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Prosodic distances between different survey sites in Romance-speaking Europe*

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Abstract

The aim of this paper is to classify Romanian dialects from a prosodic point of view within the European Romance-speaking area. The data is part of the *Multimedia Atlas of Romance Prosody* - AMPER (Contini, 1992) and is analysed dialectometrically by means of ProDis (Elvira-García et al., 2015; Fernández Planas, 2016). The database includes more than 17,000 utterances produced by 48 speakers from 26 survey sites of 15 varieties of 6 Romance languages (Catalan, Spanish, Italian, Sardinian, Friulian and Romanian). The results show that the two main prosodic areas of Romanian (see Roseano, 2016b) remain separate when they are dialectometrized with data from other Romance languages. In addition, if one analyses questions and statements separately, it can be seen that questions allow us to distinguish geoprosodic areas more effectively than statements do (as suggested by previous studies such as Fernández Planas et al., 2015).

Keywords: AMPER; prosody; dialectometry; Romanian; ProDis.

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1. Introduction

1.1. The study of prosody

In the last four decades, the phonetic and phonological study of prosody has gained unprecedented popularity, thanks—among other reasons—to the development of computer science and new technologies. In addition, the impressive number of existing publications and studies on the subject has made it possible to reach an agreement regarding certain methodological aspects and approaches. At a theoretical level, although this is not the only possible approach, the majority of recent works in the field of prosody are carried out within the autosegmental metric model (AM), which was developed in Pierrehumbert's doctoral dissertation (1980), based on the contributions of the American school (Liberman and Prince, 1977; Goldsmith, 1976; Liberman, 1975; Bruce, 1983). As we know, according to the AM model, the F0 contour is regarded as a succession of high tones (H) and low tones (L) anchored to some metrically strong positions. The labelling system used to annotate the intonation of each language is known as ToBI (*Tones and Break Indices*) and it aims at attaining a relatively high level of consistency in transcriptions carried out by various researchers. Labelling is usually carried out manually, but for certain languages—like Catalan and Spanish—automatic transcribers have been developed (among them, the Phonetics Laboratory of the University of Barcelona has developed the labeller Eti_ToBI; see Elvira-García et al., 2015, and Elvira-García et al., 2016). The examples presented in section 3.3 of this paper have been labelled according to the conventions of the ToBI systems used for each language contained in the dataset: Cat_ToBI for Catalan (Prieto et al., 2015), Sp_ToBI for Spanish (Hualde and Prieto, 2015), It_ToBI for Italian (Gili Fivela et al., 2015), Fri_ToBI for Friulian (Roseano et al., 2015b), Sar_ToBI (Vanrell et al., 2015) and Rom_ToBI for Romanian (Jitcă et al., 2015).

1.2. The Prosodic Multimedia Atlas of the Romance Area (AMPER)

Traditional studies of the prosody of Romance languages were developed within several theoretical frameworks (for instance, for Catalan: Virgili Blanquet, 1971; Recasens, 1977; Bonet, 1984, 1986; Prieto, 1995, 1997, 2001, 2002a and 2002b; Salcioli, 1988a, 1988b; Estebas-Vilaplana, 2000; Payà, 2002: Payrató, 2002). In most cases, these studies analysed data from only one variety or from a limited number of varieties. This tendency has recently changed, thanks to the existence of two projects aimed at collecting data from several Romance varieties: the Interactive *Atlas of Romance Intonation* (Prieto et al., 2010-2014) and the *Prosodic Multimedia Atlas of the Romance Area* (AMPER). The research presented in this paper has been carried out within the framework of the latter.

AMPER was initiated and promoted at the Université Stendhal Grenoble 3, under the coordination of Michel Contini and Antonio Romano (Contini, 1992; Contini et al., 1998, 2002; Romano and Contini, 2001; Romano, 2003; Fernández Planas, 2005), and is coordinated at present by Antonio Romano at the University of Torino. The project aims to create an atlas with the

collaboration of several research teams in different countries. One of the advantages of the project is that all research groups use the same methodology, meaning that results are comparable across languages.

This article is the result of a collaboration between two research groups within AMPER: the AMPER-CAT group, based at the Phonetics Laboratory of the University of Barcelona, and the AMPER-ROM group, based at the "Alexandru Ioan Cuza" University of Iaşi. AMPER-CAT studies the prosody of Catalan, Spanish and Friulian, whereas AMPER-ROM studies the prosody of Romanian.

1.3. An overview of dialectometry

Dialectometry, which can be regarded as a methodological connection between linguistic, geography and mathematical taxonomy (Goebl, 1981: 349), is a methodological framework where several statistical analysis techniques are used to analyse data from dialectal atlases. Its main purpose is to study the way in which varieties are grouped according to their distance or proximity (Fernández Planas, 2016; Elvira-García et al., 2016). Dialectometric techniques show some advantages in comparison with traditional dialectology (Roseano, 2016a): 1) they allow the relatively easy analysis of large amounts of data stored in databases; 2) there is no apriorism in data processing; and 3) the result of data analyses are displayed in graphical forms, such as dendrograms (which plot the results of cluster analyses) and MDS maps (which plot the results of multidimensional scaling). Despite its advantages, one could argue that this technique fails to consider the qualitative differences between varieties (Clua, 1999).

Dialectometry has already been used for the study of several Romance and non-Romance languages from a segmental, morphological and lexical point of view, among them Ladin (Goebl, 1993; Bauer, 2005), Italian (Bauer, 2003), French (Séguy, 1971; Verlinde, 1988; Goebl, 1987, 2003), Galician (Álvarez et al., 2006; Sousa, 2006; Saramago, 2004), Asturian (D'Andrés Díaz et al., 2007) and Catalan (Clua, 2004; Polanco, 1992). From a prosodic point of view, dialectometric studies are much less common (Fernández Rei et al., 2013, 2014; Rodriquez et al., 2020; Fernández Planas et al., 2015; Roseano and Fernández Planas, 2019).

1.4. Aim of the study

This study aims to analyse the prosodic distance between various survey sites of Romance Europe in the area between Romania and Spain, with special attention given to the survey sites in two major areas according to which the Romanian language is divided from a prosodic viewpoint (Roseano, 2016b; Jitcă et al., 2015; Turculeţ et al., 2008). The most relevant innovative element is the inclusion in this study of Romanian survey sites together with other varieties discussed in previous studies (Fernández Planas et al., 2015, for instance).

In addition to this main objective, this study also aims at testing the efficacy of ProDis, the dialectometric tool utilised to analyse the data (Elvira-García et al., 2016, 2018; Fernández Planas, 2016; Fernández Planas et al., 2017).

The paper is structured as follows: section 2 contains the methodological aspects (corpus, informants, localities, acoustic analysis and statistical analysis). Section 3 presents the main results, which are discussed in section 4. Section 5 puts forward some conclusions.

