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Some observations on consonant gemination in Italian

JOHN M. LIPSKI (Union, New Jersey)

1. The phonological structure of a language, being situated on an abstract level of representation, cannot be approached for direct observation. Rather, data concerning the phonological level must be determined inferentially, by means of indirect observations designed to bring out the characteristics of this abstract level. There are two fundamental methods by which such inferential data may be gathered, each representing a method of figuratively plotting the action of phonological structures against an unmoving background. The first method consists of formulating abstract patterns, known as phonological systems, and attempting to arrive at a maximally coherent, unified, and 'economical' configuration, based on the available data. Once such a system has been established, it becomes as it were axiomatic, being applied to additional data in order to yield further information about phonological structures. On the other hand, the workings of the phonological component may be determined by observing the action of certain phonological processes, either synchronic or diachronic, and letting such observations accumulate until sufficient points of convergence are noted. Phonology regarded in this fashion is taken to be more a function of human behavior than in the former instance, but the potential for formal patterning still remains. It is gratifying when conformity of results is achieved between theories based on formal configurations and theories derived from observations of phonological processes, for the posited phonological model is thereby strongly supported. When no such convergence obtains, however, the results remain inconclusive, and it is necessary to bring in additional data from other areas in order to cancel the indeterminacy and resolve the problem.

Once this has been accomplished, often an extremely difficult task, one must go back to the original discrepancies and ferret out the source of the confusion; if this can be done in a reasonable fashion, the ensuing results may be considered more nearly definitive.

The above pattern of events, while surely obvious to every investigator, has been reproduced here because it perfectly characterizes the history of research on one of the most tenacious problems of Italian phonology: the relationship between vowel length and consonant length. This is a problem which has cropped up again and again since Bembo's *Prose della Volgar Lingua*, and perhaps even earlier, and from the diversity and disparity of the reported results, it may be fairly concluded that the last word on the subject has yet to be spoken. It is certainly not the intent of this brief report to lay claim to a definitive solution, or to shine any penetrating light on areas heretofore enveloped in total darkness. And yet the problem is of too great a significance to the overall subject of Italian phonology to be ignored, and any additional light which may be shed on this matter, no matter how small, may push the accumulated results closer to an ultimate solution. Aside from its general interest to theoreticians of Italian phonology, the problem of vowel length and consonant length is of the utmost importance when teaching Italian as a second language. Clearly, the untutored native speaker of Italian has little use for theories about the phonological structure of his language; he produces the required alternations in blissful ignorance of the difficulties which mastering his language might pose for speakers of other languages. In order, however, to develop in his students an authentic pronunciation approximating the linguistic competence of native speakers, the instructor teaching Italian as a second language must familiarize himself as much as possible with the necessary phonological prerequisites. It is in the area of consonant gemination, and particularly gemination of word-initial consonants, the so-called *raddoppiamento* or *rafforzamento iniziale*, that teachers generally experience into their students, and the literature dealing with this topic is quite literally enormous. It is not the purpose of the present study to offer a literature survey *per se*, since several such surveys already exist and there is no need to belabor the question. Rather, the remainder of this paper will center around some more recently developed theoretical aspects of the problem of consonant gemination, and will attempt to bring further discussion to matters hitherto not fully developed. The discussion will of necessity be confined to modern literary Italian, the standardized 'Tuscan' generally to be found wherever Italian is taught as a second language. In view of the pedagogical nature of this paper, this limitation should be of little or no significance.

