

Acoustic analysis of intonation: comparison between two dialects of Spanish from the north of the peninsula

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Abstract

This paper introduces the melodic characterisation of spontaneous Spanish presented by speakers from two regions in the north of Spain: Asturias and Navarre, based on a conversational corpus composed of 100 utterances emitted by 62 participants. It focuses on the intonation of the dialects, an aspect which is poorly investigated but highly relevant for characterising and distinguishing one from the other.

The study is based on the *Melodic Analysis of Speech* method, a meticulous acoustic analysis through which exact values are obtained from spontaneous speech, which can then be compared. In short, the most notable coincident and divergent melodic features between the two dialects are: (1) the tendency of the two to present a first peak, more frequently tonic in Asturian Spanish and atonic in Navarrese; (2) an almost flat or slightly falling body of the contour with abundant internal inflections, which are also distinguished by the syllable where the rise ends: tonic in Asturian Spanish, and tonic and atonic in the final position of the word in Navarrese; and (3) more pronounced final inflections, with five different endings, and tonal fields, in the region of Navarre.

Keywords: Intonation; Spanish; Dialects; Navarrese; Asturian Spanish

1. Introduction

The study of the role that intonation plays in the characterisation of the varieties of a language is extremely enlightening since it is one of the elements that best determines the *raison d'être* of languages and their varieties. The use of a particular intonation gives away the geographical origin of the speakers; for example, we are able to know if a person is Asturian, Castilian or Andalusian because of their particular pronunciation, from their characteristic lexicon and syntax, but also from the specific intonation in the way they speak.

To date, several researchers have addressed the description of the basic intonational patterns of Peninsular Spanish (Navarro Tomás, 1944; Quilis, 1993; Hidalgo, 1997; Sosa, 1999; Cantero and Font-Rotchés, 2007; Face, 2008; Estebas and Prieto, 2010; Font-Rotchés and Mateo, 2013, 2017, among others). However, the geoprosodic studies undertaken on Spanish and its varieties are still scarce. Even so, it can be stated that in recent years, studies on different peninsular dialects have appeared that intend to describe some aspects relevant to each one and conduct contrastive analyses using different methodologies (Congosto, 2005, 2011; Dorta and Jorge, 2015; Fernández Planas et al., 2015, 2017; Mateo, 2014; Prieto and Roseano, 2010; Ramírez, 2005, *inter alia*). That said, if we are to focus specifically on the dialects of the north of the peninsula, there are studies on interrogatives and/or declaratives — mostly following the AMPER methodology and, in some cases, the Autosegmental-Metrical model (AM) — for Galician (Fernández Rei and Engroba, 2014; Fernandez Rei, 2016), for Asturian Spanish (Díaz Gómez et al., 2007; López Bobo et al., 2008; Alvarellos et al., 2011), for Cantabrian (López-Bobo and Cuevas-Alonso, 2010, 2014; Cuevas et al., 2011), for Spanish of the

Basque Country (Elejabeitia et al., 2008), for Navarrese (Iribar et al., 2014) and for the Spanish of Catalonia (Martínez-Celdrán et al., 2011). There is also a study that follows the MAS method (Ballesteros, 2011a) and describes some of the features of the five varieties of Spanish found in Madrid, Castile and León, Asturias, the Basque Country and Navarre.

The most extensive effort made in the field of intonational dialectology has been produced by AMPER¹. The results of all these studies are interesting and creditable; however, the characteristics of the corpus of analysis and the methodology used have major limitations: in general, they tend to be based on very few informants (between 1 and 4 per region) who are female, middle-aged, with no tertiary education and who were requested to read the same pre-prepared sentences three times. It is, therefore, a corpus of laboratory utterances, mediated by writing and removed from everyday speech, which ultimately does not reflect all the melodic richness of natural conversation. In this sense, Face (2003) demonstrated that there are notable differences in the results obtained between the intonation of Spanish declaratives in laboratory speech and in spontaneous speech. Furthermore, related to the methodology, his research is based on fundamental frequency values in Hz instead of standardised ones, an essential calculation for comparing the melodies with exact relative values coming from multiple and varied informants, and for establishing the melodic profile of a dialect or the patterns of a language. It should be remarked, that in recent studies using AMPER, like that of Iribar et al. (2014), the relativisation of values with semitones has been introduced and, in certain studies, like those of López-Bobo et al. (2012), semi-directed surveys have been used.

