Length Phenomena in Italian: Support for the Syllable
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LENGTH PHENOMENA IN ITALIAN: Support for the syllable

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During the first half of the 20th century, the syllable was commonly used as a unit of phonology by the Structuralists, both European and American. It was then essentially banished from phonology by generative phonologists in the 1960's. And the syllable is now in the process of completing the circle as it is once again gaining acceptance through recent developments in natural phonology (Hooper 1972, 1973, 1976; Vennemann 1972, 1974) and in autosegmental phonology (Kahn, 1976). Although it has now become more respectable to talk about syllables in phonological theory than it was just a few years ago, the syllable's status is still somewhat marginal. Thus, Pike's early characterization of the syllable as the "stepchild" of phonology remains apt today. It is the purpose of this paper to contribute to the recent efforts to establish the syllable as a full-fledged phonological unit by demonstrating the syllable-dependence of two length phenomena in Italian.

There is a great deal of regional variation in Italian, due in large part to local dialectal influence, so unqualified use of the term 'Italian' may lead to confusion. The Italian I refer to in this paper is what is generally called Standard Italian. It has its origins in the Tuscany region of Italy and is essentially the language of educated speakers. (cf. Hall, 1948; Agard and Di Pietro, 1965; Muljačić, 1972)

The first length phenomenon I will examine is vowel length. While consonant length is contrastive in Italian (e.g. fato 'destiny' contrasts with fatto 'fact') vowel length is predictable. The traditional type of statement about allophonic distribution of vowel length goes as follows:

(1)a. stressed vowels in word-internal open syllables are long, or in more modern symbols: $V \xrightarrow{[+\text{stress}]} [+\text{long}] \;/\; \_\_\$C_0V$;

b. all other vowels are short.

For example, the -a- in fato is long since it is a stressed vowel in a word-internal open syllable. The -a- in fatto is short since, although it is stressed and word-internal, it is in a closed syllable. The -à in città 'city' is also short since, although it is stressed and in an open syllable, it is not word-internal. Finally, the -o in fato and fatto and the -i- in città are short since they are not stressed.

But it would be jumping the gun to accept the traditional analysis of vowel length with its reference to syllables. We must first examine the segmental environments in which long and short vowels are found, and then consider alternatives for expressing

these environments.

Early kymograph tracings (Josselyn, 1900; Parmenter and Carmen, 1932) revealed that stressed vowels were approximately twice as long as a following single (short) consonant and were almost half as long as a following double (long) consonant. Thus,

(2) $\underset{[+\text{stress}]}{V} \rightarrow [+\text{long}] \;/\; \_\_CV$ e.g. pane 'bread' =[pá:ne]

$\underset{[+\text{stress}]}{V} \rightarrow [-\text{long}] \;/\; \_\_C_{\alpha}C_{\alpha}V$ e.g. panni 'sheets' =[pánni]

I have made spectrographic measurements of the consonant and vowel durations of three native speakers of Italian to determine whether other medial consonant sequences are treated more like the single consonants which require a long preceding stressed vowel, or more like the double consonants which require a short preceding vowel. While three speakers is not a large sample, the results were, nevertheless, very consistent and definite patterns emerged. Based on the spectrograms and on information found in Italian grammars (e.g. Hall, 1948; Saltarelli, 1970; Muljačić, 1972) about the segmental environments for long vowels, I have concluded the following:

(3)a. In addition to the environment /__CV, stressed vowels are long in the following environments:

__sCV, where C ≠ s

$\_\_(s)\left[\begin{matrix} C \\ \{\text{stop} \\ \text{fric.}\} \end{matrix}\right]\begin{Bmatrix} L \\ G \end{Bmatrix} V$, where C ≠ s when s is present

__(s)NGV

__(s)LGV[1]

b. In addition to the environment /__$C_{\alpha}C_{\alpha}$V, stressed vowels are short in the following environments:

$\_\_C_{\alpha}C_{\alpha}\begin{Bmatrix} L \\ G \end{Bmatrix} V$

$\_\_\begin{Bmatrix} N \\ L \end{Bmatrix} CV$, where C ≠ G

__GC

Without using syllables, we can write the following rule which

appropriately lengthens vowels in the first environment, (3)a:

(4) Vowel Lengthening Rule

$$V_{[+\text{stress}]} \rightarrow [+\text{long}] \;/\; \_\_(s)(C)\begin{bmatrix}\alpha\text{vocalic}\\ \alpha\text{consonantal}\end{bmatrix}^{V}_{0}$$

Conditions: if s is present, then C ≠ s;
if C = [+nasal] or $\begin{bmatrix}+\text{vocalic}\\ +\text{consonantal}\end{bmatrix}$, then
$\begin{bmatrix}\alpha\text{vocalic}\\ \alpha\text{consonantal}\end{bmatrix}$ may not have '+' values;
if C = $\begin{bmatrix}-\text{vocalic}\\ -\text{consonantal}\end{bmatrix}$, then $\begin{bmatrix}\alpha\text{vocalic}\\ \alpha\text{consonantal}\end{bmatrix}$
may not be present.

This lengthening rule, stated without syllables, can now be compared to a rule stated with syllables. Although traditional analyses of Italian used syllables in the statement of the environments for vowel length, they did not provide any independent principles for determining syllable divisions. But before we can compare the segmental rule (4) with a syllabic rule for vowel lengthening, we must be able to predict the placement of the syllable boundaries.

Most studies of syllables (as far back as that of Herodotus) have noted that there is a relationship between word-internal consonant sequences and the consonant clusters occurring word-initially and word-finally. The sequences of consonants within a word are generally decomposable into a word-final consonant or cluster + a word-initial consonant or cluster. Thus, the English arctic is broken down as /ark$tik/ since -rk is a permissible final cluster and t- is permissible word-initially.

This principle is adequate for languages such as English which permit fairly complex initial and final clusters, but it causes problems in a language such as Spanish which permits only the single consonants /l, r, n, s, ð / in word-final position. For example, if we try to divide the word acción /akšjón/ 'action' according to the principle of possible final + possible initial, we run into difficulty since /sj-/ is a possible word-initial cluster, but /-k/ is not possible word-finally (and /ksj-/ is not possible initially). Pulgram (1970) suggests that in such cases whatever is not permissible word-initially is automatically placed at the end of the preceding syllable. So the /k/ in acción functions as the coda of the first syllable. In accordance with Pulgram's proposal, the following two principles of syllabification may be stated:

(5)a. $\emptyset \rightarrow \$ \;/\; \_\_C_{mi}V$, where C_{mi} is the maximum initial cluster;

b. all remaining consonants form the coda of the preceding syllable.

These principles may be stated in terms of Kahn's (1976) autosegmental framework in which syllables and segments represent two distinct levels of phonological analysis, and are related by a series of association rules. The reasons for using this approach will become clear below. The following are the autosegmental syllable assignment rules:

(6) Rule I: With each [+syllabic] segment of the input string, associate one syllable.(Kahn, 1976:39)

(7) Rule IIa: $C_1 \ldots C_n V \Rightarrow C_1 \ldots C_i C_{i+1} \ldots C_n V$ (Kahn, 1976: 43)

Rule IIb: $V C_1 \ldots C_n V \Rightarrow V C_1 \ldots C_i C_{i+1} \ldots C_n V$

where $C_{i+1} \ldots C_n$ is a permissible initial cluster
but $C_1 C_{i+1} \ldots C_n$ is not.

The application of these rules is seen in the following examples:

(8) /g a t t o/ 'cat' /k a n t o/ 'I sing' /l a b b r a/ 'lips'

/m o s t r o/ 'I show /k o s m o/ 'cosmos' /z a j n o/ 'knapsack'

where ____ is by Rule I,
---- is by Rule IIa,
.... is by Rule IIb.

