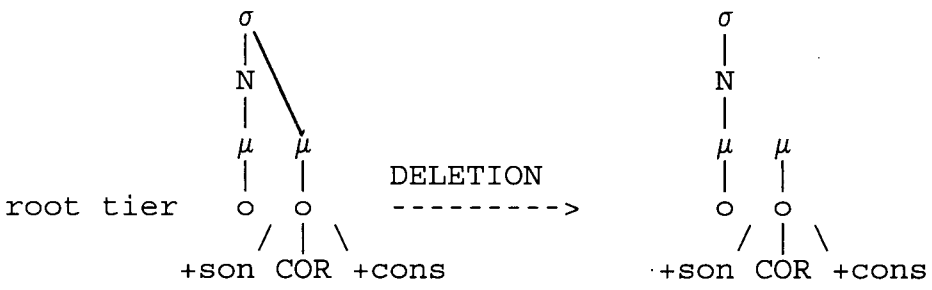
5.2 Deletion

Cases of deletion of syllable final /-l/ in phrase final position are common in areas of Andalusia, the Dominican Republic and Panama, e.g. *cabal* realized as [kaßá] (Cotton and Sharp 1988:60), *miel* as [mié] (Alonso and Lida 1945:337). Deletion of syllable final /-r/ is a common process in areas of Andalucía, Chile, Colombia, the Dominican Republic, Louisiana, Mexico, Panama, Puerto Rico, and Venezuela, e.g. *humor* realized as [umó] (Cotton and Sharp 1988:60), *soltarle* as [soltále]

(Cotton and Sharp 1988:223), *confesar* as [konfesá] (Alonso and Lida 1945:337), *trabajar* as [tʃaßaxá] (Lipsky 1990b:28).

The deletion of a coda consonant, an /-l/ or an /-r/ in this case, might be motivated by the universal preference for open syllables (Bell and Hooper 1978, Vennemann 1988). This deletion could be analysed as the delinking of the mora:

(49) Deletion rule:[16]



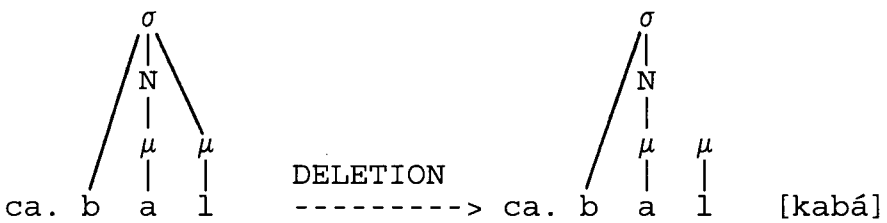
Given the set of conditions specified in (49), the rule of deletion would not only target /l/ and /r/, but also any other sonorant coronal in coda position. The palatals [ɲ] and [λ] are not licensed in coda position and therefore would never be found in the relevant context. However, the nasal [n] would be targeted by the rule in (49). Closer look at the dialects where this deletion is found, reveals that an [n] in word-final position is often velarized. This observation, however, is not sufficient to account for the data, since at least in two dialects, in Chile and in Louisiana, [n] in coda position is always alveolar. Even though I will not pursue the matter any

[16]In this and in subsequent representations involving the feature geometry proposed by Padgett, I have omitted the PLACE node for reasons of space.

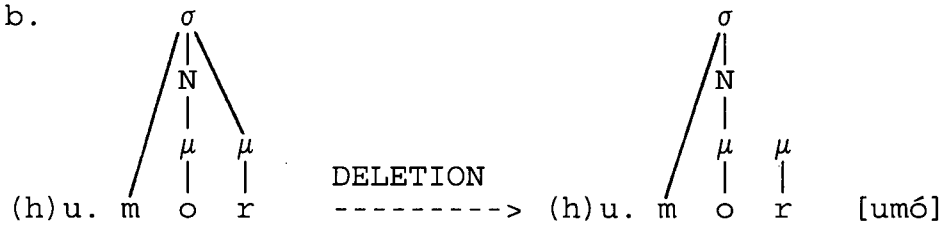
further here, I would like to suggest that a way of preventing the rule in (49) from deleting a nasal is possible within Optimality Theory. Such an alternative would crucially rank a constraint that forces the parsing of the feature nasal above the one which handles the deletion cases. The cases where a coronal nasal is present in the output would violate the constraint on deletion of coronal sonorants in coda position, while satisfying a higher ranking constraint, i.e. PARSE [nasal].

The application of the deletion rule in (49) is illustrated in the derivation of "cabá" and "humó", where [l] and [r] represent the corresponding root nodes:

(50) a.



b.



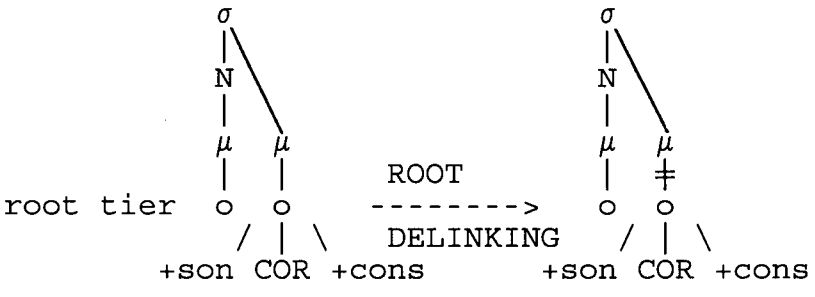
I assume that any material which is not linked to the syllable fails to be phonetically realized being subject to Stray Erasure (Itô 1989).

5.3 Assimilation

In some cases, a syllable-final liquid /-l/ or /-r/ assimilates to the following consonant[17]. This phenomenon is observed in Chile, Colombia, Cuba, the Dominican Republic, and in the Spanish regions of Andalucía and Murcia, e.g. *puerta* as [puétta], *algo* as [ággo] (Lipsky 1994:232), /el niño/ as [en.ní.ño] (Martínez-Gil 1991), *carne* as [kánne] (Cotton and Sharp 1988:206), *curva* as "cu[bb]a", *tal droga* as "ta[dd]roga" (Harris 1983b:129, 133)[18].

This assimilation may be analyzed as the delinking of the root which subsequently leaves a mora with no melody associated to it. Assimilation to the following segment may be accounted for by the leftward spreading of the following root to associate with the stranded mora (Hayes 1986a):

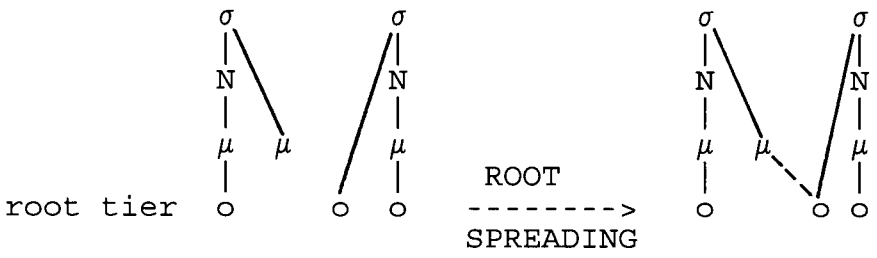
(51) a. Root delinking:



[17]The liquids are not the only segments which assimilate to the following consonant in this environment. Although there is wide variation among dialects, it appears that any coda consonant may undergo the rule. E.g. syllable final /s/, *caspa* as [káp.pa], *mismo* as [mím.mo], *isla* as [íl.la]; obstruents in coda position, *acto* as [át.to], *opcional* as [oθ.θio.nál], *submarino* as [sum.ma.rí.no] (Martínez-Gil 1991:558).

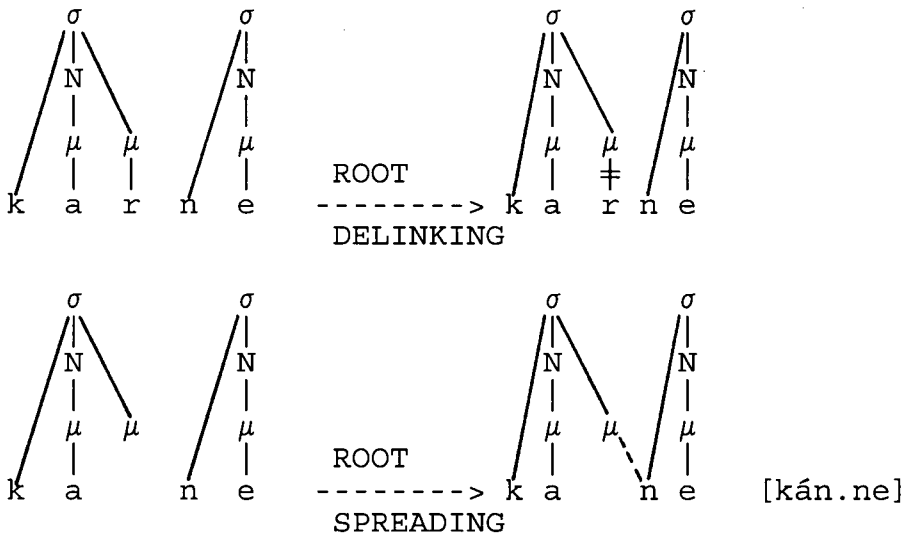
[18]The assimilation data from Havana Spanish is complicated by a rule of retroflection active in this dialect. For a detailed analysis of these cases, see Harris (1983b).

(51) b. Root spreading:



The application of the rules in (51) is illustrated in the derivation of [kánne]:

(52)



5.4 Gliding

Liquid gliding is found in areas of Andalusía, Cuba and Puerto Rico, yet is not as common a process as aspiration, assimilation, or lateralization, e.g. *serpentón* realized as [seipentón], *golpe* as [góipe] (Alonso and Lida 1945:339). On the other hand, in the Cibao region of the Dominican Republic, gliding is the most common process affecting syllable final liquids, e.g. *porque* pronounced [póike], *algo* as [áiɣo], *mejor*

as [mexói] (Alonso and Lida 1945:339, Cotton and Sharp 1988:206, Lipsky 1994:239).

The generalization seems to be that a syllable final liquid, i.e. -r or -l, is realized as a high front vowel in certain dialects.

(53)	a.	carta	[kay.ta]	'letter'
		algo	[áy.ɣo]	'something'
		parque	[páy.ke]	'park'
	b.	pare	[pá.ɾe]	'stop'
			*[pá.ye]	

(Guitart 1981:223, 226)

The forms in (53a) illustrate that liquids are realized as glides in coda position. (53b) illustrates that this alternation is not observed when the liquids are in onset position. The example in (53b) was the only form illustrating this that I was able to find in the literature, although Guitart (1981) assures us that gliding never applies to liquids in onset position.

There are a few complications in the formalization of the rule as the following examples illustrate:

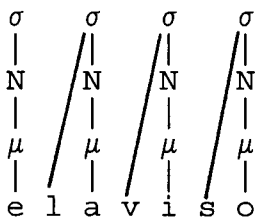
(54)	a.	él avisa	"he advises"
		e[i] avisa	
	b.	el aviso	"the advice"
		e[l] aviso	

(Harris 1983a:48)

Guitart (1981) maintains the position that the relevant context for liquid gliding is syllable final and accounts for the different outputs in (54) by considering articles and prepositions, such as *el*, *por*, etc., as clitics and therefore

not prosodic words. In (54a) the pronoun *él* being an independent prosodic word is subject to liquid gliding. The article *el* in (54b), on the other hand, is not subject to the rule since it does not constitute a prosodic word on its own, but forms one in conjunction with the noun *aviso* in which case the final /l/ is syllabified as onset, thus not satisfying the structural description of the rule:

(55) [el aviso]$_{PrWd}$ "the advice"



For the purposes of the analysis proposed here, I assume the definition of prosodic word given in Guitart (1981). Liquid gliding, I claim, involves the delinking of the root node (rule (51a), leaving a mora behind, but instead of spreading the following root, a default vowel is inserted. It has been argued by Archangeli (1988) that languages have a default vowel in their inventory. This is supported by the observation that the same vowel is inserted in the various epenthesis processes in a given language. In the case of Spanish the default vowel is the mid front vowel [e]. This vowel surfaces when there is a sequence of consonants which cannot be syllabified:

(56) a. Initial Epenthesis:

hemi-sferio	'hemisphere'
e-sfera	'sphere'

b. Final Epenthesis:

padr-e	'father'
padr-ino	'Godfather'
adelant-e	'ahead'
adelant-ar	'to go ahead'

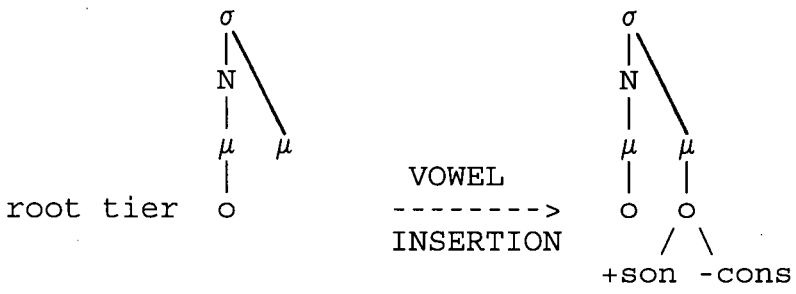
c. Plural Epenthesis:

barco	barcos	'boat(s)'
enchilada	enchiladas	
	cf.	
tren	trenes	'train(s)'
tamal	tamales	

(Harris 1985a, 1985b)

I propose here that the Spanish default vowel is inserted to fill the slot left by the liquid through the application of a dialect specific vowel insertion rule.