With similar criteria for the construction of a corpus, is the Autosegmental-Metrical model (AM) proposed in Pierrehumbert (1980) and, later, extended and revised in Ladd (2008), and its system of prosodic notation ToBI (Tones and Breaks Indices) that was adapted for Spanish in the proposal Sp-ToBI (Estebas and Prieto, 2008; Hualde and Prieto, 2015, 2016). Through this method, with respect to the corpus, sentences are obtained from only a few informants, prompted by the researcher in a laboratory setting, and with respect to the analysis, phonological descriptions of each statement are presented in the form of symbols (H and L referring to a high or low tone, respectively) and diacritics (* referring to a nuclear accent, % indicating a boundary tone, + representing a combination of two tones, among others). These describe generic tendencies in the movement of the curve, although they are not enough to explain the intonational complexity of speech.

The work presented focuses on the study of spontaneous speech in two Spanish dialects, Asturian Spanish and Navarrese, and highlights the coincident and divergent melodic features of the two². Although both dialects are found in northern Spain, Asturian Spanish in the west and Navarrese in the east, the features of the speakers' pronunciation in either one makes it possible to clearly distinguish their origin. Although the existence of an intonation pattern with a falling final inflection has been verified, that of absolute questions, comprising an extended dialectal continuum from west to east, from the Galician-Portuguese domain to the Basque Country (Cuevas et al., 2012:438), the two dialects have received very different linguistic influences, which we believe are reflected in the intonation. Navarrese is a dialect of Spanish that is spoken in Navarre together with Basque (the latter only in Basque-speaking areas) and contains features of an old Romance language that is now extinct, Navarrese or Navarro-Aragonese. In contrast, the dialect of Spanish, which we will call Asturian Spanish and which is spoken in the Principality of Asturias, receives the influence of Asturian-Leonese, a language with a certain level of vitality in the area that extends to León, Zamora and Miranda do Douro in Portugal.

¹ AMPER (Multimedia Atlas of Romance Prosody), which can be consulted at http://stel.uv.es/labfon/amper/cast/index_ampercat.html, is a project of international scope on prosody that commenced in 2002 and which has its own methodology for all the work groups involved. Fundamentally, it consists of contemplating the analysis of three prosodic parameters: fundamental frequency (F0), duration and intensity. The fundamental objective of the project consists of presenting the prosody of Romance languages and in reflecting the results on maps that can be consulted visually and perceptively on the internet.

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With respect to our studies, we start out with the researches undertaken following the AMPER method of Alvarellós et al. (2011), Díaz Gómez et al. (2007) and López Bobo et al. (2008), which describe the declaratives and the interrogatives of Asturian and whose results highlight certain features that could have been transmitted to Asturian Spanish, and that of Iribar et al. (2014), which describes the declaratives and interrogatives of Navarrese.

According to Alvarellós et al. (2011:113) and coinciding with the results of their predecessors, Díaz Gómez et al. (2007) and López Bobo et al. (2008), "the melody of the declarative utterances SN+V+SN, is characterised in all the diatopical varieties of Asturias by two peaks associated with the first and second accent with a valley inserted between them. Throughout this region, a decline is observed in the falling slope of the F0 curve". In addition, these researchers finish the phonetic description with a phonological scheme: L+>H* (first accent), L+>!H* (second accent), H+L* L% (toneme). With features very similar to Asturian Spanish, Iribar et al. (2014) describes the declaratives of Spanish in Navarre: it starts below the tonal average; a first peak in the first syntactic and word boundary; a second peak, which coincides with the second word (the verb) boundary, preceded by a very marked valley followed by a descent; and the toneme, the final tonal configuration, which presents a slight fall and ends with a value lower than at the start of the melody.

Taking into consideration all these previous researches, in the present study, the aim is to describe the melodic profiles and the spontaneous speech patterns of declarative, suspended and emphatic utterances of the Asturian Spanish and Navarrese dialects³, located at opposite ends of the north of the peninsula, and compare them to determine the distinctive and coincident features of the two dialects, using the MAS method (Melodic Analysis of Speech).

