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## **Lenition of voiceless fricatives in two varieties of southern Italian**

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# LENITION OF VOICELESS FRICATIVES IN TWO VARIETIES OF SOUTHERN ITALIAN

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## ABSTRACT

The aim of this study is to verify acoustically the extent to which the traditionally acknowledged lenition of intervocalic plosives in the varieties of southern Italy also applies to voiceless fricatives. Data from a recent corpus of semi-spontaneous speech collected in Naples and Palermo are analysed according to the parameters of duration, intensity, and voicing. It is demonstrated that, in the intervocalic position, the realisations of /s/ and /f/ are significantly shorter than in the other contexts, whereas intensity does not prove to be affected by the phonotactic position; sonorization does occur, to some extent, in the Neapolitan data, being marginal among the Sicilian speakers.

**Keywords:** Lenition, fricatives, southern Italian.

## 1. INTRODUCTION

### 1.1. Lenition and the feature *fortis/lenis* (or [±tense])

According to a traditional definition, lenition is a weakening process of a consonantal sound involving a reduction of articulatory energy [7]. Such weakening usually affects either the manner of articulation and/or the glottal state, along the two dimensions of ‘opening’ and ‘sonorization’ [5]. In this view, lenition finds its natural context in the intervocalic position and turns out to be a kind of partial assimilation that involves features such as [±voice] and [±continuant] and has obstruents as its primary target.

For the present study, we follow the tradition of Italian dialectology, where the term is used in a more restricted sense to define the partial sonorization of voiceless plosives, a phenomenon which is typical of central and southern Italian varieties [7]. Moreover, we explore the possibility of relating this particular type of lenition to the feature *fortis/lenis*.

The dichotomy *fortis* vs. *lenis* has been part of the terminology of linguistics since its beginnings

as a modern science [13, 10]: it refers to an opposition between obstruents relying not on the laryngeal mechanism, but rather on different degrees of ‘articulatory strength’ (i.e. duration and energy). In the 20<sup>th</sup> century, this idea was reinterpreted as a phonological feature [±tense] by Jakobson and Halle [4].

### 1.2. Lenition in central and southern Italy

A lenited pronunciation of intervocalic plosives characterises many dialects of central and southern Italy, even if it is not always noted in the dialectological literature. Nevertheless, lenition is supposed to be a “macroscopic and unitary” phenomenon in southern Italy, although it is better described by means of a variable rule than in terms of a categorical allophonic rule [6].

As regards the pronunciation of the regional varieties of Italian, the descriptive survey by Canepari [2] reports the lenited pronunciation of intervocalic voiceless plosives for the whole of central and southern Italy (from Umbria to Sicily). As regards the lenition of voiceless fricatives, the same author indicates the neutralization of the opposition /s/ ~ /z/ and a lenited pronunciation of intervocalic /s/ for all southern regions, but he limits the geographical extension of lenited /f/ to central Italy (without mentioning Sicily and Campania, the two regions considered in our research).

In the last fifteen years, several acoustic studies have focused on the pronunciation of consonants in southern Italy. Albano Leoni and Maturi [1] analysed the speech of a politician from the province of Avellino (Campania), finding “sonorizzazione e (parziale) lenizione simultanee”; the voiceless stops are kept distinct from the voiced ones in the contexts VCV and VCCV, whereas in NC this opposition is neutralised. The latter phenomenon is also confirmed by Marotta and Soriano [8], who analysed three speakers from Cosenza (Calabria). Intervocalic plosives are reported to be shortened and partially voiced in the speech of four students from Bari [3], and similar observations have been

made for the Italian spoken in Rome [9]. Finally, the lenition of /s/ and /f/, in terms of both partial and total sonorization, appears in a phonetically annotated corpus of spoken Neapolitan Italian [12].

