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*Raddoppiamento fonosintattico* is an Italian sandhi phenomenon whereby mono- and polysyllabic words ending in a stressed vowel trigger gemination of the initial consonant of the subsequent word. In this paper I will discuss the origins of *raddoppiamento fonosintattico* and its synchronic structures within a moraic framework. The claim is made that *raddoppiamento* is caused by an empty mora which is present in the underlying representation (not added by a rule). At an early stage in the history of Italian, the mora which now triggers *raddoppiamento* was filled either by a consonantal coda or by a long vowel. Loss of the phoneme associated with that mora resulted in an empty mora which is now filled by spreading from the initial consonant of the following word. The moraic model allows us to account for the data which have presented problems to linguists (such as the so-called unstressed monosyllables), as well as the data from various Italo-Romance dialects.<sup>1</sup>

#### Introduction.

*Raddoppiamento fonosintattico* is a sandhi rule in Italian which applies between two words: if the first word ends in a stressed vowel and the second word begins with a consonant, then the initial consonant of the second word is lengthened.<sup>2</sup> A vast literature on *raddoppiamento fonosintattico* has lately appeared, continuing a trend begun centuries ago. As early as the first quarter of the 16th century Italian grammarians (such as Bembo and Tolomei) noted a phenomenon whereby word initial consonants were doubled in certain contexts, and in the 19th century linguists (D'Ovidio

<sup>1</sup> I would like to thank Ed Tuttle, Bruce Hayes, and three anonymous reviewers for the *Rivista di Linguistica* for their advice and comments on this paper.

<sup>2</sup> I will use data from what is generally referred to as standard Italian, although the difficulties in defining such a language for these purposes have been noted (Fancullo 1986). The phonological constraints on the trigger words vary from dialect to dialect, as do the syntactic conditions. Napoli & Nespor (1979: 824) describe the syntactic conditions necessary for *raddoppiamento fonosintattico* to occur in Italian as the Left Branch Condition; however, Nespor & Vogel (1986: 41) conclude that the domains of application of *raddoppiamento* cannot be identified with syntactic constituents.

1872; Schuchardt 1874) dedicated detailed linguistic studies to *raddoppiamento*.<sup>3</sup> Contemporary linguists (Antelmi 1989; Basbøll 1989; Chierchia 1986; Fanciullo 1986; Hurch 1986; Korzen 1986; Loporcaro 1988; Marotta 1986; Nespor & Vogel 1986; Vincent 1988) continue to study issues relating to *raddoppiamento*.

In this paper I discuss the origins of *raddoppiamento fonosintattico* and its synchronic structures, offering first an overview of the traditional analyses and then presenting a moraic model. The claim is made that *raddoppiamento* is caused by an empty mora and that the rule to fill empty moras in Italian is to spread from the right (§ 1 and § 2). I provide further evidence of the empty mora in § 3. The "exceptions" to the *raddoppiamento* rule are explained in § 4 and § 5, and I end the paper (§ 6) with an analysis of means of filling the empty mora.

## 1. Traditional Explanations.

Various explanations of the origins and synchronic forms of *raddoppiamento fonosintattico* have been proposed.

### 1a. Diachronic Development.

The origin of this sandhi phenomenon has long been agreed upon: an etymological (Latin) word final consonant assimilated to the initial consonant of a following word: AD RŌMAM > [ar:ó:ma] 'to Rome'. The monosyllables which trigger *raddoppiamento*, called *particelle raddoppianti*, were often used as a prefix forming a new word in which the doubled consonant is represented orthographically: \*ad + ripare > *arrivare* 'to arrive'. In fact, they caused gemination with such regularity that many words without an etymological *particella* prefix were reanalyzed as having one, and the following consonant (etymologically single) was doubled: Gk. *Akadēmeia* > *accademia* 'academy'; \*alēcro > *allegro* 'happy'.

In some cases, the trigger word is, as expected, the heir of a Latin word ending in a consonant:

- (1) AD > a 'to'  
 AMÁUIT > amò 's/he loved'  
 ĒT > e 'and'  
 RĒX > re 'king'  
 SIC > sì 'yes'  
 TRĒS > tre 'three'

<sup>3</sup> Perhaps de Lollis (1885: 411) was a bit overenthusiastic about the work of his predecessors when he explained that he would not be dealing with cases of *raddoppiamento fonosintattico* in his article on consonantal gemination because "se n'è già detto da altri tutto quel che se ne poteva e doveva dire" ('everything that could and should be said about it has already been said by others').

Hence, the historical development of *raddoppiamento* in these cases could be readily explained as anticipatory consonantal assimilation. However, there is a significant problem with this analysis: how can we explain the historical development of *raddoppiamento* in cases where there is not a word final consonant in the etymological form (cf. 2)?<sup>4</sup>

- (2) QUĪ > *chi* 'who' (as in *chi sono?* [kis:ó.no] 'who are they?')  
 SĪ > *se* 'if' (as in *se vuoi* [sev:vó] 'if you want')  
 TŪ > *tu* 'you' (as in *tu sei* [tus:é] 'you are')

*Raddoppiamento* here cannot be explained as a case of anticipatory consonantal assimilation. Some scholars have attributed such apparent deviations from the straightforward diachronic analysis as a case of analogical extension, whereby monosyllables without historical codas cause lengthening of the subsequent consonant by analogy with monosyllables which had such codas.<sup>5</sup>

### 1b. Synchronic Forms.

Synchronically, *raddoppiamento fonosintattico* can no longer be considered a case of consonantal assimilation for two reasons. First, the words in question lost their final consonants centuries ago, and, second, in the cases of words with final consonants still present, we do *not* find total assimilation with the initial consonant of the following word:<sup>6</sup>

- (3) in *biblioteca* > [imbliote:ka] 'in the library'  
 non *loro* > [nonlo:ɽo] 'not them'  
 per *me* > [perme] 'for me'

<sup>4</sup> Korzen (1980: 339) says that of the 139 monosyllables in Italian, 106 cause *raddoppiamento*, but, of these 106, only 18 had a final consonant in Latin. Loporcaro (1988: 345) disputes these findings.

<sup>5</sup> Hall (1964) suggests that *raddoppiamento* might have functioned to preserve word initial consonants in their non lenited form.

