Article

Tonal Proximity Relationship in the Spanish of the Canary Islands in the Light of Dialectometry

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Abstract: Traditional linguistic geography has not dealt with issues relating to the prosodic study of languages and linguistic varieties. The international project AMPER (*Atlas Multimédia Prosodique de l'Espace Roman*) achieves a key milestone in this area by studying the prosody of Romance languages and varieties in order to disseminate research outcomes in the form of interactive online atlases. Using prosodic data from a wide corpus of declarative and interrogative sentences, obtained from a range of informants from the seven Canary Islands (AMPERCan), a dialectometric study was carried out with a tool especially designed within the framework of AMPER. Correlation values, dendrograms as well as multivariate analysis by means of the multidimensional scaling technique (MDS), have enabled us to establish relationships of close prosodic proximity among the Canary Islands.

Keywords: dialectometry; intonation; declarative and interrogative sentences; dialectology of the Canary Islands

1. Introduction

The study of the Spanish language spoken in the Canary Islands has been the subject of significant research. Earlier work that has had a powerful impact on traditional dialectological studies in this linguistic field is the "*Linguistic and Ethnographic Atlas of the Canary Islands*" (ALEICan), by Alvar (Alvar 1975). This important atlas was created within the context of linguistic geography in order to arrange data from the Canary Islands in the form of printed cartography, and subsequently trying to identify regularities and differences derived from them. This type of methodology, although significant in the field of dialectological studies of different languages and linguistic varieties, has important limitations (Álvarez et al. 2006). In this respect, Geolinguistic studies have tried to be renewed by introducing, among other things, statistical and computer techniques that allow a greater amount of data to be processed in a more objective way.

In this regard, Dialectometry was introduced to the field of dialectological studies in the 1970s (Séguy 1973). According to Goebl, one of its most recognized proponents, this discipline arises from the alliance between linguistic geography and techniques of numerical taxonomy in order to mathematically process a large amount of data and distribute them spatially depending on their degree of affinity. By doing so, multivariate analysis and the statistical technique allow for the measurement of the linguistic distance between the location or area which has been analyzed. The interpretation of the results is provided by graphic representations, such as dendrograms, which organize the data in the form of a tree diagram or correlation charts among other forms (Goebl 1981; Fernández-Planas et al. 2015). For this reason, Dialectometry has been widely accepted to establish phonetic or lexical relationships between languages, such as Italian (Bauer 2003), French (Séguy 1973; Goebl 1987, 2002,

2003), Galician (Álvarez et al. 2006; Sousa 2006; Saramago 2002), Bable (D'Andrés Díaz et al. 2007) or Catalan (Clua 2004; Polanco Roig 1992; Fernández-Planas et al. 2011).

However, until a few years ago, the integration of prosodic data had not been previously considered in the traditional linguistic geography or in the dialectometric studies. The international project AMPER (*Atlas Multimédia Prosodique de l'Espace Roman*) marks a key milestone since it is concerned with the prosody of Romance languages and varieties in order to disseminate research results in the form of interactive atlases online. The methodology of this macro project has allowed to obtain a large amount of prosodic data (in Hz, St, etc.) that can then be subjected to a dialectometric analysis in order to establish distance relationships between languages and varieties studied from statistical indicators. Therefore, research within the framework of AMPER has been trying for a few years to adapt or improve dialectometric tools that enable the spatial distribution of prosodic data. Thus, Rilliard and Lai (2008), among others, started working on 'Stat-Distances'. Later, the Phonetic Laboratory research work at the University of Barcelona did so with two different routines. Calcu-Dista worked with a matrix of distances of quantitative data of F0 in semitones and DiaTech, originally developed by the research team of the University of the Basque Country (Aurrekoetxea et al. 2013), performing distance analysis with nominal data (Fernández-Planas et al. 2011, 2015). The AMPER-Galicia group has also designed a software tool for the statistical analysis of R data (Martínez Calvo and Rei 2015). Additionally, the evaluation of prosodic distance and a correlation method have been applied to Italian and Portuguese (Romano et al. 2011; De Castro Moutinho et al. 2011). Lastly, the Phonetic Laboratory team members from Barcelona, as a continuation of their initial research in this field, have designed a new tool entitled ProDis (Elvira-García et al. 2015, 2016; Fernández-Planas 2016a, 2016b; Fernández-Planas et al. 2017).

The aim of this work is to perform a dialectometric analysis with ProDis from a large amount of prosodic data obtained with the AMPER methodology, applied to the declarative and interrogative intonation in the Canary Islands (AMPERCan). It is our intention to establish in this way the degrees of prosodic proximity between the seven islands, starting from the parameter F0. Our initial hypothesis, based on previous studies carried out within the framework of AMPERCan, is that the ProDis statistical and correlation analyses will show close prosodic contact between the islands, although some kind of variation is expected, particularly in the interrogative sentences.

2. Methodology

2.1. Informants

There are fourteen selected informants, men, and women from the seven Canary Islands (see Figure 1) with primary education. They are representative of the survey area, given that they were born and have lived there all or most of their lives. Their characteristic features are shown in Table 1.
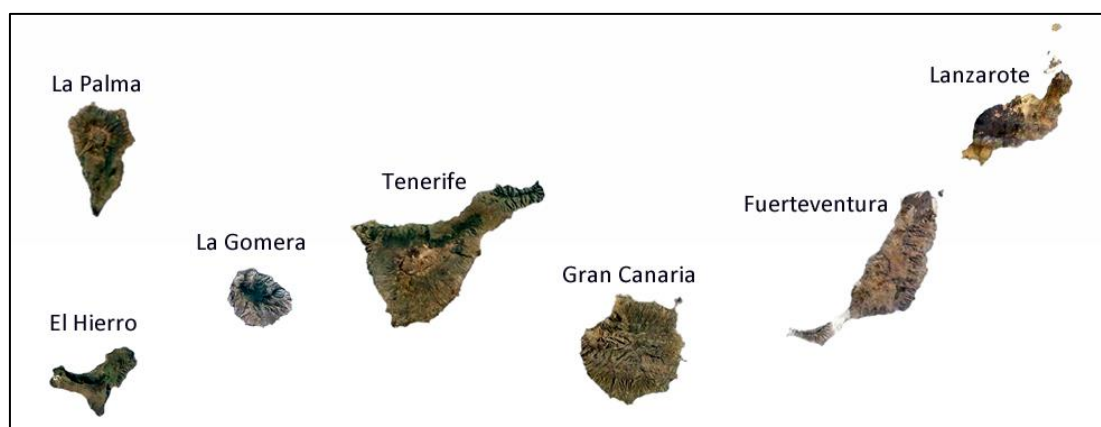

Figure 1. Map of the Canary Islands.

