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## An Autosegmental Theory of Raddoppiamento

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AN AUTOSEGMENTAL THEORY OF RADDOPPIAMENTO\*

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0. Introduction

One of the motivations that has been presented in favour of the autosegmental approach concerns the status of segmental length in phonological theory. It has been argued that in general phonetically long segments cannot be properly analysed either as bearing a +long feature or as a sequence of two identical segments. Rather, length is best regarded as a consequence of the way in which a syllabic skeleton is mapped into a melody tier (see e.g. Leben, (1980) or Halle and Vergnaud (1980)). I will try to show how this idea proves to be extremely fruitful in looking at raddoppiamento (R from now on) in Italian, which constitutes a fairly complex external sandhi process affecting consonantal length. I also hope to be able to point out some aspects of general theoretical interest that an autosegmental analysis of R might offer to the discussion of syllable structure.

I will be mainly speaking about my dialect (the Roman). What I will say, however, extends straightforwardly also to standard Italian (as described e.g. in Lepschy and Lepschy (1977) or Muljadic (1972)).

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In section 1 the relevant data will be presented. In section 2 we will discuss some basic assumptions about syllable structure in general and with specific respect to the case of Italian. In section 3 resyllabification and a rhythmic constraint that seems to be operating in Italian will be discussed. Finally, in section 4 it will be argued that the phonology of R can be accounted for in terms of the principles underlying resyllabification and the aforementioned rhythmic constraint.

1. The data.

The phenomena that standard Italian grammars describe as R can be naturally grouped in three different but related class of cases. The first class of cases can be called rhythmic R. It consists of the doubling of the initial consonant of a word after a stressed syllable, as shown in the following examples.

- (1) a. caritá pelósa → [karitáppelósa]  
interested charity  
b. é bello → [ébbello]  
it is beautiful

The second class of cases can be called backwards R. It is constituted by the doubling of the final consonant of a stressed closed syllable before a word initial vowel. Some examples of backwards R are given in (2).

- (2) a. cognác eccélsa → [konnákkett]élsa]  
sublime cognac  
b. trám elétrico → [trámmelétriko]  
electric bus

The third and last class of cases can be labelled morphological R. It concerns the doubling of the initial consonant of a word after a small class of weak (i.e. unstressed) monosyllables and polysyllables with penultimate stress. For a complete list of words conditioning morphological R see, for instance, Muljacic (1972). Examples of morphological cases of R are the following:

- (3) a. Giáni e Páolo → [d<sub>3</sub>ánnieppáolo]  
Gianni and Paolo  
b. cóme Páolo → [kómeppáolo]  
like Paolo  
c. la cása ↗ \* [lakkása]  
the house

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It should also be mentioned that s + C clusters (the so called s impura) do not undergo R, as can be seen in (4).

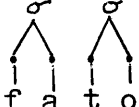
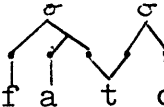
(4) città strana ↗ \* [tʃittásstrána]  
 strange city

Within the generative tradition several theories of R have been developed. The best articulated proposals are those of Saltarelli (1970) (developed within the standard framework) and Vogel (1977) (developed within Kahn's autosegmental theory of syllable structure). Given the limits of the present paper, we cannot discuss these proposals here. However, we might point out two unsatisfactory features they both share. The first is that it seems that both theories require stipulations that are specifically made to handle R and appear to have extremely weak independent motivation. The second is that they both fail to provide a unified account of the three cases of R described above. Hence, the intuitive connection between rhythmic, backwards and morphological R remains unaccounted for.

In the present paper I propose various conditions governing syllabic structure and stress in Italian and then go on to demonstrate that all three cases of R follow in a simple manner from the independently required apparatus.