2. Put in its most basic terms, the problem under discussion boils down to a question of phonological primacy: whether vowel length or consonant length (or conceivably both, or neither) is phonemic in modern Italian. This problem may be rephrased in psycholinguistic terms as whether Italian speakers consciously alter, and respond to, vowel quantity or consonantal quantity in order to produce and differentiate between such pairs as *fato-fatto*. The orthography of Italian provides a clue to one possible solution: consonant length but not vowel length is indicated orthographically. This fact, therefore, has served as the basis for nearly every traditional treatise on Italian pronunciation. The reader surely needs no introduction to the scores of manuals of Italian pronunciation in which this theoretical appraisal is made; indeed, one would be hard pressed to come up with an exception. This almost complete unanimity of scholarly opinion might well be, and in fact has often been, regarded as conclusive evidence in favor of the phonological primacy of consonantal quantity. It is obvious, however, that mere orthographic considerations are not in themselves sufficient to justify phonological analysis; as a single example, consider modern German, where long vowels are sometimes orthographically indicated by an *b* (*stabl*), and sometimes by a double vowel (*baar*), while single and double written consonants are pronounced identically. More importantly for the case under consideration, however, is the fact that in Italian, there exists a demonstrable relation between vowel length and consonant length, as evidenced by the behavior of various phonetic environments. It has been known for a long time that Italian exhibits what has been termed a 'duration rhythm', whereby geminate consonants are approximately twice the length of the corresponding single consonants, while vowels followed by a single consonant are about one third or more longer than vowels followed by a geminate or two consonants. The end result of these facts is that the absolute length values for groups of the form [V:C] and [VCC] are approximately equal, thus suggesting the action of a recurrent rhythm, which accounts for the distribution of the relative length values between consonants and vowels. These observations have been experimentally verified by a number of phoneticians, including Josselyn (1900), Metz (1914), Parmenter and Carmen (1932) and Rosenzweig (1965). Measurements of the relationship between vowel and consonant quantity in Italian have also been made by the present writer, with results comparable to those of earlier investigators. It therefore becomes apparent that this phonetic rhythm is a prime factor to be contended with when dealing with consonant gemination, for the results point clearly to some sort of correlation or causal relationship between vowel length and consonant length. The problem of cause and effect is still left

unsolved at this point, and it is here that one must reconsider several additional aspects of Italian phonology.

3. Perhaps the most often discussed and widely disputed topic in Italian phonology is the gemination of word-initial consonants after words ending in a stressed vowel, as well as after certain other forms. The literature on this phenomenon is abundant, and will not be comprehensively reviewed here. Good surveys of the literature dealing with this process may be found in Norman (1937) and more recently in Saltarelli (1970). Basically, there are two opposing schools of thought concerning the origin of the process: the first believes in a purely phonetically-motivated process, while the second group sees the process as a question of syntactic phonology, whence the alternative term *raddoppiamento sintattico*. In view of the recent discussion regarding this problem, it is useful to briefly review the major arguments adduced by each side.

Originally, of course, words like *a, tra, che, ciò, fa, sta*, and so forth ended in a consonant; when this consonant was dropped from the end of the word, it remained morphophonemically as the ability to trigger the gemination of a following consonant followed by a vowel, liquid, or glide. Thus, for example, in early Italian there was the paradigm *ad* [ad] ~ *ad casa* [adkása] > [akkása]. When the *d* was phonetically dropped from *ad*, forms like [akkása], in which gemination had originated from assimilation of a heterogeneous cluster, remained to yield the present-day alternations between single consonants and geminates. Proponents of a purely phonetic solution note that, provided certain prosodic conditions are met, gemination occurs after all word-final stressed vowels. Neglected in such presentations, however, are certain recalcitrant forms ending in *unstressed* vowels which also trigger gemination, among them *come, dove, sopra*, and so on. Moreover, when a final glide is apocopated, such as in *può fare* from *puoi fare*, gemination does not generally occur, although the phonetically identical *può fare* does exhibit gemination¹. Nonetheless, since the time of Bembo², it has been quite customary for manuals of Italian pronunciation to state descriptions of word-initial gemination in terms of a purely phonetic process.

Other investigators, particularly in more recent times, have noted the insufficiencies of a totally phonetic explanation, and have sought a larger scale description based on a greater number of parameters. It is obvious, of course, that even given the proper phonetic configuration, gemination only takes place when the two words are united both prosodically and syntactically.

¹ For a further discussion of these matters, see Camilli (1913-1941).

² Cf. Bembo (1955: 110-11, 124-5, 162).

A discussion of the subtleties of these criteria would carry us too far afield; for some interesting considerations, the reader is referred to the studies of Camilli (1941: 44-5), Bianchi (1948: 76), and Fiorelli (1958). It has, furthermore, been recognized that the property of causing gemination is, as noted by Hall (1964: 553), « a morphophonemic phenomenon involving the replacement of a single consonant by a double one, provoked by the presence of certain preceding elements ». As suggested in various works by Hall (1944, 1948, 1959, 1964) and by Camilli (1947: 122-3), this « preceding element » is a phonemic diacritic, variously /+/, /×/ or /'/, which indicates the underlying ability to produce gemination. Within the framework of generative phonology, representing the most recent theoretical approach to be applied to Italian phonology, it is possible to state the process of gemination after final *stressed* vowels in terms of a totally phonetic process, thereby duplicating the observed competence of native speakers of Italian:

$$(1) \quad C \rightarrow [+ \text{long}] / \hat{V} \# \text{ — } \begin{Bmatrix} V \\ G \\ L \end{Bmatrix}$$