**Table 1.** Identification of the informants in the study.

Informants				
Code[1]		Hometown and Survey Area	Age	Study Levels
Women	Men			
WCq1	WCq2	Valverde (El Hierro)		
WCo1	WCo2	San Sebastián de La Gomera (La Gomera)		
WCm1	WCm2	Santa Cruz de La Palma (La Palma)		
WC91	WC92	San Cristóbal de La Laguna (Tenerife)	25–55 years old	Without higher education
WCk1	WCk2	Las Palmas de Gran Canaria (Gran Canaria)		
WCn1	WCn2	Puerto del Rosario (Fuerteventura)		
WCp1	WCp2	Arrecife (Lanzarote)		

2.2. Corpus Data

The dialectometric study of the two modalities was carried out on the basis of the prosodic data obtained from the analysis of 3.024 sentences from the fixed or ad hoc corpus considered in AMPER (Table 2). Two types of subcorpus have been taken into account:

(a) Without expansion: In this case, the sentences have a basic structure S + V + O (subject, verb, object) where S and O are formed by three-syllabic words stressed on the last syllable, on the penultimate syllable, and on the antepenultimate syllable. Each informant issued 27 sentences (9 × 3 repetitions) in each modality. An example of the tonal curve (in Hz) of the two modalities of this type of corpus can be seen in Figure 2a.

(b) With an expansion in the object: It consists of 81 sentences (27 × 3 repetitions) with the structure S + V + O + Exp. SVO was set in the same way as the short corpus. The expansion of the object is made up of words based on stress from the Spanish language (see Figure 2b).

(**a**)　　　　　　　　　　　　　　　　　(**b**)
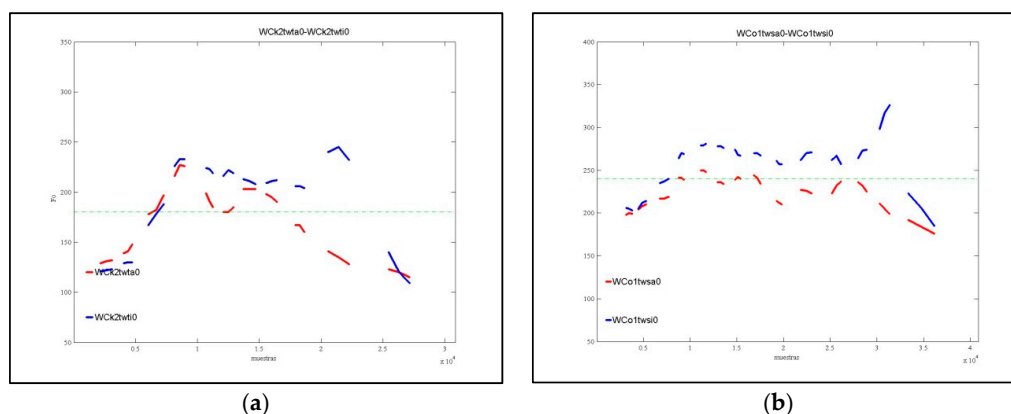
Figure 2. (**a**) Average of F0 from *La guitarra se toca con paciencia* ('The guitar is played with patience') pronounced as a declarative sentence (WCk2twta0, the curve in red) and as an interrogative sentence (WCk2twti0, the curve in blue) by a man from Las Palmas de Gran Canaria; (**b**) Average of F0 from *La guitarra se toca con paciencia finita* ('The guitar is played with finite patience') pronounced as a declarative sentence (WCo1twsa0, the curve in red) and as an interrogative sentence (WCo1twsi0, the curve in blue) by a woman from La Gomera.

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[1]　In the code of each informant **W** stands for *Spanish*, **C** stands for *the variety of the Canary Islands*; the third digit identifies *the place of origin* and the last digit *sex of the informants* (women = 1; men = 2).

Table 2. Corpus selected for the dialectometric study.

	Corpus			
	S + V + O		S + V + O + EXP	
	D	**I**	**D**	**I**
Women	189	189	567	567
Men	189	189	567	567
	378	378	1134	1134
Total	756		2268	
	3024			

2.3. Collecting the Data

The data collected for the dialectometric analysis were obtained in the initial stage with routines created specifically for AMPER in the Matlab environment (Romano 1995). From 2007, an adaptation of the initial routines implemented in the AMPER2006 program at the University of Oviedo (Brezmes-Alonso 2007) were used. This enabled the attainment of three values of F0 from each vowel—a starting point, midpoint, and a final point—a value for duration and a value for intensity, which are collected in data files (.txt). The resulting F0 values are given in Hz (absolute values) and in St (relative values).

2.4. Acoustic Data Processing with ProDis

The purpose of ProDis is to represent the data of the seven Canary Islands according to their relations of proximity and prosodic distance. As indicated by the authors of this working tool (Fernández-Planas et al. 2019), on the basis of the acoustic data, ProDis calculates the mean and median correlation (Pearson) from informants and survey area. This allows to demonstrate numerically the degree of relationship between them and the extent to which they are related. Then, a cluster analysis will be carried out to classify them into different groups according to their similarity.

In order to understand relationships through modality, the dialectometric analyses of the two subgroups of the corpus (Section 2.2) were carried out by separating the declarative sentences from the interrogative ones. Then, they were analyzed together in order to observe the extent to which one or another modality influences the results. It should be stressed that due to space restrictions, this work only examines F0, that is, we have not weighed this parameter considering duration and intensity. The dialectometric analysis was undertaken with tonal values in semitones, in other words, with standard data and not with gross values in Hz.

3. Results

3.1. Declarative Sentences

Declarative sentences in The Canary Islands, as it can be expected in standard Spanish and shown in Figure 2a,b above, are characterized by a falling tonal pattern in its final/L * L%/(Dorta et al. 2018a).