2. Methodology

2.1. Corpus, informants and survey sites

The dataset used for this study is part of the so-called "fixed corpus" of the AMPER project (Fernández Planas, 2005), which includes read speech. The dataset consists of two sentence types: broad focus statements and information-seeking yes-no questions. The sentences contain three basic syntactic constituents (subject, verb and object) and have an SVO structure. Except for the verb, the other elements can acquire in turn other determinants (adjectival or noun complement), yet not at the same time, this is to say that a sentence can contain either determinants of the subject or determinants of the object. As far as stress is concerned, the subject and the object (as well as their respective complements) can be oxytone, paroxytone or proparoxytone. Verbs are always paroxytone. Sentences (1) to (3) exemplify some of the possible combinations of elements in Italian (example 1), Spanish (example 2) and Friulian (example 3). The sentences in the examples are glossed literally word-by-word and then translated. The sentence in (1) is a broad focus statement with paroxytone subject and paroxytone object (the stressed syllables are underlined). The sentence in (2) is a broad focus statement with oxytone subject, oxytone expansion of the subject and paroxytone object. The sentence in (3) is an information-seeking yes-no question with oxytone subject, proparoxytone object and oxytone expansion of the object.

(1) *La*	*bambina*	*mangiava*	*la*	*banana.*	
The	girl	was eating	the	banana	
'The girl was eating the banana'.					
(2) *El*	*saxofón*	*español*	*se*	*toca*	*con* *obsesión.*
The	saxophone	Spanish	self	play	with obsession
'One plays the Spanish saxophone obsessively'.					
(3) *La*	*dipendent*	*si*	*netia*	*la*	*cotula* *lisera.*
The	saleswoman	self	clean	the	skirt light
'Does the saleswoman clean her light skirt?'.					

Data were collected for 6 languages: Catalan, Spanish, Friulian, Romanian, Italian and Sardinian. For the first four languages, the dataset includes sentences with and without noun complements, while for the last two all sentences are without complements.

As far as the survey sites are concerned (see table 1), there are 26 in total. For Catalan, we included 7 survey sites from different dialectal areas. For Spanish, 2 sites were included for the Catalan-Spanish bilingual area, while for the rest of the European Spanish-speaking area we included 3 sites. We also included 6 sites for Romanian (3 for each of the two main geoprosodic areas), 3 sites for Friulian, 1 site for Sardinian and 4 sites for Italian.

At each survey site we recorded at least one female speaker and one male speaker, with a total of 48 speakers. The only exceptions are Palencia (where only one female speaker was recorded), Porto Torres (one female speaker) and Tolmezzo (one male speaker). All informants complied with the terms and conditions stipulated in the AMPER project, i.e. they are native speakers of the variety under study and have always lived in the survey site. The dataset on the whole contains 17,046 utterances.

TABLE 1

Languages, varieties, survey sites, informants and utterances analysed in the study

LANGUAGE	VARIETY	SURVEY SITES	N. OF SPEAKERS	N. OF SENTENCES FOR EACH SPEAKER
Catalan	Alguerese	L'Alguer	2	567
	Central	Barcelona, Girona	4	567
	Northwestern	Tortosa	2	567
	Balearic	Palma	2	567
	Valencian	València	2	378
	Northern	Perpinyà	2	180
Spanish	Bilingual Catalan-Spanish areas	Lleida, Barcelona	4	567
	Rest of European Spanish-speaking areas	Madrid, Palencia, La Laguna	5	378
Romanian	Transylvanian	Timişoara, Cluj Napoca, Braşov	7	270
	Central-Eastern	Botoşani, Bucureşti, Constanţa	6	270
Friulian	Northern	Agrons	2	378
	Central	Beivars	2	378
	Eastern	Gradisca	2	378

Italian	Italian of Sardinia	Porto Torres	1	54
	Italian of Tuscany	Siena, Perugia	2	54
	Italian of Friuli	Tolmezzo	1	54
Sardinian	Logudorese	Biddanoa	2	54
Total		***26***	***48***	***17,046***

2.2. Data analysis

The acoustic analysis of the utterances was performed with AMPER06 (López Bobo et al., 2007), a computer programme created in Matlab which is designed to analyse prosody. For each vowel in the utterance, the program extracts three F0 values (at the beginning, middle and end of the interval), as well as the duration and the average intensity. Intensity data are expressed in decibels (dB), duration in milliseconds (ms), and F0 in semitones (st) calculated using as reference the average F0 of the utterance (using st instead of Hz allows the standardization of the differences between the voices studied in this research).

AMPER06 saves prosodic data in a .txt file for each utterance. The txt files are the input for ProDis (Elvira-García et al., 2018), the dialectometric tool used for statistical analysis. ProDis calculates the mean Pearson correlation (Romano et al., 2011) among utterances of the several survey sites. Using this data, two types of analysis are performed: a cluster analysis and a multidimensional scaling analysis (EMD). Data from both types of results (for informants and for survey sites) is classified according to similarities, so that the distances between the groups are as great as possible, while the distance within the group is as small as possible. Correlations were weighted using duration and intensity values.

3. Results

In the following subsections we shall present the results of the dialectometric analysis of statements and questions together (3.1), of statements only (3.2), and of questions only (3.3).

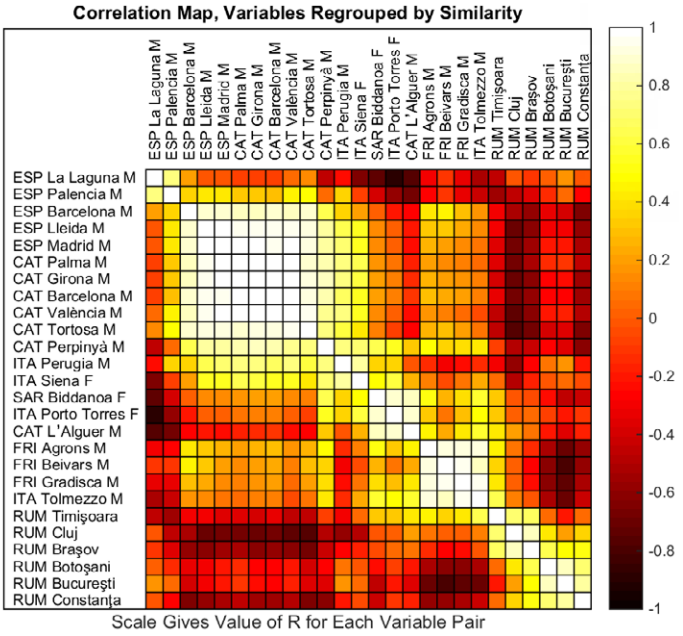
3.1. Statements and questions

The analysis of the two sentence types together allows for an accurate classification of the Romance varieties under study. The first results provided by ProDis are a heatmap of the correlations between the survey sites (figure 1) and a heatmap of the standard deviation of informants (figure 2). In the heatmap of correlations, instead of displaying numerical values (from +1 to -1), ProDis represents them using a chromatic scale. Lighter colours (closer to white) indicate a high correlation between two investigation sites (in linguistic terms, this means

that the intonation patterns are similar). Colours closer to dark red indicate a low degree of correlation (different melodic patterns, for instance).