## 2. THE PRONUNCIATION OF /s/ AND /f/ IN NAPLES AND PALERMO

### 2.1. Our hypothesis

According to the restricted conception of ‘lenition’ and ‘lenis’ outlined in 1.1. and on the basis of the research surveyed in 1.2., we assume that, phonetically, three main classes of obstruents exist in the regional varieties of southern Italy: voiceless *fortis*, voiceless *lenis*, and voiced (e.g. [s], [z̥], and [z]). Adopting the feature [±tense], we thus formulate rule (1), which turns a singleton *fortis* obstruent into a *lenis* allophone:

$$(1) \begin{bmatrix} -\text{sonorant} \\ -\text{voice} \\ +\text{tense} \end{bmatrix} \rightarrow [-\text{tense}] / \text{V}\_$$

This rule, which applies in a variable rather than in a categorical manner, affects all postvocalic contexts (both word-internal and across word boundaries). As regards the acoustic correlates of the feature [±tense], we hypothesise that *lenes* display a shorter duration, lower overall intensity, and partial sonorization.

### 2.2. Data and methods

In order to verify this hypothesis, we have analysed the realisations of /s/ and /f/ produced by three Neapolitan and three Palermitan speakers (all male academic students), who took part in the Map Task procedure used to gather spontaneous speech for the CLIPS Project ([www.clips.unina.it](http://www.clips.unina.it)).

**Table 1:** Number of occurrences of /s/ and /f/ according to phonotactic contexts in the Naples and Palermo data.

	/s/ NA	/f/ NA	/s/ PA	/f/ PA
##CV	60	8	65	19
VCV	134	29	170	71
VCCV	77	7	51	1
RF	29	10	25	10
C1C2	134	0	132	0
NC	7	5	3	2
LC	23	14	29	16
Total	464	73	475	119

The phonotactic contexts are: utterance-initial (##CV), intervocalic (VCV), lexical and prosodically determined geminates (VCCV and RF

= *raddoppiamento fonosintattico*), syllable coda (C1C2), postnasal (NC) and postliquid (LC).

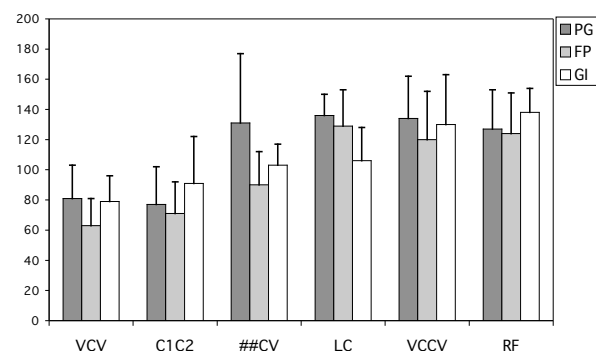
An instrumental analysis of 1131 phones was carried out using the *Multi-Speech 3700* software (version 2.5). The dialogues were first broken down into single files for each turn; then, for each occurrence of /s/ and /f/, the beginning and end were marked on the temporal axis by specific tags inserted manually on the waveform. The tagged files were automatically interpreted by the *Winrmscalc* software, which computed the duration and intensity measurements of the whole consonant and of the following vowel; intensity was calculated as root mean square (RMS). Sonorization was checked manually on the waveform through the presence or absence of the pulses which represent the periodicity of the acoustic signal (and can be considered an acoustic correlate of glottal vibration). Additionally, we also reported the presence of the F0 contour as an indication of voicing.

## 3. RESULTS

### 3.1. Duration

Fig. 1 represents the mean duration of [s] produced in different phonotactic contexts by the three Neapolitan speakers PG, FP, and GI (it is worth noting that the speakers are quite similar in their realisations).

**Figure 1:** Mean duration (ms) and standard deviation of [s] produced by Neapolitan speakers.

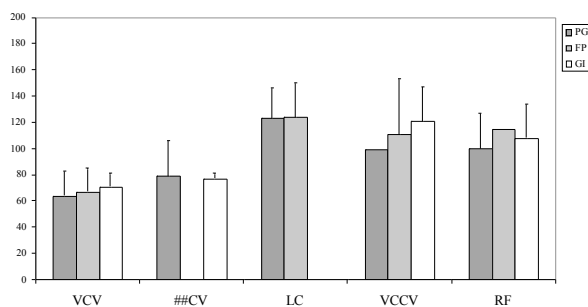


The histogram displays a continuum for the mean durations, which increase from left to right. As expected, the intervocalic fricatives are the shortest, with a mean duration of 74 ms and a standard deviation of 10 ms. The data also show a short duration for the C1C2 context (80 ms ±10 ms), indicating that the syllable coda is also a weak position. The voiceless sibilants in the context

##CV show a duration of 108 ms ( $\pm 21$  ms), due to the emphatic pronunciation of the first speaker. Finally, the postconsonantal context LC confirms the ‘strong position’ of the syllabic onset.

