Hesitation Phenomena In Spontaneous Italian

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ABSTRACT

This paper will present an acoustic investigation concerning the spoken Italian realized by the map task and the game of differences method. By means of the spectrographic analysis the formant values of vocalizations, of the vocalic lengthenings and of the stressed and unstressed vowels were obtained for each of the eight examined speakers. In addition a few short considerations on the different tone level of such hesitation phenomena with respect to the phrasal intonative contour will be given.

1. INTRODUCTION

In spite of the rich literature in the field of non silent pauses, the subject is far from being exhausted. In fact, quite often, data are not comparable, not only because of the diversity of the used material, but also because of the different methodology employed. Furthermore a few and contrasting investigations have been carried out on the spectroacoustic characteristics of vocalizations and of vocalic lengthenings. Those of Levelt [1] on the Swedish language, O'Shaughnessy [2] on English/American and Pätzold and Simpson [3] on German were especially interesting among the essays on vocalizations. The question "*whether the phonetics which make up these particles are correlates of the same phonological system and structures which make up lexical items*" [3: p. 512] was the starting point of two of these papers [1] [3] but the conclusions which the authors arrived at were contrasting. Levelt on one side, while admitting that in many languages, vocalizations may be produced as a central vowel, finds that in the Swedish language they are produced as an open front vowel and that this effect is a consequence of acquiring a form of derived lexical status. Pätzold and Simpson, conversely, demonstrated that vocalizations are phonetically different from the lexical items and that they are not part of the language phonological system even if produced as central vowels, due to the articulatory economy. O'Shaughnessy finally finds that this type of non silent pauses are characterized by a schwa spectral pattern. It appears that, depending on the type of language analysed, there is a different production of this type of pauses. Furthermore it needs to be emphasized that, in the mentioned papers, both the oral vocalizations and the nasal ones have been evaluated as a single phenomenon, while in our opinion they should be separately analysed.
The vocalic lengthenings have always been considered of marginal interest in the spectroacoustic research. The point is that, being abnormally final lengthened vowels, they have always been considered as having the same formant pattern of an unstressed final vowel.
The tonal pattern of non silent pauses has conversely been dealt with in several papers in various languages with coherent results. These pauses indeed appear to be characterized by a descending pattern of f_o or flat on very low absolute values [2] [4] [5].
In order to shed new light upon the articulatory strategies on which hesitation phenomena are based, in this work we shall try to verify whether a relationship between such patterns and Italian stressed/unstressed vocalic system exists. Our starting hypothesis is that the speaker, in producing hesitation phenomena, tends to use articulatory models belonging to his phonological inventory.
In addition, we shall present a few considerations on the different tone levels of such phenomena with respect to the phrasal intonative contour.

2. MATERIAL AND METHOD

Our research is part of a series of parallel works that have been conducted or will be conducted within a common corpus collected by different research units supported by MIUR (AVIP, API, IPAR, CLIPS). The examined corpus, obtained by the map task and the game of differences method, represents the spontaneous Italian language in four regional areas, two from southern Italy (Bari, Naples) and two from central Italy (Pisa and Rome). The analysis has been carried out with the Kay Multispeech software. The analysed material is made of four dialogues, one for each regional area, uttered by four male speakers and by four female ones, all being university students. The vocalic area of stressed and unstressed vowels was obtained for each speaker. F1/F2 values of both the oral vocalizations and lengthenings have been measured at the central point of the formant pattern. We left out of our analysis stressed and unstressed vowels in nasal context and at the end of the word. In addition to this, the vowels with a duration equal or higher than 90 ms were considered stressed and those with a duration lower than this value were considered unstressed.
Overall 105 vocalizations, 358 lengthenings and about 350 vowels were analysed. The total duration of the recordings is of about 50 minutes. The f_o was measured at the central point of the non silent pauses and was compared with the f_o of the stressed and unstressed preceding and following syllables as well as with the minimum and maximum value in the examined phonetic chain.
It needs to be mentioned that data pertaining to the intonative contour are still provisional as they do not yet

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cover the whole corpus but only a few parts of the speech randomly chosen. The Roman speakers were left out.