FIGURE 1

Heatmap of correlations between survey sites (statements and questions)

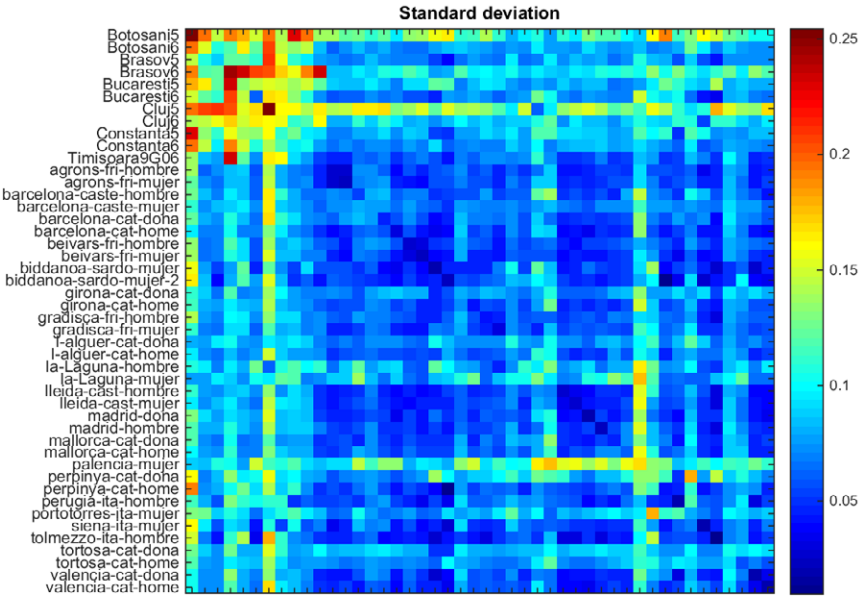


In figure 1 we can see that the Romanian survey sites display major differences when compared to the other Romance varieties, yet these differences are not strong among the Romanian sites themselves. We should also mention that the survey sites in Biddanoa Monteleone (Sardinian), Porto Torres (Italian) and L'Alguer (Catalan) corresponding to the three languages of the island of Sardinia, display significant differences when compared to the corresponding sites for Catalan, Spanish and Romanian, and less significant differences when compared to the Italian and Friulian sites. The heatmap also reveals that Italian and Catalan are very similar.

The heatmap in figure 2 plots the results of the analysis of intra-speaker standard deviation. In this map, cool colours indicate a low standard deviation (for instance, from a linguistic viewpoint, the respondent has the tendency to use the same intonation patterns consistently). Warm colours indicate the fact that the respondent displays a higher standard deviation, meaning that, from a linguistic perspective, s/he displays a greater variety of intonation patterns within the same type of utterance. In figure 2 we can observe that most speakers tend to show very little variation. Only a small number of them shows high standard deviation values. In particular, Romanian informants (specifically, one from Botoşani, one from Braşov and one from Cluj Napoca) and an informant from Palencia (Castilian Spanish) have values that reach 0.25. This means that the above-mentioned informants adopted a greater variety of intonation patterns.

FIGURE 2

Heatmap of standard deviation for informants (statements and questions)



The third type of graphic is a dendrogram (figure 3), i.e. a tree diagram, drawn based on cluster analysis, in which investigation sites are grouped according to their prosodic similarities. The fourth type of representation provided by ProDis (figure 4) is an MDS map, which is a virtual space in which the points representing the investigated areas are distributed according to their intonational similarities.

FIGURE 3

Dendrogram based on a cluster analysis of statements and questions

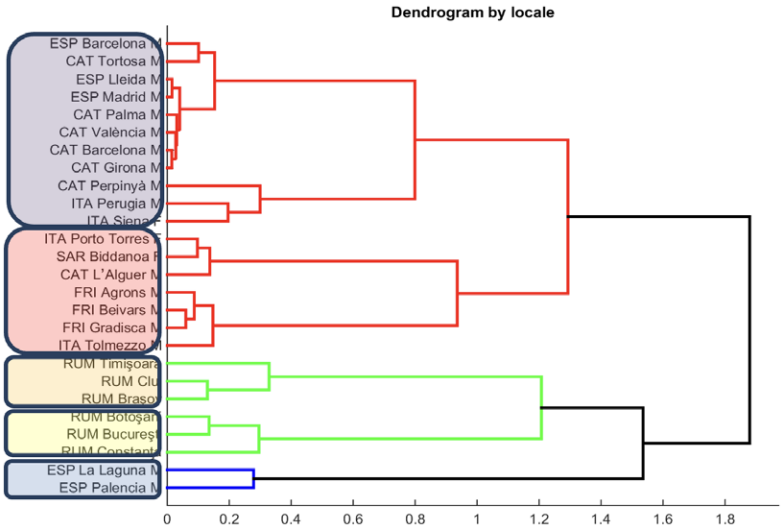
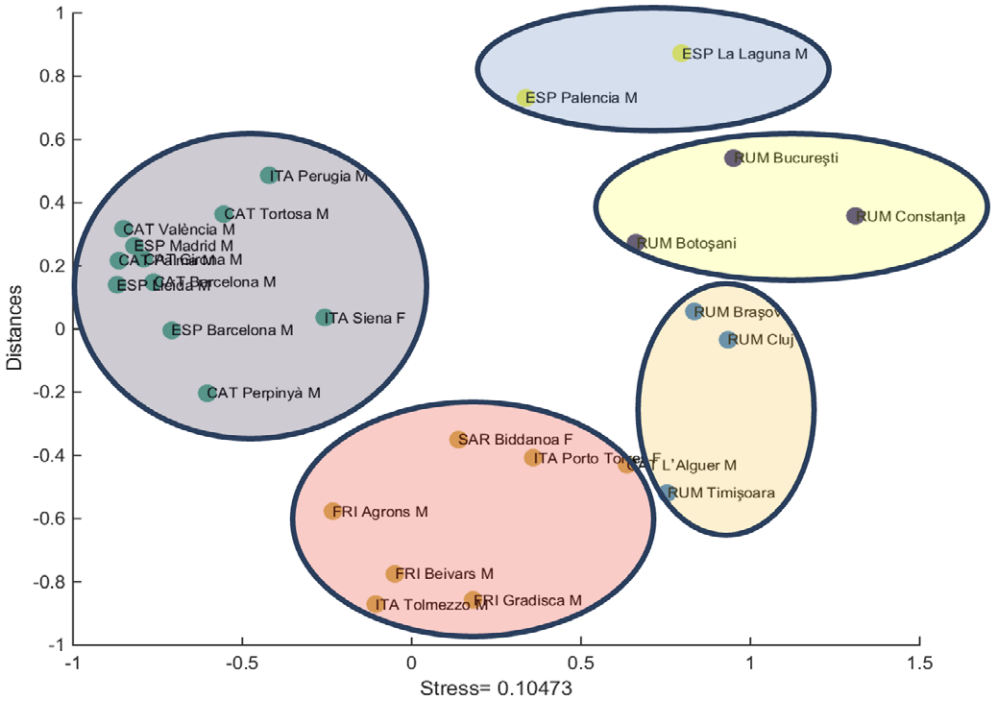


FIGURE 4

MDS map based on the analysis of statements and questions



Figures 3 and 4 indicate that there are 5 prosodics groups, which can be described as follows:

(1) The first group includes two Spanish-speaking sites (Palencia and La Laguna). At both survey sites, the contour of yes-no questions shows a hat-pattern with a rising falling nuclear configuration (see figure 12 below).