In the case of forms like *come, sopra*, etc., it will be necessary to posit a final underlying segment which is deleted before a pause or a following vowel, but assimilated to a following consonant in the appropriate environment to form a geminate. This analysis is especially necessary in the case of monosyllabic words, in order to distinguish between those that do cause gemination (*fa, sta*), and those that do not (*la, ne*). The exact manner in which this morphophonemic analysis is to be performed is as yet undetermined; clearly, it will have to be more complex than that suggested by Hall, including morphological and probably also syntactic factors. The justification for such an analysis based on two separate rules may be found in the observation that there in fact seem to be two distinct although closely related processes at work: a completely regular process in the case of final stressed vowel, and a more sporadic and idiosyncratic process operative for unstressed final vowel and monosyllabic forms. It would also be possible to include gemination after final stressed vowels in the analysis involving underlying final segments, by positing a final underlying consonant for these forms as well. Such an analysis, while theoretically possible, adds an additional degree of complexity to the resulting description, since it is more complex than the analysis which could be performed by native speakers based entirely on the superficial forms of the words in question. A much more plausible characterization of the linguistic competence of native Italian speakers is derived from the assump-

tion, that such speakers, during the process of language acquisition, learn a series of ordered pairs (*a*, *b*), where *a* is a mono- or polysyllabic form causing gemination and *b* is a form in which initial gemination has occurred. Clearly the set of such ordered pairs is open, for it is possible to produce an arbitrarily large number of such combinations. The set of first elements *a* is also open, considered as a whole, but it is reasonable to assume that the subset consisting of monosyllables and words ending in unstressed vowels is closed at an early age. If this is in fact the case, the only common trait uniting the remaining pairs (*a*, *b*) is the presence of a stressed vowel at the end of the first word, given, of course, the proper syntactic and prosodic features necessary for any case of *rafforzamento*. This in turn implies that the generalization extracted by Italian speakers from the remaining data is substantially different from that accounting for gemination following unstressed vowels. These remarks are of course only tentative at the moment, but they are at least consistent with the observable data. What is needed to conclusively demonstrate the feasibility of such an analysis is a psycholinguistic study of a large cross-section of Italian children, a study which, to the writer's knowledge, has not been realized. However, for the purposes of second language pedagogy, it may be safely concluded that the preceding model represents a feasible and economical method of producing the required alternations.

4. The key question, that of phonological primacy, has not yet been answered. As noted above, in the majority of traditional Italian grammars the problem was resolved simply enough on the basis of the orthography: consonant quantity was considered to be phonologically prime. However, the advent of generative phonology has brought with it a totally different method of viewing phonological structure, based on levels of representation more abstract than those forming the basis for most traditional analyses. Significantly for the purposes of the present discussion, the theory of generative phonology has been applied to the problem of consonant gemination in Italian, with results which diverge sharply from those to be found elsewhere. Since the claim is made that the competence of native speakers is being modelled, it is imperative that the generative analysis be subjected to the closest scrutiny, with an additional view toward the matter of language pedagogy.

The analysis referred to is offered by Saltarelli (1970). Saltarelli begins by considering the « duration rhythm » found in Italian by stating (p. 27) that « a vowel is long if it occurs within a word and it is in a free syllable and stressed. Elsewhere a vowel is short ». Based on this postulate, Saltarelli proceeds to consider the following rule of vowel lengthening:

$$(2) \quad V \rightarrow [+ \text{ long}] / \left[\begin{array}{c} \text{---} \\ + \text{ stress} \end{array} \right] C_1 Z \#$$

Such a rule is merely a reformulation of the descriptions found in standard manuals of Italian pronunciation. This account does not satisfy Saltarelli, however, who poses the question of which is in fact fundamental in Italian, length or stress. From a purely superficial point of view, of course, one would have to opt for the latter alternative, which is the one found in traditional Italian grammars. Saltarelli, like other adherents of generative phonology who have studied the Romance languages, is of the opinion that the old Latin quantitative vocalic distinctions are still valid in modern Italian, at the systematic phonemic level. He states, in fact (p. 28), that « it seems to me that for reasons of economy, the order should be the opposite in a descriptive analysis of Italian, that length should be the phonemic feature while stress should be the predictable one ». Based on these considerations, Saltarelli goes on to propose the following rule of stress assignment, to replace rule (2) of vowel lengthening.