<sup>6</sup> However, there are many cases in Italo-Romance dialects where we do find consonantal assimilation across word boundaries. In some dialects of the extreme South one finds the negative marker (num/) followed by the verb (for example, [bɔ:u] 'I want' with either partial or total assimilation across the word boundary: [numbɔ:u]/[num:ɔ:u] (Fanciullo 1986). In the Florentine dialect the final consonant of the masculine singular definite article (/i/) assimilates to the initial consonant of the following word: /il kane/ > [i k:ane] 'the dog' (Antelmi 1989; Loporcaro 1988; Pratielli 1970; Savoia 1974-75). In a related point, in the Lucchese and Pisan dialects we find assimilation of the entire masculine plural definite article (/i/) to the initial consonant of the following word: /o portato i bimbi/ > [o p:orta:to bbimbi] 'I brought the children' (Bianchi 1948: 76 n. 2). However, for the dialect of Lucca, Loporcaro (1988: 352) reports *i kkanì* 'the dogs', with both the definite article and doubling (see below n. 24).

Some early linguists (D'Ovidio 1877; Rajna 1872; Schuchardt 1874) saw *raddoppiamento* synchronically as a case of consonantal gemination after a stressed vowel, common especially in words with antepenultimate stress (cf. 4).

- (4) *áttimo* < *átomo* 'instant'  
*cípero* < *cypèru* 'sedge'  
*fèmmina* < *fèmina* 'female'  
*máccina* < *máchina* 'machine'  
*òbliggo* < *òbliggo* 'obligation'  
*báccina* < *búcina* 'bugle horn'  
*cólèra* < *chólèra* 'anger'  
*figgere* < *figgere* 'to fasten'  
*párroco* < *párocho* 'priest'  
*zéffiro* < *zèphyru* 'zephyr'

A word final lax vowel (Wanner 1973: 884) or a word final short vowel (Fiorelli 1958; Saltarelli 1972) has been identified as the possible synchronic trigger of *raddoppiamento fonosintattico*. The argument proceeds as follows. In Italian, all stressed, word final vowels are phonetically short (except for the heteromorphemic "geminate" vowels, see § 4a), and a well-formed stressed syllable with a short vowel must have a consonantal coda (which may be the first half of a geminate).<sup>7</sup> In *raddoppiamento* contexts the final, stressed, short vowel requires the following consonant to be long so that the stressed syllable will have a VC structure. More recently, Hurch (1986: 102) has proposed that *raddoppiamento* is a "fortition process" viewed within the framework of Natural Phonology.

Analyses dealing with the prosodic structure of the phrase have gained favor. In these analyses, *raddoppiamento* is examined in relation to the rhythmic constraints of the language, assuring Sufficient Phonological Distance between two primary stresses (Marotta 1986; Nespor & Vogel 1978, 1979). It is also viewed as a rule of syllabic levelling (Chierchia 1982, 1986; Korzen 1980; Loporcaro 1988;<sup>8</sup> Nespor & Vogel 1978; Saltarelli 1983; Vincent 1988; Vogel 1978, 1982). Since all stressed syllables must be heavy (VC or V:), a unit is inserted on the skeletal tier of words with stressed, open, light syllables. The empty unit is then filled by spreading from the following consonant.

The main problem with all of these explanations is that they cannot account for the so-called unstressed monosyllables which trigger *raddoppiamento*. Although Korzen (1980: 351) suggests that at an earlier stage in the history of Italian, most monosyllables were "accentual units" requiring a VC or V: structure, today they are unstressed. So why do they require a heavy syllable?

<sup>7</sup> Lipski (1973) measures the length of both stressed and unstressed word final vowels at 250-260 ms. However, stressed short vowels in word internal position (in a VC syllable) are only 180 ms. Fava & Miagno-Caldogno (1976) and Korzen (1980) report similar measurements.

<sup>8</sup> Loporcaro (1988) shows that synchronically *raddoppiamento* might be a stress conditioned phenomenon in standard Italian, but that this is not the case for some dialects where *raddoppiamento* can only be described in terms of an assimilatory process unrelated to stress.

## 2. Moraic Model.

One may ask if an account of *raddoppiamento* could be framed in more general terms, terms which describe its diachronic as well as its synchronic generation. I will now propose a moraic model for the diachronic and synchronic forms of *raddoppiamento*. This model assumes that light syllables (5a) have one mora ( $\mu$ ), and heavy syllables (5b) have two moras ( $\mu\mu$ ).

- (5) a. light syllable (monomoraic)      b. heavy syllables (bimoraic)
- $$\begin{array}{c} \sigma \\ | \\ \mu \\ | \\ (C) \ V \end{array} \quad \begin{array}{c} \sigma \\ / \backslash \\ \mu \quad \mu \\ | \quad | \\ (C) \ V \quad C \quad (C) \ V \end{array}$$

## 2a. Diachronic Development.

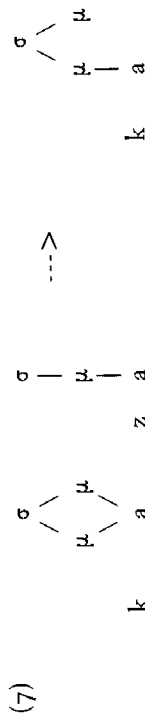
The application of this model to the question at hand helps clarify the issue. We note that each of the final syllables of the trigger word was bimoraic in Latin, whether the second mora was associated with a consonant, as in *ād* (VC), or doubly linked to the vowel, as in *rū* (V:). If we assume that this second mora was not lost despite the loss of the final consonant or of the length of the vowel, i.e., if we assume that the moraic tier retained its original structure, despite the loss of phonemes on the segmental tier, we have another proposal for the origin of *raddoppiamento*.

According to the model adopted here, diachronically, we can represent *raddoppiamento* as follows. The trigger word lost the phoneme associated with the second mora of the word final bimoraic syllable, whether it was a consonant (6a) or a vowel (6b).