3. RESULTS AND DISCUSSION

Diagrams relative to stressed and unstressed vocalic areas of the eight examined speakers as well as the formant pattern of vocalizations and lengthenings are shown in figures 1 and 2.

It may be seen that there is a different production of vocalization both for the male and female speakers. Speakers from Naples and Bari (southern Italy) produce the vocalization inside the unstressed vocalic area quite similar to a central vowel, whereas speakers from Pisa and Rome (central Italy) produce it as front vowel outside the unstressed vocalic area (the only exception being from Roman female speaker who produces, however, a front close-mid vowel. See last frame in figure 2). Obviously the degree of centralization and of advancement of the tongue changes depending on the speaker. In this last case, however, a well defined area may be noticed: the vocalization, when produced as front vowel, is uttered either as a close-mid vowel or in an intermediate space between a close-mid or open-mid vowel.

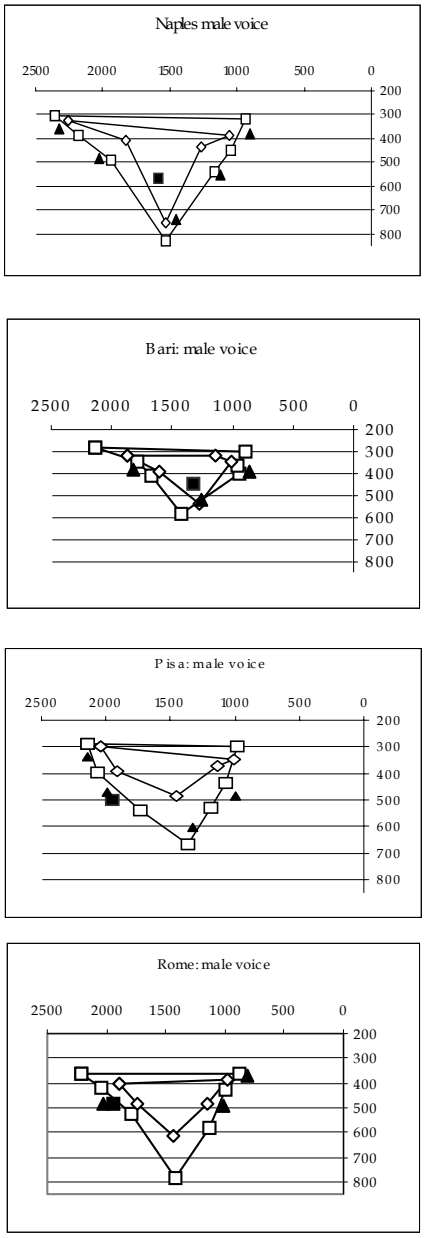


Figure 1: F1-F2 pattern vs: stressed, unstressed vowels; vocalization, legthenings.