## 2. Aspects of the Italian syllable.

I will assume that there is a lexical process of syllabification that assigns syllable structure to lexical items. Whether this process takes place cyclically does not need to concern us here. Following essentially Halle and Vergnaud (1980), I will moreover assume that the output of lexical syllabification is represented by a segmental melody (i.e. a tier of segments) associated to a syllabic skeleton by connecting lines. The syllabic skeleton displays the constituent structure of the syllable in the usual form of a labelled tree. For the sake of the present discussion, let us assume that the terminal nodes of such trees are just empty slots, rather than sequences of C-V slots. Nothing I will say, though, will hinge on this particular issue. An example of what might be the representation of a minimal pair is the following:

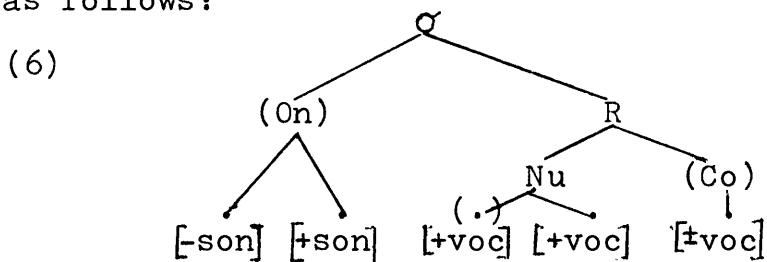
(5) a. fato                                            b. fatto                        
 fate                                      fact

Contrasts like those in (5) are taken to be the result of

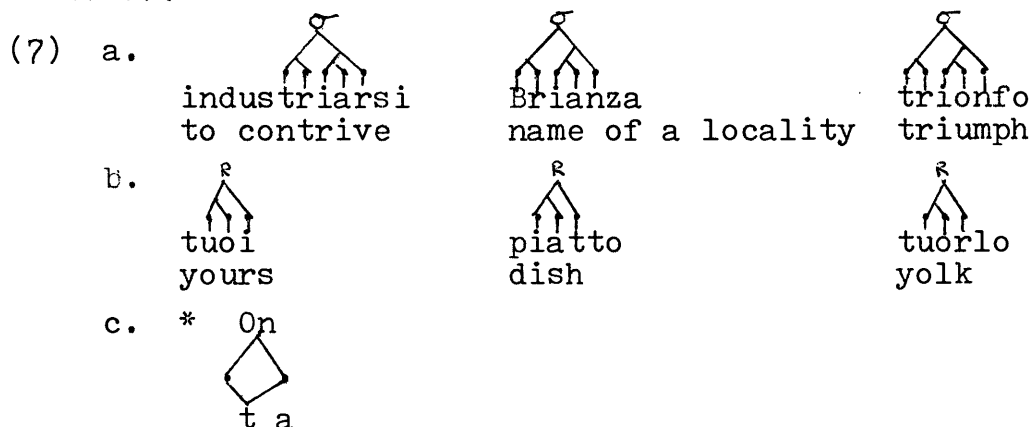
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different choices in lexical syllabification.

Proposals that have been made in recent discussions (e.g. Selkirk (1980), Halle and Vergnaud (1980)) exploit syllable templates as the formal device for describing the principal facts about syllable structure. So, we might try to describe the basic shape of the Italian syllable as follows:



For our purposes, we need consider in detail neither general problems with this view of syllable structure, nor empirical problems that a specific proposal like the one illustrated in (6) might encounter. It should be sufficient to show that something like (6) does capture a fair range of facts concerning the syllable in Italian. So, for example, a syllable can have at most 5 phonemes (as illustrated in (7a)), a rime at most 3 (as illustrated in (7b)), no geminate can appear in onsets or codas (as illustrated in (7c)), and so on.



Even putting aside many problems with a template like (6), however, one cannot fail to notice that it cannot be the whole story about syllable structure. Further provisions will have to be made in order to account for a variety of phonotactic facts. At first sight, some such provisions appear to be of a purely sequential nature. I.e. they seem to concern sequences of segments that are just impossible, independently, as it were, from questions of syllabic constituency. Examples of these kinds of distributional restrictions are in (8).

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(8)  $\left\{ \begin{array}{l} t \\ d \end{array} \right\} l , * l r , * [obs] [obs]$

Within an autosegmental approach, the restrictions in (8) might simply be viewed as, say, filters on impossible melodies.