(57) Vowel Insertion rule:



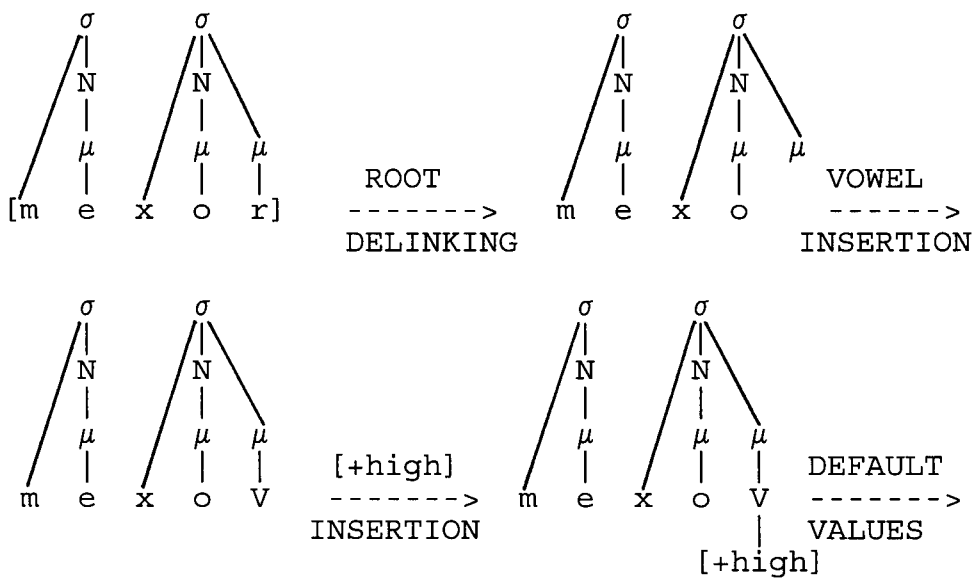
The vowel [e] would surface after the default values [-back], [-round] are assigned at the end of the derivation. Yet this insertion would yield ungrammatical results:

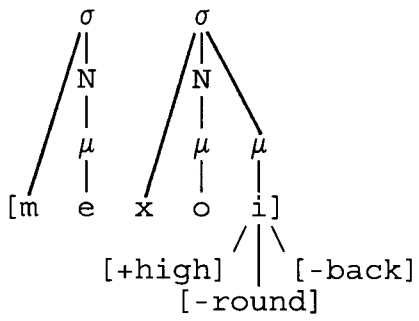
(58)

golpe		* [goepe]
algo	DEFAULT VOWEL INSERTION ---------->	* [aeɣo]
mejor		* [mexoe]

In order to obtain the desired results, let us recall the structure of Spanish diphthongs illustrated in Table 3, on p.34. A prerequisite to being a diphthong is that one of the segments, either the first or the second, must be [+high] or put differently, a vocalic non-nuclear mora must be [+high]. A sequence of two [-high] vocalic segments is always analyzed as two syllables. Assuming prosodic structure preservation, this would not be an option, since in the case at hand, the words are already syllabified. Therefore, in order to be phonetically interpreted the inserted front vowel must be realized as [+high], i.e. [i]. The following derivation illustrates the application of liquid gliding:

(59)





I claim that the rules of root delinking, default vowel insertion and [+high] insertion are necessary to generate the desired surface forms.

An apparently problematic case would be presented by forms which underlyingly contain a [+high] vowel followed by a liquid, e.g *azul* 'blue', *sirve* '(s)he serves'. Presumably the insertion of the default vowel would generate in these cases the sequences /ue/ and /ie/, which being well-formed Spanish diphthongs, would not force the insertion of [+high]. These forms however, do not surface as *[a.súe] and *[síe.ße], but as [a.súy] and [sí.ße], respectively, confirming that [+high] insertion has applied. I believe that syllable structure data sheds some light on this issue. As it was discussed in section 3.2 (see p.24), a sequence of a high and a non-high vowel always renders a GV rhyme. In this case, assuming prosodic structure preservation, a GV rhyme would never arise in the sequences [ue] and [ie] because the high vowel is already syllabified as nuclear. Therefore the insertion of high applies as in the case in (59) rendering [a.súi] and *[síi.ße]. A constraint prohibiting long vowels in Spanish would account for *[síi.ße]

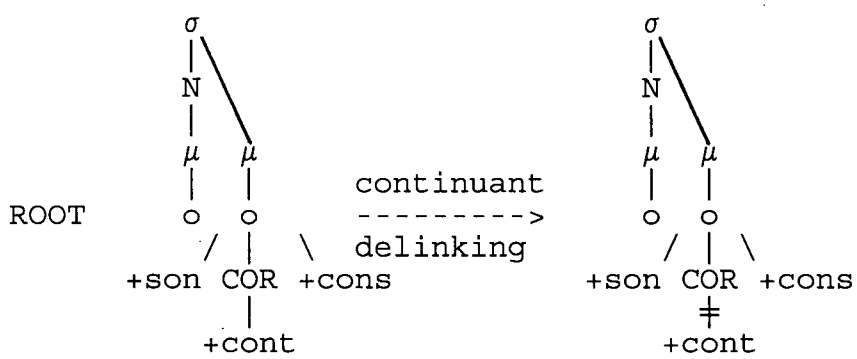
surfacing with a short vowel: [sí.ße].

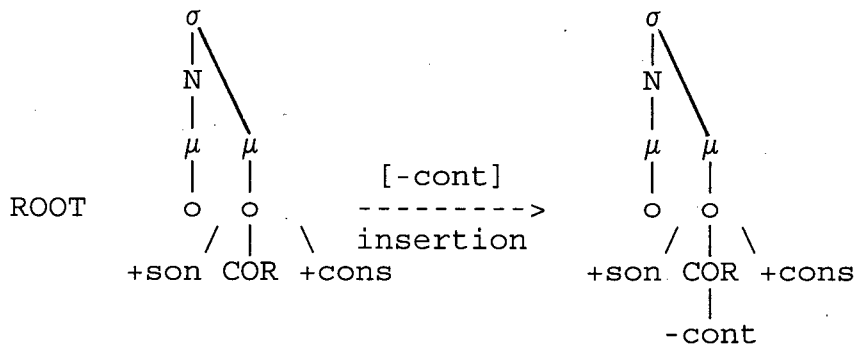
5.5 Lateralization

One of the most common realizations of a syllable final /-r/ is [l] (lateralization), found in areas of Cuba, the Dominican Republic, coastal areas of Colombia, Louisiana, the caribbean coast of Panama, Puerto Rico, regions of Spain, Trinidad and rural areas of Venezuela, e.g. *mujer* realized as [mu.hél], *hermano* as [el.má.no] (Alonso and Lida 1945:318-319), *puerta* as [puél.ta] (Lipsky 1990b:28). It is interesting that although a final /-r/ may be realized as [l] in *olor* [o.lol], the plural form, in which the /r/ is no longer in coda position, but syllabified as the onset of the final syllable, is always without exception [oloɾes] (Alonso and Lida 1945:342).

The dialects where lateralization of an /r/ in coda position is observed may be analyzed as the delinking of the underlying [+cont] specification associated with /r/, followed by the assignment of [-cont]:

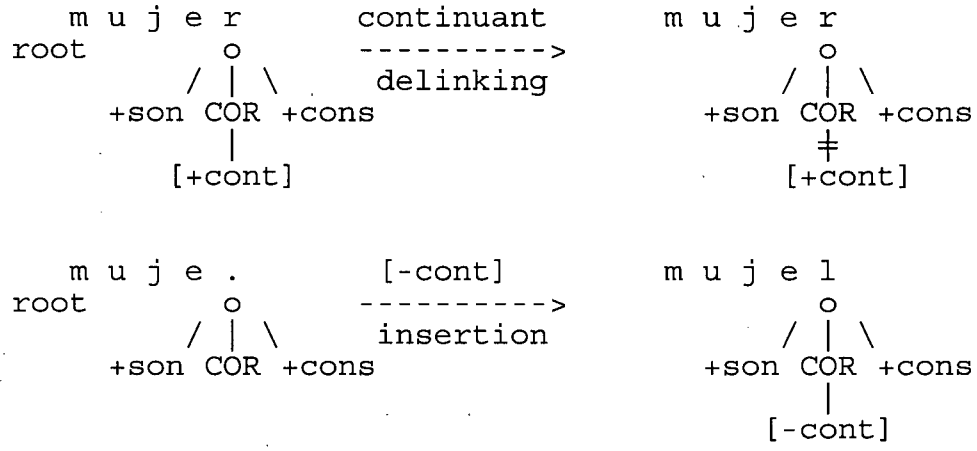
(60)





The application of lateralization is illustrated in the derivation of "mujel":

(61)



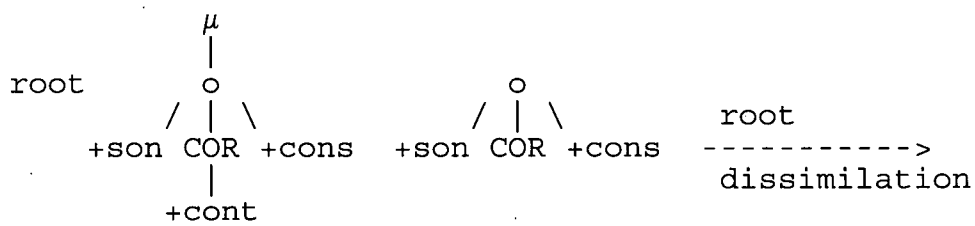
The representation does not offer a full specification of the segment [l], since the feature [lateral] is missing. According to Table 4, on p.55, the only Spanish segment that is a sonorant, coronal, non-continuant, non-nasal is [l]. Therefore, I assume that the underspecification of [lateral] in this case may persist into the phonetic component (Keating 1988) and that given the inventory of Spanish sonorants, the only possible output is a lateral sonorant.

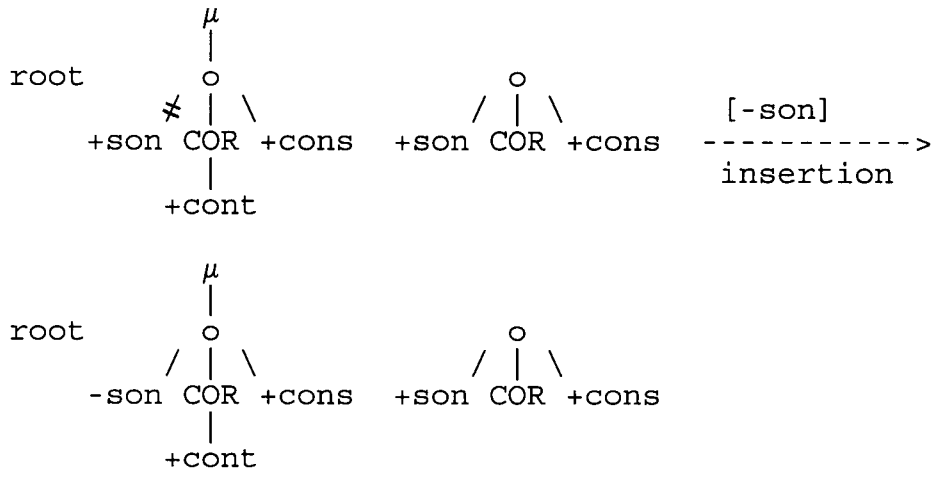
5.6 Assibilation

An /r/ in coda position may be assibilated if followed by /n/ or /l/ as illustrated by the following examples taken from data collected in Andalusia, the Antilles, Colombia, Guatemala and New Mexico, e.g. *carne* realized as [kás.ne], *burla* as [bús.la], *perla* as [pés.la] and *pierna* as [piés.na] (Alonso and Lida 1945, Lipsky 1994). The assibilating dialects may be regarded as having a rule which dissimilates adjacent roots which have the same specifications for [sonorant] and PLACE: /r/ surfaces as [s] in these dialects if it is followed by a homorganic sonorant, namely [n] or [l]. Such a phonological rule which prohibits a sequence of two [+son, +cons] roots with the same place specification, could be motivated by the Obligatory Contour Principle (Leben 1973, McCarthy 1986, Yip 1988).