Figure 3a,b represents graphically simple sentences correlation matrices (SVO) by survey areas as well as those with expansion in the object (SVO + Exp). Correlation maps rearrange these areas by similarity and allow us to display in a scale on the right the numerical value of the correlation index resulting from the contrasts analysed. The value oscillates in the interval between 1 and −1 (a value of 0 indicates that there is no relationship between the variables). As can be seen in Figure 3a,b, positive values are associated with lighter colours until 1 is reached, which indicates a perfect positive correlation (for example, if La Palma is contrasted with itself, then the value is 1 associated with the white colour). By contrast, negative values are associated with darker colours until a maximum of −1 is reached (black colour), which is viewed as the maximum value of dissimilarity.
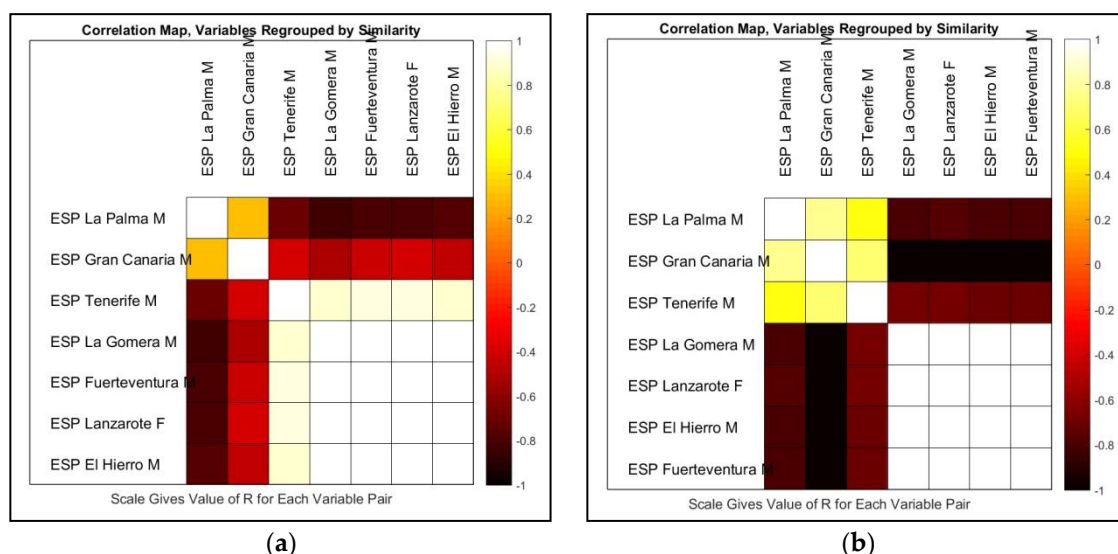
Figure 3. (**a**) Correlation matrix by survey areas for simple declarative sentences; (**b**) Correlation matrix for sentences with expansion in the object.

The contrasts between La Gomera, Fuerteventura, Lanzarote and El Hierro illustrate a positive correlation value of 1, as it is shown in the correlation map regarding simple SVO sentences (Figure 3a). In this sense, the similarity between these islands reveals a positive maximum value. The correlation value is also positive and close to 1 between these islands and Tenerife (0.8/1), although this value decreases between Gran Canaria and La Palma (0.2). On the other hand, the correlation values between Gran Canaria (−0.2/−0.6), and even more La Palma (−0.6/−0.8) and the other five islands are negative, pointing out, in these cases, greater dissimilarity. Regarding longer sentences (SVO + Exp), the most important variation with respect to simple sentences is that the correlation of Tenerife with La Palma and Gran Canaria is now positive (0.4/0.8); by contrast, the correlation with La Gomera, Lanzarote, El Hierro and Fuerteventura is negative (−0.4/−0.8). Moreover, the correlation value between La Gomera, Lanzarote, El Hierro and Fuerteventura remains 1 as in the SVO sentences.

Once the correlations have been established, ProDis undertakes a hierarchical agglomerative cluster analysis that creates groups by survey areas or by informants based on the distance between them. The dendrograms (Figures 4 and 5) illustrate the cluster by areas. As it is shown, these clusters are related to the correlation values we have seen above.

In the SVO sentences (Figure 4), two clusters are clearly established at a distance of 0.8. The first cluster includes five of the seven islands, that is, Tenerife, Lanzarote, Fuerteventura, La Gomera and El Hierro. The second cluster includes La Palma and Gran Canaria, more distant from the other five islands. However, if we take into consideration intracluster differences, it should be emphasised that the islands in the first cluster are brought together at a distance of 0.2 or less, so the distance between them is very short or non-existent. Instead, La Palma and Gran Canaria are less close to each other so if we make a cut at a distance of 0.6 they should be separated into different clusters.

The dendrogram from the sentences with expansion in the object (Figure 5) shows two clusters located at a shorter distance than in the previous case (close to 0.6); however, in line with correlation values, a significant difference compared with short sentences is that Tenerife is now clumped together with La Palma and Gran Canaria. Nevertheless, if we consider intragroup differences it can be seen that Tenerife is the most distant from the three islands, so if we make the cut at 0.4, it would be in a different cluster. It should also be noted that in the cluster formed by Lanzarote, La Gomera, El Hierro and Fuerteventura these islands reappear very close together within a very short distance (between 0 and 0.2).
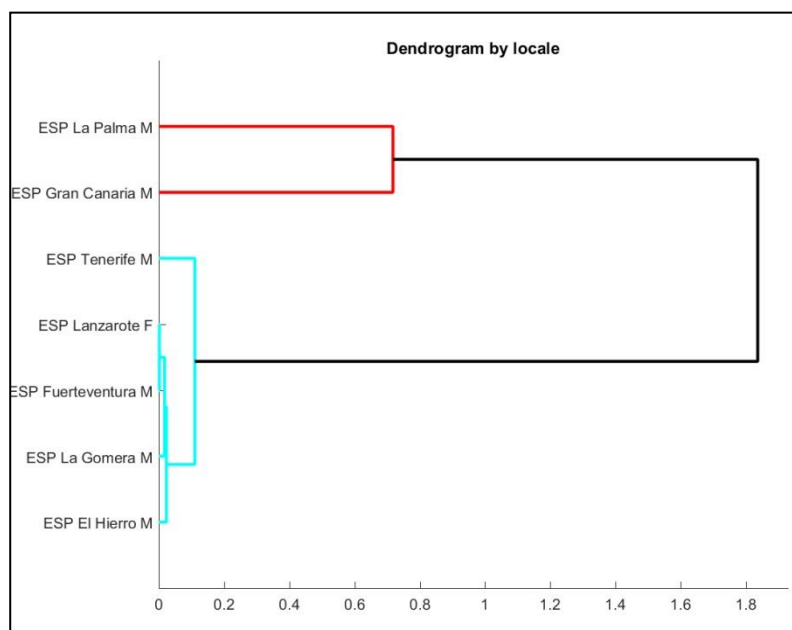
Figure 4. Dendrogram of SVO declarative sentences by areas (vertical axis) and distance values along the horizontal axis.
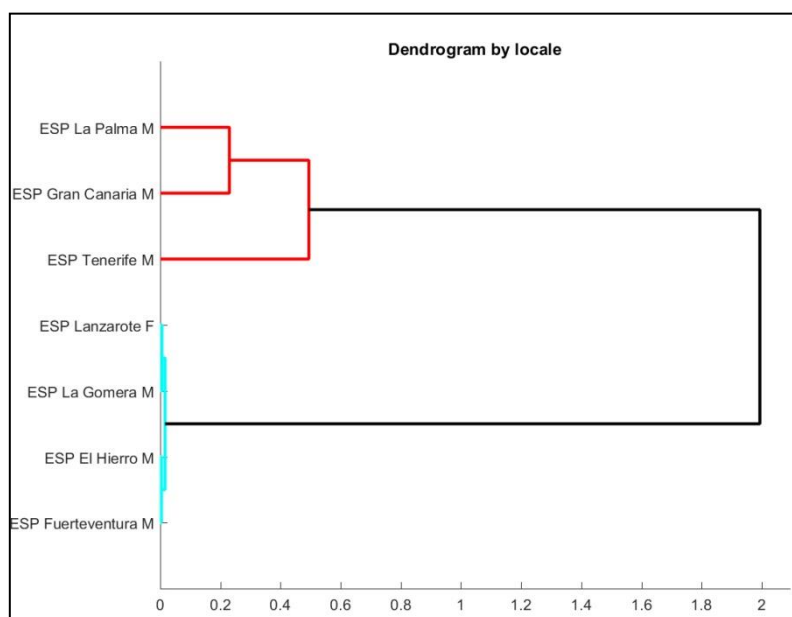
Figure 5. Dendrogram of SVO + Exp declarative sentences by areas (vertical axis) and distance values along the horizontal axis.

