

# Short vs long and /or abruptly vs smoothly cut vowels. New perspectives on a debated question

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## ABSTRACT

This contribution reviews current issues related to the distinction between quantity and syllable-cut languages. The dichotomy is first illustrated by means of some major European languages, mainly Standard German, and then applied to some data from Frignanese, an Italo-Romance variety spoken in Northern Italy. In this dialect vowel duration contrasts are accompanied by some minor quality differences. We argue that Frignanese shares some of the typical properties of a syllable-cut language, for example the fact that vowel duration contrasts crucially depend on word stress. Finally, some new experimental approaches to the close/loose contact dichotomy are briefly presented, which serve the search for physical and physiological correlates on both the acoustic and the articulatory side.

## 1. INTRODUCTION

Several interesting studies have addressed the relationship between quantity and syllable-cut features. Nevertheless, many questions still remain unanswered [1],[2],[3]. For instance, we still lack reliable criteria for classifying a language as either "quantity" (in the classical sense) or "syllable-cut". As far as vowels are concerned, a controversial issue concerns the relation between short/long and abrupt/smooth cut distinctions. Two alternative proposals are possible: according to the first view the above mentioned distinctions are mutually exclusive, whereas according to the second view they are phenomena which do not conflict with each other and can co-occur in the same language.

## 2. QUANTITY AND SYLLABLE-CUT IN SOME EUROPEAN LANGUAGES

This paper focuses on some European languages with vowel duration contrasts displaying systematic differences. First, one crucial feature contrasting languages like Finnish and Czech on one hand to languages like Standard German and Dutch on the other is related to the role of word stress. It is clear that vowel duration contrasts in the former languages are independent on stress (i.e. short and long vowels occur both in stressed syllables and in unstressed syllables), whereas in the latter they systematically depend

on stress (i.e. short and long vowels occur only in stressed syllables). Second, the two groups of languages differ in some distributional properties. Without going into detail, it's vital to emphasize a phonotactic property of vowels in open stressed syllables. In the former languages we observe that in such syllables both short and long vowels are allowed. The latter languages, on the other hand, are characterized by a peculiar constraint which, in open stressed syllables, allows only long vowels, barring the occurrence of short vowels in this context.

Considering the properties we have briefly outlined, the vowel duration contrasts are interpreted in different ways, namely as quantity contrasts in Finnish and Czech and as syllable-cut contrasts in Standard German and Dutch. We believe the proposed dichotomy plausible and convincing from a phonological point of view. The claim that Modern Standard German has to be classified as a syllable-cut language rests mainly on the following assumptions. First, the vowel duration contrasts are found only under word stress, which is dynamic in nature. Second, stressed short vowels are disallowed in open syllables and require the presence of a subsequent consonant in the same word. Third, a single intervocalic consonant, when is preceded by a short stressed vowel, is always ambisyllabic.

The abrupt/smooth cut distinction, which appears in minimal pairs such as *Mitte* "middle" vs *Miete* "rent", is implemented by a bundle of phonetic properties affecting not only the stressed vowel ([ɪ] vs [i:]), but also the postvocalic consonant and the vowel-consonant interaction. In the case of abrupt cut the vowel is always short and usually lax; moreover the vowel is cut off by the following consonant and is linked to it by the so called *fester Anschluss* (close contact). On the other hand in the case of smooth cut the vowel is always long and usually tense; moreover the vowel fulfils its course and is linked with the following consonant by the so called *"loser Anschluss"* (loose contact). Finally, it appears as though the consonant occurring after a short vowel is stronger and sometimes longer than the consonant occurring after a long vowel.

Given the great importance of the vowel-consonant interaction, we'd like to quote Jespersen's description (found on p. 202 in [4]): "Ein wichtiger Umstand, der den Bau von Silben betrifft, ist noch nicht besprochen, nämlich

die Art und Weise, wie ein Konsonant mit einem Vokal verbunden wird: kommt er schnell und bricht den Vokal in dem Augenblick ab, wo dieser am kräftigsten gesprochen wird, so haben wir 'festen Anschluss' (zwischen Vokal und folgenden Konsonanten); wenn er dagegen erst einige Zeit nach der kräftigsten Aussprache des Vokals kommt, wenn der Vokalklang also schon vor Eintritt des Konsonanten etwa geschwächt ist, so haben wir 'losen Anschluss'. We are aware of the fact that the nature of the physical and physiological correlates which may account for the described phenomena is still open to debate. However, the earlier quotation from [4] helps us understand how some Germanic languages, such as Standard German, have become both phonologically and phonetically syllable-cut languages. Many scholars assume that the change took place in the transition from Middle High to New High German, when, for various reasons, the earlier vowel quantity contrasts were in danger of collapsing [2],[5],[6]. In order to keep a distinction between short and long vowels in stressed syllables the necessity arose to counteract the lengthening effect of strong dynamic stress and to save vowel shortness. The solution to this problem is provided by the above mentioned articulatory process. To preserve and enhance vowel shortness under stress, the vowel is abruptly cut by the following consonant so that vowel and consonant end up closely connected with each other.