2. Melodic Analysis of Speech Method

In order to carry out this research, the *Melodic Analysis of Speech* (MAS) method has been used, described for the first time in Cantero (2002) and reviewed by Font-Rotchés (2007) and Ballesteros (2011a). The stages for the application of the method are presented in the form of a protocol in Cantero and Font-Rotchés (2009) and, subsequently, Mateo (2010) offers a semi-automatic proposal. A new version of the method is under development, which includes the advances that have taken place to date, puts forward new terms, reviews some criteria and demonstrates their compatibility with the labelling system of the Autosegmental-Metrical method.

Before addressing its explanation, it is worth highlighting a terminological question: why the word melodic? We are not talking about "tone analysis" — like many well-known schools of analysis — but about the melody. The reason lies in the fact that, although the fundamental parameter in the perception of accent is the tone, from our perspective, the absolute tonal values, namely, the F0 curve, are not the melody. The *melody* is the relative succession of values that emerges from the successive tone variations of the segments of an utterance, obtained by relativising these tonal values. Therefore, it is a mid-way point between tone and intonation that makes the comparison, classification and experimentation of scientific studies possible. By contrast, the transcription of an utterance, in the Autosegmental-Metrical model, requires the previous identification of syllables with a lexical accent. Therefore, it does not use the F0 curve to determine which syllables have accentual prominence; instead, before beginning to interpret the F0 curve, it is necessary to observe which syllables have a lexical accent. Only then is one in a position to decide whether or not these syllables have tonal prominence in the utterance under consideration.

³ These types of utterances are the most frequent in the corpus and particularly typical of spontaneous speech.

The MAS method has had a special impact on the field of intonation for various reasons. In the first place, because it fulfils a condition that seems to be required by any theory, namely, that it departs from a phenomenology of linguistic development par excellence: the face-to-face encounter with other people where the spatial-temporal copresence of the interlocutors provokes a constant exchange of expressivity. Furthermore, there is no standard of intonational analysis in the other models mentioned that respects this essential characteristic of oral communication. Attempts to construct a theoretical model of intonation without any relation to the participants and the context are attempts that attribute “to the code, an existence detached from the communicative act and threaten to turn the language into a sort of scholastic fiction” (Jakobson, 1991:89). The second important virtue that explains the success of this analytical system in the last decade is that it has introduced the habit of drawing conceptual limits between prelinguistic, linguistic and paralinguistic intonation as regions of intonational phenomena. This process is a useful abstraction for the phonetic study of the melody.

2.1. Levels of intonation analysis

To describe the intonation, we start out with the features of the melodic curve, which simultaneously provide us with very diverse information: the origin of the speaker, the discursive modality of the utterance, the intentions of the speaker, his/her emotional attitude, etc. in other words, a lot of information converges in just a few features.

To deal with this complexity in an appropriate way, Cantero (2002, 2014) establishes three levels of analysis of these features with different functions: the prelinguistic level, features that fulfil the function of phonically organising the discourse; the linguistic level, those that fulfil a distinctive function and that make it possible to identify and differentiate the speech modalities of the utterance; and the paralinguistic level, those which fulfil expressive functions. From this point of view, we can confirm that it is important to decide at each moment from what level the interpretation of a feature is intended.

2.1.1. Prelinguistic level

The prelinguistic level of intonation refers to what Quilis (1993) considered the way that each language and its varieties has of integrating and delimiting speech. A manifestation of prelinguistic intonation is the phenomena known as *dialectal accent* or the phonic features of the speakers of a specific geographical area (Cantero and Mateo, 2011) and *foreign accent*, that is, the traits presented by learners of a foreign language who organise the oral discourse with the features of their own native language (see Fonseca, 2013, and Devis, 2011, which characterise the interlanguage Spanish spoken by Brazilians and Italians, respectively).

In Cantero (2002), intonation contours are described as having a tripartite structure constituted by the following elements: anacrusis, body and final inflection, which are limited by two relevant accents, the first peak and the nucleus⁴ (see Fig. 1).