There are phonotactic restrictions, however, that clearly are not melodic and would have to be stated in terms of syllable structure. In particular, given the autosegmental format, facts involving length will be of this second type, because length arises from the way melodies are related to syllabic skeleta. So, consider the following phonemes:

(9)  $ts, \lambda, p, \zeta, d_3, b$

In the Roman dialect these phonemes are always geminated in postvocalic position, both word internally and in external sandhi. For example:

- (10) a.  $\acute{o}zio \rightarrow [o'ttsjo]$   
idleness
- b.  $c\acute{u}bo \rightarrow [ku'bb\acute{o}]$   
cube
- c.  $z\acute{i}o \rightarrow [tsi':o]$       lo  $z\acute{i}o \rightarrow [lo'ttsi':o]$
- d.  $b\acute{e}ne \rightarrow [be':ne]$        $v\acute{e}do\ b\acute{e}ne \rightarrow [ve'dobbe'ne]$   
well      (I) see well
- e. impossible words:  $* [latsio]$  ,  $* [kabo]$

A condition capturing this fact is schematized in (11).


(11)  $\square \begin{array}{c} \diagdown \\ \diagup \\ C \end{array}$  where C is one of the phonemes in (9)

The intended meaning of (11) is that C has to be attached to two syllabic slots whenever such slots are available on the basis of independent principles of syllable structure. What this amounts to, given our assumptions about the basic template, is that the first syllabic slot in (11) belongs to a coda, and the second to an onset. (since geminates within onsets or codas are disallowed by (6)). When two such slots are not available, say word or phrase initially, a marked syllabification that violates (11) will be chosen. (11) might be regarded as a well-formedness constraint on syllable structure. Since constraints like (11) crucially involve the mapping between syllabic skeleta and melody tiers, let us call them connecting line constraints (CLCs, for short). One might point out, in

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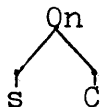
this regard, that something like the so called Maximal Onset Principle could be most naturally regarded as a CLC.

Another CLC can characterize the distribution of long and short vowels. Long vowels in Italian have a limited distribution; they occur either in stressed open syllables in non prepausal position or when two identical vowels become adjacent in the course of a morphological derivation. One straightforward way of accounting for this would be to assume, following Vogel (1977), that vowels are underlyingly short and that they are lengthened by rule in the relevant contexts. Within the present approach this view can be naturally expressed in terms of a CLC like the following:

(12) \* 

What (12) says is that a vowel associated with two syllabic slots is ill-formed in Italian. We will see shortly how long vowels come about in certain environments.

An approach along the present lines might be able to account in a relatively simple way for the problematic distribution of s. Word internally, s cannot appear between two consonants. This might be cast in terms of the following CLC:

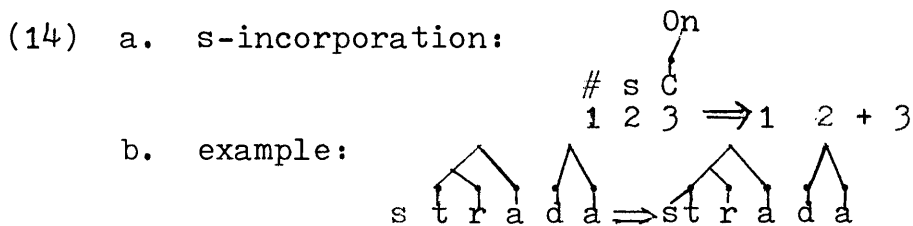
(13) \* 

Given our basic template (6), (13) establishes that words like base ('base') and perso ('lost') are possible while words like \*pelsto are impossible. Moreover,