An autosegmental account of assibilation in Spanish dialects may be obtained by proposing a rule of "root dissimilation" formulated in (62), followed by the assignment of [-son]:

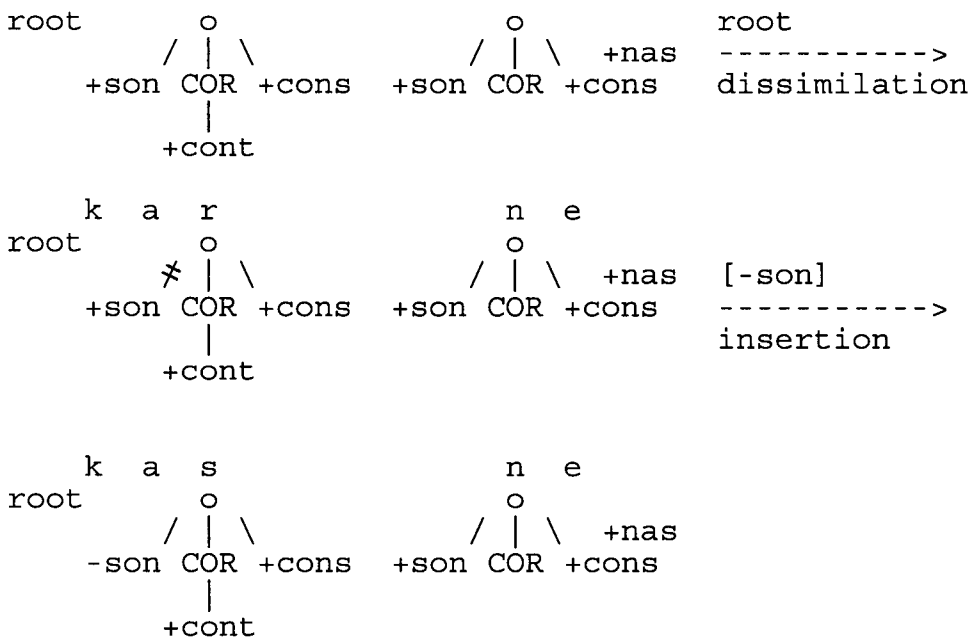
(62)





The following derivation illustrates the application of the dissimilation rule in obtaining the form [kasne]:

(63)



Some dialects of Spanish have two segments that are [-son, +cont] coronals, namely [s] and [θ]. I assume that coronals are unmarked for the features [-distributed], [+anterior] and in the case of the fricatives, [+strident]. Based on cross-linguistic

studies, where [s] emerges as the unmarked segment in comparison to [θ] (Maddieson 1984), I assume that [θ] is underlyingly specified as [+distributed] and therefore in a case, such as the derivation in (63), a [+strident] segment, i.e. [s], surfaces.

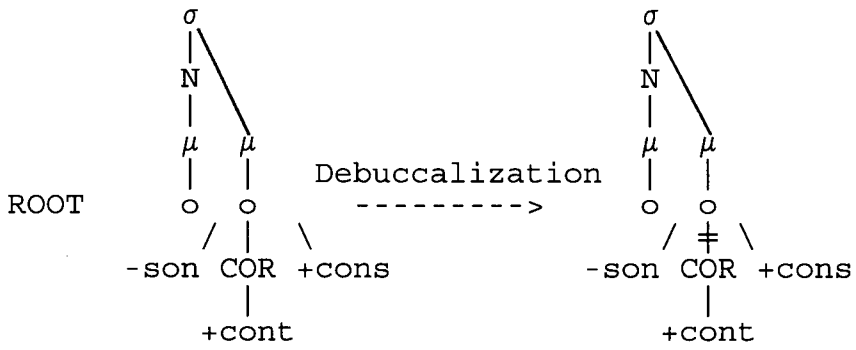
The cases of assibilation provide support for considering [sonorant] as a feature and not as constituting the root, since this allows for a simple account of assibilation. They also provide support for specifying /r/ as [+cont] since the segment with which it alternates in the assibilating dialects is a [+cont] segment, namely [s].

5.7 Aspiration

Syllable final /-r/ may be aspirated as observed in regions of Chile, Louisiana and Panama, e.g. *carne* pronounced as [káhne] (Cotton and Sharp 1988:223), *burla* as [búhla] (Alonso and Lida 1945:339), *gobierno* as [goßiéhno] (Lipsky 1990b:28). The cases of assimilation and gliding analysed above involved the delinking of the root. The cases of aspiration may be handled by a rule of debuccalization which causes the place node to be delinked (McCarthy 1988, Goldsmith 1981). The difference between these two cases, delinking of a root vs. delinking of the place node, is that the former case leaves a mora with no content, which I claim is not interpretable, while the latter case leaves a root node with no place specification which the phonetics is able to interpret.

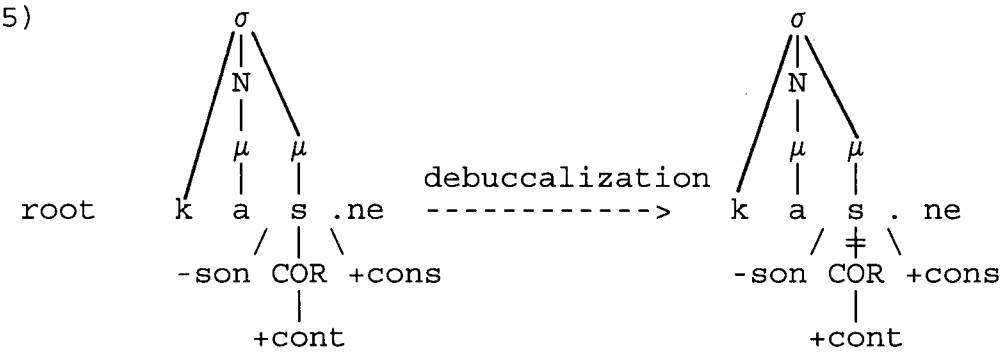
The cases of aspiration of syllable final /r/ can be related to the cases of assibilation in this same environment, since syllable-final /s/, not only in Spanish but cross-linguistically, is often realized as [h]. Aspiration of /r/ would be obtained through the application of two processes: first assibilation would apply (see (62) above), then debuccalization. The rule of debuccalization would be formulated in the following way:

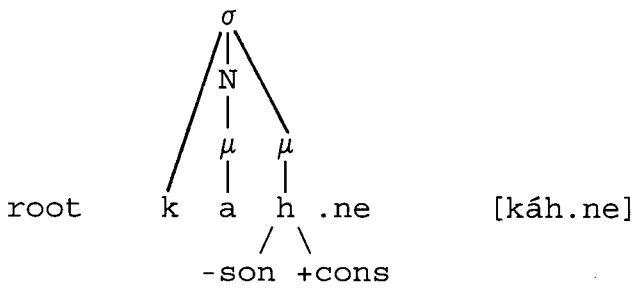
(64) Debuccalization rule:



With the application of rule (64) neither the mora tier nor the root tier are affected and a placeless sonorant segment surfaces, namely [h]:

(65)





5.8 Intervocalic Trill: A Special Case of /r/ in Coda Position

All the processes discussed in this chapter have applied to an /r/ in coda position. The proposal put forth here, where an intervocalic trill has the structure in (15) repeated here as (66):

(66) UR

seems to make the prediction that a trill in this position could undergo the processes discussed above, since the /r/ is indeed in coda position. However, an intervocalic trill is never subject to any of these processes. In order to account for this, I invoke Hayes's (1986b:331) formulation of geminate inalterability which relies on the exhaustive interpretation of association lines in structural descriptions:

(67) "LINKING CONSTRAINT. Association lines in structural descriptions are interpreted as exhaustive."

According to the Linking Constraint, a rule that must specify "both the melodic and the CV tiers, and thus include association lines in its structural description,...will not apply to

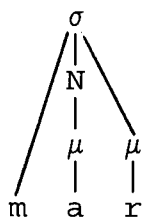
configurations containing more association lines than the rule specifies" (Hayes 1986b:344). Given that the rules proposed in the previous sections need to include association lines in their structural description in order to target only /r/ in coda position, they will not apply to an intervocalic trill since its configuration contains more association lines than the formulation of the rules requires.

5.9 Tap in Coda Position

According to the analysis proposed here, in which a moraic /r/ is realized as a trill, to find a tap in coda position is unexpected given that coda consonants are moraic in Spanish. I argue that the emergence of a tap in this position is related to the processes described in the previous sections of this chapter. These were intended to show that coda position is an unstable position, at least as far as the liquids are concerned.

An /r/ which is always moraic in coda position, should be expected to surface as a trill. However, in casual speech, a moraic /r/ is weakened to a tap. This weakening may be viewed as an artifact of a relaxed style of pronunciation, which does not generate the tension needed for the articulation of a trill. Therefore an /r/ in coda position in casual speech would have the phonological structure of a trill, yet the phonetic realization of a tap:

(68)



[maɾ]

5.10 Summary

It has been argued in this chapter, that an /r/ in coda position is rather unstable. This has been shown to be the case through the analysis of various processes that affect /r/ in coda position if singly linked. The claim that occupying the coda position makes an /r/ unstable, is crucial in accounting for the tap that surfaces in casual speech. An /r/ in coda position, as far as the phonology is concerned, constitutes a moraic /r/ whose phonetic correlate is a trill. The tap heard in casual speech is proposed to be a result of the style of pronunciation.

CHAPTER 6: /r/ IN ONSET POSITION

6.0 Introduction

/r/ is found in onset position in various contexts: (i) word-initially, (ii) word-medially, after an open syllable, (iii) word-medially, after a closed syllable, and (iv) as the second segment in a tautosyllabic cluster. Cases of context (ii) have been dealt with in Chapter 3, where it was argued that the contrast between an intervocalic trill and a tap resulted from a lexically specified prosodic distinction. An /r/ in contexts (i) and (iii) always surfaces as a trill, never as a tap as illustrated in (5) repeated here as (69):

(69) (a). [r]eto
[r]uta
la [r]ata *la [ɾ]ata (Harris 1983a:64)
la [r]opa *la [ɾ]opa (Harris 1969:48)

(b). al.[r]e.de.dor
hon.[r]a
Is.[r]a.el (Harris 1969:49)

An /r/ in context (iv), on the other hand, invariably surfaces as a tap, never as a trill:

(70) p[ɾ]ado, b[ɾ]avo, f[ɾ]asco, t[ɾ]apo, d[ɾ]ama, c[ɾ]ater (Harris 1983a:63)

It will be argued in this chapter that cases of /r/ in contexts (i), word-initially, and (iii), in onset position after a closed syllable, are instances of strengthening. It will be shown that the phonological representations of these cases are consistent with the proposal to consider a trill as the phonetic

realization of a moraic /r/.

6.1. Trill as /r/ Strengthening

An /r/ in word-initial position may surface only as a trill, never as a tap. One may ask, what is it about this position that forces the /r/ to be realized as a trill? I propose that the relevant process is strengthening. Onset position has traditionally been labeled a "syllabically strong position" (Hooper 1975, Bell and Hooper 1978, Vennemann 1988, Clements 1990) and according to Foley (1977) elements in strong positions undergo preferential strengthening, while elements in weak positions undergo preferential weakening. Foley (1977:109) offers the following classification of strong and weak environments:

(71)

STRONG	WEAK
initial/ #___	final/ ___#
postnasal/ n___	intervocalic/ V__V
posttonic/ V́___	post atonic/ V___

Word-initial position is then a position in which strengthening may take place. The hypothesis that I put forth is that there is strengthening (fortition) of Spanish word-initial onsets and that in the case of an /r/, this fortition is realized as a trill. The trill which surfaces after a closed syllable may be treated also as a case of fortition if one adopts Vennemann's (1988) formulation of syllable contact changes. Among the strategies that languages employ to improve a syllable contact of the form A.B (where . = syllable boundary), Vennemann (1988)

mentions calibration. There are two possible ways in which calibration may come about:

(72) Calibration

(a) Coda weakening:
A.B > C.B, where C is weaker than A.
E.g. Spanish cap.ti.vu > cau.ti. vo 'captive'

(b) Head strengthening:
A. B. > A. C, where C is stronger than B.

E.g.	German	var.ue > Far.be	'color'
		far.io > Fer.ge	'ferryman'
	Italian	val.io > val.go	'I am valid'
		ten.io > ten.go	'I hold'

(Vennemann 1988:44, 52)

The trill that obligatorily surfaces after a closed syllable may be interpreted as a case of calibration by means of head strengthening. To interpret a trill as the "strong" variant of an /r/ is not a novel idea, as a cursory review of the literature indicates (Alarcos Llorach 1965, Foley 1977, Hock 1988, Lapesa 1981, Martinet 1952). In order to maintain this hypothesis, independent evidence demonstrating that other segments occupying this position are also affected by the process must be provided. If this is demonstrated, then the question that arises is how to represent this fortition in the phonology so as to be able to generate the strengthened variants. I will attempt to address these issues in the following pages.

An underlying /r/, I claim, is strengthened in word-initial position and in onset position after a closed syllable, giving rise to a trill. If other consonants undergo this fortition, there should be some observable reflexes of this process. In

the sections that follow, similar cases of fortition are examined.

6.2. Glide Strengthening

Spanish has two glides, [y] and [w][19]. In some cases these glides are derived from an underlyingly specified mid vowel which diphthongizes under certain morphological conditions when stressed, (73a and b), e.g. /soñar/ 'to dream', [sweño] 'I dream', while in other cases the high vowel is underlyingly specified (73c). In Castilian Spanish, these glides are strengthened to the voiced palatal and labio-velar fricatives [y̌] and [w̌] respectively, in syllable-initial position as the following examples illustrate:

(73)

a.

[e]		[yé]	
[seráßa]	'I was closing'	[syéro]	'I am closing'
[pensámos]	'we think'	[pyénso]	'I think'

[e]		[y̌é]	
[elámos]	'we freeze'	[y̌éla]	'he freezes'
[erámos]	'we are shoeing' (a horse)	[y̌éra]	'he is shoeing'

b.