⁴ Navarro Tomás (1944:46-52) already distinguished these three parts of the contours; *initial inflection*, *body* and *final inflection*, which correspond to the *pre-head*, *head* and *nucleus* of the British tradition, respectively, and were described for the first time in Palmer (1922). Of the three parts, the phoneticians of the British tradition considered that all the intonational information resided in the nucleus, which at the same time is the main accent of the contour and its intonational nucleus. Navarro Tomás, on the other hand, although he considers that the greatest intonational information of the melodic unit is found in the final inflection, maintains that the initial inflection and the corpus give us the idiomatic information, that is, the dialectal accent, a line consistent in MAS. These three parts of the contours are the ones that the AMPER model reproduces, although in a less explicit way, and are called *first peak*, *body* and *toneme*, and are also considered essential for characterising the contours.

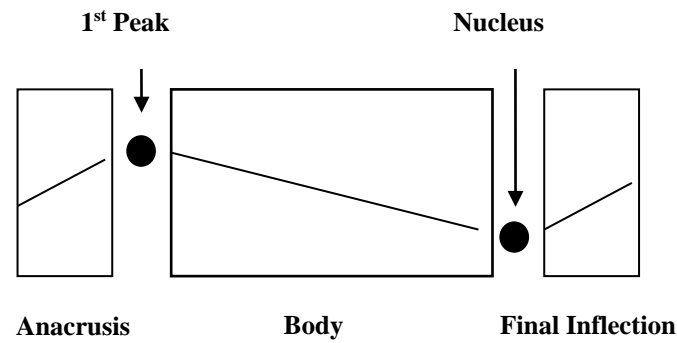


Fig. Structure of intonation contours (Cantero and Font-Rotchés, 2007:70).

The anacrusis is formed by the rising tonal segments preceding the first stressed syllable that appears with a peak, the *first peak*. The tonal rise of the anacrusis will be more or less marked depending on the height of the first peak; information of utmost importance to phonologically characterise the contour. Not all of the contours have anacrusis as on occasion it is non-existent. The body, on the other hand, corresponds to the tonal segments found between the first peak and the last stressed segment of the group or *nucleus*. The phenomenon of decline is observed in the body (although in some emphatic utterances it can be rising), consisting of a gradual tonal fall of the different tonic segments and these perceptible alterations provide phonological information. Lastly, the *final inflection* comprises the last stressed segment or nucleus and the subsequent segments.

This structure of the intonation contour is ideal for describing the features that characterise dialects, languages or interlanguages. It is this set of traits that characterise a language or a variety of it and what Cantero and Mateo (2011) call the *melodic profile*. This is a profile whose field of action between the main accents of the utterance determines what its first tonal peak will be like, how the melody will decline throughout the utterance, and above all, how the last tonal inflection will be defined. Cantero and Mateo (2011:115) summarise these features of the melodic profile, which must be measured objectively, in:

- the percentage of rise of the anacrusis;
- the relative value of the first peak and location (in the tonic or posttonic vowel);
- the percentage of fall, internal inflections, location of the inflections, and so on, of the decline;
- the percentage of rise or fall of the final inflection, circumflex inflection, location of the beginning of the inflection (tonic vowel, pretonic), etc;
- the values of the tonal field and the percentage of displacement of the tonal register.

Of all the melodic features that can take place in the contour, we will specifically take a closer look at the body, where rising and falling melodic movements may take place that affect a word (or sometimes a syntagma), referred to as *tonal inflections* or *tonal prominences* (Fonseca, 2013). Sometimes, these internal inflections may be very marked rises, greater than 30%, which constitute authentic *word emphasis* (Cantero et al. 2005:24; Font-Rotchés, 2007, 2011). Like word emphasis, these tonal prominences can be of three types, according to the tonal movement that takes place.