(2) The second group includes the survey sites of Eastern Romania.

(3) A third group, close to the second, includes the sites of Central-Western Romania.

(4) The fourth group includes the survey sites of Romance languages spoken in Friuli (both Italian and Friulian) and of the languages spoken in Sardinia (Sardinian, Catalan and the regional Italian in Sardinia); within this group, one can clearly discern the Friulian and Sardinian subgroups.

(5) Finally, the fifth group includes all Catalan and Spanish sites (with the exception of Palencia, La Laguna and L'Alguer, mentioned above). Within this group we can identify a nucleus that geographically corresponds to the central and eastern parts of the Iberian Peninsula, and some peripheral elements, which are the Catalan of Perpinyà (in Southern France) and the varieties of Italian spoken in Tuscany (Perugia and Siena), which are grouped with the Iberian sites a little later.

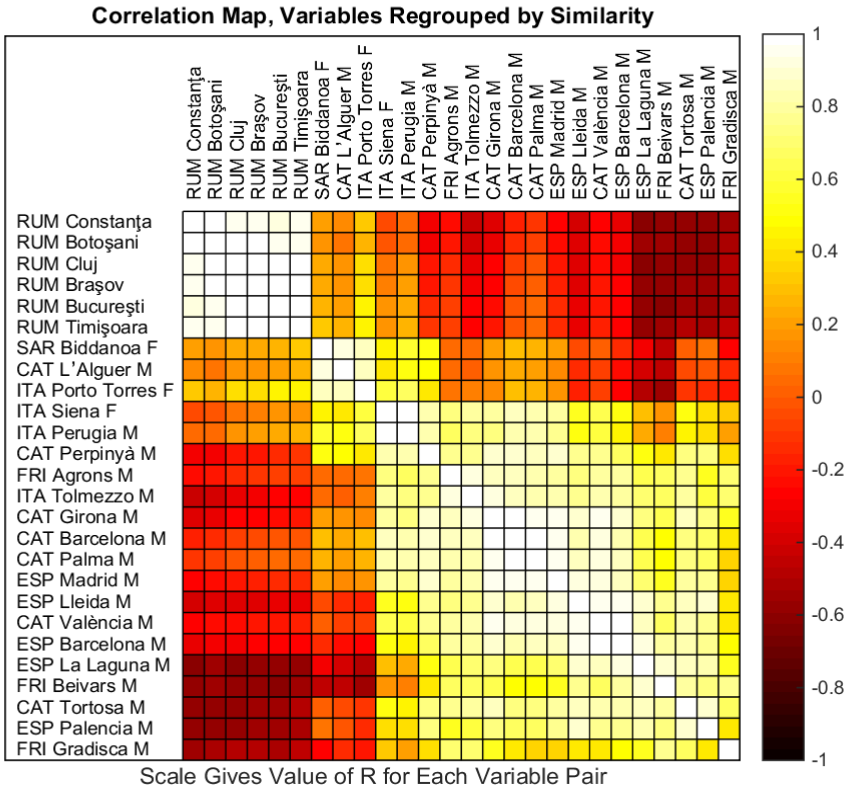
In order to assess whether the classification we have described above depends on one sentence type or on both, in the following subsections we shall analyse statements and questions separately.

3.2. Statements

Figure 5 contains the heatmap of correlations among statements at different survey sites. We can observe, first of all, that the Romanian sites show a high degree of correlation among themselves and are weakly correlated with the other sites. Moreover, the three languages of Sardinia (Catalan of L'Alguer, Sardinian of Biddanoa and the regional variety of Italian spoken in Porto Torres) display few differences among themselves, while the correlation with other sites is weaker.

FIGURE 5

Heatmap of correlations between survey sites (statements)

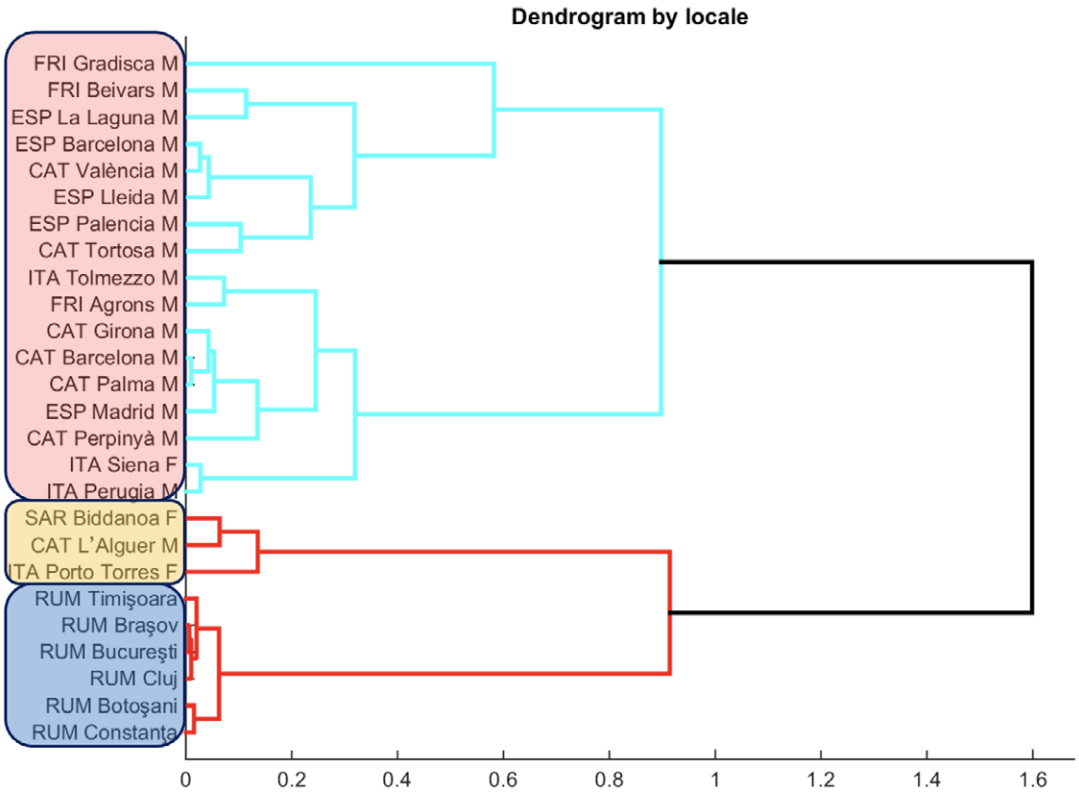


The dendrogram in figure 6 allows us to distinguish between three large groups. The first group (at the bottom in figure 6) includes the survey sites in Romania. The second group includes the sites in Sardinia. The third group, with more disperse samples, includes Catalan, Spanish, Italian and Friulian.