[o]		[wé]	
[soñámos]	'we dream'	[swéña]	'he dreams'
[moßí]	'I moved'	[mwéßo]	'I move'

[o]		[w̌é]	
[olémos]	'we smell'	[w̌éle]	'he smells'
[ospedar]	'to lodge'	[w̌ésped]	'lodger'

c. *yugo* 'yoke' [y̌ú.ɣo]
cayado 'cane' [ka.y̌á.ðo]

(Lozano 1979:17-18)

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[19]These are the phonetic symbols used by Lozano (1979). The corresponding IPA symbols are: [j] and [w].

The fricatives derived from the glides, i.e. [y̆] and [w̆], exhibit further strengthening: [y̆] alternates with the palatal affricate [^{d}y] and [w̆] with the labio-velar stop [g^{w}]. [^{d}y] surfaces following a homorganic nasal or homorganic lateral and optionally in utterance-initial position:

(74) a.

[y̆]	≈	[^{d}y]		[^{d}y]	
[y̆élo]		[^{d}yélo]	'ice'	[siñ^{d}yélo]	'without ice'
[y̆éso]		[^{d}yéso]	'a cast'	[el^{d}yéso]	'the cast'

[g^{w}] surfaces only after a homorganic nasal:

(74) b.

[w̆]	≈	[g^{w}]		[g^{w}]	
[w̆éßos]		[g^{w}éßos]	'eggs'	[koŋg^{w}éßos]	'with eggs'
[w̆érfano]		[g^{w}érfano]	'orphan'	[uŋg^{w}érfano]	'an orphan'

(Lozano 1979:19-21, Navarro-Tomás 1950:64)

The data offered by Lozano is representative of Mexican and Porteño dialects. However, according to Navarro-Tomás (1950) the alternations in (74a) are also observed in practically all dialects of Spain. The alternations in (74b) on the other hand, are more characteristic of non-standard dialects (Navarro-Tomás 1950, Malmberg 1965). López-Morales (1971) also reports the frequent occurrence of the alternations in (74a) in Cuban Spanish and Lipsky (1994) reports them present in the Dominican Republic, Puerto Rico and Venezuela.

In comparing (74a) and (74b), one observes that of the two fricatives, only [y̆] undergoes strengthening in utterance-initial position. The absence of [w̆] strengthening in this environment is attributed by Lozano (1979) to an ever increasing tendency in most Castilian Spanish dialects to eliminate the contrast between [g^{w}] and [w̆]. Forms such as *guante* 'glove' and

guapo 'handsome' which have an underlying [gʷ] in word-initial position, are pronounced as [w̆ante] and [w̆apo] respectively, except in hypercareful speech. Lozano suggests that the failure of [w̆] strengthening in utterance-initial position can be attributed to a tendency to weaken [gʷ] to [w̆] in all environments.

Just as the fricatives which were derived from glides, further strengthen to an affricate and a stop, the case of Puerto Rican /r/, although a diachronic process, could also be treated as a case of further strengthening of /r/. In Puerto Rican Spanish, a velar fricative surfaces wherever a trill is found in standard Castilian, i.e. word-initially, intervocalically and after a closed syllable. This change apparently took place in two stages: first there was a velar preaspiration of the rhotic, which in 1887 is recorded for the first time as <jr> in "ajrancal" for Standard Spanish *arrancar* "to tear away" (De Granda 1966b); then it evolved into the velar fricative [x] (Zlotchew 1974). Nowadays, there are areas of the island that have preserved the trill; others have preserved the preaspirated /r/, but most of Puerto Rico exhibits the velar fricative variant (Lapesa 1981). A change in this direction is seen in progress in other Spanish speaking areas such as regions of Venezuela, Colombia and Santo Domingo, where the preaspirated rhotic is observed (De Granda 1966b, Terrell 1982).

Another alternation in Spanish that has been analyzed as involving strengthening in initial position is the case of

voiced stops. These cases are examined in the following section.

6.3. Stop/Spirant Alternation

Spanish exhibits a systematic alternation between voiced stops and spirants: b≈ß, d≈ð, g≈ɣ. Several attempts to account for this process have been proposed in the literature (among others, Malmberg 1965, Harris 1969, Lozano 1979, Goldsmith 1979, Mascaró 1984). The distribution of these sounds is the following: stops are observed phrase-initially and following a homorganic nasal or lateral, while fricatives surface intervocalically and following any other consonant. Some illustrative examples are shown in Table 5.

Table 5. Stop-Spirant Alternations

PHRASE-INITIAL	INTERVOCALIC	AFTER HOMORGANIC: NASAL OR LATERAL	AFTER OTHER CONSONANTS
botella	naßo	ambos	calßo
dato	haða	candela / caldo	arðe
gota	maɣo	engreido	alɣo

Lozano 1979 argues for an analysis of these data which relies on the application of two complementary processes: stop-formation and spirantization. She claims that the segments exhibiting the alternations are underlyingly unspecified for continuancy and are assigned a value for this feature in the course of the derivation by the application of phonological rules which are

sensitive to the environment in which the segments occur. Lozano (1979) gathers support for her fortition (or stop-formation) analysis from the behaviour of Spanish glides shown in (73) above. Crucial to her analysis is the proposal of a rule that assigns a [-cont] feature specification to the unspecified segments, which she labels archisegments B, D, and G, if they are found in phrase-initial position or after a homorganic nasal or homorganic lateral. In any other environment the rule inserts a [+cont] specification.

The contexts in which the obstruents [b], [d] and [g] surface are very similar to those in which the trill is found, that is, following a homorganic nasal or homorganic lateral and at the left edge of a domain, an utterance in the case of the stop/spirant alternation, a phonological word in the case of /r/. An utterance is defined as the largest prosodic category, "comprising a maximal sequence between phonetic, structural pauses" (Hayes 1989b:219). A phonological word is defined as "the lowest level on the Prosodic Hierarchy and is always at least as large as the grammatical word" (Hayes 1989b:207).

In the last three sections, I have argued that rhotics, fricatives derived from glides, and voiced obstruents undergo strengthening in two environments: initially -be it a word or an utterance-, and after a closed syllable. The second environment, however, seems to be too broad. In fact the actual generalization appears not to be after a syllable closed by any consonant, but following a homorganic heterosyllabic consonant.

In the case of /r/, the heterosyllabic consonants that may precede it happen to be all homorganic, i.e. [n], [l], [s]. In the case of the fricative and obstruents, this heterosyllabic consonant triggers the strengthening argued for here only if it is [-cont], i.e. a nasal or a lateral. This condition would still account for the cases involving /r/, except that in the case of /r/ an /s/ also triggers this strengthening. These issues and a way to account for the differences in the contexts of application will be dealt with in Chapter 7 below.

The contrast between a tap and a trill that is observed in intervocalic position is represented in the orthography: the trill written <rr>, the tap represented as <r>. This representation of the trill, however, is not extended to the positions discussed in this chapter, namely word-initially and after a closed syllable, where the trill is represented by a single <r>. This, however, was not always the case as illustrated in the following section.

6.4. Strengthening in Historical Records

Allen (1964) reports that around the Xth century, there is a change in orthography observed in Old Spanish. Although there is a great deal of inconsistency, double letters begin to appear in two environments: word-initially and in syllable-initial position when preceded by a syllable closed by a consonant:

(75) LTN filiu > OSp. fijo > OSp. ffijo 'son'
LTN rege > OSp. rei > OSp. rrei 'king'
OSp. Alfonso > OSp. Alffonso 'proper name'
LTN honorare > OSp. onrar > OSp. onrrar 'to honour'
(Allen 1964:296)

Lapesa (1985) also reports the use of double letters in a XIIIth century document:

(76) OSp. ssol > ModSp. sol 'sun'
OSp. ffechas > ModSp. fechas 'dates'
OSp. enffermedades > ModSp. enfermedades 'illnesses'
OSp. rregno > ModSp. reino 'kingdom'

Double letters were at the same time used to indicate etymologically long consonants:

(77)

LTN	OSp.	ModSp.	
peccatum	> peccado >	pecado	'sin'
oravissent	> orassen >	orasen	'they prayed (subj.)'
terra	> tierra >	tierra	'earth'
suffero	> ssuffrio >	sufrio	'he suffered'

(Lapesa 1985, McLeod 1957)

Allen considers the pairs ff/f, ss/s, and rr/r as representing the opposition tense/lax based on the 1517 descriptions of these sounds offered by the first grammarian of the Spanish language, Antonio de Nebrija (1442-1522). Allen points out that the environments in which the medieval scribes used the double <rr> are precisely the contexts in which Modern Castilian trill surfaces. Allen attributes the abandonment of this orthography around the XVth century to two sound changes: (i) /f-/ ---> /h/, (ii) the fusion of /ss/ with /s/, and to a condemnation of the practice of writing double letters in any position other than intervocalically, made by De Nebrija in a treatise dealing with rules of orthography.

Martinet (1952) has argued in favor of a strengthening account of the Spanish word-initial trill. He claims that an /r/ in word-initial position was identified with the "strong" variant of the pair /r/ - /rr/, whose contrast was observed intervocalically. If one accepts that the process at hand is indeed fortition, then the medieval written records would indicate that not only /r/ but at least /f/ and /s/ underwent this strengthening as well. The question that arises then, is whether this process is still active in the language and if so, how is it reflected today. I claim that phonetic data offered by Navarro-Tomás (1918) helps to illuminate this issue.

6.5. Duration of Consonants

Even though other Spanish consonants in word-initial position do not exhibit featural alternations that can be taken to constitute classical strengthening cases, there is however, a systematic phonetic difference in duration. I would like to argue that it is this difference in duration which signals fortition as an active process. In the case of /r/, the glides and the obstruents, this fortition is not only reflected in terms of length, but also manifested through the surfacing of the strong member of a strong/weak pair. Navarro-Tomás (1918) offers a thorough description of the differences in duration among Spanish consonants. The data he presents takes into consideration factors that may affect the duration of consonants

such as their position within a word, or whether they are in a stressed or unstressed syllable. The data recorded[20] are representative of casual conversation of a speaker of Standard Castilian. The underlined segments in the following examples are all in stressed syllables and the figures to the right of each example indicate the duration of the underlined segment as measured by Navarro-Tomás.

(78)

Word initial		Word Medial	
base	97 msec	embozo	53 msec
doce	85 msec	vendido	60 msec / caldero 35 msec
gasa	80 msec	angosto	56 msec
lazo	110 msec	pelota	65 msec
rosa	82 msec	carreta	98 msec / jirafa 25 msec
sapo	140 msec	peseta	82 msec
faja	120 msec	refajo	98 msec
yeso	126 msec	inyecta	56 msec

It is observed that word initial consonants are relatively longer in duration than the same consonants within a word. This difference in duration is only exhibited by consonants. In two similar studies involving the duration of vowels, Navarro-Tomás (1916, 1917) observes no difference in duration in these cases. With respect to unstressed vowels, he states that "[l]a vocal inacentuada en posición inicial absoluta, es tan corta, por lo menos, como la que se halla precedida de consonante" (Navarro-Tomás 1917:375). The situation is no different in the case of stressed vowels, where the same author observes that "la vocal

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[20]Navarro-Tomás at no point gives a total number of forms recorded. I have counted over 500 tokens published in three different articles (Navarro-Tomás 1916, 1917, 1918) based on the same data, dealing with the duration of Spanish consonants and vowels.

inicial absoluta presenta aproximadamente igual duración que la que va precedida de consonante" (Navarro-Tomás:1916:402).

The observation that consonants are longer in word-initial than in word-medial position suggests a possible representation of strengthened consonants in this environment. In the following section, such an alternative is explored and a means of representing fortition in the phonology is offered.