Finally, the distribution of all the informants analysed in a virtual space using the multivariate interdependence technique of multidimensional scaling (Multidimensional Scaling, MDS) represents the close relationship between them. In three-dimensional Figures 6 and 7, it is observed that the informants showing a closer distribution are grouped by colour.

The distribution in the SVO corpus reveals that the most distant informants are the woman from La Palma (F) and the man from Gran Canaria (M), whereas the informants of the opposite sex in both survey areas appear closer in the virtual space along with the rest. However, among these, three groups are distinguished.

Figure 7, related to declarative sentences with expansion in the object, shows a more heterogeneous distribution of informants than in simple sentences. It is worth highlighting that, in this case, women from Tenerife and La Palma appear close to the informants from Gran Canaria.
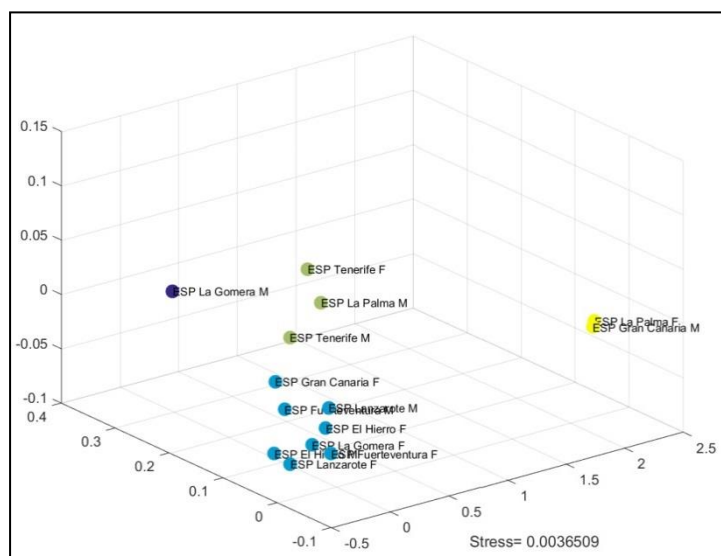

Figure 6. Three-dimensional MDS of SVO declarative sentences with the value of Stress.
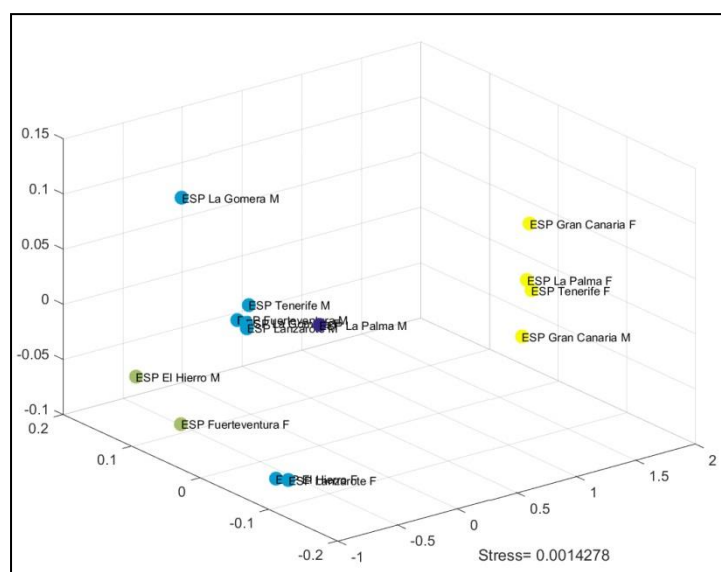

Figure 7. Three-dimensional MDS of SVO + Exp declarative sentences with the value of Stress.

As Figures 6 and 7 show, the stress values (which give the reliability of the graphical representation) are very good (0.003 and 0.001) since the closer they get to 0 the more suitable they are (Kruskal 1964 suggested the following interpretations: 0.2, *Poor*; 0.1, *Acceptable*; 0.05, *Good*; 0.025, *Very Acceptable*; and 0.0, *Excellent*).
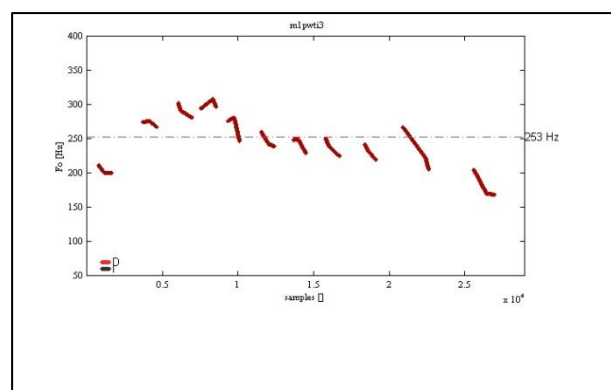
3.2. Interrogative Sentences

As it has been pointed out in previous studies (Dorta 2013, 2018; Díaz and Dorta, 2015, 2016; Jorge Trujillo 2015; Dorta and Jorge 2017), we find two different tonal patterns in the interrogative sentences in the Canary Islands: one with a rising-falling ending (or circumflex)—L + ¡H* L%—which is the most frequent feature of the Canary Islands (Figure 8a) and a more unusual tonal pattern with a rising ending, similar to the standard Spanish, used in El Hierro, La Gomera and Fuerteventura/L*+H

H%/(Figure 8b). Both patterns have been checked in the formal corpus of El Hierro, Fuerteventura and La Gomera, even alternating with the same speaker. Nevertheless, the highest frequency of the rising tonal pattern has been shown in the first of these islands (Jorge Trujillo 2015), while in Fuerteventura and La Gomera (Jorge Trujillo 2015; Díaz 2013) the most characteristic pattern is the circumflex. On the other hand, although the circumflex pattern is characterized by a peak in the word stem stressed vowel followed by a falling ending (Figure 8a), (Dorta 2008; Dorta and Mora 2011) a configuration with a falling ending preceded by a high plateau was found in La Palma, whereby there is no tonal peak in the stressed vowel/H* L%/(Figure 9). Taking into account these differences regarding intonational patterns, a greater distance between the different areas and informants in relation to the declarative sentences is expected in the analysis of the formal corpus.