(13) also predicts that words like basta ('enough') are possible, given that s syllabifies into codas. An argument from Camilli (1941) is especially relevant to the syllabification of s + C clusters. Vowels in Italian are long in stressed open syllables (e.g. [bá:se]). So if s syllabifies into onsets in words like basta, the vowel of its first syllable should be long, because it would be on an open stressed syllable. But this is not the case. Hence the s must close the first syllable of basta. Vogel (1977) questions this conclusion on the basis of measurements done on three speakers. However, her results are in contrast not only with the observations of Camilli but also with the measurements of Fava and Magno Caldo-

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gnetto (1976). In the present work, I will therefore follow Camilli, and assume that s syllabifies into codas in the contexts under discussion. The next question, then, is what happens to word initial s + C clusters. Consider a word like strada ('street'). Independently of (13), the template we are adopting makes word initial s unsyllabifiable in such words. Unattached segments, then, would constitute a marked case; something special must happen to them. How unattached segments are dealt with appears to be a language particular parameter. They can be altogether deleted or they can be rescued by associating them with an epenthetic vowel. Another option, would be to incorporate them, by some special rule, into the neighboring syllable. The resulting syllable will violate the basic template, and will have, therefore, a marked status. Old Italian (like Spanish) had the option of vowel epenthesis in the case of word initial s + C clusters. Modern Italian seems to prefer an incorporation rule. This can be tentatively formulated as follows:



To sum up so far, we have argued that certain distributional patterns involving long segments can be best handled within an autosegmental framework in terms of a set of well-formedness conditions on metrical structure (CLCs). In particular, we have offered some arguments for the two CLCs (11) and (12). We have also suggested that the distribution of s, problematic on any account, can be treated in a relatively simple way in terms of a CLC. For the purposes of the present discussion, we will assume that CLCs, qua well-formedness constraints on prosodic representations, operate throughout the course of phonological derivations. This assumption, however, is not crucial to our account. One alternate possibility is to regard CLCs as part of the definition of syllable structure (i.e. language particular analogous to something like the Maximal Onset Principle). While these two ways of regarding CLCs are, in principle, empirically distinguishable, I am not able to detect any difference between them as far as R is concerned. Both positions turn out to be compatible with the approach presented here and we will adopt the first one essentially for the sake of clarity.)



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3. Resyllabification and the "strong rime" constraint.

It has often been observed that it is a consistent intuition of native speakers that phrases like per esempio ('for example') resyllabify as in (15).

(15)

Following a proposal due to E.Selkirk (class lectures), I will assume that languages that have phrasal resyllabification are positively specified for the following parameter:

(16)  $\bar{X} \Rightarrow (\text{Syl}^*)$

The intended meaning of (16) is that syntactic phrases (i.e. maximal projections of lexical categories) have to correspond to a sequence of well-formed syllables as defined by the principles of syllabic well-formedness operating in the language. In particular, (16) might be implemented by erasing syllable structure of syllables that come to be in a new environment at the phrase level and then rebuilding it with the aim of minimizing markedness. This will obviously account for the most straightforward cases of resyllabification, like the one in (15). But consider now a phrase like amo scialare ('(I) love to squander money'). At the word level it is impossible for the word initial  $\int$  of scialare to conform to the constraint in (11), because there is no rime slot to which  $\int$  could be attached. Therefore, a marked option has to be taken, namely:

(17)

At the phrase level, however, a way of syllabifying that meets well-formedness is available and thus, according to what we have said, it has to be chosen. This gives us:

(18)

The word initial  $\int$  is geminated. In other words, within our theory, the gemination in external sandhi of the phonemes in (9) simply follows. No special rule is needed. This also seems to show that the present approach to resyllabification is on the right track.

Let us turn now to another phenomenon. We have already mentioned that vowels in stressed open syllables surface as long. Apparently, the strongest rime

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of a word in Italian must be heavy, This seems to be a fairly natural process that somehow tends to make elements under various conditions of stress more prominent. Phenomena at first sight related to this show up in totally unrelated languages, such as late Latin (Tekavcic (1972) pp. 27 ff.), Biblical Hebrew (Leben (1980) p. 570), Yup'ik (Reed et al. (1977) pp. 310 ff.). My proposal with respect to the Italian case is to introduce a constraint requiring that the strong rime of a word (in non prepausal position) must be branching. We have to leave it open, for the time being, whether and how such a constraint might be generalized to other cases, or whether it could somehow be derived from some more fundamental principle of metrical theory. Schematically we will have:



This "strong rime" constraint (SRC) has to be interpreted not as ruling out stressed rimes that happen to be non-branching, but as actually forcing them to conform to well-formedness by building an extra branch. We regard (SRC) as a well-formedness condition that operates across the phonological derivation, whenever its environment is met.