- *Rising tonal inflections*: characterised by an elevation in the melodic line of the body of the contour, which usually ends in the tonic syllable of a word (sometimes in an atonic syllable) and returns to its initial point in the following syllable. From a phonetic point of view, they consist of an inflection with two tonal stages.
- *Rising-falling inflections* (described for Catalan in Pons, 2012; Rius-Escudé and Pérez, 2012): characterised by a rise that begins in the tonic syllable of a word and concludes in the posttonic, which has two values and lengthens until it falls and returns to the starting point (see type A in

Fig. 2) — it may also be the case that the syllable on which the rise takes place and which has two values or even three is the tonic (see type B in Fig. 2) —. From a phonetic point of view, they consist of a circumflex inflection, that is, with three tonal stages.

- *Falling-rising inflections* (Pons, 2012; Rius-Escudé and Pérez, 2012): characterised by a fall that starts in the tonic syllable of a word and finishes in the posttonic, which has two values and lengthens in the rise until returning to its starting point (see type C in Fig. 2) — also in this case, the tonic syllable sometimes has two values (see type D in fig. 2), or even three —. From a phonetic point of view, these are also circumflex inflections with three tonal stages.

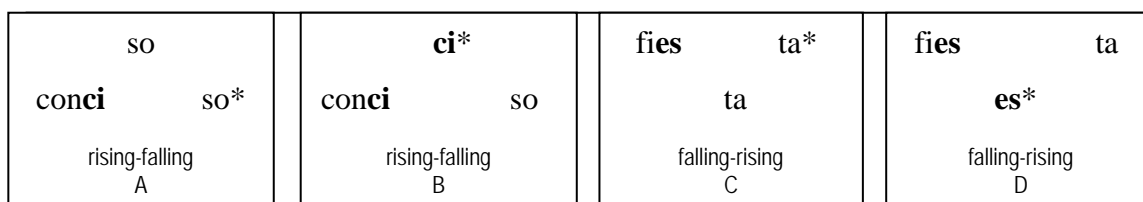


Fig. 2. Diagram of circumflex inflections⁵

Another phenomenon that takes place in the body of the contours and that characterises them is the *splitting of the vowels* (also known as *ligatures* by Fonseca, 2013). These are internal vocalic inflections — the vowels are not always pronounced in the same way — that have movements. The difference between the two tonal segments in which a vowel splits, whether it is tonic or atonic, is roughly between 10% and 15%.

2.1.2. Linguistic level

Linguistic intonation is the phonological interpretation of the melody. It is a level of analysis that studies the suprasegmental phonological units that, in this model and in line with Navarro Tomás, are called *tonemes*, and identify and differentiate the sentence modalities of what is uttered. These, like phonemes, are defined by features that are of an exclusively phonic character, capable of distinguishing meanings and are characterised by the combination of three binary phonological features, /±interrogative/, /±emphatic/ and /±suspended/.⁶ In this sense, the "declarative" or "neutral" intonation would correspond to the toneme /-interrogative -emphatic -suspended/, namely, an intonation without any marked feature; the "interrogative" intonation, to the toneme /+interrogative -emphatic -suspended/; the "suspended" intonation, to the toneme /-interrogative -emphatic +suspended/ and the "emphatic", to the toneme /-interrogative +emphatic -suspended/.

Each toneme (like the phoneme) is distinguished within wide margins of dispersion, permitting large progressive movements that are not phonologically distinctive. Each one of these tonemes can be expressed with different melodies, which present features that are within these margins. Of all of them, those that appear more frequently in the language are defined as *melodic patterns*. In this sense, it is worth observing the patterns of Spanish (Cantero and Font-Rotchés, 2007), Catalan (Font-Rotchés, 2007) or the interrogatives of Brazilian Portuguese (Mendes, 2013; Araújo, 2014) or northern German (Torregrosa and Font-Rotchés, 2017).

Studying intonation from a phonetic or phonological point of view is an essential necessary step but it is not sufficient to understand the role that intonation plays in human communication (Ballesteros, 2011a, 2011b). This knowledge does not include all the conceptually relevant elements for a theory of

⁵ The asterisk (*) denotes the second value of a syllable.

⁶ As what happens in the segmental level, the phonological features are somewhat arbitrary. They are exclusively used to classify. However, as can be seen in the description of language patterns such as Spanish, Catalan or German, they have a real phonetic correlation.

intonation. It is not enough to analyse the form it presents (formal dimension), but also necessary to shift attention from the melodic analysis in itself to the speakers who use intonation in their communicative exchanges.