Figure 7, which plots the results of the MDS analysis, gives the same result. In fact, the same three large groups can be distinguished. The first includes the points corresponding to the three languages of the island of Sardinia. The second group includes the Romanian localities. The third group, with more disperse samples, includes Catalan, Spanish, Italian and Friulian.

Overall, if we compare the results of the analyses carried out on statements with the results of the analyses which take into account both statements and answers, we can conclude that statements alone allow us to distinguish fewer prosodic areas.

FIGURE 6
Dendrogram based on a cluster analysis of statements



3.3. Questions

The heatmap of correlations between the survey sites for this sentence type (figure 8) suggests that Spanish and Catalan survey sites are very close, while the other survey sites display greater differences. The darkest points correspond to the comparison of Romanian survey sites, as well as Palencia and La Laguna, with survey sites in other locations.

FIGURE 7

MDS map based on the analysis of statements

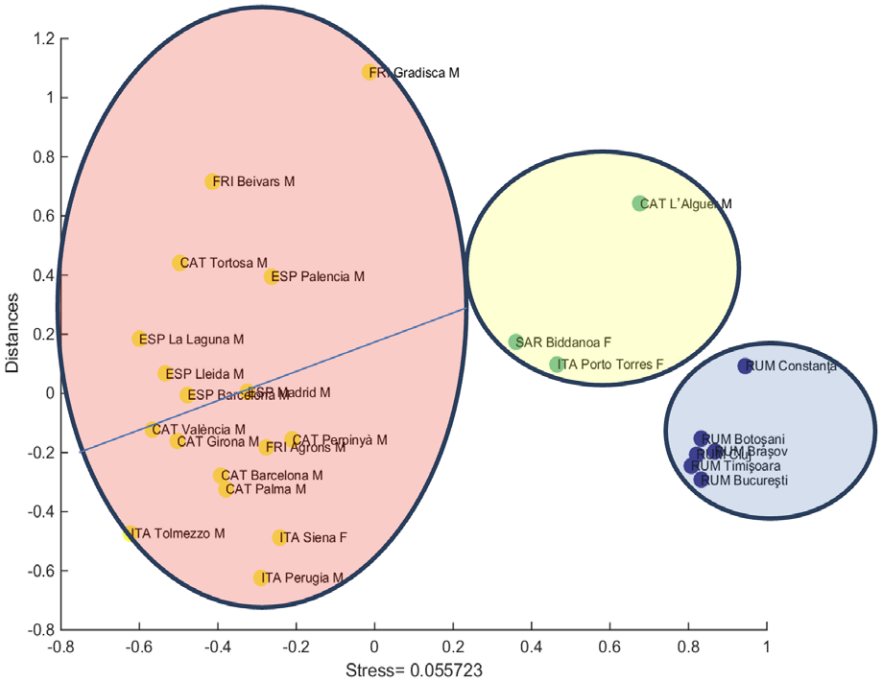
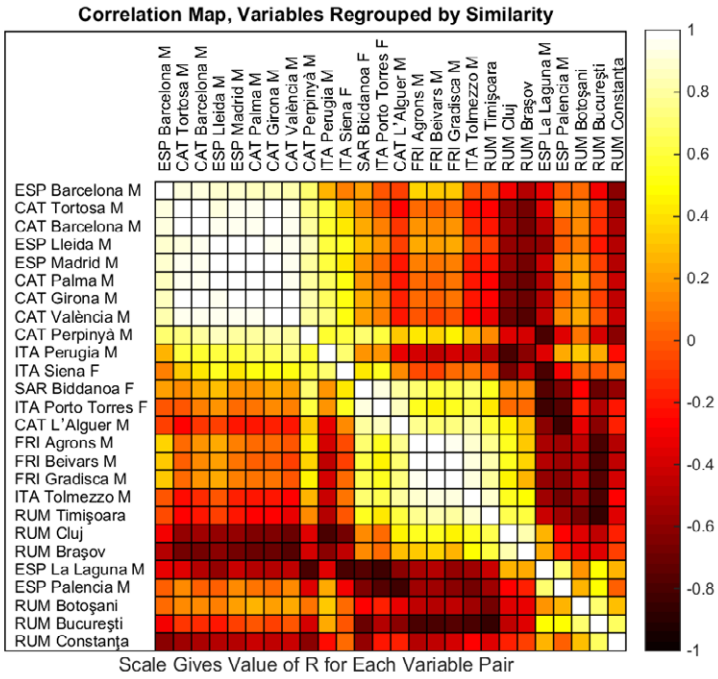


FIGURE 8

Heatmap of correlations for questions



Regarding the classification of the survey sites for this sentence type, both the dendrogram in figure 9 and the map in figure 10 suggest that there are three major clusters, and that subgroups can be identified within each cluster (seven subgroups in total).

FIGURE 9
Dendrogram based on a cluster analysis of questions

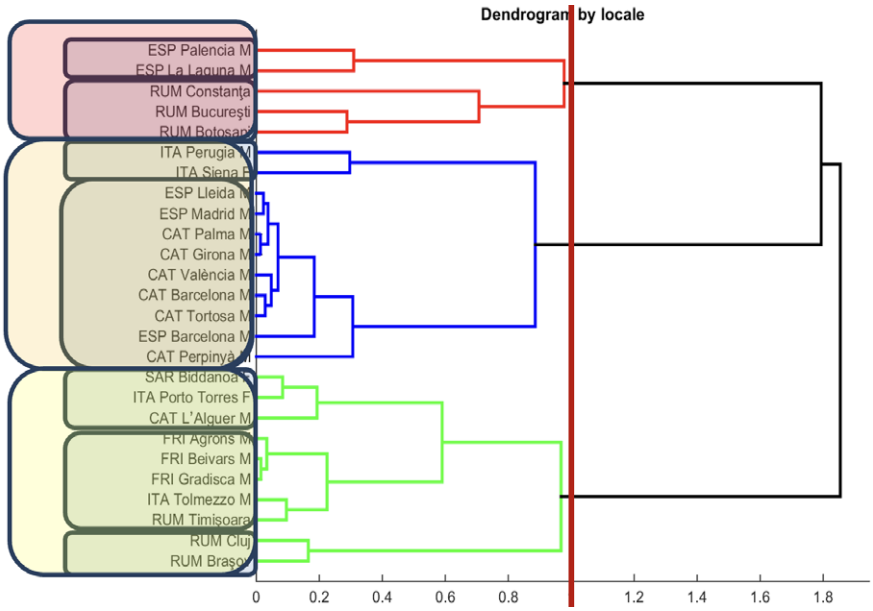
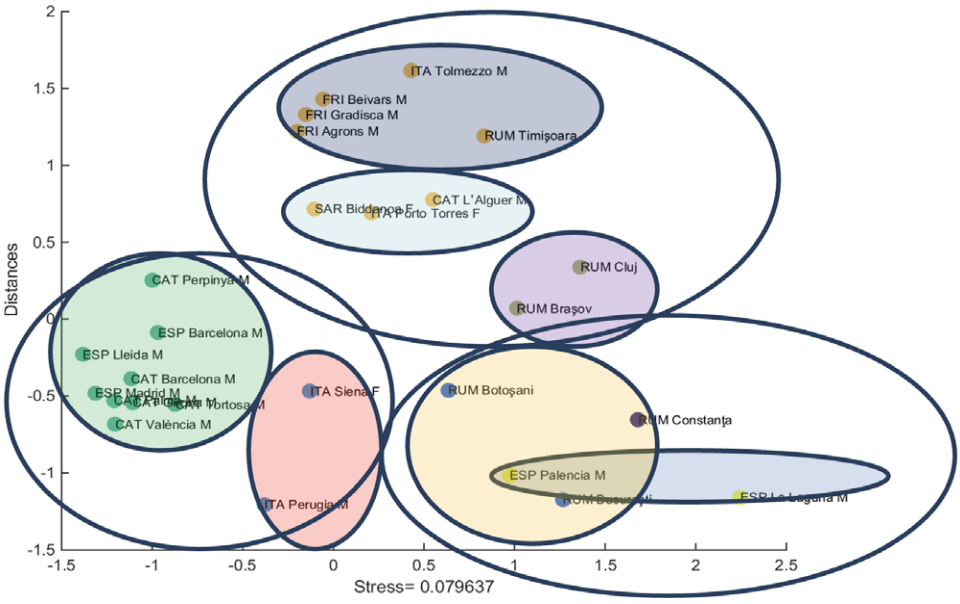