As Fig. 2 illustrates, labiodental fricatives are shorter than sibilants, and the speakers exhibit a more homogeneous production.

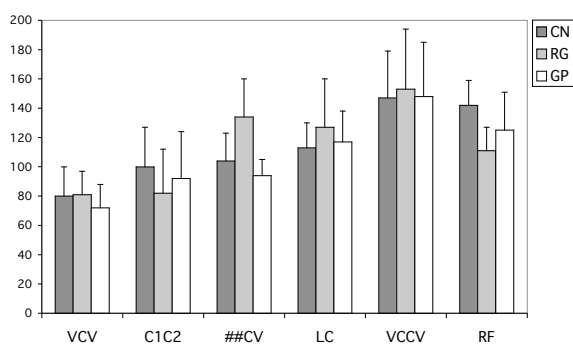
**Figure 2:** Mean duration (ms) and standard deviation of [f] produced by Neapolitan speakers.



A difference in the continuum has to be noted: if the labiodentals in VCV are still the shortest segments, measuring 67 ms ( $\pm 4$  ms), the mean duration of the ##CV context (78 ms,  $\pm 1$  ms) does not differ in the same way as with the sibilants. As predicted by rule (1), these two Neapolitan speakers do indeed lenite [f] in the ##CV context. Looking at the right-hand part of the histogram, we notice that, in the LC context, singleton labiodentals are even longer than geminates (mean duration of 124 ms,  $\pm 1$  ms).

Moving to Palermitan Italian, the histogram in Fig. 3 is quite similar to the one in Fig. 1. The speakers CN, RG, and GP also exhibit quite homogeneous durations, with the exception of RG, who tends to realise emphatic sibilants in the context ##CV. In this case, the duration continuum is even more evident than for the Neapolitan data.

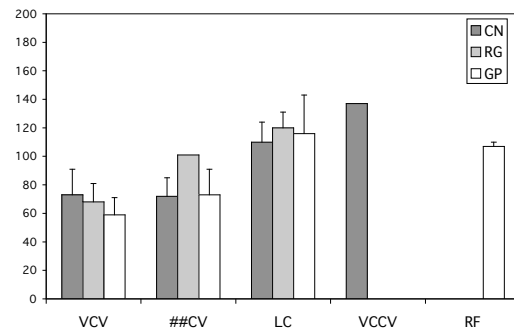
**Figure 3:** Mean duration (ms) and standard deviation of [s] produced by Palermitan speakers.



The VCV context triggers the shortest allophones (mean duration: 78 ms,  $\pm 5$  ms), followed by the C1C2 realisations (mean duration: 90 ms,  $\pm 30$  ms). The closer we move towards the right-hand side of the histogram, the more the mean duration increases: 111 ms ( $\pm 19$  ms) for ##CV, 119 ms ( $\pm 24$  ms) for LC.

Fig. 4 displays the mean duration of the /f/ realisations produced by the Palermitan speakers.

**Figure 4:** Mean duration (ms) and standard deviation of [f] produced by Palermitan speakers



As with the Neapolitan labiodental fricatives, the mean duration of /f/ in the ##CV context is similar to the VCV one (except for speaker RG, who emphasizes this segment in the initial position). Mean durations are as follows: 67 ms ( $\pm 14$  ms) in VCV, 82 ms ( $\pm 16$  ms) in ##CV, 115 ms ( $\pm 17$  ms) in LC.