### 3. THE ITALO-ROMANCE DATA

The focus of the present paper on some Italo-Romance varieties may sound odd. Indeed, according to canonical descriptions, Romance languages lack vowel duration contrasts. On the other hand, as to the linking of stressed vowels to postvocalic consonants, Romance languages are regarded as always having "loser Anschluss". The results of investigations carried out from both a phonological and a phonetic point of view disagree with the traditional claims. In this paper we will focus on some Italo-Romance varieties spoken in the Frignano area, situated in the Emilia-Romagna region (in Northern Italy).

A rich vowel inventory is found in several Frignanese dialects. In stressed syllables they yield thirteen phonemes: the nine long vowels /i:, y:, u:, e:, ø:, o:, ε:, ɔ:, a:/ and the four short vowels /e, ø, ɔ, a/. Vowel duration contrasts undoubtedly occur in these dialects, both in final and in non-final syllable. Nevertheless, the phenomenon is constrained in two important ways. First, vowel duration contrasts show a clear dependence on word stress; second, they are restricted to a subset of the thirteen-vowel system, namely the four pairs /e, ø, ɔ, a/ and /e:, ø:, ɔ:, a:/.

The words displaying such contrasts differ in a few respects, namely the stressed vowel, the postvocalic consonant, and the vowel-consonant interaction. For instance in minimal pairs such as /'pela/ vs /'pe:la/ and /'bɔt/ vs /'bɔ:t/ the stressed vowels show both duration and quality differences.

Moreover the short vowel sounds as being abruptly cut by the following consonant, with some sort of "fester Anschluss". Finally, the consonant which is preceded by a short vowel gives the impression of being, to some extent, stronger and longer than the consonant preceded by a long vowel.

These properties, based on auditory impressions, are in part supported by experimental analyses, as can be seen in the results of the acoustic investigation offered in Uguzzoni and Busà [7],[8]. Vowel duration differences between short /e, ø, ɔ, a/ and long vowels /e:, ø:, ɔ:, a:/, are considerable, with an average V/V: ratio of 49.28%. The quality differences associated with the short/long distinction are of a lesser degree than the duration differences, yet they show systematic tendencies also present in other languages. From the analysis of F1, F2, F3 the four short vowels, compared with the corresponding long ones, show the following features: /e/ is lower and less front than /e:/; /ø/ is lower and less rounded than /ø:/; /ɔ/ is lower, more front, and less rounded than /ɔ:/; /a/ is higher and more front than /a:/. As for consonant duration, the experimental evidence was unexpected. In disyllabic words (/CVCV/ vs /CV:CV/) the acoustic data did not support our auditory impressions, because the measured durations of consonants occurring after short and long vowels are virtually the same. Only in monosyllabic words (/CVC/ vs /CV:C/) the duration values of consonants are somewhat higher after short than after long vowels, the ratio being on average 81.29%.

Since we still lack well-founded evidence it is very difficult to determine whether the Italo-Romance variety in question typologically belongs to quantity or to syllable-cut languages. We'd merely like to mention two relevant facts supporting the hypothesis that the Frignanese dialects bend towards the latter rather than the former type of language. One unquestionable factor is the role of word stress, on which the vowel duration contrasts crucially depend both in Standard German and in Frignanese. Another striking property is the presence in Frignanese dialects of a "fester Anschluss" between the short vowel and the following consonant, which is very similar to the Standard German setting.

It is clear that the Frignanese vowel duration contrasts are the outcome of historical developments which took place in Italo-Romance varieties [9]. We believe that the reconstruction of these diachronic processes could shed light on some important questions. For instance, it is reasonable to speculate that, at least for the dialects spoken in the Emilia-Romagna region, the "fester Anschluss" was the phonetic strategy employed to solve a functional problem arisen during their historical development. That is the need to safeguard the short/long distinction in vowels under dynamic stress.

#### 4. NEW PERSPECTIVES

As for vowel-consonant interaction, in the literature two parallel terms are used: on the one hand close vs loose contact (“fester vs loser Anschluss”), on the other abrupt vs smooth syllable-cut (“scharfer vs sanfter Silbenschnitt” [10]. Both define two different ways of linking a stressed vowel and a following consonant. For a long time this dichotomy was described in intuitive and impressionistic terms, but modern experimental investigations aim to find physical and physiological correlates for this important distinction.