- (6) a.  $\text{ād} > \text{a}$  'to'
- $$\begin{array}{c} \sigma \\ / \backslash \\ \mu \quad \mu \\ | \quad | \\ a \quad d \end{array} \quad \text{--->} \quad \begin{array}{c} \sigma \\ / \backslash \\ \mu \quad \mu \\ | \quad | \\ a \quad \end{array}$$
- b.  $\text{tū} > \text{tu}$  'you'
- $$\begin{array}{c} \sigma \\ / \backslash \\ \mu \quad \mu \\ | \quad | \\ t \quad u \end{array} \quad \text{--->} \quad \begin{array}{c} \sigma \\ / \backslash \\ \mu \quad \mu \\ | \quad | \\ t \quad u \end{array}$$

Is the (empty) second mora of [tu] < rŭ 'you' (6b) the remnant of Latin vowel length, or is it added by a rule? It is usually claimed that Latin vowel length was lost, and then a rule of vowel lengthening in open syllables reintroduced vowel length distinctions in Early Romance. Let us assume, instead, that Latin vowel length was not *lost* and then *reintroduced*, but was merely *reinterpreted* according to syllable structure so that every stressed syllable was bimoraic and every word had at least one bimoraic syllable. Latin rŭ [tu:] was pronounced [tu] in Early Romance (and Italian) because of a rule requiring final stressed (tautomorphemic) vowels to be short, but the word would necessarily be bimoraic. In other words, although [tu] is pronounced with a short vowel, the second mora is empty underlyingly and is filled when certain conditions are met.

The same moraic analysis holds true when an entire final syllable was lost. Diachronically, we see this in the development of words such as: *su* < *sūso* < *sŭrsūm* 'up'; *virtŭ* < *virtute* < *virtŭtem* 'virtue', and synchronically in the abbreviated forms of nouns such as: *ca'* < *casa* 'house'. In the case of truncated words such as *casa* [ka:za] > *ca'* [ka], if we assume that the stressed syllable of [ka:za] is bimoraic in the lexicon, after the loss of the final syllable, it is the second mora of the stressed syllable (now in word final position) which triggers *raddoppiamento*. Since word final stressed vowels are short, the second mora is empty (cf. 7).<sup>9</sup>



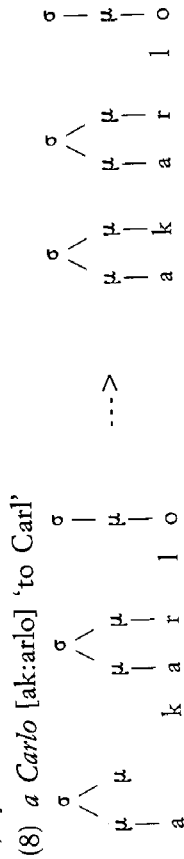
Although the phonemes on the segmental tier were lost, the mora was not deleted from the prosodic tier. The empty mora is filled only when particular phonological conditions are met. Hence, *raddoppiamento* is a case of compensatory lengthening, a process which serves to preserve mora count (Hayes 1989). It is important to note here that the maximum syllable is bimoraic and that there is a maximum of one empty mora. In this way we do not find a proliferation of empty moras in words such as *virtŭtem* > *virtŭ* 'virtue', which has one empty final mora (not three, which can be accounted for historically).

<sup>9</sup> If, instead, *casa* is represented in the lexicon with a monomoraic stressed syllable, after the loss of the final syllable, its mora remains and triggers doubling.



## 2b. Synchronic Forms.

The synchronic process of *raddoppiamento fonosintattico* may now be accounted for as a mora preservation rule. According to the model adopted here, synchronically, we can represent *raddoppiamento* as in (8).<sup>10</sup>



This process is one of compensatory lengthening: a consonant spreads back to fill an empty moraic slot (a slot which is documented historically).<sup>11</sup>

The claim that a mora may remain empty, i.e., that empty slots may persist unassociated in the phonology, is well documented in the literature: Anderson (1982); Bertinetto & Loporcaro (1988b); Keyser & Kiparsky (1984); Marlett & Stemberger (1983); Yip (1983). However, Dresher (ms) argues that it is better to posit abstract rather than empty positions.

The moraic approach to *raddoppiamento* differs from the others in the following three ways:

(i) It reconciles the historical with the contemporary data. The synchronic motivation is an empty mora at the right edge of the word, a mora which is documented historically. It is not claimed that the empty mora is added by a rule, but, instead, that it is present in the underlying representation.

(ii) Using this analysis we can account for the unstressed monosyllables which trigger *raddoppiamento*. They may be unstressed in a syntactic context, but they are bimoraic, just as the first syllable of *matina* [mat:i.na] 'morning' is unstressed and bimoraic.

(iii) Another advantage of this approach over those previously proposed is that the empty mora explanation can also be used for similar phenomena in other languages such as Finnish *alkukadennus* 'initial doubling' (Bertinetto 1985; Bertinetto & Loporcaro 1988b; Hurme & Lindgren 1986; Keyser & Kiparsky 1984; Loporcaro 1988).<sup>12</sup>

<sup>10</sup> Both the synchronic and the diachronic analyses presented here have been anticipated by others. Schein & Steniade (1986: 740) propose a similar model when they note that Latin AD, OB, SUB > a, o, su + an empty X position. Loporcaro (1988) claims that in an earlier stage of Italian (and currently in some conservative dialects), *raddoppiamento* was due to an empty segment. Bashøll (1989) says that synchronically *raddoppiamento* is the result of the 'floating' final mora of the trigger word. Slobytters (1990: 92) argues that the trigger word has a final empty C-position.

<sup>11</sup> Note that we do not find *raddoppiamento* with initial /s/ + consonant clusters: a *scuola* [askwo:lɔ] not \**ʃas:kwo:lɔ* 'to school'. The syllabification of /s/ + consonant clusters (tautosyllabic or heterosyllabic) in Italian is controversial (Bertinetto 1981; Davis ms; Vogel 1982).

<sup>12</sup> Hoberman (1989: 153) notes that in a modern Aramaic dialect of Iraqi Kurdistan the short monosyllabic clitic *la* 'not' is followed by a double consonant in certain contexts, so that,

## 2c. Direction of Spreading.

One question which arises in all synchronic accounts of *raddoppiamento* regards the direction of the spreading rule (Chierchia 1986; Papa 1981; Vincent 1988; Vogel 1982). Why do we find spreading from the following consonant and not from the preceding vowel? Why do we find gemination of the consonant (resulting in a VC syllable) and not lengthening of the vowel (resulting in a V: syllable)?

Chierchia (1986) analyzes *raddoppiamento* within the framework of lexical phonology. He argues that words like *casa* 'house' and *tu* 'you' leave the lexicon in the forms shown in (9a) and (9b).

(9)	a.	s	/	\	/	\	/	\
		x	x	x	x	x	x	x
		k	a	z	a	t	u	
	b.	/	\	/	\	/	\	
		x	x	x	x	x	x	
		k	a	z	a	t	u	

The rules and conditions in post-lexical phonology affect *casa* 'house' and *tu sei* 'you are' in the following way: the empty node in *casa* is filled by spreading from the preceding vowel (Empty Node Convention), while the empty node in *tu sei* is filled by spreading from the following consonant (10a and 10b).