2.1.3. Paralinguistic level

The paralinguistic level of the intonation is what provides personal and expressive information. This level is not easily systematised and cannot be considered linguistically relevant, although it plays important communicative functions, (in which the British tradition has focused its interest). The tonal movements provide character, personal or attitudinal information about the speaker and fulfil a defined pragmatic function within a community. Therefore, they are not features of the language itself (they are generally not part of the code) nor do they affect the phonological functioning of the tonemes.

The pragmatic factors (the context of the utterance and the intention of the speakers) permit the incorporation of very different meanings to the utterance, beyond the mere lexical-grammatical formulation. For example, an utterance like; *Sí, sí, lo que tú digas* 'Yes, yes, whatever you say', may mean that the speaker is satisfied with the proposal offered by the speaker, as indicated by the literal formulation of the utterance. But, in another context, that same utterance may have a completely different meaning, namely, *no tienes razón en absolute*, 'you are not right at all'. According to Cantero and Mateo (2011:122), the "traits of determined stress, those melodies that want to convey an intention that goes beyond the mere linguistic formulation, constitute what can be called paralinguistic intonation."

2.2. Materials and analysis method

To approach this level in which intonation plays a role, it is necessary to use a methodology based on the analysis of the oral corpus of spontaneous speech that permits real and genuine intonation models to be obtained, which, in turn, make the description of the linguistic reality possible.⁷

The most generalised methodological tendency consists of studying the intonation from utterances read or prompted by the same researcher: utterances that have not been extracted from a natural context (dialogue) and that consider the sentence as a unit of analysis par excellence. The cause of this tendency lies in the fact that one of the greatest difficulties in the elaboration of an oral corpus is ensuring the quality of the recordings, an essential requirement for carrying out an empirical analysis of the productions. This methodology undoubtedly provides technically correct recordings and a very large amount of data in a very short space of time; but, on the other hand, the utterances used minimise the melodic richness of natural conversation. In our opinion, it is necessary to study the objects in action if we do not want to lose realism. Linguistic realism is a cooperative activity that involves the exchange of beliefs, knowledge and desires among people who consider themselves to be in possession of a certain mental state that is manifested in the intonation that they use. These exchanges do not require resorting to specific grammatical forms but to units defined by an illocutionary force.

The difficulties traditionally encountered by dialectologists when trying to obtain good recordings from an acoustic point of view have been resolved thanks to television and social networks. These media have become an ideal source of data for those studying intonation since there is a proliferation of spaces dedicated to talk shows, debates and contests. This typology of programmes is of great interest since they involve many people who are not professionals and who express themselves spontaneously. The participants of these programmes do not arouse any suspicion of having their interventions

⁷ Corpus should be understood as a "collection of linguistic data, whether written texts or recorded speech transcripts, that can be used as a starting point for linguistic descriptions or as a means of verifying hypotheses around a language" (Crystal, 1968:32). In our field, this is a set of sound productions that will be the object of study for the phonetist. It is a very valuable tool for the investigation of phenomena typical of a colloquial language register, among which intonation is of particular interest.

planned, as happens, for example, on some *reality shows*. Talk shows, debates and contests have another advantage: the profile of the participants is very mixed, which facilitates the task of creating a balanced corpus.

The productions of professional speakers have been dismissed in the creation of the corpus, since they are people who, in addition to mastering the technique required to speak behind a microphone and for the cameras, are not speaking with interpersonal purposes.

2.2.1 Utterances and informants

For this study, we have selected a total of 100 utterances, 50 from Asturias and 50 from Navarre (see Ballesteros, 2011a) extracted from 13 and 10 hours of recording, respectively. These are utterances obtained from interventions by people who speak each dialect, who had a dialogue with other people or with a presenter. Regarding the typology of the utterances, there are three types: declarative (50% of the corpus of Asturian Spanish and 46% in that of Navarrese), suspended or unfinished, generally because the informant did not finish his/her turn and, in fewer cases, because they were cut short when another person intervened (26% in the corpus of Asturias and 34% in that of Navarrese) and emphatic or exclamatory (24% in the corpus of Asturias and 20% in that of Navarrese).