6.6. Word-initial Strengthening: Phonological Representation

In order to offer a phonological representation of fortition, let us first summarize some of the arguments made so far. It has been claimed that word-initial consonants and consonants preceded by homorganic nasals, laterals, and in the case or /r/, /s/ as well, are subject to strengthening. The fortition analysis has been supported by data illustrating the alternation of a weak and a strong segment (i.e. glides with fricatives, and these with affricates; fricatives with stops). Data from historical records indicated an attempt by medieval scribes to reflect this alternation in the orthography and phonetic data pointed to differences in duration observed. It has also been noted that in the case of /r/, such a strengthening results in a trill[21]. A trill in turn has been

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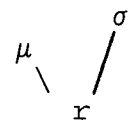
[21]That this strengthening is an active process in the language is supported by data from word games. Harris (1983a:144) reports of a language play in the dialect of Lima, Peru, which involves metathesis of syllables; e.g. [r]aya 'line', becomes ya[ɾ]a, where a word-initial trill is realized

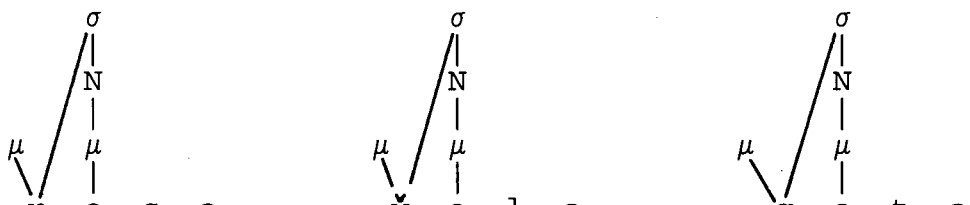
defined as the phonetic correlate of a moraic /r/. I propose then to represent a trill in word-initial position as a moraic /r/:

(79)



By generalizing this representation to all other consonants in Spanish, word-initial strengthening could then be viewed as the addition of a mora at the left edge of a phonological word. This addition of a mora could then correlate with the differences in duration observed. The representation of strengthened consonants in word-initial position would then be the one exempified in (80):

(80)



[rosa] 'rose' [y̆ela] 'he freezes' [gota] 'drop'

This proposal offers several advantages: in the first place we are able to offer a unified analysis of the Spanish trill. The phonetics is thus able to interpret a moraic /r/ as a trill whether it is found intervocalically, in word-initial position or in coda position (in careful speech):

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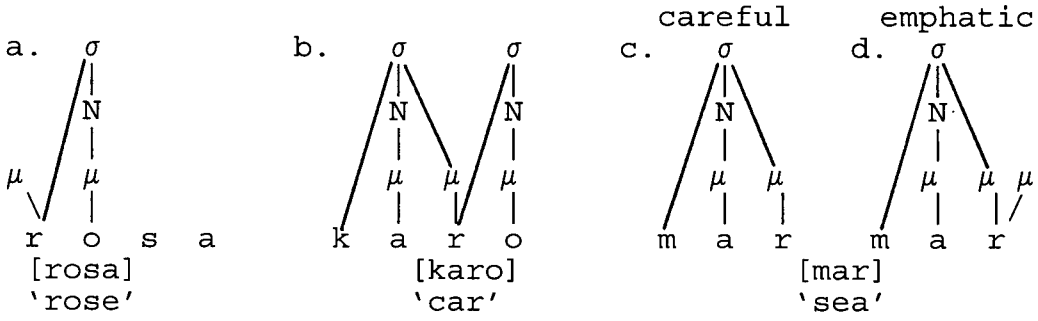
as a tap in the metathesized word.

(81) word-initial intervocalic coda



A second advantage is that identifying fortition with the addition of a mora in word-initial position, explains the durational differences observed, since the mora constitutes the unit of weight and length within Moraic Theory (Hyman 1985, Hayes 1989a).

The analysis advanced so far offers a unified account of the Spanish trill in three out of the four environments in which it is found: between vowels, in coda position in careful and emphatic speech and word-initially. The fourth context in which a trill surfaces is after a closed syllable. An analysis of /r/ in this last environment is developed in the following section.

6.7. Trill after a Closed Syllable

The generalization traditionally established by Spanish grammarians was that an /r/ surfaced as a trill if preceded by /l/, /n/, or /s/; if it was preceded by any other consonant, a tap surfaced. Harris (1983a) recognized the fact that the actual generalization was that an /r/ surfaced as a trill when in onset position, following a closed syllable. It so happens

that the only consonants that could close a syllable when followed by /r/, are /l/, /n/, and /s/, all other consonants forming a tautosyllabic cluster with /r/ (e.g. /pr-/, /dr-/, /fr-/, etc). Let us take a closer look at this environment in order to gain some insight into the way of formalizing this type of strengthening.

Let us begin by analyzing the case of [n.r]. It has been well documented that nasals in coda position assimilate in place to the next segment (Navarro-Tomás 1950, Harris 1969, Harris 1982, Fernández-Ramírez 1985):

(82)

Orthography	Place of articulation of the nasal
ambición	bilabial
ínfimo	labiodental
onza (where z=[θ])	interdental
diente, conde	dental
honra	alveolar
ancho, conyuge, conllevar	palatal
angel, cinco	velar

(Fernández-Ramírez 1985:70)

A nasal followed by /r/, always surfaces as alveolar [n]. This place assimilation, which Harris (1982) analyzes as the delinking of the place node associated with the nasal and the subsequent leftward spreading of the place node of the following consonant, is able to account for the place of articulation of the nasal but does not explain why /r/ never surfaces as a tap. It is possible however, that place assimilation might be related to the strengthening of /r/ in this environment, given that the relevant sequences, namely [lr], [nr], and [sr], all involve homorganic segments. If both /s/ and /l/ exhibit place

assimilation as well, an analysis of /r/ strengthening which is somehow related to place assimilation could be pursued.

/s/ and /l/ do exhibit place assimilation, yet not to the extent displayed by the nasal. Fernández-Ramírez (1985) in describing the behaviour of Spanish coda consonants, points out that consonants in this position assimilate to the place of articulation of the following consonant, which is in syllable initial position, only if "los dos se hallan situados en una zona común y no distante" (p.67)[22]. In order to illustrate this assimilation, the author cites /s/ and /l/ as cases where the assimilation is evident. (83) summarizes Fernández-Ramírez's (1985) generalizations and examples, complemented by further examples offered by Navarro-Tomás (1950) who also notices the assimilation:

(83) ■/l/ and /s/ have a dental articulation if preceding a dental sound, e.g. a<u>lt</u>o, pa<u>st</u>o, ca<u>ld</u>ero.

■/l/ and /s/ have an interdental articulation if preceding an interdental sound, e.g. a<u>lz</u>ar, a<u>sc</u>ender.

■/l/ is articulated as palatal if followed by a palatal sound, e.g. E<u>lch</u>e, co<u>lch</u>a.

(Fernández-Ramírez 1985:67; Navarro-Tomás 1950:114)

In the cases of strengthening presented above, namely glide and obstruent strengthening, there was a recurrent restriction: the preceding consonant had to be a homorganic nasal or lateral for the strengthening to occur as illustrated in (74) and in

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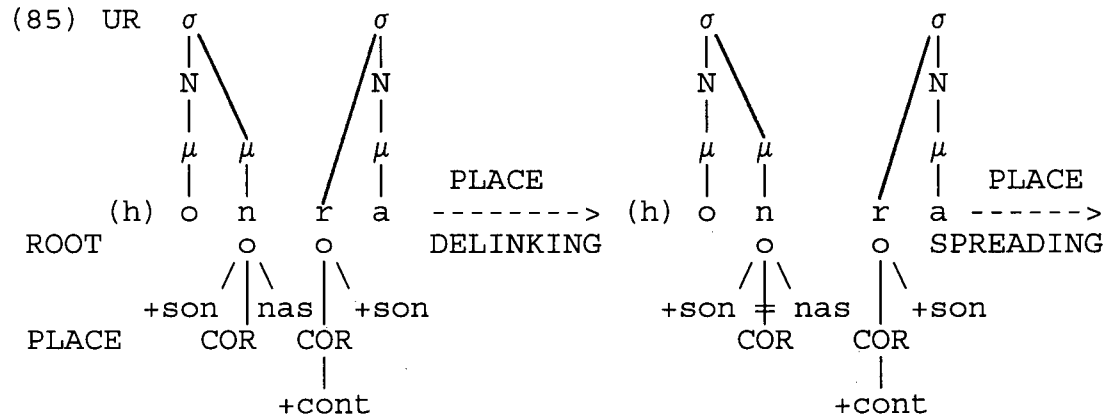
[22]"If both sounds are articulated in a common, not distant area".

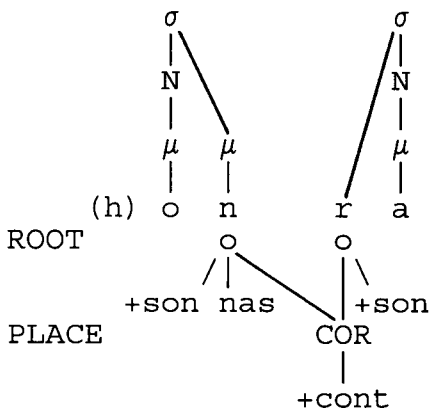
Table 5 above. This generalization combined with the observation just made above, that /r/ strengthening also involves homorganic consonants, points towards an analysis of strengthening that involves the sharing of place. We turn now to examine the representations involved and to explore the implications such an analysis makes.

Let us take a representative example of each of the relevant environments:

(84) [n.r] honra 'honour'
[l.r] alrededor 'around'
[s.r] Israel

There are only a handful of examples where the sequences in (84) are found, *Israel* being the only example of morpheme-internal [s.r] (Harris 1969:47). A representation of *honra* which assumes the feature geometry presented in (48) above, the underlying representations specified in Table 4, and the analysis of nasal assimilation offered by Harris (1982), is illustrated in (85):





An immediate consequence that follows from the representation in (85) is that continuant nasals have been generated. Padgett (1994) proposes that place assimilation entails continuant assimilation. His version of the feature geometry therefore, predicts that in a language where nasals assimilate in place to the following segment, a continuant nasal could surface. Padgett provides examples from Kpelle and Spanish to illustrate that this is precisely the case:

(86) Kpelle

/N+polu/	[mbolu]	'my back'
/N+tia/	[ndia]	'my taboo'
/N+fela/	[mvela]	'my wages'

(Padgett 1994:491)

Spanish

ca[mp]o	'country'
triu[m͡f]o	'triumph'
ma[nt]o	'cloak'
ma[ns]o	'gentle'
ma[ŋk]o	'one-handed'
aje[ŋx]o	"wormwood"

(Padgett 1994:493)

Padgett claims that these examples render support to the feature geometry he proposes since nasal assimilation to a fricative (a [+cont] segment), although dispreferred cross-linguistically, is not absolutely disallowed and must be able to be generated by

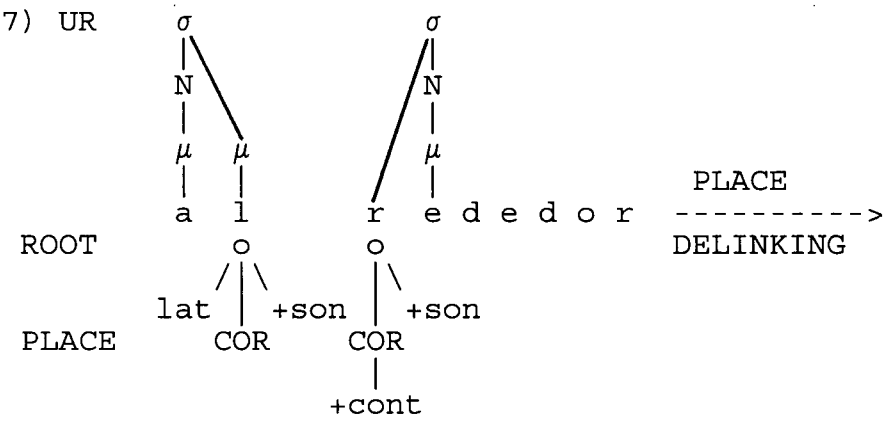
the theory.

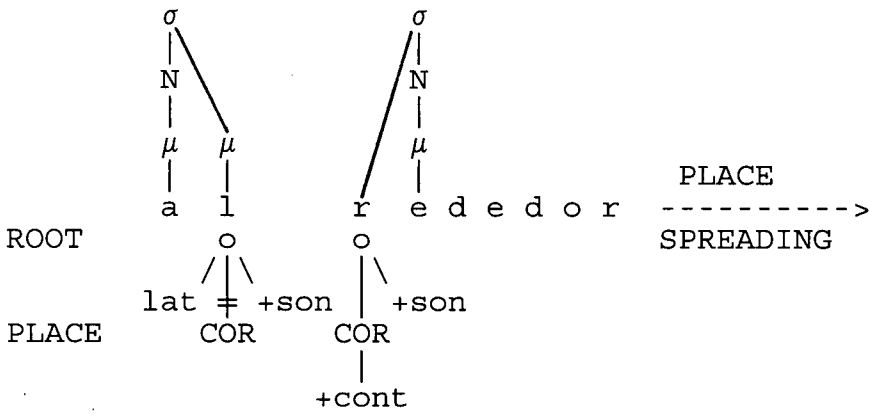
Further support for the existence of continuant nasals in Spanish is provided by Navarro-Tomás (1950) who notices that nasals do not have a complete closure when followed by a fricative. Fernández-Ramírez (1985:40-41) describes this observation in the following way:

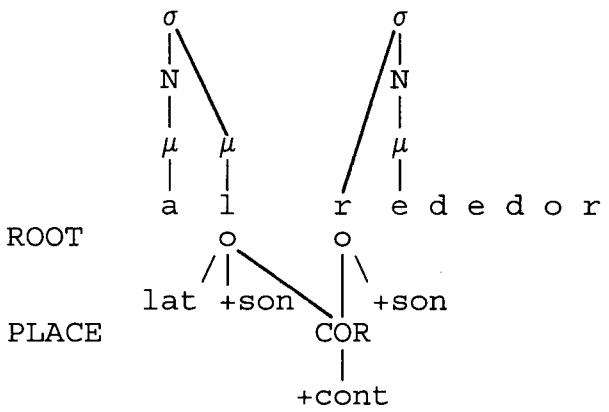
> "La articulación bucal (de las nasales), a su vez, no es necesariamente una oclusión completa. Se producen nasales con articulación fricativa, ante [θ] [s] [f] [x], por ejemplo: *danza, ansia, confiar, injuria*. El cerramiento de los órganos bucales no es entonces completo."