(10)	a.	/	\	/	\	/	\	/	\
		x	x	x	x	x	x	x	x
		k	a	z	a	t	u	s	e
	b.	/	\	/	\	/	\	/	\
		x	x	x	x	x	x	x	x
		k	a	z	a	t	u	s	e

How can we account for the presence of long vowels word internally ([ka:za]), but the lack of long vowels at word boundaries (\*[tu:sei])? Chierchia says that we *do* find long vowels word internally because "ENC is free to apply postlexically" (p. 23), but that we *do not* find long vowels in *raddoppiamento* contexts "because of the usual ban against long vowels" (p. 25). Bertinetto (1985: 632, in reference to a previous version of the 1986 paper) notes that Chierchia is not convincing on this point.

The direction of spreading to fill an empty mora slot is governed by language particular parameters (Hayes 1989). I claim that in Italian the rule to fill an empty mora (both word internally and a word boundaries) is to spread from the right. Let us assume that both vowel length and consonant length are indicated in the lexicon, i.e., that neither is derived by a rule, and that the rule to fill an empty mora is to spread from the

for example, *lā* 'not' + *ki+n* 'I know' > *lakki+n* 'I don't know'. Since *lā* is the heir of *lā* (Hoberman, personal communication), it is possible that here too we are witnessing a phenomenon similar to *raddoppiamento fonosintattico*.

right. This rule allows us to account not only for the direction of spreading in *raddoppiamento* contexts, but for other related phenomena in Italian as well.

First, well-integrated loans with penultimate stress and an original CVVCV or CVCV structure were integrated into Italian with a CVC stressed syllable, regardless of the vowel length of the original word. Since all stressed syllables in Italian must be bimoraic, these words must be realized either with a CVC syllable (by spreading from the following consonant) or with a CVV syllable. Since the result is a CVC syllable, we can assume that vowel length is not borrowed and that the second (empty) mora of the stressed syllable is filled by spreading from the right:<sup>13</sup> Spanish *bellaco* > [vi:á:k:ol] 'coward' (not \*[vi:á:kol]), *despacho* > [dispá:ol] 'dispatch' (not \*[dispá:çol]), *flota* > [flót:a] 'fleet' (not \*[flót:ta]), *resaca* > [risá:k:a] 'surf' (not \*[risá:ka]); Arabic *gabála* > [gabé:la] 'tax' (not \*[gabé:la]), *garrafa* > [karáf:a] 'decanter' (not \*[karáf:fa]), *zuráfa* > [gíráf:a] 'giraffe' (not \*[gíráf:fa]); Venetian *gheto* > [gét:ol] 'ghetto' (not \*[gét:tol]).

Second, throughout the history of Italian when the structure of a stressed syllable changed, it always changed in the same way: a V: bimoraic syllable could become a VC syllable; however, a VC bimoraic syllable never became a V: syllable: *sūcu* > \*[sú:ko] > [súk:ol] 'juice'; *SQUÁLIDU* > \*[skwá:lido] > [skwá:lido] 'squallid'.

## 2d. Preposizioni articolate.

The moraic model could also provide a synchronic account of the *preposizione articolata* (preposition plus definite article), which has a double /l/ before a vowel, as shown in (11):

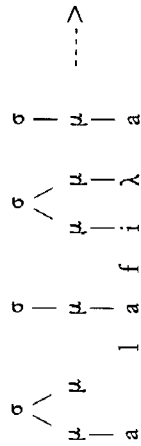
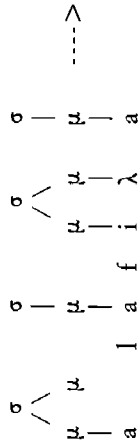
(11)	a + l + a	>	alla	(alla figlia 'to the daughter')
	a + l + e	>	alle	(alle figlie 'to the daughters')
	a + l + o	>	allo	(allo studente 'to the male student')
	a + l + V	>	all + V	(all'ospedale 'to the hospital')
	but a + l + C	>	al + C	(al figlio 'to the son')

(see Basbøll 1989: 24-25, n. 18 for a similar analysis; see Agostiniani 1980 for a study of the *preposizione articolata* in the Tuscan dialects; see Napoli & Nevis 1987 for an analysis of the *preposizione articolata* as an inflected preposition). The standard historical explanation is that the forms of the *preposizione articolata* are derived from the preposition plus a fossilized form of the Latin demonstrative pronouns (ILLA, ILLUM, etc.): *AD* + *ILLA* > *alla*.

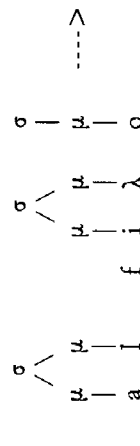
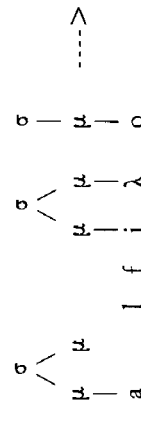
<sup>13</sup> With regard to recent loans, it appears that the graphic system plays a role in the phonetic realization of the stressed syllable: *flipper* [flíp:er] 'pin ball machine' vs. *computer* [kompjú:ter] 'computer'.

An alternative moraic model of the *preposizione articolata* is exemplified for the bimoraic preposition *a* 'to' in 12. When the /l/ (definite article) is followed by a vowel (gender and number marker), it is syllabified as the onset of that syllable and spreads back to become the coda of the preceding bimoraic syllable (12a). Alternatively, when the /l/ (definite article) is followed by a consonant, it cannot become an onset, so it fills the empty second mora of the foregoing bimoraic syllable (12b).

(12) a. *a + figlia* [al:afil:a] 'to the daughter'



b. *a + figlio* [alfil:ɔ] 'to the son'



This synchronic model can account for the *preposizione articolata* of the prepositions *a* 'to', *da* 'from', and *su* 'up'. For the prepositions *in* 'in' and *di* 'of', we need to posit allomorphs. The preposition *in* 'in' does not have an empty second mora and, therefore, does not trigger *raddoppiamento*. However, since the *preposizione articolata* of *in* is *nella, nelle, nello, nell'*, we need to posit an allomorph, *ne-*, which does trigger doubling.