FIGURE 10
MDS map based on the analysis of questions



In order to understand this classification, one must look in more detail at the shape of the F0 contours of the localities included in each of the three clusters (and seven subgroups). Figure 11 shows a schematic interpretation of the intonation melodies of the different clusters and subgroups, which can be described as follows:

1A) The first subgroup (the first on the left in figure 11) includes survey sites at which questions display an extra-high tone in the nuclear configuration (e.g. ¡H* L% such as in Palencia; see example in figure 12[1]).

1B) The second subgroup (the second from the left in figure 11) also has an extra-high tone in the nuclear configuration, however, it is preceded by a low leading tone (e.g. L+¡H* L% as in Constanţa; see example in figure 13).

2A) The third subgroup (the third from the left in figure 11) is characterized by the typical Tuscan falling-rising H* LH% nuclear configuration (see example in figure 14).

2B) The fourth subgroup (the fourth from the left in figure 11) is characterized by the widespread rising L* H% nuclear configuration, which is found in several Romance languages (see example in figure 15).

3A) The fifth subgroup (the fifth from the left in figure 11) has an early-falling nuclear configuration (H+L* L%) and a prenucleus characterized by several sharp F0 falling movements associated with stressed syllables (see Roseano et al., 2015a, for a description; see example in figure 16).

3B) The sixth subgroup (the sixth from the left in figure 11) has a rising L* H% nuclear configuration and shares with 3A the presence of a prenucleus characterized by F0 falling movements associated with stressed syllables (see Roseano and Fernández Planas, 2013, for a description; see example in figure 17).

3C) The seventh subgroup (the seventh from the left in figure 11) has a late-falling H* L% nuclear configuration and a prenucleus characterized by F0 high/falling movements associated with stressed syllables (see example in figure 18).

Overall, cluster 1 (which includes subgroups 1A and 1B) is defined by a ¡H* in the nuclear configuration and a relatively simple prenucleus (i.e. an F0 contour with few movements). Cluster 2 (subgroups 2A and 2B) is defined by a final H% tone and a prenucleus with limited F0 movements. Cluster 3, on the contrary, seems to be based mostly on the prenucleus, which shows complex falling movements in all localities, in spite of the fact that the nucleus is different in the three subgroups that are clustered together. In sum, the classification is the result of the interplay between the features of the nuclear configuration and of the prenucleus.

1 All images in this paper have been created using a Praat script (Elvira-García, 2018).

FIGURE 11

Correspondence between subgroups and general features of the Fo contours

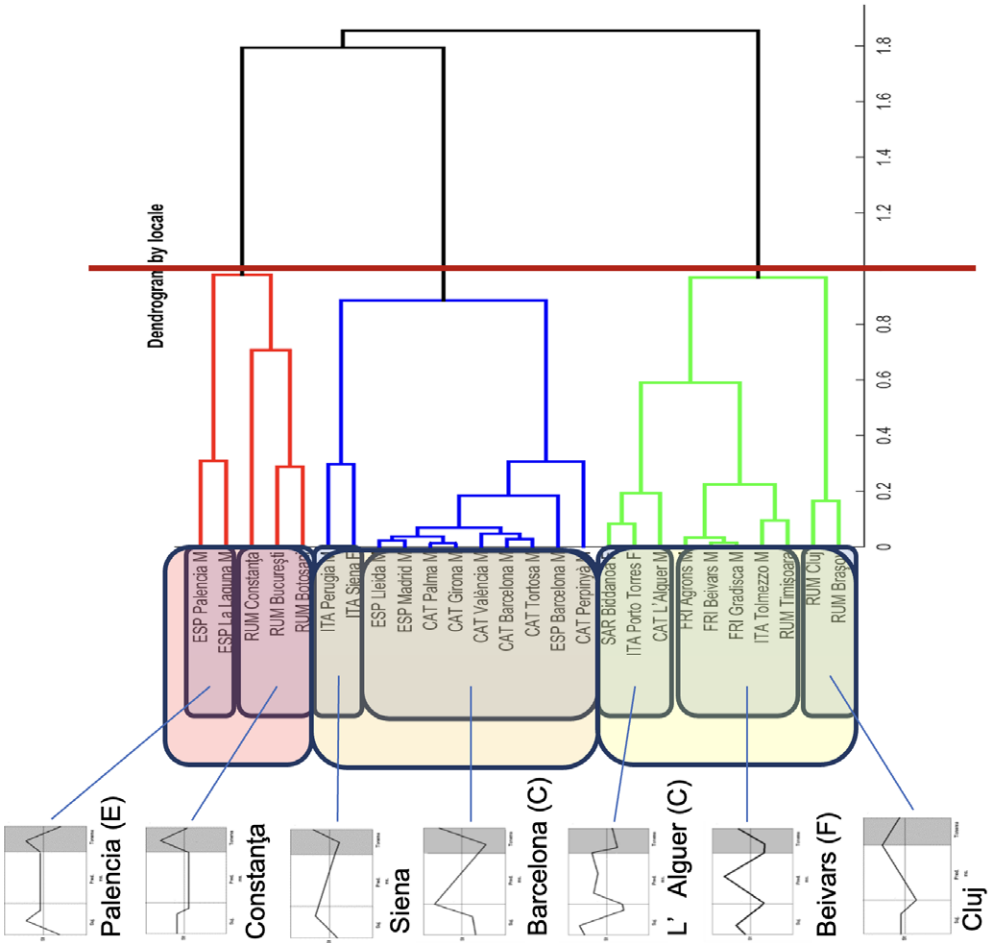


FIGURE 12

Example of yes-no question from Palencia (Spanish)