The representation of a sequence [l.r] is illustrated in the case of *alrededor*, making the same assumptions made above for the representation of *honra* with the additional assumption of considering [lateral] as a dependent of the root (Shaw 1991):

(87) UR



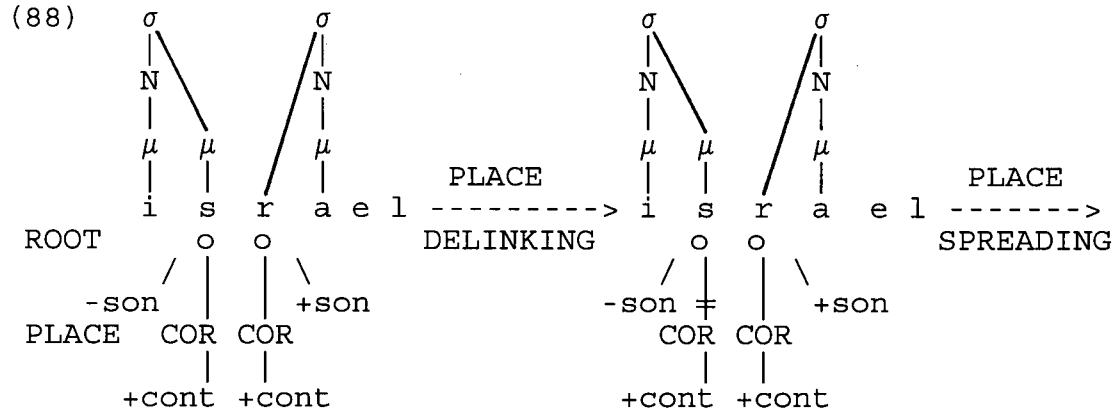


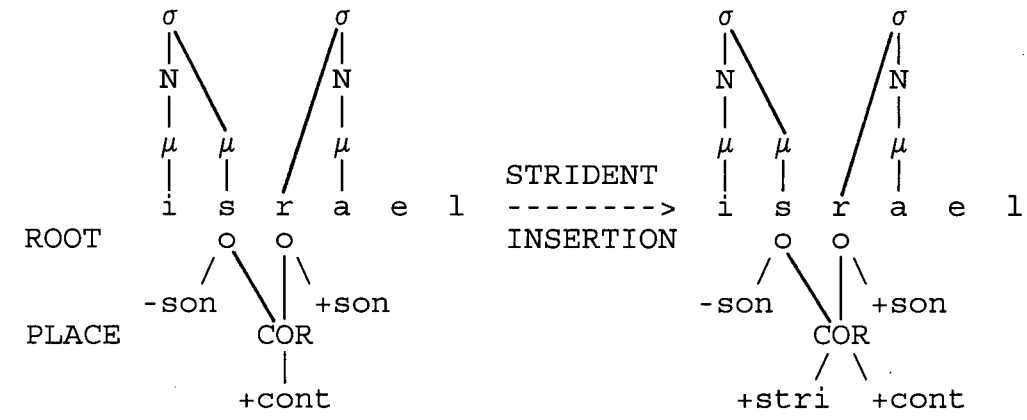


It is crucial that [lateral] be a dependent of the root and not of the coronal node, because if it were, and the proposed place sharing took place, as place delinking applied, the lateral specification would be lost and two [+continuant], coronal roots would be obtained, generating the ungrammatical form *arrededor. The case of nasal assimilation applies to every nasal in coda position, regardless of the place of articulation of the following segment. The case of /l/ (and also /s/) assimilation is different from that of nasal assimilation as Fernández-Ramírez points out. In the latter cases, assimilation takes place only if the following consonant is also a coronal. This case may be best viewed as motivated by a rule prohibiting a

sequence of two coronal articulations, which motivates the delinking of the first place specification and the subsequent leftward spreading of the second one as the representation of *Israel* illustrates:

(88)



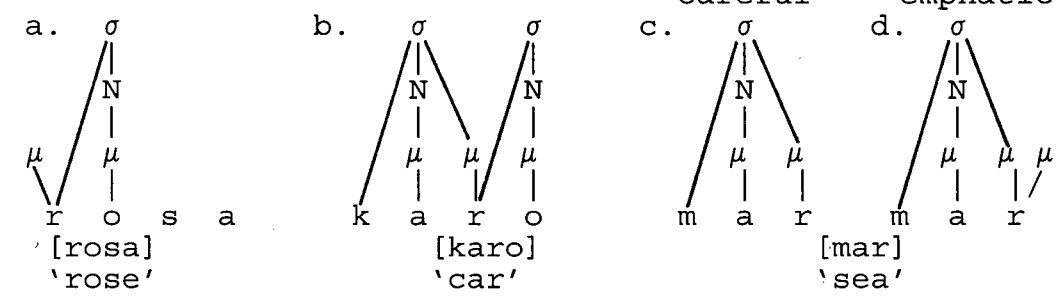


The insertion of [+strident], which is the unmarked value for a coronal fricative, has resulted in it being attached to a sonorant segment, namely [r]. It is clear that the first root is realized as [+strident], what is not so clear is how this stridency, if at all, is realized in the second root. There are two possible outcomes: (a) the [+strident] specification either does not get realized in the second root because it is

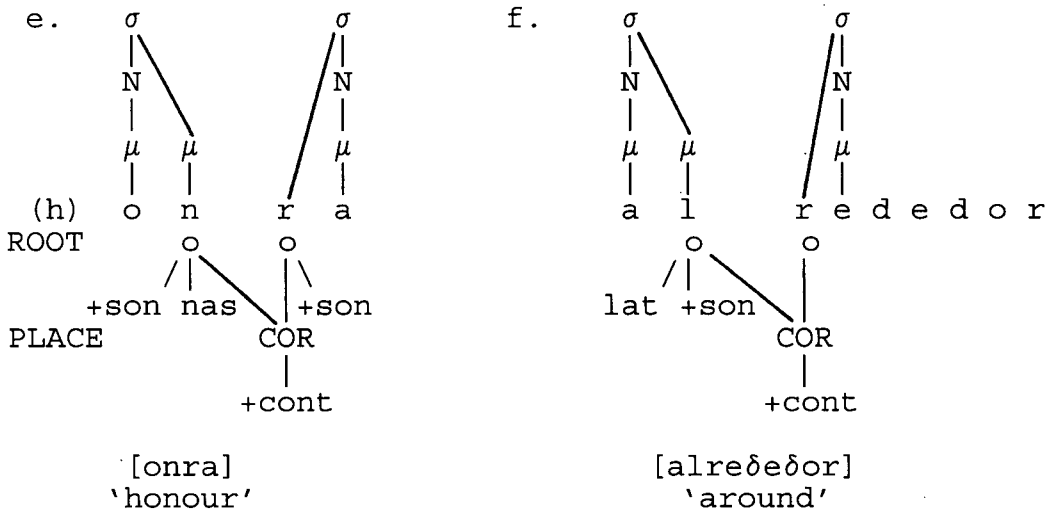
incompatible with a [+sonorant] specification, or (b) the second root surfaces as [+strident]. Let us recall that this particular configuration, i.e. [s.r], is only found in one monomorphemic form, namely *Israel*. Harris (1969) reports that in Mexican Spanish, an /r/ in this environment is realized as a [+strident] rhotic, which he transcribes as [r̆].

In order to offer a unified account of /r/ strengthening, let us compare the representations presented so far where a trill surfaces (see (81) above), with the ones developed in this section:

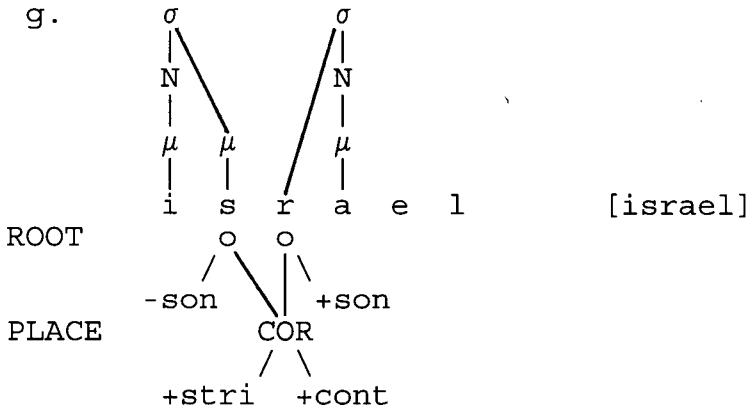
(89) <u>word-initial</u> <u>intervocalic</u> <u>coda</u> careful emphatic



<u>after a closed syllable</u>



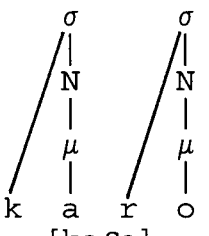
g.



According to the analysis advanced so far, all of these configurations, and furthermore, only these configurations, result in an /r/ being realized as a trill. All of them share a property: /r/ is always associated to a mora. In cases (89a-d), the segment is directly linked to a mora. In onset position after a closed syllable (89e-g), its moraic status is acquired by virtue of sharing the place node with the preceding root which is moraic.

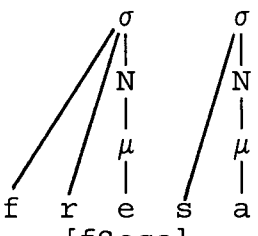
The requirement that /r/ be moraic for the trill to surface explains why strengthening of a lexically non-moraic /r/ in intervocalic position or of an /r/ in a tautosyllabic cluster never occurs, since in such environments /r/ could never be moraic:

(90) a.



[kaʃo]
'expensive'

b.



[fʃesa]
'strawberry'

6.8 Summary

In this chapter, I have argued that an /r/ which is realized as a trill, in onset position word-initially and after a closed syllable, could be viewed as a case of /r/ strengthening. I have also argued that the main proposal of this thesis, namely that a trill is the realization of an /r/ associated to a mora, can be maintained to account for these cases. It has also been noted that the strengthening I argue for shows a disjunction in its environment of application when the case of /r/ strengthening is compared with that of the obstruents. If the strengthening hypothesis proposed is to be maintained, we must address this difference in the contexts of application. In the following chapter, I explore what the reasons behind this disjunction might be and outline a way of formalizing it within an Optimality approach.

CHAPTER 7: UNIFIED STRENGTHENING ANALYSIS

7.0 Introduction

Harris (1969) recognizes that the alternations exhibited by the voiced obstruents share some characteristics with those exhibited by the vibrants. However he is unable to offer a unified analysis pointing out that

> "...it seems that b, d, g, and r undergo some sort of 'strengthening of articulation' in some partially shared environments... Attempts to write rules that capture these ideas, however have proved completely unilluminating. The conclusion that I draw is that some crucial insight is missing either in the facts of Spanish or in the nature of phonological processes in general" (Harris 1969:55).

I believe that a unified analysis of both cases is possible within an Optimality Theory approach. In this chapter, I will outline a possible way of accounting for the disjunction observed.

7.1 Disjunction in the Environments of Application

When the strengthening data of /r/ is compared with that of the obstruents, it is observed that the proposed strengthening applies only in a subset of the environments in the latter case. /r/ strengthens both in word-initial and utterance-initial position, while the stops are only found in utterance-initial position. /r/ also strengthens after any homorganic heterosyllabic consonant, while the obstruents only undergo strengthening if the preceding consonant is a homorganic, [-continuant] consonant, i.e. a nasal or a lateral.

The following table illustrates the differences in the environments in which strengthening takes place. The "--->" is to be read as "strengthens to". A "√" indicates that strengthening does take place in a given context, while a "*" indicates that it does not. Each mark is followed by an example illustrating the grammatical output.

Table 6. Strengthening Environments of Spanish Obstruents and Vibrants

	[ɾ]--->[r]	ß--->b δ--->d γ--->g
WORD-INITIAL	√:una [r]osa √:un [r]aton	*: una [ß]otella √: un [d]edo
UTTERANCE-INITIAL	√: [r]osa	√: [b]otella
AFTER [+cont] HOMORGANIC CONSONANT	√: Is[r]ael	*: ar[δ]e des[δ]e
AFTER [-cont] HOMORGANIC CONSONANT	√: en[r]edo al[r]ededor	√: am[b]os cal[d]o

(Harris 1969, Lozano 1979)

The contexts in which the strengthening of /r/ coincides with that of the obstruents are: utterance-initially and following a homorganic noncontinuant consonant. The contexts in which /r/ strengthening is observed and obstruent strengthening is not, are word- or syllable-initially following a [+cont] consonant or a vowel.

The relevant feature at play in the case of fricatives alternating with stops is continuancy. It is observed that a [+cont] segment (i.e. a fricative) surfaces in the environments

where the output results in a sequence of segments with the same value for continuancy: between vowels and after continuant consonants. It appears that the segment preceding the obstruent unspecified for continuancy, determines whether a stop or a fricative would surface. In fact, it has been argued (Goldsmith 1979, Mascaró 1984) that the feature [continuant] spreads rightward to supply a continuancy value for the unspecified obstruent. I am not going to argue for such an approach but would like to suggest that perhaps what the language is attempting to do is to generate strings in which the continuancy value is "shared" with the preceding segment. In the case of word-initial obstruents which happen to also be in utterance-initial position as well, a stop surfaces in accordance with the strengthening account proposed in section 6.6 above. In cases where the obstruent occurs in word-initial position within a phrase, it surfaces as a fricative if the final segment of the preceding word is a vowel or a continuant segment, but as a stop if the preceding segment is a homorganic nasal or lateral, which are the same restrictions imposed on obstruents within a word.