$$(3) \quad V \rightarrow [+ \text{ stress}] / \left\{ \begin{array}{l} (C)\check{V}C'V(C) \\ (C)V(C) \end{array} \right\} \#$$

This rule is translated (p. 29) as « if the penult is "light", stress antepenult; otherwise stress penult; where "light" means short vowel in open syllable ». This statement naturally entails a highly abstract analysis; for example, in order to account for forms ending in a stressed vowel, it is necessary to posit an additional syllable in the underlying representation: *città* /kivi-tāte/. However, for words whose surface forms more nearly approximate their proposed phonological representations, this analysis represents an empirical claim regarding the relationship between vowel length and consonant length. It is claimed, as a result, that consonant length follows predictably from vowel length through the action of the following rule:

$$(4) \quad [+ \text{ cons}] \rightarrow [+ \text{ long}] / \left[\begin{array}{c} V \\ + \text{ stress} \end{array} \right] \text{---} [+ \text{ voc}]$$

By means of rule (4), all surface geminates are derived from underlying single consonants, in order to satisfy the duration rhythm; thus *casa* /kāsa/ vs. *cassa* /kasa/. Moreover, Saltarelli utilizes this analysis to include the process of *rafforzamento iniziale*. He states (p. 28) that since rule (2) requires all word-final

vowels to be short³, the « duration rhythm » will require a following single consonant to be geminated, when the two contiguous forms are united in the continuous stream of speech. It is interesting to note that, far from being a new proposal, the same description was offered a century ago by Schuchardt (1874: 14):

Toute voyelle finale accentuée en italien est brève. Par conséquent, si l'on ajoute par exemple à *andrò* l'enclitique *vi*, pour que la voyelle *o* conserve sa quantité, il faut que le *v* s'allonge et que le group devienne *androvvi*, car on ne peut avoir de voyelle brève dans aucune syllabe accentuée et ouverte, à la seule exception de la syllabe finale.

Here it is clear that Schuchardt is speaking of the superficial phonetic level, where word boundaries may disappear and phonic elements become fused. Moreover, no mention is made of gemination after final unstressed vowels, evidently part of a different process. In fact, Schuchardt notes (p. 14) that « il s'agirait donc, pour la production du renforcement, de deux conditions différentes: d'un côté, l'accentuation de la voyelle finale, de l'autre, l'existence d'une consonne finale originaire ». In the case of the generative model, however, there appears to have been a mixing of levels, for while the « duration rhythm » is a surface phonetic phenomenon, differences in vowel length are posited for the (systematic) phonological level. The precise point at which the duration rhythm rule would apply in a derivation is not clearly specified, since underlying differences of vowel quantity are not necessarily reflected in a one-to-one fashion by the surface forms. In addition, since no explicit mention is made of gemination following unstressed vowels or monosyllables, it is difficult to agree with the claim that the generative model can account for *all* cases of word-initial gemination in terms of a wholly phonetic process. By positing suitable base forms, one could perhaps consider such forms together with those ending in a stressed vowel, but by doing so the process would have to be analyzed as taking place at a much more abstract level of representation, thus destroying any claims as to the phonetic motivation behind cases of consonant gemination. It therefore appears that, on at least one major point, the proposed generative description fails to offer a complete and satisfactory account of gemination in Italian.

5. Regardless of whether or not word-initial gemination may be linked with geminate consonants occurring word-internally,

³ It should be noticed that Saltarelli's argument makes essential use of rule (2), although further on the same page he proceeds to reject rule (2) in favor of phonemic vowel length, thereby creating a contradiction.