It has often been noted (e.g. Vogel (1977)) that vowel length and consonant length (that constitutes R) are essentially two different ways of meeting the same rhythmic constraint that, in terms of our proposal, is cast as in (19). The problem is to explain why vowel length is chosen over consonant length word internally, while the opposite choice is made at word boundaries. Prima facie, this appears to be a curious asymmetry. On the contrary, we will try to show that this "curiosity" is not a curiosity, but rather a matter of principle.

Let us consider first word internal vowel length. Take a word like fato. Recall that in virtue of (12), there are underlyingly no long vowels. After lexical syllabification and stress placement have taken place, the metrical structure of fato will be as shown in (20a):



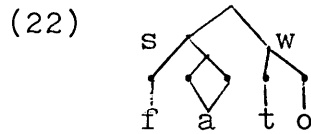
However, (20a) is not well-formed according to (SRC), so an extra branch has to be created, yielding (20b). The problem is then how to deal with the dangling node brought

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about by (SRC). Ingria (1980) has proposed a universal empty node convention (ENC) to handle analogous situations that arise in case of compensatory lengthening. His proposal reads as follows:

- (21) Empty nodes in a rime have to be associated with the terminal element dominated by the immediately preceding syllabic nucleus (Ingria (1980) p. 471).

Ingria's (ENC) can be viewed as a principle of syllabic integrity: it requires that the empty node be reattached respecting, so to speak, the existing syllable boundaries, i.e. with the melodic material already associated with the syllable of which the empty node is a constituent. Since (ENC) is a universal, it seems plausible to assume that, at least in the unmarked case, it overrides language particular conditions like the prohibition against long vowels in Italian (i.e. (12)). Therefore, the empty node brought about by (SRC) is attached according to (ENC) as shown:



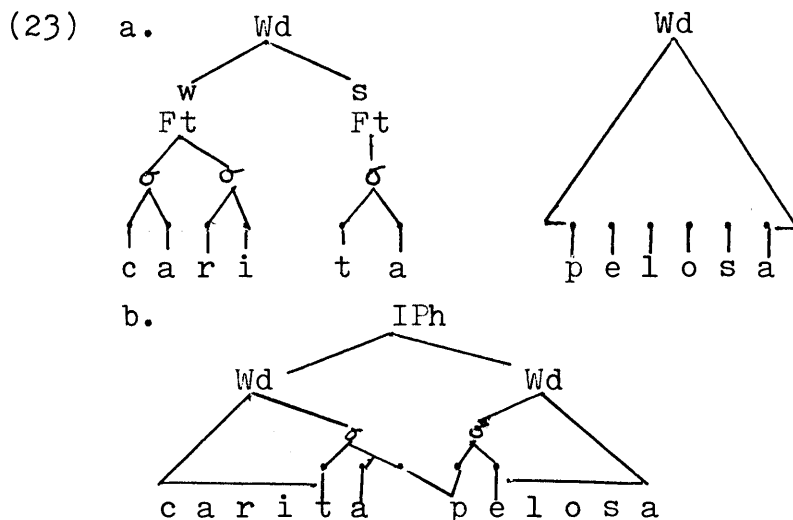
A long vowel is created, which is the right result. Both rhythmic lengthening in Italian and compensatory lengthening in Greek appear to be processes that tend to maintain constant the weight of syllables, the first with respect to stress, the second with respect to deletion processes. The present proposal makes formally explicit this intuitive similarity.