| (a) | (b) |
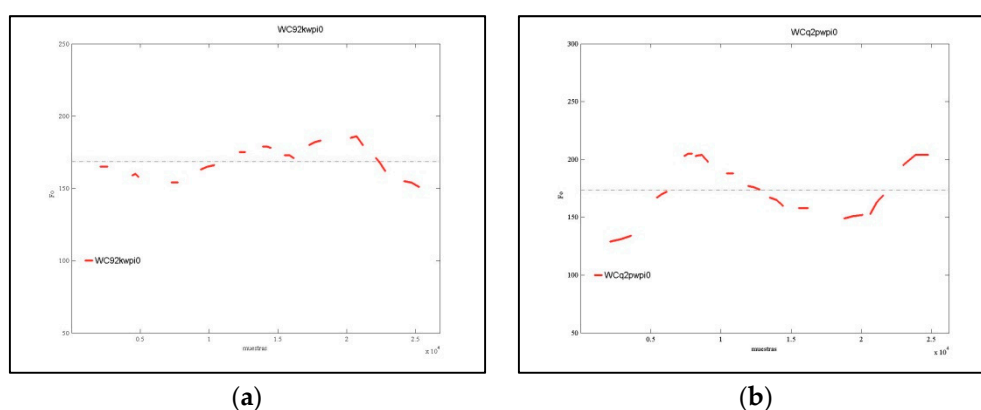
Figure 8. (**a**) Average from *El saxofón se toca con pánico* ('The saxophone is played in panic'), uttered as an interrogative sentence by a man from Tenerife; (**b**) *La cítara se toca con pánico* ('La zither is played in panic'), uttered as an interrogative sentence by a man from El Hierro.


Figure 9. Average from La cítara se toca con paciencia ('The zither is played with patience') uttered as an interrogative sentence by a woman from La Palma.

As illustrated in Figure 10a, the correlation matrix by survey areas from the SVO sentences shows that the greater presence of the rising pattern observed in El Hierro clearly influences the negative correlation value (−0.6, in the case of the correlation with Tenerife, it becomes −1) between this island and Lanzarote, Gran Canaria, Fuerteventura, La Gomera and Tenerife. On the other hand, the contrast between El Hierro and La Palma yields a positive value, although low (0.2), so the degree of dissimilarity between these two islands is lower. The correlation of values between La Palma and the rest of the islands is negative but not very high (−0.2). Furthermore, the correlation value between Lanzarote, Gran Canaria, Fuerteventura and La Gomera is 1, that is, there is no dissimilarity. The value is still positive but slightly lower (0.6) between these islands and Tenerife, so there is a certain degree of dissimilarity. In the sentences with an expansion in the object (Figure 10b), the correlation value between Lanzarote, Fuerteventura and La Gomera is still 1, as in the case of the short

sentences. By contrast, the correlation between these islands and Gran Canaria has varied showing now a negative value (−0.4/−0.6) that reveals greater dissimilarity. El Hierro, on the other hand, continues to show dissimilarity in reference to the other islands, as illustrated by the always negative correlation values, although the contrast with Tenerife continues to stand out, where the value is still −1 as in the SVO sentences. As far as La Palma is concerned, the correlation values are positive in contrast to Gran Canaria (0.6) and Tenerife (0.2), and negative (−0.2/−0.6) comparing this island with Lanzarote, Fuerteventura, El Hierro and, further, La Gomera.
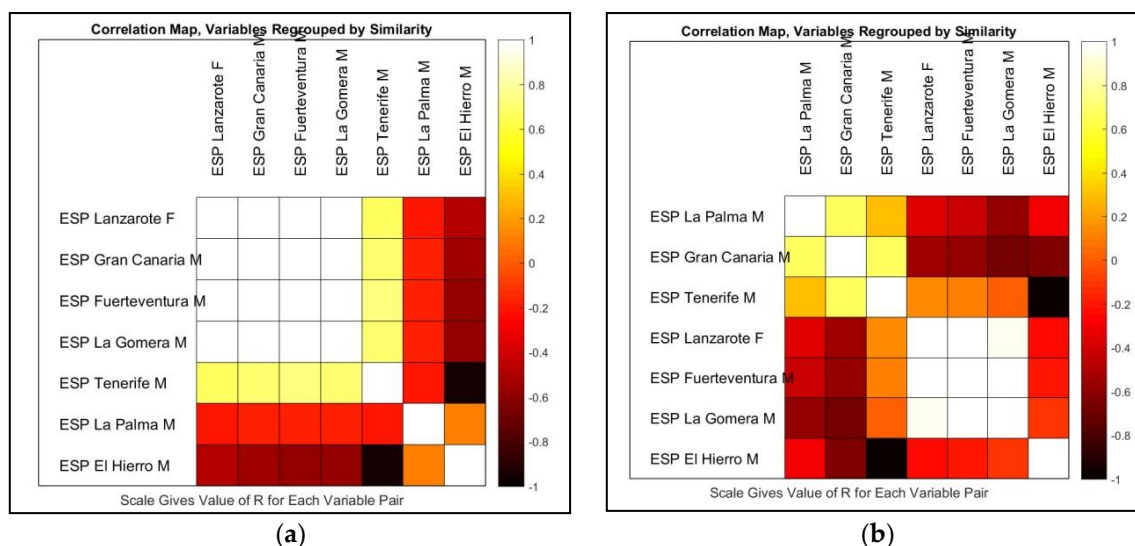

Figure 10. (**a**) Correlation map by survey areas in the simple interrogative sentences; (**b**) Correlation map by survey areas with expansion in the object.

In line with the correlation values, ProDis shows the creation of two well- delimited clusters in the SVO sentences (Figure 11): one formed by La Palma and El Hierro and the other by the rest of the islands. Taking into account the intracluster variety, it is clearly shown in this last cluster the great prosodic proximity between Lanzarote, La Gomera, Gran Canaria and Fuerteventura and the greater distance from Tenerife, as we had seen in the correlation values. Moreover, if we make a cut at a distance between 0.4 and 0.6, El Hierro appears isolated from the rest of the islands, although it continues to be closer to La Palma, which is also separated from Tenerife, Gran Canaria, Fuerteventura, La Gomera and Lanzarote.