The same explanation applies to the synchronic forms of the *preposizione articolata* of *di* 'of'. Since *di* 'of' is one of those rare monosyllables which does not cause *raddoppiamento* (see § 4d), we must assume it does not have an empty second mora. However, since the *preposizione articolata* of *di* is *della, delle, dello, dell'* (not *\*dilla, \*dille, \*dillo, \*dill'*), we need to posit an allomorph, *de-*, which is bimoraic and triggers doubling. We can seek

the origin of this allomorph in an earlier form of this preposition, *di* < *de*. Perhaps the Old Italian preposition *de* caused doubling, as evidenced by the vestige of this form when combined with an article to form a *preposizione articolata*: *della, delle, dello, dell'*. The raising of the vowel [e] to [i] (*de* > *di*), due to its predominantly prestressed position (Migliorini 1983: 67), may reflect the loss of its bimoraic structure.

It is difficult to find written evidence to support this claim. Documents from as early as the 13th and 14th centuries usually report *di* (not *de*) with, as expected, no doubling of the following initial consonant (Castellani 1958: 78; Schiaffini 1954: 274), and in the first quarter of the 16th century, Tolomei (Sbaragli 1939: 192) noted that the phrase *di lui* 'of him' (a relatively recent syntagm) was pronounced with a single [l], and not a geminate \*ll. In early word formations, when functioning as a prefix, we find *di* (not *de*) and no doubling: *DÈLECTARE* > *dilettare* 'to delight', *DÈMENTICARE* > *dimenticare* 'to forget'.<sup>14</sup>

Some sporadic cases of doubling after *di* are found in the old texts. Schiaffini (1954: 274) says that *di* sometimes triggers *raddoppiamento* in 13th and 14th century documents, and Castellani (1958: 78) notes that the preposition *di* is often followed by an initial geminate /s:/ in a 13th century Florentine account book. Although Castellani believes the double *ss* is "meramente grafico" ('merely graphic'), perhaps we are witnessing in the synchronic grammar of the time an uncertainty about the status of *di* with regard to *raddoppiamento*, an uncertainty reflecting a period of transition between a previous stage when this preposition did cause doubling (i.e., it was bimoraic) and a new monomoraic status.

### 3. Further Evidence of the Empty Mora.

In addition to what has been stated up to this point regarding the historical evidence and the synchronic forms of *raddoppiamento*, there are other facts which support the hypothesis of the empty mora.

#### 3a. The Bimoraic Norm of Stressed Syllables.

Most obvious is the claim that all accented syllables in Italian are bimoraic (Repetti 1989). Hence, the final syllables of oxytones in Italian must be bimoraic. If there is no overt coda (VC or V:), we must assume that the second mora, though present, does not always have an association with the segmental tier.

<sup>14</sup> Those Central and Southern dialects with the preposition *de*, which covers the same semantic range as standard Italian *di* 'of' and *da* 'from' and which never underwent the raising of [e] to [i] described above, do not have *raddoppiamento* after this preposition (Fancullo 1986: 87).

3b. Word Final /e/ Insertion.

It is not surprising that some varieties of Italian optionally add an extra vowel, [e] ("e paragogica"), after words which end in a stressed vowel, filling the empty mora and avoiding the *raddoppiamento* issue altogether (Bianchi 1948: 77; Rohlf's 1966: 468).<sup>15</sup> This expedient was more common in the past, where Medieval manuscripts abound in forms such as those shown in 13.

- (13) *cosie* < *così* 'so'                      *piue* < *più* 'more'  
*formoe* < *formò* 's/he formed'        *uscie* < *uscì* 's/he went out'  
*fue* < *fu* 's/he was'                      *virtue* < *virtù* 'virtue'

Even Dante uses *èè* (< *è*) 'is' (*Inf.*, 24, 90; *Purg.*, 32, 10; *Par.*, 28, 123); *fèè* < *fe* < *fece* 'it made' (*Purg.*, 32, 12; *Par.*, 32, 19); *mee* (< *me*) 'me' (*Inf.*, 26, 15). And today in the Florentine dialect we find: *cosìe* < *così* 'so'; *peròe* < *però* 'but'; *dureràe* < *durerà* 'it will last'; *piùè* < *più* 'more'; *làè* < *là* 'there'; *sìè* < *sì* 'yes'.

It is crucial to note that other analyses of *raddoppiamento* which claim that lengthening is due to insertion of a segment on the skeletal tier (Strong Rime Condition) when a segment immediately follows (Chierchia 1986: 24) cannot handle these data. There are innumerable cases in which a phoneme is inserted at the end of a verse of poetry, for example, in *Inf.* 24, 90 of Dante's *Divine Comedy*: *né con ciò che sopra al Mar Rosso ee* (not \**è*) 'nor with that (land) which borders the Red Sea'.

3c. Word Final /j/ Insertion.

In some dialects of the extreme South, the empty mora may be filled by inserting a glide (Fanciullo 1986). For example, in the Salentine dialect, we regularly find *raddoppiamento* after the adverb [d:a] 'there', as in the expression [d:a b:aš:u] 'down there'. However, in the sentence below, instead of *raddoppiamento* we find insertion of [j] to fill the empty mora: [lu má:ru štáe d:a j ku l:u ġ:ován:i] 'Mario is there with Giovanni', not \*[lu má:ru štáe d:a k:u l:u ġ:ován:i].

In old texts from Southern Italy we find the same use of glides. In an 11th century confessional formula, *farai* 's/he will do' is written instead of *farà* (Migliorini 1983<sup>6</sup>: 101, n. 1).

<sup>15</sup> Other vowels may be used instead of *e*. For example, in the 13th century account book of a Florentine bank, we find *prestoa* < *prestò* (Migliorini 1983<sup>6</sup>: 106, n. 4).

3d. Word Final Syllable Insertion.

A bit more exotic, though only slightly more complex, is the addition to the empty mora of an entire syllable (consonantal onset plus vocalic nucleus). In Medieval Tuscan documents we find the addition of the monomoraic syllable, *ne*:<sup>16</sup> *fene* < *fe* 's/he did'; *partine* < *partì* 's/he departed'; *puone* < *può* 's/he can'. In some contemporary Southern dialects a final syllable, *di*, is added, so that one hears: *edi* < *è* 'is'; *nodi* < *no* 'no'; *sidi* < *sì* 'yes'; *tređi* < *tre* 'three'; *tudi* < *tu* 'you'.<sup>17</sup>

3e. Moraic Preservation After Metathesis.