So (SRC) seems able to predict the right distribution of long vowels word internally, and moreover it allows us to do so by extending the empirical coverage of an independently needed universal of the theory, which seems to be a welcome result.

#### 4. The phonology of Raddoppiamento.

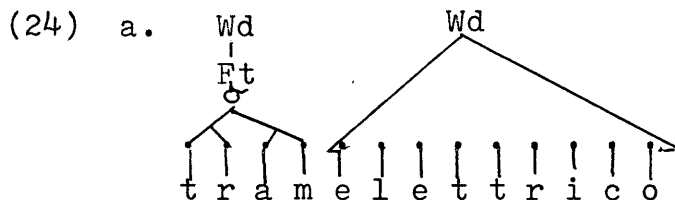
We will try to show now how the apparatus presented so far, and motivated on independent grounds, allows us to derive, as it were, the three cases of R, without any further stipulation.

Consider the phrase carità pelosa. After lexical syllabification and stress placement, its metrical structure would be as shown in (23a).

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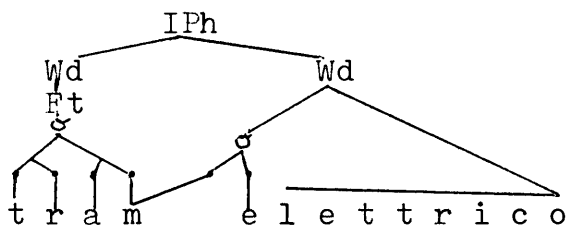
At the word level the conditions of (SRC) are not met, so nothing happens. At the phrase level, on the other hand, both resyllabification and (SRC) come into play. As proposed above in section 3, these are regarded as well-formedness conditions on metrical structure that apply automatically whenever their environment is met. In the case at hand, the environment that triggers them is met simultaneously, so they will apply simultaneously. Consequently, a branching rime has to be created in the last syllable of carità, while the structure of the adjacent syllables of the two words is being redefined. Now, as we already observed, (ENC) is a principle of syllabic integrity; here, however, we are defining syllable structure; thus there is no integrity of syllables to be respected. In other words, it seems to be a consequence of how (ENC) and resyllabification are stated that the latter makes void the former. So given our language particular conditions on syllable structure, and specifically, given (12), there is only one well-formed output, that can be obtained by attaching the extra node required by (SRC) to the following consonant (shown in (23b)). This gives us the gemination we wanted.

Backwards R works in a fully parallel fashion. Consider the phrase tram elettrico in (24a).



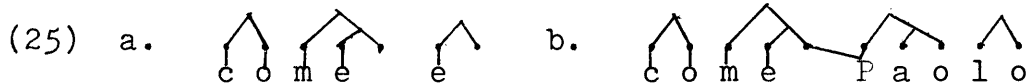
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(24) b.



At the word level, the strong rime of the first word is already branching, so we don't have to worry about (SRC). At the phrase level, resyllabification seeks an onset for the first syllable of the word elettrico, universally a less marked option. This cannot be done by detaching the final m of tram from the rime where it belongs and re-attaching it as an onset for the following syllable; in that case, (SRC) would be violated. So, once more, there seems to be a unique well-formed output. We can only build an onset for the first syllable of elettrico and attach m to it (without detaching the m from the rime of tram), causing its gemination, as shown in (24b).

Finally, all we have to do in order to handle morphological R is to assume that the relevant class of words are represented in the lexicon as having the syllable structure illustrated in (25a)<sup>4</sup>.



When they occur in a phrase like come Paolo and resyllabification takes place, the less marked option available will be that of connecting the empty syllabic slot to the following consonant, which will be thereby geminated. This is illustrated in (25b).

Let us now turn to the case of word initial s + C clusters. We have argued that these are onsets of marked syllables in virtue of a rule of s-incorporation. Now, given our theory of resyllabification, the prediction would be that if at the phrasal level a less marked option is available for s (i.e. one where s could be attached to a coda) it must be chosen. So, for instance, the syllable structure of a phrase like la strada should be as indicated in (26a) at the word level, and as in (26b) at the phrase level.