Once syllable boundaries have been inserted according to the above rules, these boundaries may be used in the formulation of a syllable-dependent vowel-lengthening rule for Italian. It turns out that the environments for long vowels listed above in (3)a correspond to possible word-initial clusters and thus to syllable onsets. In other words, a stressed vowel is long in the environment directly preceding the beginning of a syllable, and hence a syllable boundary. That is:

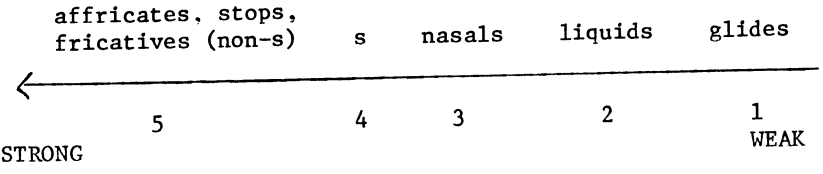
(9) $\underset{[+\text{stress}]}{V} \rightarrow [+\text{long}] \; / \; \_\_ \$ C_0 V$

which is the rule used in the traditional analyses mentioned above, but which has now been motivated by independently established principles of syllabification.

It is not difficult to see that the statement of vowel-lengthening in terms of syllables is much simpler than the one which does not use syllables. Although appealing, this, in itself, is not an adequate argument for syllables, since it is still possible to avoid using them.

Before proceeding to the second length phenomenon, I would like to back-track briefly and discuss the notion of "possible initial cluster". It seems that there ought to be some independent way of characterizing such clusters so that a speaker, or linguist, does not have to actually know a word beginning with a particular cluster before placing a $ to the left of it in a string. This is particularly important in the case of an accidental gap, either in the speaker's or linguist's vocabulary, or in the language itself. So, following Hooper's (1973, 1976) example for Spanish, I have established a strength hierarchy for Italian consonants, which in turn allows us to state a general constraint on the structure of permissible initial clusters. The hierarchy is as follows:

(10) Italian Strength Hierarchy



Based on this strength hierarchy, we may characterize initial clusters in the following way: the strengths of the consonants in an initial cluster must be in descending order towards the vowel, except that s may precede any other consonant (not itself), even if that consonant is of greater strength. That is, $C_{mi}=(s)C_mC_nC_pV$. where $m > n > p$, and where C_m, C_n, $C_p \neq s$, when (s) is present. We will see below that the strength hierarchy is useful for more than simply allowing us to characterize initial clusters.

The second length phenomenon to be discussed is doubling, the process whereby the first consonant of the second word in a sequence is doubled under certain circumstances. This process has been discussed in the literature on Italian since the 16th century (cf. Fiorelli, 1958; Saltarelli, 1970), and has typically been treated as somewhat of an oddity. What I would like to suggest is that doubling is actually a very fitting rule for Italian if syllable structure is taken into account.

There are essentially two types of environments for doubling: phonological and morphological. The phonological environment is

a stressed vowel at the end of the first word in the sequence. Words which automatically fall into this category are vowel-final monosyllabic words which receive stress (i.e. nouns, verb forms, adverbs and strong pronouns), as opposed to non-stressed monosyllables (i.e. articles and pronominal and adverbial particles). Doubling also occurs after vowel-final polysyllabic words with final stress. The phonological doubling rule and examples follow:

(11) Phonological Doubling Rule

$$\emptyset \rightarrow C_{\alpha} \; / \; \underset{[+\text{stress}]}{V} \; \_\_ \#C_{\alpha}\left(\begin{Bmatrix} L \\ G \end{Bmatrix}\right)V$$

Examples:

(noun)	tè freddo	[téffréddo]	'cold (iced) tea'
(verb)	sto bene	[stóbbé:ne]	'I am well'
(adjective)	tre cani	[trékká:ni]	'three dogs'
(adverb)	già fatto	[ǰáffátto]	'already done'
(strong pronoun)	tu dici	[túddí:či]	'you say'
(polysyllable, final stress)	parló bene	[parlóbbé:ne]	'he spoke well'