Turtle's (1986) study of the prefix *štra-* in Central and Southern dialects provides supportive data for the hypothesis of the empty mora and *raddoppiamento*. Considering semantic and phonological evidence, Turtle concludes that the evolution of certain Latin prepositions ending in *s* followed a dual path: one with deletion of the final element (*š*) and *raddoppiamento* of the following consonant, and another with metathesis, or transfer of the final *s* to initial position and no *raddoppiamento*:

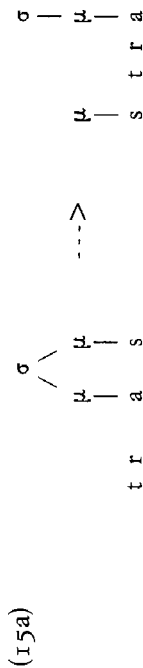
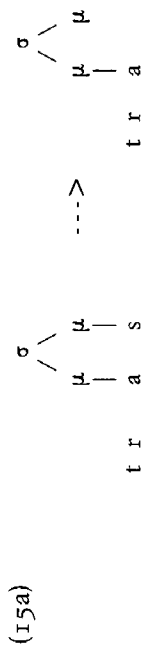
- (14) TRĀNS > *tras* > *tra-* (with doubling)  
           *štra-* > *štra-* (without doubling)  
       *bes* > *bes* > *be-* (with doubling)  
           *sbe-* > *šbe-* (without doubling)  
       *dē-* > *des* > *dē-* (with doubling)  
           *šde-* > *šde-* (without doubling)

Using the moraic model, these facts can lucidly be explained as cases of mora preservation. In (15a) we see a straightforward example of loss of a final segment with its mora being preserved. Given the right conditions, this segmentless or empty weight bearing unit is filled by spreading from the following consonant, i.e., *raddoppiamento fonosintattico*. In (15b) we again see a case of mora preservation. Here, there is a metathesis of the

<sup>16</sup> Here is an interesting and useful meeting of philology and linguistics. The seemingly semantically opaque *insuno* (v. 37) of the anonymous 12th century poem "Il detto del gatto lupesco" is quite transparent if analyzed as *in su* 'up' with an epenthetic *-no* filling the empty mora and rhyming with *caschedano* (v. 38) (see Repetti 1988 for an analysis of this poem).

<sup>17</sup> Rohlf's (1966: 469-470) offers an explanation of the etymology of the syllables inserted in these positions, *-ne* and *-di*. The *-ne* may be an extension of the *-ne* optionally deleted in the reduced forms of words such as *viene* > *vie*, *bene* > *be*. As for the other final syllable used in *raddoppiamento* contexts, *-di*, Rohlf's believes that its origin is to be found in conservative Southern dialects where the Latin morpheme marker of the third person singular form of the verb, *-t*, survived as *-d-*, so that *bibit* > [vivid] 's/he drinks'. Here, the final syllable, *-di*, is extended to other words as well.

two moras, so that the original second mora (the coda *s*) is shifted to the initial position.<sup>18</sup> In other words, the *s* is a weight bearing segment, so when it shifts to the initial position, it takes its mora along with it, preserving mora count.<sup>19</sup>



4. Exceptions: Words Which End in a Stressed Vowel But Do Not Trigger "Raddoppiamento Fonosintattico".

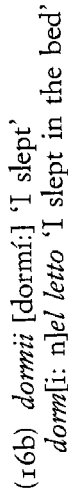
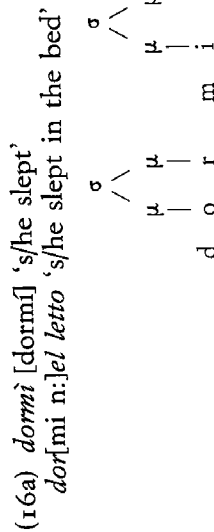
There are a few categories of mono- and polysyllabic words which end in a stressed vowel and do not trigger *raddoppiamento*. I will now analyze each of these cases separately.

4a. Word Final "Geminate" Vowels.

The word final stressed vowels with an empty mora which trigger *raddoppiamento* are not to be confused with word final, heteromorphemic "geminate" vowels (Valesio 1967), which have both moraic slots filled and do not trigger *raddoppiamento*. In (16a) *dormi* n:]el letto 's/he slept in the bed', we find doubling of the *n*, while in (16b) *dormi*[:i:] 'I slept in the bed', we do not find such consonantal gemination. We find *raddoppiamento* only after the word with an empty mora (*dormi*), but not in the case of final geminate vowels which have their final mora filled (*dormi*). In the latter case there is no empty mora, hence no resyllabification and no *raddoppiamento* (see § 6b).

<sup>18</sup> Rohlf (1966: 257) notes that the palatalization of *s* before another consonant is common in many Italian dialects.

<sup>19</sup> It is significant that the very dialects that exhibit this unusual initial moraic /s/ also have word initial geminate consonants (Rohlf 1966: 193). One way to represent word initial geminates is to have an extrasyllabic mora (Hayes 1989: 303), just as the word initial /s/ in these examples is represented.



4b. Falling Diphthongs.

The data regarding the relationship between *raddoppiamento fonosintattico* and falling diphthongs further clarifies the issue at hand. A falling diphthong has a bimoraic structure with both moras filled: the first mora with the vocalic nucleus and the second mora with the offglide (see § 3c and Repetti ms). Therefore, we do not find doubling after a falling diphthong.<sup>20</sup> For example, in Tasso's 16th century *Gerusalemme liberata* we find *svegliati + mi > svegliami* (12, 37, 5) 'I awoke', without doubling, (but *comparti + le > compartille* (12, 45, 5) 'it spread them', with the expected doubling). We expect that if the offglide of a falling diphthong is deleted, resulting in an empty second mora, *raddoppiamento* should occur, and, in fact, in some Tuscan dialects (Bottiglioni 1933: 266; Pieri 1886: 30-31, n. 1; Rohlf 1966: 235-236), such as that of Lucca, we find *lui disse > [lu di:is:e] 'he said'*.

At first glance, it seems surprising that *raddoppiamento* does not take place in the standard language and in the Florentine dialect after the reduction of a falling diphthong<sup>21</sup> (Bianchi 1948; Bottiglioni 1933; Camilli 1913, 1941; Fiorelli 1958; Loporcaro 1988; Papa 1981; Pratelli 1970; Schuchardt 1874). For example, it has been noted by Fiorelli (1958: 124) and Pratelli (1970: 42) that in those Tuscan dialects which employ the

<sup>20</sup> For the Florentine dialect Savoia (1974-1975: 285) records /un bel bambino/ 'a cute baby' > [um be b:ambino] with loss of a segment and *raddoppiamento*. However, he also records [um be:b:ambino] with a falling diphthong and *raddoppiamento*. I am not sure how to explain these facts.