As it was seen in the correlation map (Figure 10b), the case of interrogative sentences with expansion in the object varies slightly in relation to SVO sentences. Hence, although two clusters continue to be formed at a distance close to 1.4, intracluster relationships vary accordingly (Figure 12). La Palma now clumps together in the same cluster with Gran Canaria and Tenerife in line with the correlation values that show the contrasts between these islands. However, there is a greater proximity between the last two islands, so if we make a cut at a very short distance (less than 0.6) they are isolated in the same cluster as compared with La Palma that moves away in a single cluster, although closer to those two islands than to the rest. Furthermore, within the cluster that brings together the rest of the islands, it is clear that El Hierro appears more distant from La Gomera, Fuerteventura and Lanzarote, which according to the correlation values are clumped together at a very short distance (less than 0.2). Therefore, if we take into account the intracluster differences and in accordance with the correlation values, El Hierro would be isolated from those three islands at a short distance into a single cluster.
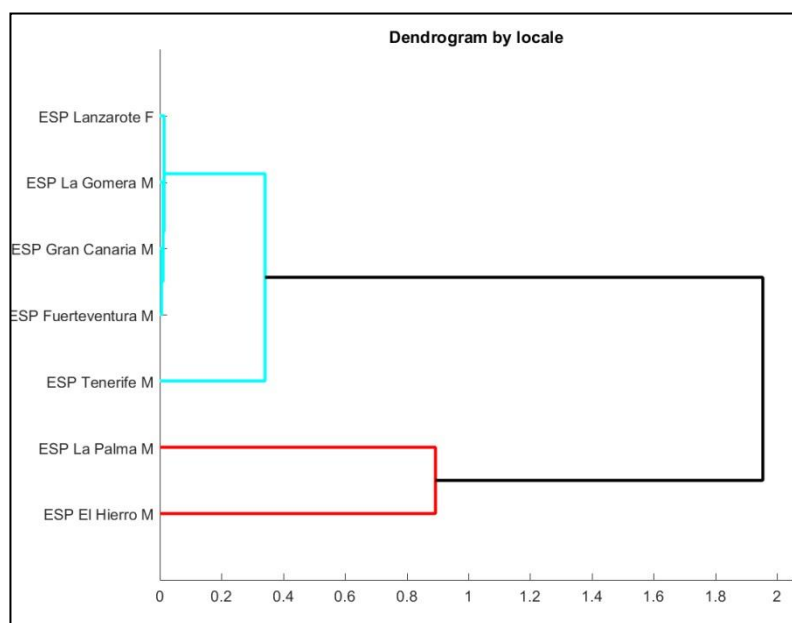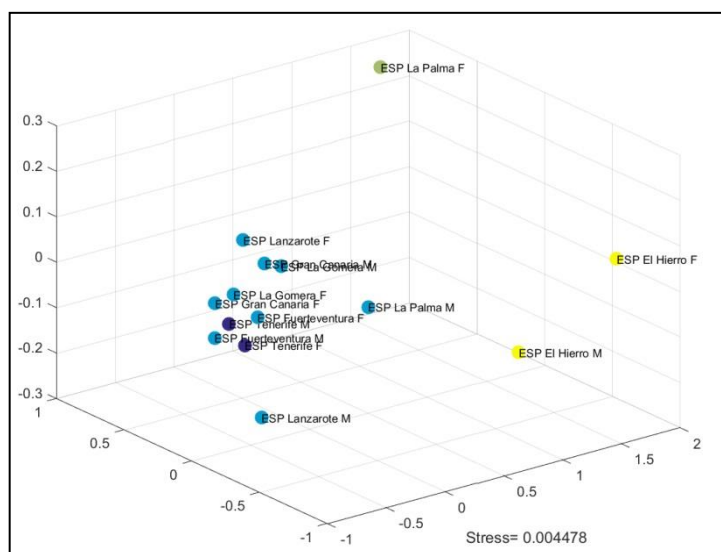
Figure 11. Dendrogram of SVO interrogative sentences by areas (vertical axis) and distance values along the horizontal axis.
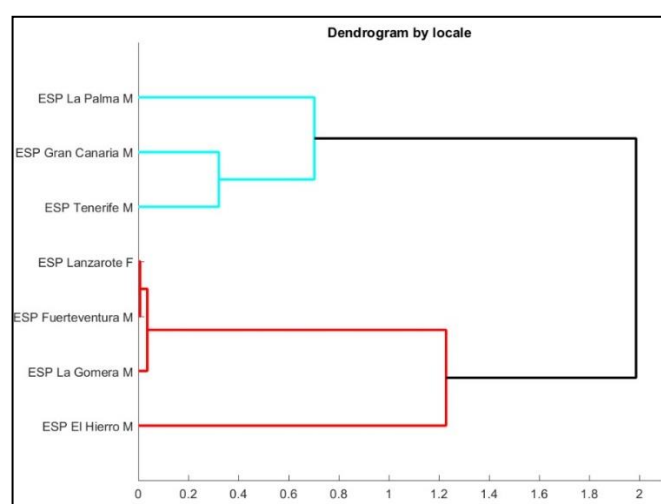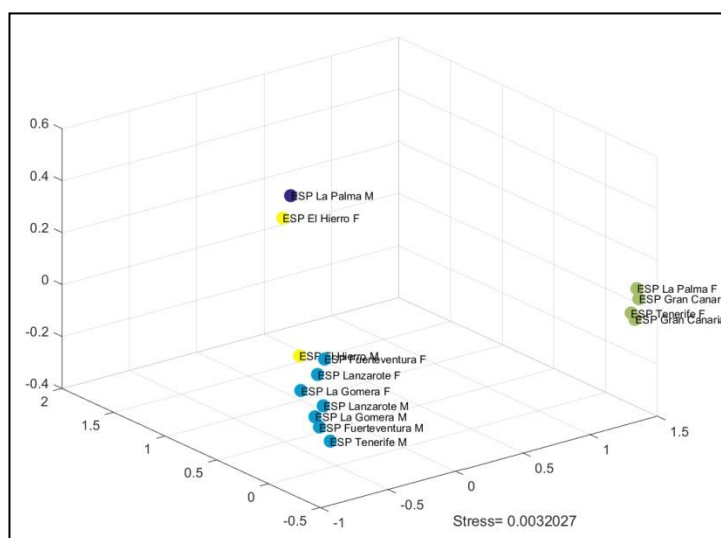

Figure 12. Dendrogram of SVO + Exp interrogative sentences by areas (vertical axis) and distance values along the horizontal axis.

The distribution of all the informants analysed with the MDS technique allows us to check that in the SVO sentences (Figure 13) the two informants from El Hierro (they use a pattern with a rising ending) appear with a more isolated distribution with regard to the rest. Additionally, the woman from La Palma (she uses a pattern with a high plateau and a falling ending) stands apart from the cluster made up of most of the informants (they use a circumflex pattern), who distribute themselves very close throughout the virtual space.

Figure 13. Three-dimensional MDS of SVO interrogative sentences with the value of Stress.

In the sentences with expansion in the object, we can see that the distribution of the informants using the same MDS technique (Figure 14) allows us to see that most informants appear in the same virtual space; the man from La Palma and the woman from El Hierro are more isolated from this major cluster and the same is true for the women from La Palma, Tenerife and Gran Canaria, together with the man from this last island who are also separated in a more distant cluster.