It appears that there are two competing requirements that the language is trying to satisfy: on the one hand, the language requires word-initial strengthening; on the other hand, it "prefers" to generate sequences of segments which have the same value for continuancy. Both requirements must be regarded as weak in the sense that the language allows them to be violated. The strengthening requirement is not satisfied when

strengthening fails to generate stops if these are preceded by a [+cont] segment, while the restriction on continuancy is not absolute since the language allows sequences of segments with opposite values for continuancy, e.g. fiesta 'feast',where [s] is [+cont] and [t] is [-cont].

This apparent competition between two restrictions, or constraints, in which one seems to "win over" the other one, is precisely what Optimality Theory allows us to capture. Let us now turn to develop a strengthening analysis in terms of Optimality Theory.

7.2 OT Analysis

To account for the alternations observed, I propose a series of constraints which are unviolated in the language:

(91) STRENGTH: strengthen a [+cons] at the left edge of a phonological word through the addition of a mora. Ensures that a trill is generated word-initially.

NAS ASSIM (Nasal Place assimilation) : a nasal in coda position assimilates in place to the following [+cons] root.

*αplace αplace: the language does not allow a sequence of two identical place specifications in adjacent roots.

*αpl ßpl : a continuant value can not be linked to two different PLACE nodes. This enables our analysis to account for the observation that continuancy is not shared by non-homorganic segments, e.g. caldo but calßo, where the [-cont] value is shared in the former but not in the latter.

I also propose the constraints in (92) as violable constraints which are crucially ranked with respect to each other in the order in which they are presented, with PARSE [αcont] as the highest ranked violable constraint, and FILL [+cont] as the lowest ranked one.

(92) PARSE αcont: a continuancy value present in the input must be parsed.

ALIGN L, [-cont], σ (Align [-cont] with the left edge of a syllable): This constraint may be motivated by the cross-linguistic preference for [-cont] segments in onset position. That [-cont] is dispreferred in coda position is supported by the observation that [-cont] segments do not surface in coda position, e.g. cluß, *club. The ranking of PARSE αcont >> ALIGN L, [-cont], σ , accounts for those cases in which a [-cont] segment surfaces in coda position if it is underlyingly specified as [-cont], e.g. *apto* 'suitable'.

NAS [-cont] (a nasal is [-cont]): forces insertion of [-cont] where there is a nasal. This constraint in combination with λ [-cont], forces the insertion of [-cont] to associate with a nasal only in environments in which the feature would be licensed, i.e. in onset position, or in coda position as long as it shares place with a segment in onset position which can function as a licensor for [-cont], e.g. candela, ambos.

LAT [-cont] (a lateral is [-cont]): forces insertion of [-cont] to associate with a lateral. Just as in the case of NAS [-cont], this constraint interacts with λ [-cont] accounting for the dual behaviour of /l/ which sometimes behaves as a continuant, e.g. calßo, and other times as a [-cont], e.g. caldo.

ALIGN L, [-cont], UTT (Align a [-cont] with the left edge of an utterance): accounts for stops surfacing utterance-initially and not always word-initially. The '*' in a tableau indicates the number of roots

between the feature [-cont] and the left edge of the utterance.

PARSE PLACE: A place specification present in the input must be realized in the output.

GEM [-cont]: Interpret a geminate structure as [-cont]. This constraint is motivated by the cross-linguistic preference for geminates to be [-cont] (Paradis 1988).

FILL [-cont]: This constraint is violated every time a [-cont] feature is inserted. It is crucially ranked lower than all the constraints which force the insertion of [-cont], namely NAS [-cont], LAT [-cont], and GEM [-cont].

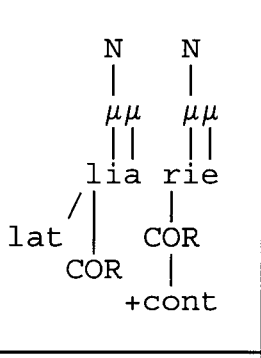
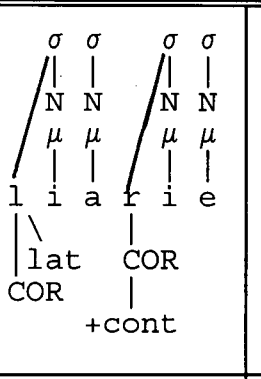
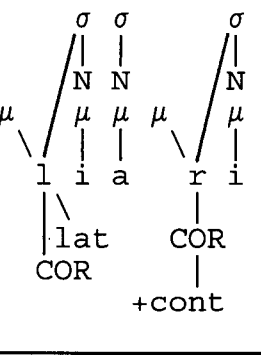
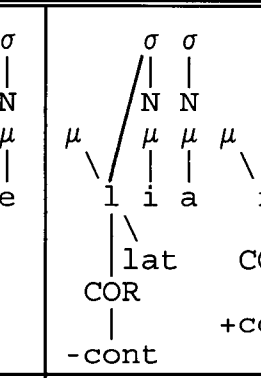
FILL [+cont]: An insertion of [+cont] constitutes the least serious violation.

Let us look at the interaction of these constraints in determining the optimal output in the cases representative of the disjunctive environments. Let us begin by examining the cases of strengthening in word-initial position.

As illustrated in Table 6, on p.102, the proposed strengthening always applies in word-initial position in the case of /r/, where it surfaces as a trill [r], e.g. una [r]osa. In the cases involving the voiced obstruents in word-initial position (not utterance-initial) however, the strengthening does not always apply and the voiced obstruent surfaces as a fricative. In order to gain some understanding into how this disjunction arises, let us compare two tableaux, one dealing with a case of /r/ strengthening, the other with a case of obstruent strengthening. The tableau in (93) illustrates how given the input */lia rie/* 'Lía laughs', three possible outputs

are evaluated to determine the optimal candidate[23].

(93)

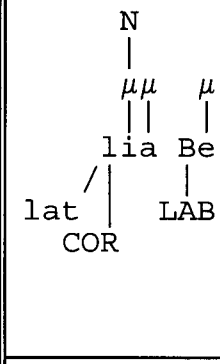
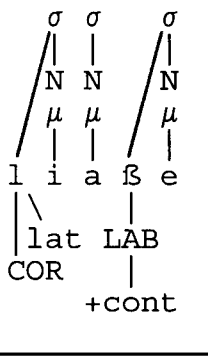
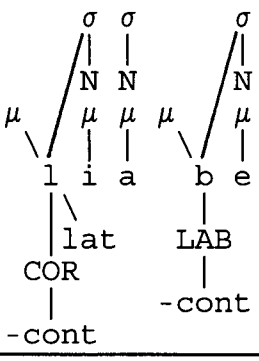
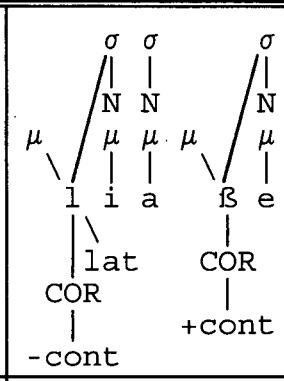
INPUT	Cand 1	Cand 2	☞Cand 3
			
STRENGTH	*!*		
NAS ASSIM			
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSE αcont			
ALIGN L, [-cont], σ			
NAS [-cont]			
LAT [-cont]	*	*!	
ALIGN L, [-cont], UTT			
PARSE PLACE			
GEM: [-cont]		**	*
FILL [-cont]			*
FILL [+cont]			

Candidate 3 emerges as optimal, since it incurs the fewest

[23]The representations of both the input and the candidates are lacking some feature specifications, such as [+son] and [+vce], which have been omitted due to space limitations.

number of violations, as well as the least serious ones. Let us now compare this case with that of the obstruents, exemplified by the utterance *Lía ve* 'Lía sees'.

(94)

INPUT	Cand 1	Cand 2	☞Cand 3
			
STRENGTH	*!*		
NAS ASSIM			
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSE αcont			
ALIGN L, [-cont], σ			
NAS [-cont]			
LAT [-cont]	*		
ALIGN L, [-cont], UTT		*!**	
PARSE PLACE			
GEM [-cont]			*
FILL [-cont]		**	*
FILL [+cont]	*		*

The tableau in (94) illustrates that if nothing else forces the insertion of [-cont], such as a nasal or a lateral, the

constraint requiring the alignment of the feature [-cont] with the left edge of the utterance will always ensure that the candidate that emerges as optimal is the one with the leftmost instance of [-cont].

The other context in which strengthening of /r/ is observed while strengthening of the obstruents is not, is when these segments are found in onset position following a syllable which has been closed by a [+cont] consonant. In chapter 6, it was argued that the trill that surfaces in this environment is not due to the addition of a mora, as the trill which surfaces word-initially was proposed to be, but rather that /r/ is phonetically interpreted as a trill because it is associated to a mora by means of sharing place with the preceding coda consonant. Given that being associated to a mora does not result in the obstruents being phonetically interpreted as stops, it is not surprising to find that fricatives surface after syllables closed by continuant segments.

Other cases exemplifying the strengthening of obstruents, or lack thereof, in other environments will not be examined here. However, the Appendix of this thesis, on p. 120, offers a series of tableaux which illustrate how the OT analysis proposed here is able to determine the optimal forms.

7.3 Summary

In this chapter I have explored the possibility of relating the strengthening facts of /r/ to those exhibited by the obstruents. It has been argued that such a unified analysis is possible within the theoretical framework of Optimality Theory by means of the relative ranking of constraints which evaluate the degree of well-formedness of potential output.

It has been claimed that this disjunction of environments of application results from the fact that the constraints dealing with the feature [-cont], which crucially interact with other constraints to ensure the strengthening of obstruents, does not play a role in the cases involving /r/.

CHAPTER 8: CONCLUSIONS

8.0 Summary of Thesis

This thesis has been concerned with the proper phonological representation of Spanish vibrants. It has been claimed that the contrast between the tap and the trill observed in intervocalic position, may be accounted for by considering an /r/ in intervocalic position which surfaces as a trill as having the following underlying representation:

(95)

The notion of a moraic /r/ as the phonological correlate of a trill, has been extended to account for all other positions where a trill surfaces: word-initially, in coda position (in careful and emphatic speech) and in onset position after a closed syllable. Word-initially, it was argued that a moraic trill emerged by the addition of a mora to the left of a phonological word; in coda position, /r/ is always assigned a mora by the independent application of the rule of "Weight by Position"; in onset position after a closed syllable, /r/ was associated to a mora by virtue of sharing place with the immediately preceding segment which was always moraic.

The absence of a trill in other environments where only the tap is found, was also discussed. It was argued that an /r/ in coda position which surfaces as a tap, is to be regarded as a case of weakening to which /r/ is subject in this environment.

It was also claimed that an /r/ as the second element in a tautosyllabic cluster, given its prosodic structure, could never be associated to a mora, explaining why a trill is categorically disallowed in this position.

It has also been concluded that an analysis which views a trill as a phonologically moraic /r/ offers definite advantages in other areas of Spanish phonology, such as syllable structure, stress assignment, and historical development.

The strengthening account proposed in Chapters 6 and 7, offers the possibility of accounting for the distribution of /r/ and the obstruents in a related way.

Finally, the analysis developed here provides support for the Nuclear Moraic Model (Shaw 1992), the feature geometry proposed by Padgett (1994), the representation of /r/ as [+continuant] and /l/ as [-continuant] (Tatò 1981), and the feature geometry which represents [sonorant] (Sagey 1986) and [lateral] as directly dependent of the root (Shaw 1991).

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APPENDIX

A series of tableaux are presented in the following pages. These intend to illustrate how the Optimality Theory analysis proposed in Chapter 7, is able to account for the grammatical outputs. The representations, as was the case with the ones presented in Chapter 7, have been simplified due to space limitations. Features such as [consonantal], [sonorant] and [voice] have been omitted. The crucial features involved in determining the optimal forms, however, have all been included. Each tableau is preceded by the orthographic representation of the word, followed by its phonetic realization and gloss.