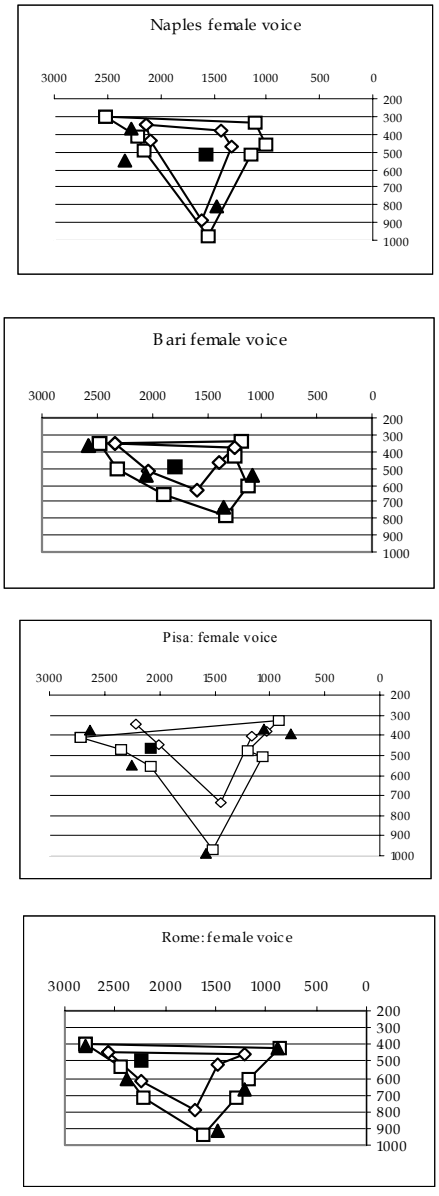
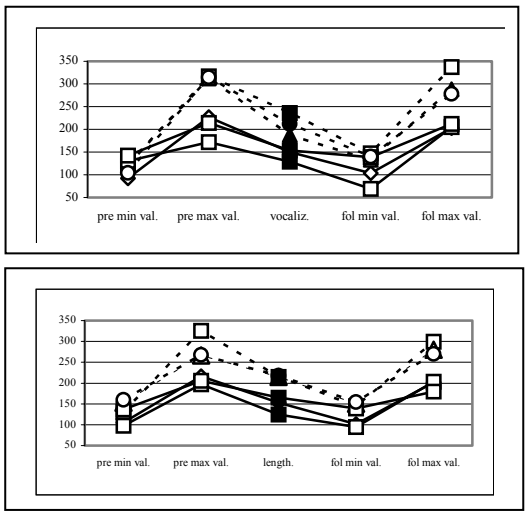


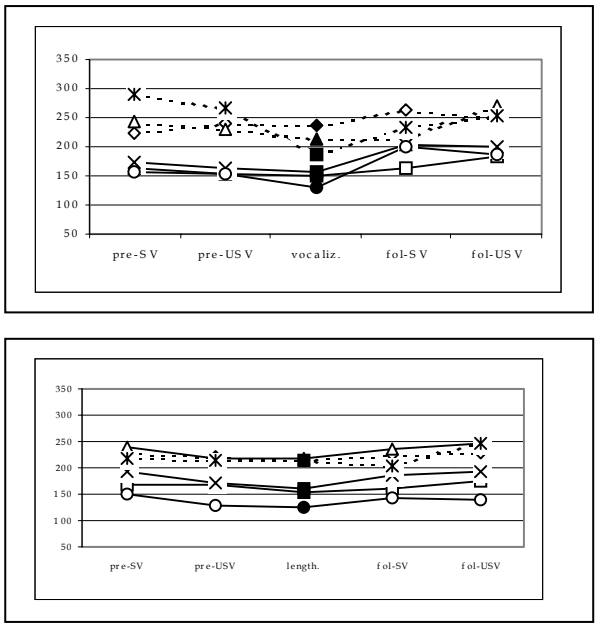
Figure 2: F1-F2 pattern vs: stressed, unstressed vowels; vocalization, lengthenings.

If the utterance of vocalizations was simply due to a phenomenon of the articulatory economy, it would be logical to assume that the maximun economy, in terms of articulatory movements, should lead to a centralization. The vocal tract should therefore assume the breathing position with the addition of voicing. This is indeed the position with the lower cost of muscular energy of the articulatory channel. The concept of articulatory economy, therefore, needs to be dealt with in a different way as shown in our data. In our sample the speakers utilise articulatory positions closer to their phonological inventory independently from the muscular effort involved. Even if the central vowel is not part of the Italian phonological inventory this vowel is present in the dialects of Naples and Bari [6] [7] while it does not appear in those of Pisa and Rome. Although we cannot assert that differences infra-speaker have not been found in the examined samples, we are certain that these data lead to the identification of non casual tendencies. The choice made by the speaker to produce this kind of pause is in our opinion a choice strictly connected to the inventory of familiar sounds which lead him to use articulatory models belonging to his phonologic inventory. Under this approach therefore, Levelt's thesis appears more convincing than Pätzold and Simpson's one.
Concerning the vocalic lengthenings it may be noticed that their formant patterns in all the examined samples are similar to the formant patterns of the stressed vowels, even if, as already stated, they are lengthenings of unstressed vowels. It seems that the speaker can foresee, even before hesitating, the programming difficulty tied to the on-line planning. This expectation leads to a different production of the hesitation if compared to the prepausal lengthenings. In this latter case the vowel shows a tendency toward the centralization.
The average value of f_o of vocalizations and lengthenings related to the tonal range of each speaker is shown in figures 3-4.