**Figure 14.** Three-dimensional MDS of SVO + Exp interrogative sentences with the value of Stress.

Figures 13 and 14 show that the values of stress are, as in the case of declarative sentences, very good values as they approach 0 (0.004 and 0.003).

3.3. Declarative Sentences vs. Interrogative Sentences

In order to verify whether the interrogative sentences have a greater weight than the declarative sentences to establish relations of a greater distance or proximity between the islands, a joint dialectometric analysis of the two modalities has been carried out by areas.

After comparing the clusters that were formed in the declarative (Figure 4) and interrogative (Figure 11) SVO sentences to the joint analysis of both modalities (Figure 15), we observe that the result of the last analysis is more similar to the single analysis of SVO interrogative sentences. In fact, El

Hierro and La Palma are joined in the same cluster in relation to the rest of the islands that form a second cluster. However, if we make a cut at a distance lower than 1.4, those two islands are separated into different clusters. In addition, in the major cluster, Tenerife appears more distant from the rest as in the case of interrogative sentences, so if we make a cut at a distance of 0.4, this island appears in an isolated cluster, as compared with Fuerteventura, Lanzarote, La Gomera and Gran Canaria that are joined in the same cluster. In any case, the relationships between these islands are more distant from those that occurred in the isolated interrogative sentences, so it is clear that the joint analysis of the two modalities has had some influence on these relations.
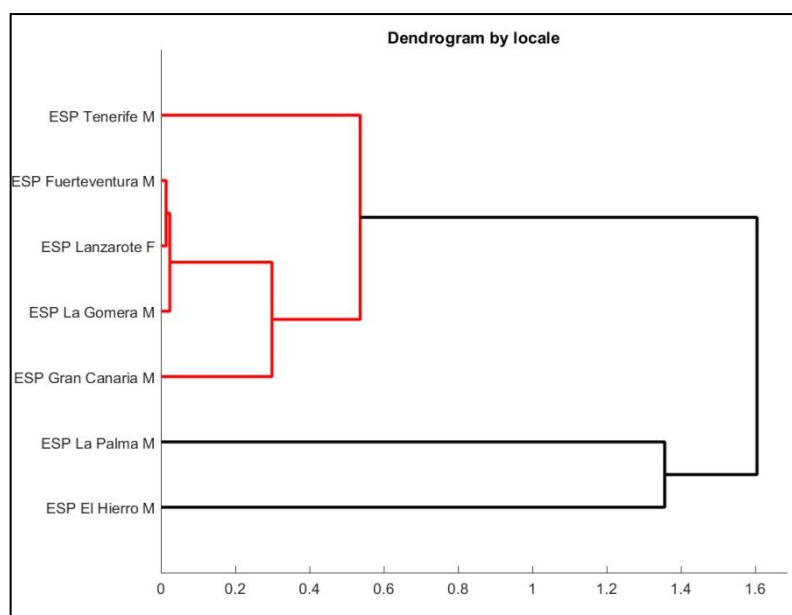
Figure 15. Dendrogram of SVO declarative vs. interrogative sentences by areas (vertical axis) and distance values along the horizontal axis.

Concerning the sentences with an expansion in the object, if we compare the dendrogram of the declarative sentences (Figure 5) and interrogative sentences (Figure 12) with the dendrogram from the joint analysis of the two modalities (Figure 16), it is observed that within a distance between 0.6 and 0.8 two clusters are formed: the first cluster clumps together the same islands that we saw in the cluster belonging to the group of declarative and interrogative sentences, that is, La Palma, Gran Canaria and Tenerife. However, in the joint analysis of the two modalities, the intragroup relations are basically the ones we saw in the declarative sentences, since La Palma and Gran Canaria appear closer to each other compared with Tenerife; whereas in the case of the isolated interrogative sentences, La Palma was the most distant from the three islands. By contrast, in the second cluster formed by the rest of the islands, the intracluster relations reveal greater proximity to the individual analysis of the interrogative sentences, particularly since El Hierro remains more distant from the rest of the islands. In fact, if we make a cut at a distance lower than 0.4, this island is isolated from the rest in a different cluster.
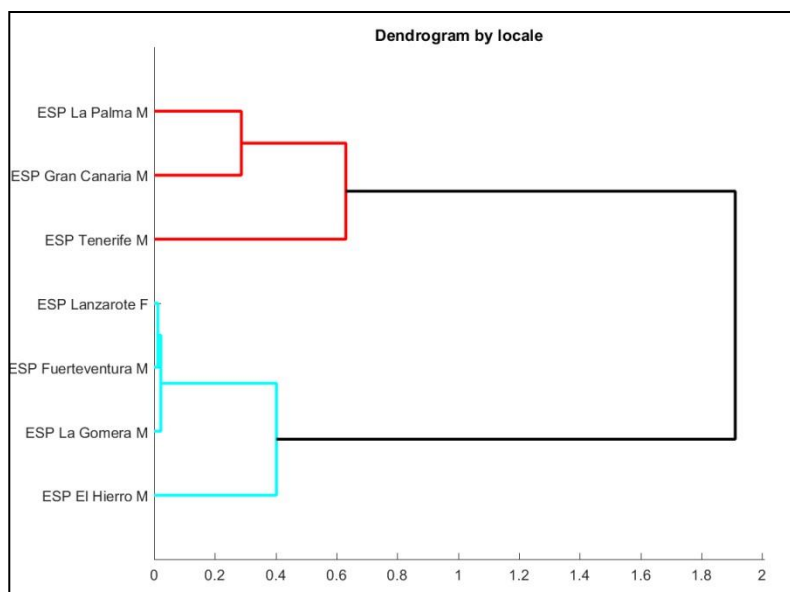
Figure 16. Dendrogram of SVO + Exp declarative vs. interrogative sentences by areas (vertical axis) and distance values along the horizontal axis.

4. Discussion

Dialectology in the Canary Islands has been the subject of numerous studies and, within the field of linguistic geography, specifically regarding ALEICan by Alvar (Alvar 1975); however, prosodic studies are toorecent. The research carried out by AMPERCan has contributed significantly to the development of these studies by providing numerous prosodic data that have allowed for the distinction of intonational patterns that determine the level of intonation and stress in the Canary Islands (Dorta 2002–2019).

Analysing prosodic data with the techniques offered by the dialectometry establishes a new and interesting dimension in the research of Canary Islands. From this point of view, so far there have been only two previous studies related to the Canary Islands. In the first one, the dialectometric study was carried out with the routines mentioned in the introduction of this work, that is, Calcu-Dista and DiaTech. We studied prosodic distance relationships of varieties in the Spanish mainland territory (Barcelona, Lleida, Palencia, Salamanca, Madrid and Bullas) and in the insular Spanish language (Palma de Mallorca, Santa Cruz de La Palma, San Cristobal de La Laguna, Las Palmas de Gran Canaria, Arrecife, Havana and Santiago de Cuba) (Fernández-Planas et al. 2015). In more recent work (Dorta et al. 2018b), the aim was to establish relationships of distance and proximity between the seven Canary Islands and other American varieties of the Spanish language (Cuba, Venezuela, Colombia and San Antonio, Texas).