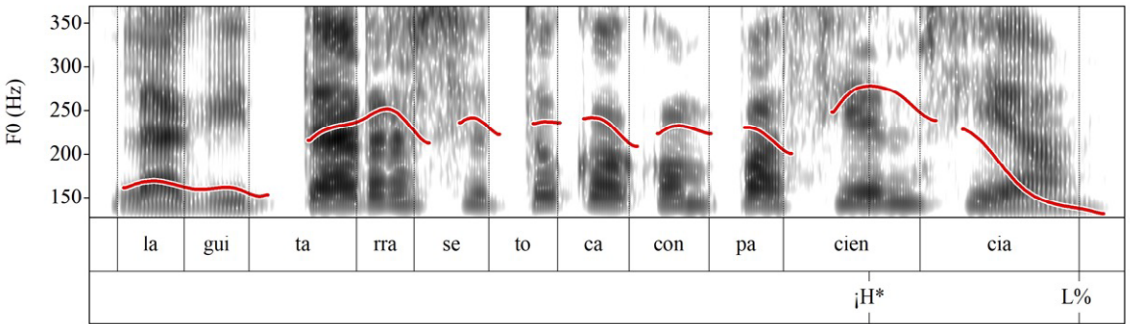


FIGURE 13

Example of yes-no question from Constanţa (Romanian)

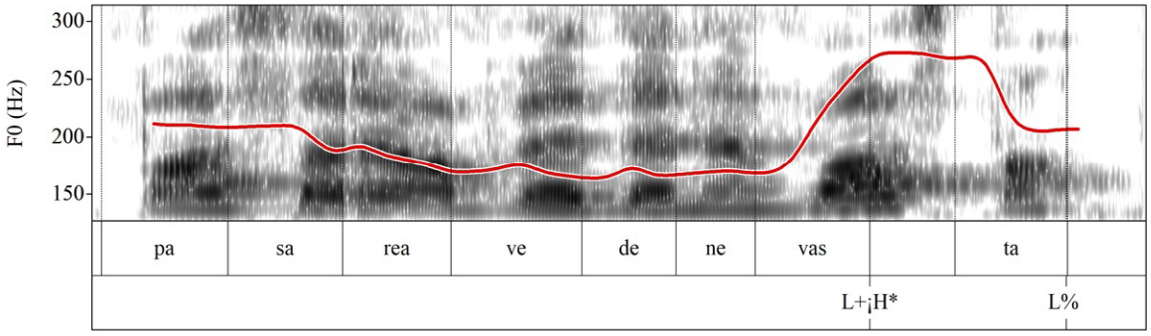


FIGURE 14

Example of yes-no question from Siena (Italian)

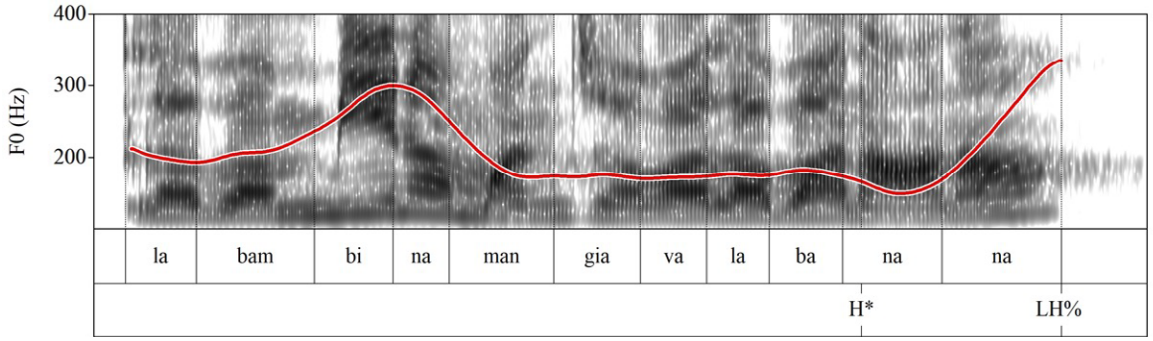


FIGURE 15

Example of yes-no question from Barcelona (Catalan)

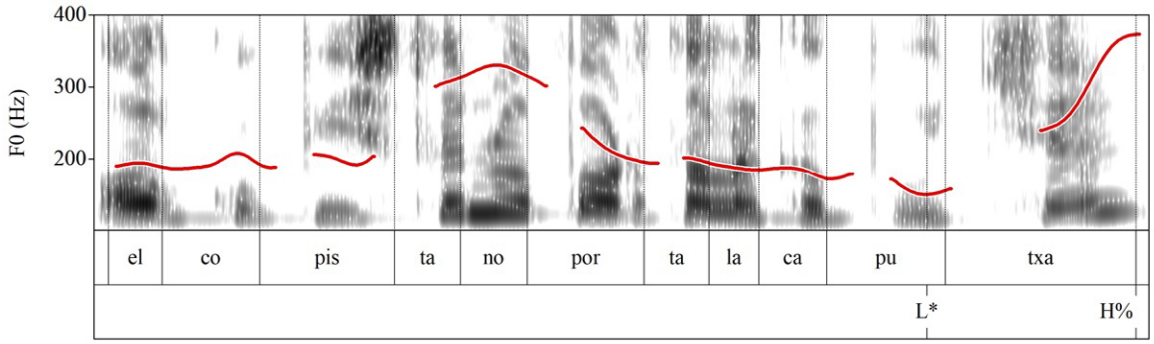


FIGURE 16

Example of yes-no question from L'Alguer (Catalan)

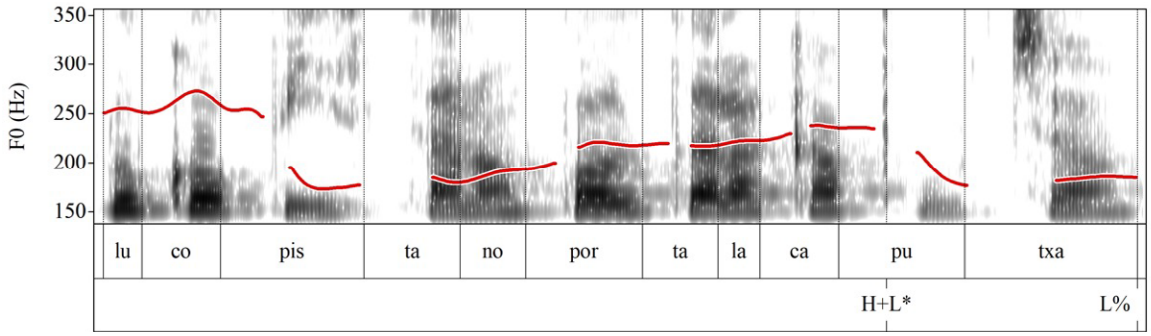


FIGURE 17

Example of yes-no question from Beivars (Friulian)