The morphological environment for doubling is following vowel-final monosyllabic prepositions and conjunctions and a few bisyllabic function words with stress on the first syllable. A rough formulation of the morphological doubling rule and examples follow:

(12) Morphological Doubling Rule

$$\emptyset \rightarrow C_{\alpha} \; / \; V] \begin{Bmatrix} \text{prep.} \\ \text{conj.} \\ \text{f. word}^{X} \end{Bmatrix} \; \_\_ \#C_{\alpha}\left(\begin{Bmatrix} L \\ G \end{Bmatrix}\right)V, \text{ where f.word}^{X} = \text{those function words which cause doubling.}$$

Examples:

(prep.)	a Pisa	[appí:za]	'to Pisa'
(conj.)	e Marco	[emmárko]	'and Mark'
(f.word^{X})	contro Paolo	[kóntroppáolo]	'against Paul'

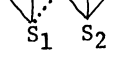
It has been suggested by certain linguists (e.g. Rohlfs, 1966) that doubling is actually a type of assimilation process since many of the words which give rise to doubling ended in consonants in Latin. This could not account for all cases of doubling, and even if it could, such historical information could not be included in a synchronic phonology of Modern Italian.

In the discussion that follows, I will only consider (11), the synchronic doubling rule since the issue this paper is concerned with is whether or not the syllable is a valid unit of synchronic phonology. The argument for the syllable based on doubling is of

a different nature than the argument based on vowel length. Since the doubling rule can be stated very simply without syllables as in (11), the issue of relative simplicity is irrelevant here. Instead, I will argue that a syllable analysis actually explains doubling, while the segmental analysis merely describes it.

In isolation, divento [divénto] 'I become' and diventó [diventó] 'he became' both end in a short vowel since all final vowels are short, stressed or unstressed. When these words are combined with another word such as saggio 'wise', doubling does not take place in the first case (i.e. divento saggio [divéntosaǰǰo] 'I become wise'), but it does in the second case (i.e. diventó saggio [diventóssáǰǰo] 'he became wise'). This is precisely what is predicted by the segmental rule in (11), but the question of why it happens remains unanswered. I propose that the "why" of doubling lies in a constraint or well-formedness condition on syllables in Italian. It was shown above that stressed vowels are long in word-internal open syllables. As long as the stressed -ó of diventó is actually final, it is short. However, as soon as it is followed by another word, such as saggio, in a phonological phrase, the -ó is no longer final. But word-medial stressed vowels in open syllables are not short, so the -tó (with a short -ó) of *[diventósáǰǰo] is not a well-formed syllable. An obvious remedy of this ungrammatical situation would be to simply lengthen the vowel, since the necessary rule is already available. This does not happen though. Instead, doubling occurs and a copy of the first consonant of the following word appears at the end of the first word, closing the offending short stressed syllable. We know that the copy of the original initial consonant belongs at the end of the preceding syllable since it is not possible to begin a word, and hence a medial syllable, with a double consonant. Below is a representation of the doubling process using the autosegmental formalism adopted above. The dotted line shows the result of doubling.

(13) /d i v e n t ó s á ǰ ǰ o/

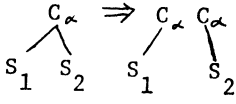


The configuration 

, where a consonant is simultaneously a member of two adjacent syllables, is interpreted as a long or double consonant in a language such as Italian which has a consonant length contrast. This interpretation contrasts with the interpretation of the same configuration in a language such as English which does not have contrastive consonant length, where it simply represents an "interlude", a single consonant spread over two syllables (i.e. d o z e n). (See Kahn, 1976.) The in-

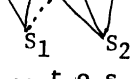
terpretation convention for languages which do have contrastive consonant length may be stated as follows:

(14) Interpretation Convention

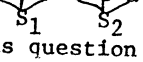


Doubling does not occur with all consonants following the final stressed vowel, however. Consider the pair divento stanco 'I become tired' and diventó stanco 'he became tired'. In accordance with the rule in (11), doubling does not occur in the second case, despite the final stressed vowel, since the initial cluster of stanco does not conform to the requirement that the onset of the second word be $C_\alpha(\{^{L}_{G}\})$. But if the explanation of doubling as a way to remedy a specific non-grammatical sequence is correct, then diventó stanco with a short -ó would be a violation of this proposal. In fact, this violation does not occur. What was revealed in my spectrograms is that the stressed vowel of items such as diventó stanco is lengthened, thus restoring grammaticality in a different way.[2]

But why does doubling not occur in diventó stanco as it does in diventó saggio? The answer to this question lies in another constraint or well-formedness condition in Italian, and this is where the strength hierarchy proves useful again. There are no words in Italian which have medial sequences of more than two consonants with a strength equal to or greater than 3.[3] If doubling were to take place in diventó stanco, the result, sst, would violate this constraint on medial consonant sequences. This is clearly illustrated in terms of the autosegmental framework: If doubling took place as indicated by the dotted line in d i v e n t o s t a n c o, the interpretation convention in (14)



would give ...t o s s t a ..., and hence the non-permissible medial sequence sst.



An obvious question to raise at this point is why does doubling occur at all? It is true that some rule must operate to render the non-grammatical sequences grammatical, but since vowel lengthening is used in some cases and in fact is already present as a rule of Italian, why does it not apply in all situations? This is actually a very puzzling question, to which the straight segmental rule does not provide a clue. But there may be an answer in terms of syllables. The autosegmental analysis shows that doubling is actually a type of resyllabification rule. That is, the initial consonant of the second word becomes associated

with the preceding syllable, while remaining the onset of the second word. It is the interpretation convention in languages with a consonant length contrast which then determines that the consonant in question is realized as double. I propose that the reason that doubling occurs, although the vowel lengthening alternative already exists in Italian, is that a rule which results only in resyllabification of segments already present in a string is preferred over one which changes feature values of segments (in this case: $V \rightarrow [+long]$), except where re-
$[-long]$
syllabification would cause another constraint to be violated. This empirical claim needs to be tested by examining the rules of other languages to determine whether, given a choice of a resyllabification rule and a feature-changing rule, the resyllabification rule is preferred, whenever it does not violate some other constraint in the language.

To conclude, this paper has examined two length phenomena in Italian in an attempt to demonstrate that the syllable is a real and useful unit of phonology. It has been shown, first of all, that the syllable allows us to represent the environment for vowel lengthening in a very simple way, whereas the alternative without syllables is extremely complex. Secondly, a well-formedness condition based on syllable structure accounts for the occurrence of doubling and vowel-lengthening across word boundaries in connected speech. Finally, the syllable, within the autosegmental framework, suggests an answer to one of the most baffling questions in Italian phonology, and at the same time, allows us to make a prediction about the preferred type of phonological rule.

FOOTNOTES

1. I do not know of any words with the cluster sLG, but this appears to be an accidental gap rather than a systematic gap.
2. To my knowledge, this lengthening has not been reported elsewhere, though the fact that doubling is blocked in certain environments has been reported by numerous Italian scholars (e.g. Camilli, 1947; Hall, 1948; Rohlfs, 1966; Saltarelli, 1970).
3. It is true that in writing and in the very careful speech of highly educated Italians, some sequences of $-nsC_m-$ ($C_m \geq 3$) are beginning to appear in neo- Latinate forms, thus creating medial sequences of three consonants of strength ≥ 3 (e.g. instituto sometimes alternates with istituto 'institute'). I do not consider such forms to be a violation of the general constraint on medial sequences since they are still marginal.

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