In order to analyse specifically the distance and prosodic proximity relationships between the seven Canary Islands by means of dialectometry, in the present work, as in the last one mentioned (Dorta et al. 2018b), the dialectometric study was carried out with ProDis, a tool specially designed to examine prosodic data within the framework of AMPER (Elvira-García et al. 2015, 2016; Fernández-Planas 2016a, 2016b; Fernández-Planas et al. 2017). In contrast to other tools, ProDis enables the user to work mathematically with a large amount of numerical data and distribute them spatially depending on their affinity relationships. This tool has been used to study the prosodic data of the declarative and interrogative sentences from a brief formal corpus (SVO) and, for the first time, from another formal corpus with expansion in the object (SVO + Exp). Both results reveal few significant differences between them and allow us to make the following remarks:

(1) The data from SVO and SVO + Exp declarative sentences show great prosodic proximity between the Canary Islands. This is not unusual considering that in this modality all of them share a

falling intonational pattern in its ending. In any case, although this pattern plays an important role in the dialectometric analysis which has been carried out, it is obvious that other less transparent factors such as the tonal range, scaling and position of the peaks, etc., can influence the results. However, in relation to the Canary Islands, this possible influence has little effect, as shown by the following findings:

(a) In the SVO sentences, the correlation values indicate an absolute degree of similarity between La Gomera, Fuerteventura, Lanzarote and El Hierro; further, between these islands and Tenerife, the similarity is very high. The most distant islands are La Palma and Gran Canaria. According to the correlation values, two clearly delimited clusters are formed, revealing the great prosodic proximity between the first five islands and the greatest distance between them with regard to the last two islands. In any case, the formation of the two clusters at a distance lower than 0.8 highlights the proximity between them. The distribution of informants using the multivariate interdependence technique of multidimensional scaling (MDS) reveals that women, in the case of La Palma, and men in the case of Gran Canaria show a more distanced distribution as opposed to the rest, which are clustered in a nearby virtual space.

(b) In the sentences with expansion in the object, the most considerable variation in reference to the shortest sentences is that the correlation values indicate the closer proximity of Tenerife to La Palma and Gran Canaria in relation to the rest. Accordingly, the dendrogram by area shows a shorter distance between these three islands and a greater distance with regard to the four remaining islands, which form a cluster with close proximity to each other as in the SVO sentences. However, it should be noted that at a distance lower than 0.6, the two clusters are formed, which shows that there is great proximity between them. The distribution of the informants following the MDS technique is more heterogeneous in this type of sentence, such that the informants who have a very close relationship in the central area of the distribution are men from Lanzarote, Tenerife, Fuerteventura and La Palma together with the women from La Gomera; the rest constitute a more dispersed distribution.

(2) The analysis of the interrogative sentences has made it possible to determine that the presence of the tonal patterns that occur in this modality have influenced the relationships of distance and proximity between the islands, as is illustrated by the following facts:

(a) In the SVO sentences, the predominant rising pattern in El Hierro, which mostly uses the circumflex pattern, determines that the contrasts between this island and the rest of the islands present negative and high correlation values, revealing greater dissimilarity. Furthermore, the pattern with a high plateau and a falling ending recorded in La Palma certainly makes the contrast of this island with El Hierro show a positive value, indicating greater similarity than the one between them and the rest of the islands. The contrasts between Lanzarote, Gran Canaria, Fuerteventura and La Gomera show positive and high correlation values that indicate an absolute degree of similarity. The similarity is also very high between these islands and Tenerife. In line with the correlation values, the dendrogram separates La Palma and El Hierro from the rest of the islands that appear in the same cluster within a short distance. The distribution of the informants using the MDS technique enables the observation of the two informants from El Hierro to appear more distant from the rest. The same is true for La Palma, but only with the women, since the men appear next to the rest of the informants.

(b) In the sentences with expansion in the object, the most important variation in relation to the short sentences is that the correlation values now bring Tenerife, Gran Canaria and La Palma closer, although the intracluster relationships reveal a greater proximity between Gran Canaria and Tenerife. El Hierro is still moving away from the rest of the islands, which appear very close to each other. According to the MDS technique, most of the informants are clustered in the same space, being more distant; on the one hand, the women from El Hierro and the men from La Palma, and, on the other hand, the women from La Palma, Tenerife and Gran Canaria along with the men from Gran Canaria.

(3) The joint analysis of the declarative and interrogative sentences without expansion has enabled us to consider the greater role being played by interrogative sentences in the formation of the clusters. Instead, in the sentences with expansion in the object, intragroup relationships show that the cluster

formed by La Palma, Gran Canaria and Tenerife is more similar to that of the isolated declarative sentences, whereas the relationships between the rest of the islands show more similarities with the interrogative sentences, thus highlighting the greater distance of El Hierro compared to the rest of the Canary Islands.

5. Conclusions

The dialectometric analysis carried out with ProDis in the declarative and interrogative modalities has revealed a slight variation between the results of the SVO and SVO + Exp sentences. It has been shown the great prosodic proximity between the islands expressed by the correlation values illustrate the contrasts between them and the resulting clusters. Despite this, it should be noted that although the relationships between most of the islands indicate an absolute degree of similarity or close distance, in the case of El Hierro and La Palma, the distance from the other islands is more systematic in the interrogative sentences, certainly due to the overwhelming presence of the rising pattern in El Hierro, as well as the plateau and falling ending pattern in La Palma. Moreover, in general terms, the different patterns that have been defined in the interrogative sentences (rising-falling ending or circumflex, falling and rising pattern) have a greater weight in setting coherent or expected groups as revealed in the joint analysis of the two modalities. Finally, it should be emphasised that this work does not conclude the prosodic analysis of the Spanish language spoken in the Canary Islands from the perspective of dialectometry. It will be necessary to observe if the results vary by weighting the parameter F0 with the other two (duration and intensity) in order to define the island intonation.

Author Contributions: Conceptualization, J.D.; methodology, J.D.; software, J.D.; validation, J.D.; formal analysis, J.D. and M.J.G.R.; investigation, J.D..; resources, J.D. and M.J.G.R.; data curation, J.D.; writing—original draft preparation, J.D.; writing—review and editing, J.D. and M.J.G.R.; visualization, J.D. and M.J.G.R.; supervision, J.D.; project administration, J.D.; funding acquisition, J.D.

Conflicts of Interest: The authors declare no conflict of interest.

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