<sup>21</sup> In the 16th century, Bembo noted that *faràne* (< *farai + ne*) 'you will make some' does not have doubling, but that *faràtti* (< *farà + ti*) 's/he will make you' does exhibit *raddoppiamento*.



imperative derived from the second person singular of the present indicative (*stai* < *stai* 'stay'), we do not find *raddoppiamento* after these words.<sup>22</sup> Papa (1981: 259) neatly accounts for these facts by ordering *raddoppiamento* before monophthongization.

#### 4c. Words Which Underwent Aphesis.

Another context in which *raddoppiamento* is non-operative is among words which underwent aphesis (Camilli 1941: 44). Even though the resulting monosyllable has a CV structure, we do not find evidence of doubling of the following consonant: *questo* > *sto* 'this (mas. sg.)', *questa* > *sta* 'this (fem. sg.)'. After the (first) stressed syllable is deleted, the remaining syllable (originally unstressed and monomoraic), remains monomoraic, and, hence, cannot trigger *raddoppiamento fonosintattico*.

The same analysis can apply to the prefix (s)tra- < EXTRA which, in standard Italian, does not trigger doubling. Here the syllable remaining after aphesis is monomoraic. Since there is no empty mora, there is no *raddoppiamento*: *strafare* (not \**straffare*) 'to overdo', *strapagare* (not \**strappagare*) 'to overpay', *straripare* (not \**strarripare*) 'to overflow'.

#### 4d. Monosyllables.

There are some monosyllables which never trigger *raddoppiamento* in the standard language. These words, all clitics, are monomoraic:<sup>23</sup>

- (a) the definite articles:<sup>24</sup> *gli*, *i*, *la*, *le*, *lo*
- (b) the adverbial clitic: *ci*
- (c) the pronominal clitic: *ne*
- (d) all the direct and indirect object pronominal clitics: *ci* (*ce*), *gli*, *la*, *le*, *li*, *lo*, *mi* (*me*), *si* (*se*), *ti* (*te*), *vi* (*ve*)

<sup>22</sup> Standard Italian employs the etymological form of the imperative (*sta* < *stā* 'stay') which does, as expected, trigger *raddoppiamento* (*stacci* < *sta* + *ci* 'stay there').

<sup>23</sup> Camilli (1941: 44-45) says that the vowels of the exclamative monosyllables *Beh!*, *Ehi!*, *Mah!*, *O!* are usually lengthened, and, hence, do not cause *raddoppiamento* (see § 6b). However, in the Roman dialect, they are not lengthened, and hence do trigger gemination.

<sup>24</sup> In Neapolitan, as well as in other dialects of the South, the feminine plural and the neuter singular definite articles trigger doubling of the following consonant. In both cases, the doubling effect of the article is traceable to a final consonant now lost: [laf.ém:an] < \**illaec feminae* 'the women'; [lup.á:nə] < ILLUD PANEM 'the bread' (Agostiniani 1975; Iannucci 1949; Loporcaro 1988; Turtle 1990). In the dialect of Lucca, one finds *i kekemi* 'the dogs' with doubling after the masculine plural article. Loporcaro (1988: 352) says that "no explanation seems available: here neither assimilation of a former final consonant nor stress conditioning (the word being a clitic) may be assumed". Using the model adopted in this paper, we assume that a final stressed vowel which triggers doubling of the initial consonant of the following word is bimoraic; therefore, the Lucchese definite article (*li*) which triggers doubling is bimoraic. The empty second mora is derived from the length of the final vowel of its Latin antecedent (n.)II. For a detailed study of the prevocalic definite articles in the Tuscan dialects see Agostiniani (1980).

The only datum which proves to be a puzzle to this analysis is the preposition *di* < *de* < *dĒ*, which does not cause doubling of the following consonant. If the other monosyllabic prepositions which end in a vowel (*a*, *da*, *su*) are bimoraic and trigger *raddoppiamento*, why does *di* behave differently? I suggested above (§ 2d) that monomoraic *di* may be derived from a bimoraic *de*. If this is true, there is no explanation for the loss of the second mora.

#### 5. Exceptions: Words With Penultimate Stress Which Trigger "Raddoppiamento".

There is a series of words with penultimate stress which appears to contradict the aforementioned model. *Raddoppiamento* was described as resulting from word final empty moras in vowel final oxytones. We must now add to that analysis some (six) paroxytones which regularly trigger *raddoppiamento*:

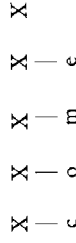
- (17) *come* < QUOMODO ET 'as'                    *intra* < ĪNTRĀ 'between'
- contra* < CŌNTRĀ 'against'                *qualche* < QUALIS QUID 'some'
- (d)ove* < DĒ ŪBĪ 'where'                *sopra* < SŪPRĀ 'above'

For these words, as well as those mentioned below from the dialects, we must posit an empty mora in final position. This mora was filled in the Latin antecedent, and currently, although empty, its effect is felt on the following consonant. However, this mora does not affect the stress assignment of the word. "[S]ome sort of information must be lexically encoded" (Chierchia 1986: 28) in these words since the final vowel is bimoraic, though not stress bearing.<sup>25</sup>

The traditional analysis, first proposed by Rajna (1872) over a century ago in which folk etymology plays a role, views these words as being composed of two parts, the second being a word which normally triggers *raddoppiamento*: *a*, *è*, *tra*, *che*:

- (18) *come* < *come* + *è*                            *intra* < *in* + *tra*
- contra* < *contro* + *a*                        *qualche* < *quale* + *che*
- (d)ove* < *(d)ove* + *è*                        *sopra* < *sopra* + *a*

<sup>25</sup> Chierchia (1986: 28) anticipated this analysis when he stated that in the case of, for example, *come*, we must posit an extra "free floating" unit in the skeleton:



The final X is syllabified with the preceding syllable in the lexicon. Postlexically, the initial consonant of the following word spreads back to fill the empty X.