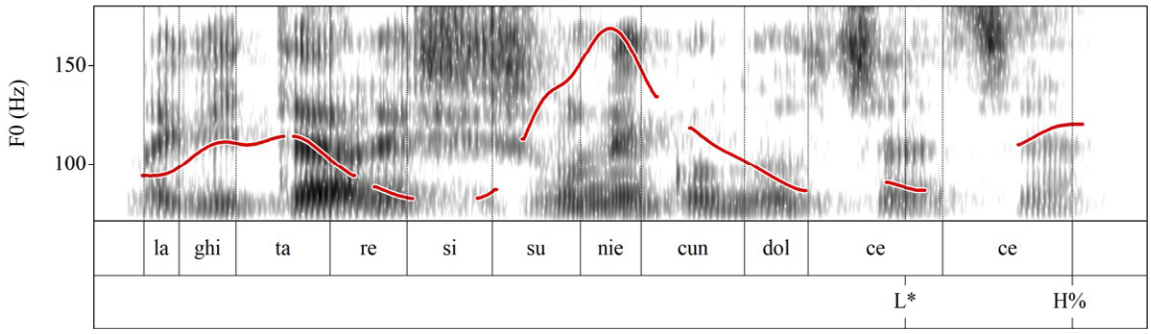
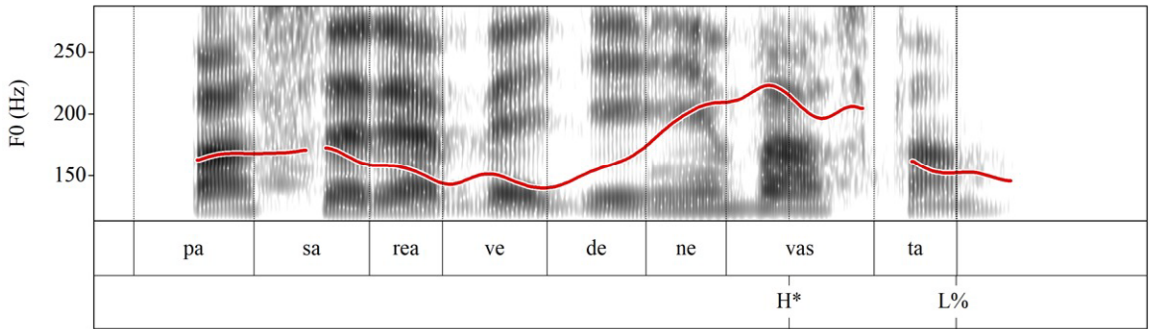


FIGURE 18

Example of yes-no question from Cluj-Napoca (Romanian)



4. Discussion

The results of this study present for the first time the application of prosodic data of Romanian varieties to the dialectometric study, together with other Romance languages.

In general terms, the results are consistent with the findings of previous studies. Among the results which can be confirmed thanks to this study, the prosody of the variety of Catalan spoken in L'Alguer (described in Martínez Celdrán et al., 2008; Vanrell et al., 2013), the prosody of Sardinian in Biddanoa and the regional Italian in Porto Torres are quite similar and this resemblance means that the three survey sites appear very often as a compact group, far from the peninsular Catalan, on the one hand, and the peninsular Italian, on the other hand. This result was previously put forward by Roseano et al. (2015a), who argue that the prosodic convergence between these three varieties is due to the influence of Sardinian.

On the other hand, one can observe that Iberian Continental varieties of Catalan and Central Peninsular Spanish are prosodically close, insofar as they both feature rising yes-no questions (see Estebas-Vilaplana and Prieto, 2010; Prieto and Roseano, 2018; among others), while the varieties of Spanish spoken in Palencia and on the Canary Islands differ, as they present a rising-falling pattern yes-no questions (Quilis, 1989; Elvira-García, 2020; Fernández Planas et al., 2020; Cabrera Abreu and Vizcaíno Ortega, 2010; Díaz Cabrera and Dorta Luis, 2015; Dorta Luis et al., 2008; Dorta and Hernández, 2004; Alvarellos Pedrero et al., 2011; Dorta Luis and Muñiz Cachón, 2009; Muñiz Cachón et al., 2007; Fernández Planas et al., 2015).

One can also note that Friulian and the Italian of Friuli show very small distances between them, while these distances are greater when compared with the Italian in Tuscany (see also on this topic Roseano, 2012, and Roseano and Fernández Planas, 2019).

As for the prosodic classification of Romanian within Romance-speaking Europe, which was the main objective of this paper, one can highlight that the dialectometric analyses we have carried out confirm that Romanian is divided into two main intonational areas, as suggested by previous research (Roseano, 2016b; Jitcă et al., 2015; Turculeț et al., 2008). These two areas remain separate and do not cluster with each other when Romanian data are analysed together with those of other Romance varieties. This suggests that the intonational differences among them are major. This notwithstanding, if we analyse questions and statements separately, we observe that in statements all Romanian survey sites cluster together, while the separation among them remains very clear if we analyse only yes-no questions. This means that the difference between the two Romanian geoprosodic groups lies in the intonation of yes-no questions.

In other words, our results show that the intonation of questions is much more relevant for dialectometric classification than the intonation of statements. This is consistent with previous findings, which strongly suggest that—in the majority of languages—the intonation of questions is one of the most relevant features of dialectal variation (Fernández Planas et al., 2011, 2015; Roseano et al., 2015a; Roseano, 2016b; Cerdà Massó, 2016).

5. Conclusions

Based on the results of this study, we can put forward conclusions on two levels: on a methodological level and on a geoprosodic level. From a methodological point of view, the tool used in the research (ProDis) proves to be useful and efficient for the analysis of prosodic distances based on acoustic values. From a geoprosodic point of view, the first conclusion that one can draw is that yes-no questions—as suggested by previous studies—reveal intonational dialectal differences more effectively than statements. Secondly, one can conclude that varieties of the same language generally tend to cluster together. Nevertheless, there are notable and interesting exceptions to this tendency. For example, the survey sites corresponding to the majority of varieties of Catalan and Central Peninsular Spanish build a single cluster. At the same time, on the island of Sardinia the three languages (Catalan, Italian and Sardinian) tend to appear together. Something similar happens in Friuli, where the regional variety of Italian and Friulian are grouped in the same cluster. In both cases (Sardinia and Friuli), the regional varieties of Italian appear in the same cluster as the local language, which is the same as Rodriquez et al. (2020) show for Sicilian. This can be explained, in line with Roseano et al. (2015a), as an effect of the presence of substrate regional languages, which transferred their prosodic pattern onto Italian during the 19th century. In fact, prosodic transfer in languages in contact is not rare in Romance (Rodríguez Vázquez, 2019). The third geoprosodic conclusion we can draw from our analysis has to do with Romanian. In the case of Romanian, we can confirm that there is a difference between the two main areas, and that this difference is due mostly to the Fo contour in questions. As a final remark, one should highlight that, as shown in previous studies, dialectal clusters based on prosodic data do not coincide exactly with the traditional clusters based on segmental, morphological and segmental levels. This strongly suggests that prosodic geolectal differences should be integrated in future dialectal classifications, in order to have a more comprehensive picture of geolinguistic variation.

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