(96) desde 'from' [dés.δe]

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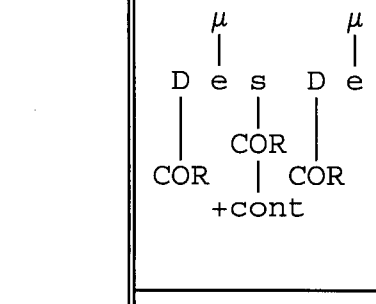	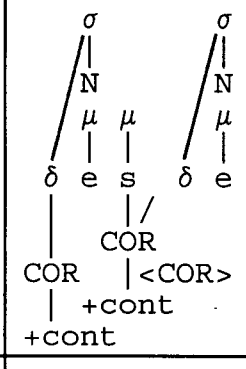	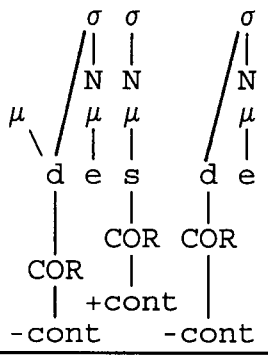	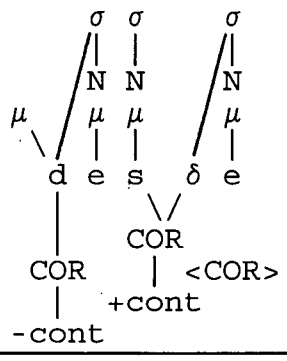
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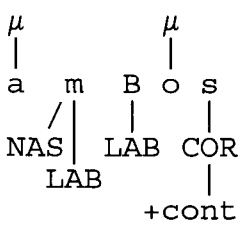
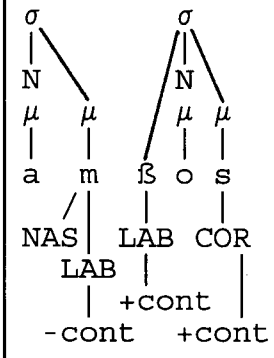
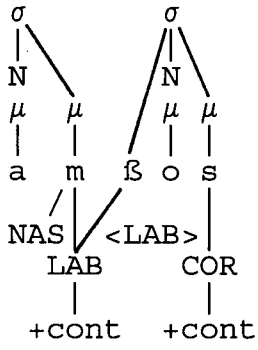
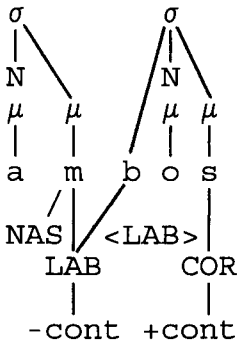
NAS ASSIM			
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSE αcont			
ALIGN L, [-cont], σ			
NAS [-cont]			
LAT [-cont]			
ALIGN L, [-cont], UTT		*!**	
PARSE PLACE	*		*
GEM [-cont]			
FILL [-cont]		**	*
FILL [+cont]	*		

(97) ambos 'both' [ám.bos]

INPUT	Candidate 1	Candidate 2	☞Candidate 3
			
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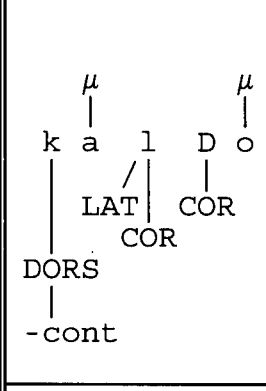
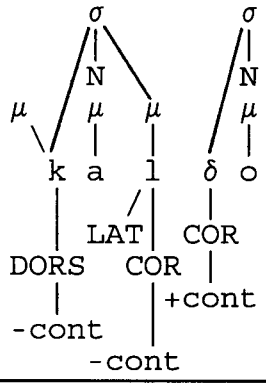
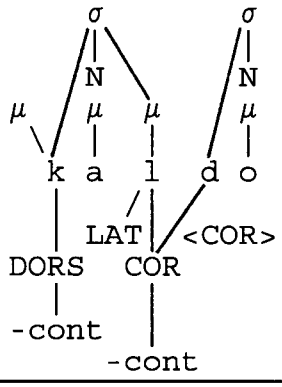
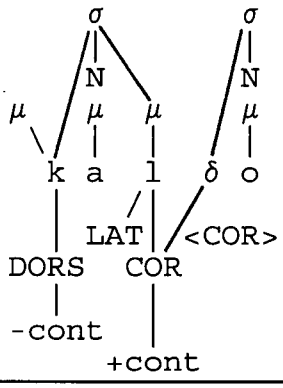
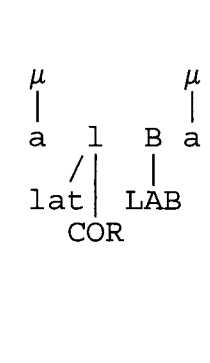
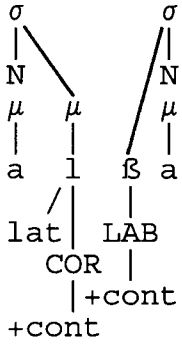
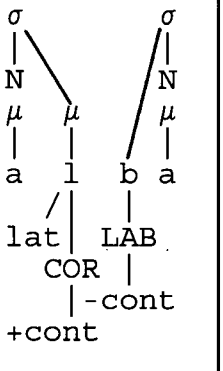
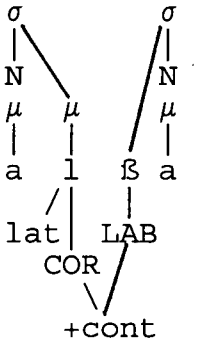
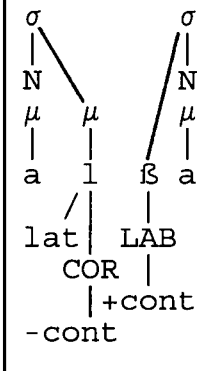
NAS ASSIM	*!		
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSE αcont			
ALIGN L, [-cont], σ	*		
NAS [-cont]		*!	
LAT [-cont]			
ALIGN L, [-cont], UTT	*		*
PARSE PLACE		*	*
GEM [-cont]			
FILL [-cont]	*		*
FILL [+cont]	*	*	

(98) caldo 'broth' [kál.do]

INPUT	Candidate 1	☞Candidate 2	Candidate 3
			
STRENGTH			
NAS ASSIM			
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSE αcont			
ALIGN L, [-cont], σ	*!		
NAS [-cont]			
LAT [-cont]			*!
ALIGN L, [-cont], UTT	**	**	
PARSE PLACE		*	*
GEM [-cont]			
FILL [-cont]	*	*	
FILL [+cont]	*		*

(99) alba 'dawn' [ál.ßa]

INPUT	☞Cand 1	Cand 2	Cand 3	Cand 4
				
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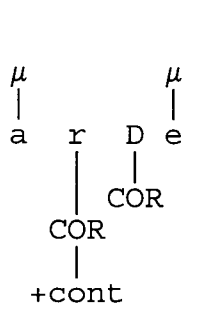
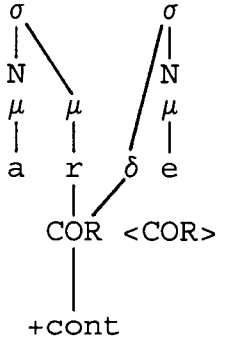
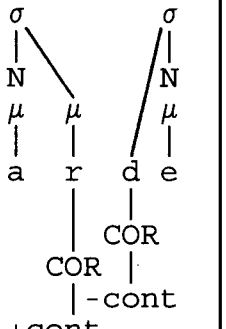
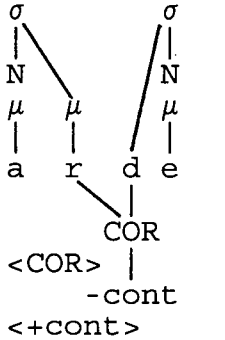
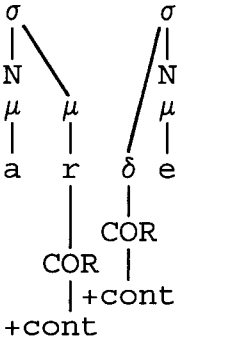
*αPL ßPL \ / δ cont			*!	
PARSEαcont				
ALIGN L, [-cont], σ				*!
NAS [-cont]				
LAT [-cont]	*	*	*	
ALIGN L, [-cont], UTT		*!*		*
PARSE PLACE				
GEM [-cont]				
FILL [-cont]		*		*
FILL [+cont]	**	*	*	*

(100) arde '(it) burns' [ár.δe]

INPUT	☞Cand 1	Cand 2	Cand 3	Cand 4
				
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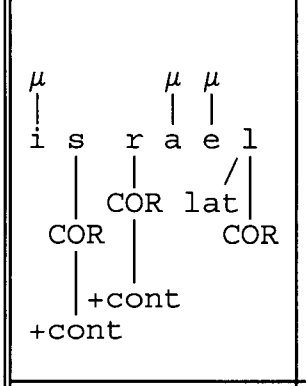
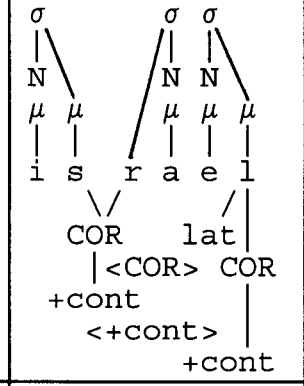
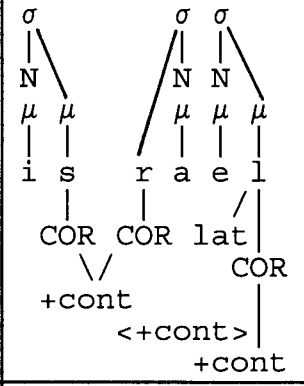
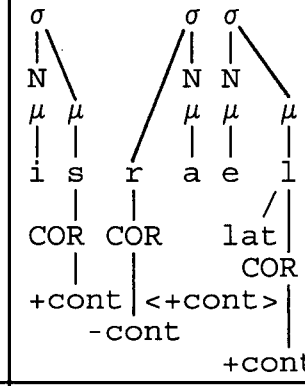
*αPL ßPL \ / δ cont				
PARSEαcont			*!	
ALIGN L, [-cont], σ				
NAS [-cont]				
LAT [-cont]				
ALIGN L, [-cont],UTT		*!*	*	
PARSE PLACE	*		*	
GEM [-cont]				
FILL [-cont]		*	*	
FILL [+cont]				*

(101) Israel 'Israel' [ìs.ra.él]

INPUT	☞Candidate 1	Candidate 2	Candidate 3
			
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NAS ASSIM			
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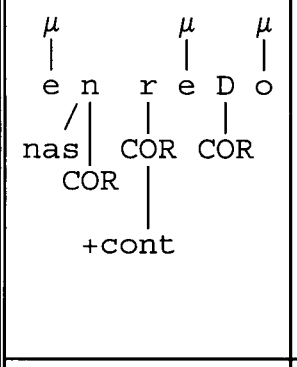
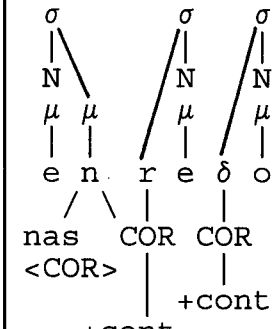
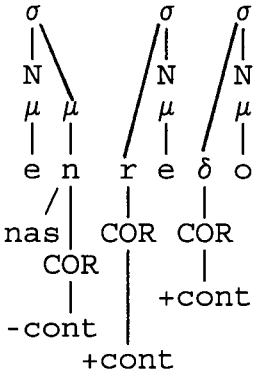
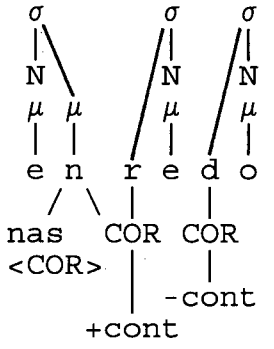
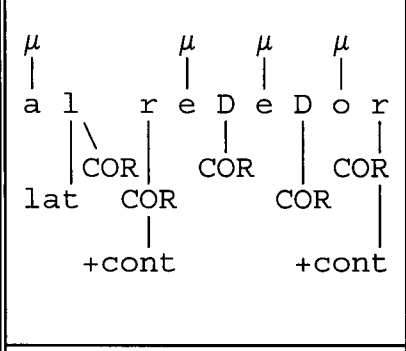
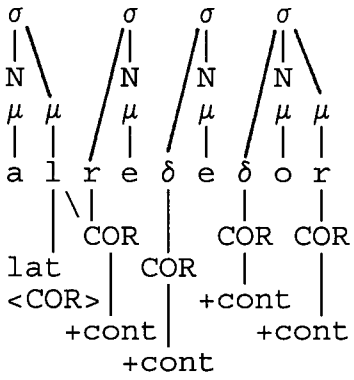
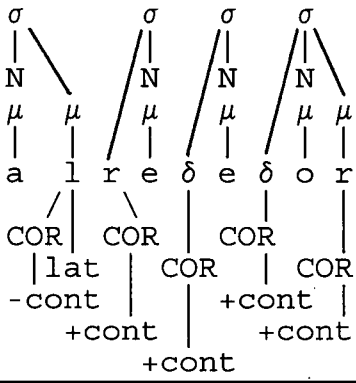
*αPL ßPL \ / δ cont			
PARSEαcont	*	*	*
ALIGN L, [-cont], σ			
NAS [-cont]			
LAT [-cont]	*	*	*
ALIGN L, [-cont],UTT			*!*
PARSE PLACE	*		
GEM [-cont]			
FILL [-cont]			*
FILL [+cont]	*	*	*

(102) enredo 'entanglement' [en.ré.δo]

INPUT	☞Candidate 1	Candidate 2	Candidate 3
			
STRENGTH			
NAS ASSIM		*!	
*αPL αPL			
*αPL ßPL \ / δ cont			
PARSEαcont			
ALIGN L, [-cont], σ		*	
NAS [-cont]	*		*
LAT [-cont]			
ALIGN L, [-cont],UTT		*	*!***
PARSE PLACE	*		*
GEM [-cont]			
FILL [-cont]		*	*
FILL [+cont]	*	*	

(103) alrededor 'around'

[al.rè.δe.δór]

INPUT	Candidate 1	Candidate 2
		
STRENGTH		
NAS ASSIM		
*αPL αPL		
*αPL ßPL \ / δ cont		
PARSEαcont		
ALIGN L, [-cont], σ		*!
NAS [-cont]		
LAT [-cont]	*	
ALIGN L, [-cont],UTT		*
PARSE PLACE	*	
GEM [-cont]		
FILL [-cont]		*
FILL [+cont]	**	**