It does indeed appear that the final *a* or *e* (as opposed to any other vowel) is intimately involved in the doubling process observed. This hypothesis is supported by data from the synonyms, *contro* and *contra* 'against'. In compound words, the former (with final *o*) does not trigger *raddoppiamento*, while the latter (with final *a*) does: *controbalanciare/contrabbilanciare* 'counter-balance'; *controgenio/contraggenio* 'aversion'; *contropana* 'tailstock (of a lathe)'; *contrappunto* 'counterpoint'; *controtempo* 'mishap'/'*contratempo* 'delay'.<sup>26</sup>

Norman (1937: 61) notes that the only time *altro* 'other' causes doubling of the following consonant in standard Italian is in the word *altrettanto* (< *altro* + *tanto*) 'as much', where the final *e* appears to be the key to the gemination. It is not surprising that the allomorphs of the prepositions *di* 'of' and *in* 'in' which trigger doubling are *de* and *ne*, respectively, both ending in an *e*.

The number of paroxytones which triggers *raddoppiamento* is small in the standard language, but it is significantly higher in the dialects, as evidenced in Loporcaro's study (1988) of *raddoppiamento* in Central and Southern dialects. In the Florentine dialect *quande* (with final *e*) 'when' triggers *raddoppiamento*, as opposed to standard Italian *quando* (with final *o*) which does not. Bottiglioni (1933: 269) notes that in the dialect of Corsica both *quande* and *quando* are present: *quande* triggers doubling, whereas *quando* does not, showing again that the final *e* is the key to the doubling.<sup>27</sup>

## 6. Filling the Empty Mora.

There are many options available to fill an empty mora: spreading could be from the left or from the right, or a new phoneme could be introduced. The choice of one option over another is an idiosyncrasy of the language in question. Various varieties of Italo-Romance choose different options.

<sup>26</sup> Can the long consonant in *diciannette* 'seventeen' and in *diciannove* 'nineteen' be due to the geminating effect of the /d/? Poppe (1966) offers the following etymology of these two words. In early Italian texts (13th - 14th centuries), they are most frequently written *dicesette* and *dicenove* (with a single consonant), although some cases of *dicesette* and *dicenove* (with a geminate consonant) are found. The *a* is derived from vowel dissimilation, common in Old Tuscan, whereby the *e-e* sequence in *dice(s)ette* became *a-e*, resulting in *dicia(s)ette*. The *a* was then extended analogically to *dice(n)ove*, resulting in *dicia(n)ove*. Poppe's convincing analysis has one gap. He does not discuss the reason that the less common forms with the geminate consonant were chosen over the more frequent forms with the single consonant. Perhaps the *a* in *dicia(s)ette* and *dicia(n)ove* favored the geminate, just as the *a* in *contra* 'against' is responsible for the gemination of the following consonant.

<sup>27</sup> Other polysyllabic words with non final stress which trigger *raddoppiamento fonosintattico* do so only in fixed phrases: *Spirito Santo* [spiritos:ánto] 'Holy Spirit', *Ognisanti* [on:is:ánti] 'All Saints', *Ave Maria* [avem:aria] 'Hail Mary'. Since these phrases have been fossilized as a unit, the double *s* in the first two cases may be etymological: SPIRITUS SANCTUS and OMNES SANCTOS. The double *m* in the last example is again a case of preserving mora count: AVE MARIA. With regard to the latter, it has been suggested that the geminate consonant might be due to a popular mispronunciation of *ave* as *avé*, with the usual doubling (Leone 1962: 169; Norman 1937: 61).

## 6a. Raddoppiamento Fonosintattico.

In contemporary standard Italian, an empty mora is filled by spreading from the right, resulting in a geminate consonant.

## 6b. Final Vowel Lengthening.

In some Northern varieties of standard Italian (Chierchia 1986: 26; Nespor & Vogel 1979: 478), the empty mora is filled by spreading from the left, resulting in a long vowel.

## 6c. Insertion of Phoneme/s.

This option, mentioned above (see § 3b, 3c, 3d), avoids the issue of compensatory lengthening by filling the empty mora with a new phoneme, either a vowel ("e *paragogica*"), a glide (yod), or an onset plus nucleus (a monomoraic syllable).

## 6d. Stress Retraction/Deaccentuation.

Retraction of the stress of the first word from the final syllable (Nespor & Vogel 1978, 1979)<sup>28</sup> or deaccentuation of the first word (Bertinetto 1985: 600) may occur in some Northern varieties of standard Italian. By destressing the final syllable, its bimoraic structure is forfeited and, hence, it can no longer trigger *raddoppiamento*: *metà torta* 'half a cake' > [mètatoríta]<sup>29</sup> or [metatórta].

The only case which I have found where a polysyllabic word with a stressed final vowel does not trigger *raddoppiamento* is *Gesù Cristo* 'Jesus Christ' [ǰesukrísto] (not \* [ǰesuk:rísto]). However, in other contexts, *Gesù* triggers doubling regularly: *Gesù mio* [ǰesum:i:ó], *Gesù Maria* [ǰesum:ari:a]. The lack of doubling in the former is due to retraction of the stress to the first syllable, [ǰesukrísto], as is the ecclesiastical *Jésus Chrístus* (Camilli 1913: 172, n. 3; Napoli & Nespor 1979: 814; Norman 1937: 60). This proposal is supported by the many examples of stress retraction in the dialects, as in the Istrian dialect [ǰizukrèjsto] (Ive 1900: 23).

<sup>28</sup> If the first word has more than two syllables, the stress shifts to the syllable with secondary stress, so that *onoro Dante* > *onoro Dante* 's/he honored Dante'.

<sup>29</sup> This expedient is found in various Central and Southern dialects as well. For example, in the Tuscan dialects we find: *sarà* > *sàra* 's/he will be', as in *quando mio figlio sarà* [ǰhande 'when my son is (will be) grown up' (Rohlfis 1966: 446).

### Conclusion.

In this paper I have suggested a moraic model of *raddoppiamento fonosintattico* which explains its origins and synchronic functioning. At an early stage in the history of Italian, the mora which now triggers *raddoppiamento* was associated with the segmental tier. If the final segment was lost, the result was an empty final mora. That mora remains empty until the correct phonotactic conditions are met for it to be filled, resulting in a long consonant.

The key here is the empty mora present in the underlying representation (not added by a rule) which allows us to account for the data which have presented problems to linguists, as well as the data from the Italo-Romance dialects. This unified treatment of the origin and synchronic functioning of *raddoppiamento fonosintattico*, not captured in previous accounts of this phenomenon, is possible because of the formalism of moraic phonology.

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