This predicts that in the case of phrases like cittá strana, the word initial s of strana will be resyllabified

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with cittá thereby closing the strong rime of this word and precluding gemination. So, also the fact that s + C clusters cannot undergo R simply follows from the present theory.

In conclusion, the theory outlined here seems capable of accomodating in a uniform way the various cases of R, as well as the cases where R is blocked. We can see at least the beginning of a principled explanation for the otherwise puzzling behavior of consonant lengthening and vowel lengthening in Italian. Such behavior can be explained in terms of the interaction between (SRC) and resyllabification. What seems even more appealing is that R is accounted for in terms of a set of conditions on metrical structure that seems to be needed anyway to handle various kinds of distributional patterns and phonotactic constraints, which is a desirable result.

## FOOTNOTES

\* I wish to thank Dan Finer and especially Alan Prince and Lisa Selkirk for their help in writing this paper. Errors and inadequacies are only mine.

<sup>1</sup>Saltarelli assumes that vowel length is underlyingly specified and proposes a cyclic rule that lengthens consonants both word internally and at word boundaries. However, the limited distribution of long vowels in Italian forces him to a series of ad hoc adjustments to get the right results. Vogel assumes that consonant length and vowel length have a different formal status and tries to analyze the distribution of long segments in Italian in terms of this hypothesis. For a detailed criticism of these approaches see Chierchia (1981b).

<sup>2</sup>It has been argued, most prominently in Napoli and Nespor (1979), that R is restricted to certain syntactic environments, characterizable in terms of a "left branchcondition". I have tried to argue against this analysis in Chierchia (1981a). Anyway, we will concern ourselves here only with the phonology of R.

<sup>3</sup>This issue is discussed in detail in Chierchia (1981b).

<sup>4</sup>This proposal has been made by A.Prince (class lectures) to handle similar facts that arise in Finnish.

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## REFERENCES

- Camilli, A. (1941), 'I rafforzamenti iniziali', Lingua Nostra, 3: 170-174.
- Chierchia, G. (1981a), 'Syntactic conditions on raddoppia-  
mento', ms, UMass, Amherst (presented at the winter  
LSA meeting, New York).
- Chierchia, G. (1981b), 'Length in Italian and the autoseg-  
mental framework', ms, UMass, Amherst.
- Fava, E. and Magno Caldognetto, E. (1976), 'Studio sperimen-  
tale sulle caratteristiche elettroacustiche  
delle vocali toniche ed atone in bisillabi ita-  
liani', in Studi di fonetica e fonologia, edited  
by the Italian Linguistic Society, 9: 35-79,  
Rome, Bulzoni.
- Halle, M. and Vergnaud, J.R. (1980), 'The syllable', ms  
M.I.T., Cambridge.
- Ingria, R. (1980), 'Compensatory lengthening as a metri-  
cal phenomenon', Linguistic Inquiry, 11,3: 465-  
497.
- Leben, W. (1980), 'A metrical analysis of length', Lin-  
guistic Inquiry, 11,3: 497-511.
- Lepschy, A.L. and Lepschy, G. (1977), The Italian language  
today, London, Hutchinson.
- Muljadic, Z. (1972), Fonologia della lingua italiana,  
Bologna, Il Mulino.
- Napoli, D.J. and Nespore, M. (1979), 'The syntax of word-  
initial gemination in Italian', Language, 55,4:  
812-841.
- Reed, I. et al. (1977), Yup'ik Eskimo grammar, Fairbanks,  
University of Alaska Press.
- Saltarelli, M. (1970), A phonology of Italian in a gene-  
rative grammar, Le Hague, Mouton.
- Selkirk, E.O. (1980), 'The role of prosodic categories  
in English word stress', Linguistic Inquiry, 11,3:  
563-605.
- Tekavcic, P. (1972), Grammatica storica dell'italiano,  
Bologna, Il Mulino.
- Vogel, I. (1977), The syllable in phonological theory  
with special reference to Italian, Ph.D. Diss.,  
Stanford.