### 3.2. Intensity

Intensity is considered another acoustic cue of the feature [ $\pm$ tense], since a greater articulatory tension increases intraoral pressure. We could therefore hypothesize that the intensity difference between the following vowel and the fricative segment (V2-C1) would be greater for the *lenes* than for the *fortes*.

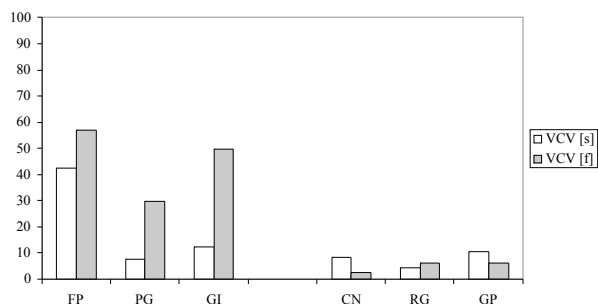
Nevertheless, this hypothesis is not confirmed by our data, as may be illustrated with the sibilants. At least in the case of the Neapolitan speakers, V2-V1 does not differentiate the various phonotactic contexts, being 4.9 dB ( $\pm 1.1$  dB) in the VCV context and 5.0 dB ( $\pm 1.2$  dB) in the VCCV context. A different picture emerges from the Palermitan data, where we have a V2-C1 value of 5.2 dB ( $\pm 2.4$  dB) in the VCV context as opposed to 2.6 dB ( $\pm 1.4$  dB) in the VCCV context; still, the highest intensity difference occurs in the C1C2 context with 6.0 dB ( $\pm 2.1$  dB), indicating that there is no clear correlation between the tenseness of the segments and their intensity; this is also due to

high values of the standard deviation, which do not portray a clear tendency.

### 3.3. Sonorization

Fig. 5 shows the percentage of sonorization (both partial and total) in the realisations of /s/ and /f/ both for the Neapolitan speakers FP, PG, and GI (on the left) and for the Palermitan speakers CN, RG, and GP (on the right).

**Figure 5:** Sonorization percentage of intervocalic [s] and [f] (Neapolitan and Palermitan speakers).



As one notes immediately, sonorization is rather pervasive in the Neapolitan data, a finding which is in line with the results of a previous study [12]; in particular, the speaker FP produces 42.6% of voiced sibilants and 57.1% of voiced labiodental fricatives. Conversely, the Palermitan speakers display rather lower percentages of sonorization (always less than 11%) both for [s] and for [f]; for two of them, sonorization is more frequent with the sibilants.

### 4. DISCUSSION

The present study provides empirical support for the observation that, in southern Italy, lenition also affects voiceless fricatives. In particular, the duration measurements have allowed us to identify, both for Naples and for Palermo, a continuum of three segment types, ranging from *lenes* to *fortes* and to geminates. In contrast, the data from both cities fail to support the hypothesis of a lower intensity for the *lenes*. The third acoustic correlate of lenition, i.e. sonorization, has proved to be much more pervasive in Naples than in Palermo. These findings corroborate our claim that, in the regional varieties of Italian, lenition is best described by a variable allophonic rule operating with the feature [ $\pm$ tense].

The duration parameter seems to constitute the common denominator of southern Italian fricative lenition, as becomes clear when we compare our

results with data from spoken Italian corpora of central Italy [9, 11] (see Table 2).

**Table 2:** Duration of the voiceless fricatives in four varieties of Italian

CLIPS data	[s]	[f]
Naples	74 ms ( $\pm 10$ ms)	66 ms ( $\pm 6$ ms)
Palermo	78 ms ( $\pm 5$ ms)	67 ms ( $\pm 9$ ms)
Rome	97 ms ( $\pm 24$ ms)	78 ms ( $\pm 22$ ms)
Florence	92 ms ( $\pm 19$ ms)	83 ms ( $\pm 17$ ms)

Not only are the values for the two southern cities quite similar, but they are also clearly lower than those measured in the two cities of central Italy. In particular, the mean duration of the Roman fricatives is quite astonishing, since plosive lenition is well documented in this area [9]. This finding raises an interesting question for further research: is allophonic fricative lenition restricted to southern Italy?

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