Fischer-Jørgensen and Jørgensen [11] carried out in-depth analysis of the close/loose contact distinctions in North German, but were unable to identify one or more parameters to systematically and specifically characterize the perceptual dimension of contact. Their results suggest that only the vowel duration is a reliable acoustic correlate, which influences other properties found in the distinctions examined.

In recent years, a number of scholars have investigated the problem of close/loose contact, using novel approaches and techniques [1]. We will include only a few examples of these studies, carried out as part of the search for convincing experimental evidence for syllable-cut phenomena.

Vowel duration is undeniably a phonetic correlate of syllable-cut contrasts, but it is also the main correlate of quantity contrasts. Spiekermann [12],[13] maintains that it is therefore necessary to find another parameter in order to differentiate from an acoustic point of view syllable-cut languages from quantity languages. The analysis focuses on Standard German vowels displaying syllable-cut contrasts. Three characteristics are measured: first, the number of intensity peaks within a vowel; second, the position of intensity peak when the vowel shows only one peak; third, the shape of intensity contour before and after a peak. Comparing Standard German data with Finnish and Czech data we find that the first parameter also characterizes the quantity contrasts of the latter languages. Both an abruptly cut vowel and a short vowel show a single intensity peak, whereas both a smoothly cut vowel and a long vowel have one or more intensity peaks. Contrarily, the differences associated with the second and third characteristics are relevant only for Standard German. Spiekermann therefore draws the conclusion that the place of a single intensity peak and the shape of intensity contour are the specific phonetic correlates of the abrupt/smooth cut distinctions. As for the place where a single intensity peak is found, the experimental analysis contradicts traditional descriptions. It is worth noticing that in the case of abrupt cut this peak is placed not at the end, but at the beginning of the vowel. These results suggest a new hypothesis about the cutting and shortening of stressed vowels: it would appear that these processes affect their beginning rather than their end.

Hoole and Mooshammer [14] review and discuss the articulatory investigations on German vowels carried out in their laboratories by means of electromagnetic midsagittal articulography (EMMA). It is not possible to show in detail here the several kinematic parameters which were successfully analysed, but we will focus on at least one property, namely the number of acceleration peaks found between the velocity peaks. The production of German vowels shows different tendencies according to vowel classes: lax vowels usually have a single acceleration peak, whereas tense vowels tend to have two or more positive acceleration peaks. Hoole and Mooshammer believe that the differences observed in acceleration patterns may contribute towards accounting for the abrupt/smooth cut distinctions.

A recent study of Zmarich, Uguzzoni, and Ferrari [15] investigates the production of the Frignanese vowel duration contrasts by means of an optoelectronic system named ELITE. The analysis is focused on the four pairs /e, ø, ɔ, a/ and /e:, ø:, ɔ:, a:/ preceded and followed by the consonant /p/ in both /CV(:)C/ and /CV(:)CV/ words. The kinematic measures show that the duration contrast is mainly implemented by the opening gestures. The short vowels, compared with the long ones, are characterized by an opening gesture displaying lesser duration, smaller amplitude, and greater velocity. As for the shape of velocity profiles, the relationship between the acceleration and the deceleration phase is clearly different for short vowels on the one hand and long vowels on the other. For instance in the case of the opening gesture of the short vowels, the duration is greater for the acceleration than for the deceleration phase. This finding can be accounted for by intergestural timing mechanisms. We believe that the shortening of the deceleration phase of the opening gesture (C-to-V) is due to an earlier onset of the subsequent closing gesture (V-to-C) [16]. Finally we emphasize another parameter, namely the percentage of the complete cycle lying between the peak velocities of the opening and closing gestures. The ratio of the interval between velocity peaks to total movement duration is very different for short and long vowels. The following values are found: 34.43% in /CVC/ vs 54.98% in /CV:C/ and 35.18% in /CVCV/ vs 51.74% in /CV:CV/. The Frignanese data, however incomplete they are, support the recent theory of relative phasing and overlapping between opening and closing gestures [17].

#### 5. CONCLUSIONS

In this paper we have reviewed the classical distinction between quantity languages and syllable-cut languages, drawing on the basic features of some major European languages. On the other hand, we have shown that Frignanese, a dialect spoken in Northern Italy and usually considered to belong to the quantity type, shares some of the properties of a syllable-cut language. Nevertheless, it is our belief that the traditional dichotomy still holds (at least in its basic assumptions), but we also feel that more

research is needed in order to ascertain its very nature. Hopefully, future studies will lead to a better understanding of the complex relationship between vowel quantity and other related phenomena (both segmental and suprasegmental), following the promising lines of recent work searching for acoustic and articulatory correlates of short vs long and abruptly vs smoothly cut vowels.

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