there remains the matter of precisely which distinctive features are operative in Italian. To date, several formal theoretical models have been proposed, each on different observations. It becomes clear that to merely replace one theory by another is not sufficient to motivate a new analysis; what is required instead is a confrontation with empirical data which lie outside the domain of the theory under consideration. In the present case, this means that one must augment arguments based on phonological patterning and simplicity with outside considerations about the workings of the Italian language. For the phonological level, and for all more abstract levels of representation, it is not possible to offer physical evidence to support or refute claims regarding phonological structures. However, many of the claims discussed above, particularly those relating to word-initial gemination and the « duration rhythm », deal with surface structures, and hence are subject to physical verification. In order, therefore, to place the study of Italian gemination on a sounder theoretical basis, a small experiment was performed which, in view of the noteworthy correspondence with early studies, and the convergence of results, promises to be of significance for larger population samples. Measurements were made of vowel and consonant length for four educated speakers of modern Tuscan. Each subject was asked to read, in a normal fashion, a list of key words, pronouncing each word twice so as to eliminate any possible mistakes. The responses were recorded in a studio utilizing high quality recording equipment⁴. For all key positions, only the vowel *a* was used, so as to eliminate variation caused by inherent differences of vowel length. For the key consonant positions, only voiceless consonants were used, so as not to skew the results through natural lengthening which occurs before voiced segments, and to give clearer tracings. The results were analyzed on a Mingograf⁵, which provides tracings of fundamental frequency (voicing) and intensity against a calibrated time base. This permitted an accurate measurement of vowel and consonant quantity in a variety of positions. The averaged results⁶ are shown in Table 1:

⁴ I am grateful to the staff of the language laboratory (Dept. of Romance Languages) of the University of Alberta, Canada, where this research was carried out, for granting me access to their excellent recording facilities.

⁵ Thanks are due to the staff and technicians of the Department of Linguistics of the University of Alberta for allowing me to use their laboratory facilities during the conduction of this experiment.

⁶ In view of the high degree of convergence found among the data elicited from the four subjects, the figures in Table 1 represent the arithmetic mean of all the individual values recorded for each case. It should be noted that, within the responses recorded for each speaker, the correlations and ratios were substantially the same, so that the data have not been significantly distorted by being reported in this abbreviated form.

Table 1

	V̂	V̂	V#
	C	C	
VC or VCL	265	—	—
	125		
VCC	200	—	—
	250		
V#	—	260	250
V#C (C)	—	180	—
		230	

In this chart, all figures are in milliseconds. In boxes cut with a diagonal, the upper-left figure represents vowel length, and the lower-right figure indicates the length of following consonants. From these figures a number of interesting observations emerge. First of all, it is possible to observe the action of the duration rhythm correlating the length of vowels with that of consonants, with numerical values comparable to those reported in the studies cited above. Across word boundaries, gemination was found regularly following stressed vowels or monosyllables known to trigger gemination, although the length of the geminated consonant was consistently less than word-internal geminates. Of greatest interest to the present study, however, are the measurements of phrase-final vowels. When standing alone, final stressed vowels, whether in polysyllabic words (*università*) or in monosyllables forming part of longer phrases (*come sta*) averaged 260 ms. in length, while final unstressed vowels averaged 250 ms. These figures, it should be noted, are in comparison with an average length of 180 ms. for final stressed vowels followed by

a (geminated) consonant, and an average length of 200 ms. for word-internal stressed vowels followed by a geminate or consonant cluster. In other words, final vowels in isolation, whether stressed or unstressed, are as long as so-called « long » vowels occurring word-internally. The impact of these results on the study of gemination is obvious, for it may be seen that, at least in the case of gemination across word-boundaries, it is the geminated consonant which entails the shortness of the preceding vowel, and not *vice versa*. Therefore, the process of initial gemination cannot be described as the logical result of the phonetic duration rhythm; rather, another explanation will have to be found, perhaps along the lines mentioned above. From the standpoint of language pedagogy, therefore, it is important that the instruction of word-initial gemination be approached from the parameter of consonant length, since only in this fashion will the correct alternations be produced.

It is not possible to claim at this point that the results reported above conclusively indicate that consonant length is phonologically prime in modern Italian, for the results may not be logically extended to word-internal position. However, these results do support the primacy of consonantal quantity in an empirical fashion which has so far not been possible with theories claiming the phonological primacy of vowel length. For whatever reason, the phonological and phonetic structure of modern Italian is different from that of earlier stages of the language, with the result that analyses based on such earlier stages cannot succeed without the introduction of excessive complication. From the standpoint of the language teacher, therefore, it appears both feasible and desirable to continue on the assumption that consonant length is phonologically distinctive in modern standard Italian, while from the standpoint of phonological theory, further evidence of an empirical nature will be required before other analyses can be seriously considered.

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