Figures 3-4: f_o pattern vs:
- -□- - female voice, —□— male voice;
■ vocalizations and lengthenings.

The range was obtained measuring the lowest and highest values for each phonetic chain (the portion of speech between two silent pauses) containing one of the two hesitation events.
It may be noticed that both the hesitation phenomena show the same trend independently from the examined regional area. In fact the f_o of the non silent pauses does not coincide either with the minimum or with the maximum value, but it is located in a point equidistant from the range borders of each speaker. More varied appears the tonal trend if compared to the stressed and unstressed vowels which precede and follow hesitations. In other words a difference between vocalizations and lengthenings is observed (figures 5-6).



Figures 5-6: f_o pattern vs:
- -□- - female voice, —□— male voice;
■ vocalizations and lengthenings.

As a matter of fact, while vocalizations altogether undergo an f_o decrease (from 10% to 36%) with respect to the adjacent vowels, lengthenings do not undergo any significant variation. This different f_o behaviour confirms what we have already stressed in a previous paper about duration and occurrence of these two pauses types [8]. In our previous paper was possible to state that these hesitation phenomena play a different role in the on line programming. In fact vocalizations not belonging to the text exhibit quite long varied durations apparently dependent on the individual strategic choices. Lengthenings, on the contrary, being part of lexical and functional words, exibit a more or less constant duration independently of the geographic area, as they have to preserve the temporal equilibrium within the phonetic chain.

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4. CONCLUSIONS

The data presented in this work on some regional varieties of Italian provide a good distinction between southern and central Italian speeches. As a matter of fact the formant patterns of the vocalizations change according to the different regional areas. They are produced as a central vowel by speakers from Naples and Bari, while they are produced as front close-mid or open-mid vowel by speakers from Pisa and Rome. Our thesis is that the use of these articulatory realizations is strictly linked to the regional phonologic inventory of each speaker. Our data further demonstrate a different use of vocalizations and vocalic lengthenings in the on line programming. Such hypothesis is also confirmed by the different f_o trends relative to the pitch observed for contact vowels. Further investigations on the intonative trend seem however necessary.

REFERENCES

[1] W. J. M. Levelt, "*Speaking: from intention to articulation*", Cambridge, MA: MIT Press, 1989.

[2] D. O'Shaughnessy, "Locating disfluencies in spontaneous speech: an acoustical analisys", *Proc. of European Conference On Acoustics on Speech Communication and Technology*, 3, pp. 2187-2190, 1992.

[3] M. Pätzold, A. Simpson, "An acoustic analysis of hesitation particles in German", *ICPhS'95*, Stockholm, 3, pp. 512-515, 1995.

[4] A. Batliner, A. Kießling, S. Burger, E. Nöth, 'Filled pauses in spontaneous speech', *ICPhS'95*, Stockholm, 3, pp. 472-475, 1995.

[5] E. E. Shriberg, R. J. Lickley, "Intonation of clause-internal filled pauses", *Phonetica*, 50, pp.172-179, 1993.

[6] M. Loporcaro, "*Grammatica storica del dialetto di Altamura*, Pisa, Giardini, 1988.

[7] L. Romito, T. Turano, M. Loporcaro, A. Mendicino, "Micro e macrofenomeni di centralizzazione vocalica nella variazione diafasica: rilevanza dei dati acustici per il quadro dialettologico del calabrese", *Atti delle 7e giornate del GFS*, Napoli 1996.

[8] A.Giannini, "Vocalizzazioni e prolungamenti vocalici", CNR, Padova*, vol. in honour of Franco Ferrero*, (in print).