The utterances were obtained from three programmes of the Principality of Asturias (TPA), namely: *De tarde* (a daily show with interviews and a contest), *Asturias en 25* (a television contest that seeks a better knowledge of Asturias through questions about the customs, history, curiosities and current affairs of each area of the Principality) and *Conexión Asturias* (a current affairs programme with reports, interviews and live connections from different cities, towns or places from the region of Asturias). Similarly, those for Navarrese were taken from three programmes on Canal 6 of Navarre Television: *Cara a cara* (a talk show), *Objetivo Navarra* (a daily current affairs programme, which goes into greater depth on everyday issues through reports, chat shows and interviews with the most prominent figures of the region) and *Navarra Pregunta* (a political programme with the participation of twenty Navarrese citizens who have the opportunity to ask a question to a guest politician).

Likewise, it was of particular interest that the number of participants of the corpus was wide and varied in terms of gender and age⁸. With respect to the corpus of Asturias, 32 participants were selected, 21 men (65.6%) and 11 women (34.4%), and for Navarre, 30 participants of which 21 were men (70%) and 9 were women (30%). This imbalance between the participants of one gender and the other has been compensated by selecting a greater quantity of utterances emitted by women, up to a maximum of three for each.

2.2.2 Method of analysis

Traditionally, a type of analysis has been carried out which basically involved extracting the successive values of the fundamental frequency of vowels and consonants of the utterances. A melodic curve of successive and absolute non-hierarchical values was obtained. Pike (1945) was the first to point out that the tonal levels are relative, so when analysing them, they must be placed in relation to each other. Indeed, the important issue is not to quantify in Hertz but to reflect the relative percentage increase or decrease that occurs between them.

However, to date, even in the IPO approach ('t Hart, Collier and Cohen, 1990), of note for addressing the study of intonation in a scientific way, the intonation curve is conceived as a succession of indistinct values because, for the members of this group, the accentual structure does not condition the melody.

⁸A corpus was used in order to make a general description of each dialect, namely, to extract the most relevant features that characterise them without taking into account variables such as age, origin and degree of contact with the standard variant of Spanish. Regarding the gender variable, in the studies carried out with the MAS method, it was found that after the standardisation process, this variable has no influence on intonation (see Cantero and Font-Rotchés, 2007, for Spanish, and Font-Rotchés, 2007, for Catalan). Research has also been done from AMPER, such as that of López Bobo and Cuevas Alonso, 2014 on Cantabrian, which confirm it.

The *Melodic Analysis of Speech* manages to extract the relative values that constitute the melodies (relativisation and standardisation process) and provide exact data for the intonation contours in percentages of rise and fall. Thus, a type of scrutiny is established that allows a description of the intonation from a phonetic point of view, suitable for the analysis of any language or variety of it. This means it is a method of analysis that does not require prior constraints, which is ideal for the analysis of the most varied corpus and offers multiple applications (in addition to speech synthesis, it can be used in studies of contrastive phonetics, dialectology, in the study of the acquisition of languages, in forensic and clinical phonetics, and the teaching of oral expression).

The following summary explains how the acoustic phase of the method is applied based on the protocol outlined by Cantero and Font-Rotchés (2009). In the meantime, we leave the perceptive phase for future studies, in which the results obtained will be validated.

The first step is the identification of the melodic units of the utterances, the tonal segments. This is because the melody of each phonic group is determined by the values of the fundamental frequency (F0) of the tonal segments that compose it, in other words, by the values of the vowels that are relevant. However, the F0 of the sonorous consonants and of the glides are irrelevant values. These units have been collected using the Praat analysis software program (Boersma and Weenink, 2017), identifying the vowels (guided by the sonogram) and calculating the average of the F0 for each vowel segment.

Figure 3 shows an example of the extraction of frequency values for the utterance *¡Es muy difícil!* 'It's very difficult!' obtained by using the Praat application. The dark areas of the spectrogram correspond to each one of the vowel segments and for each one of them the F0 value in Hz is obtained from the average value of the vowel's F0 (e.g., E-, -uy, -i- in Figure 3).

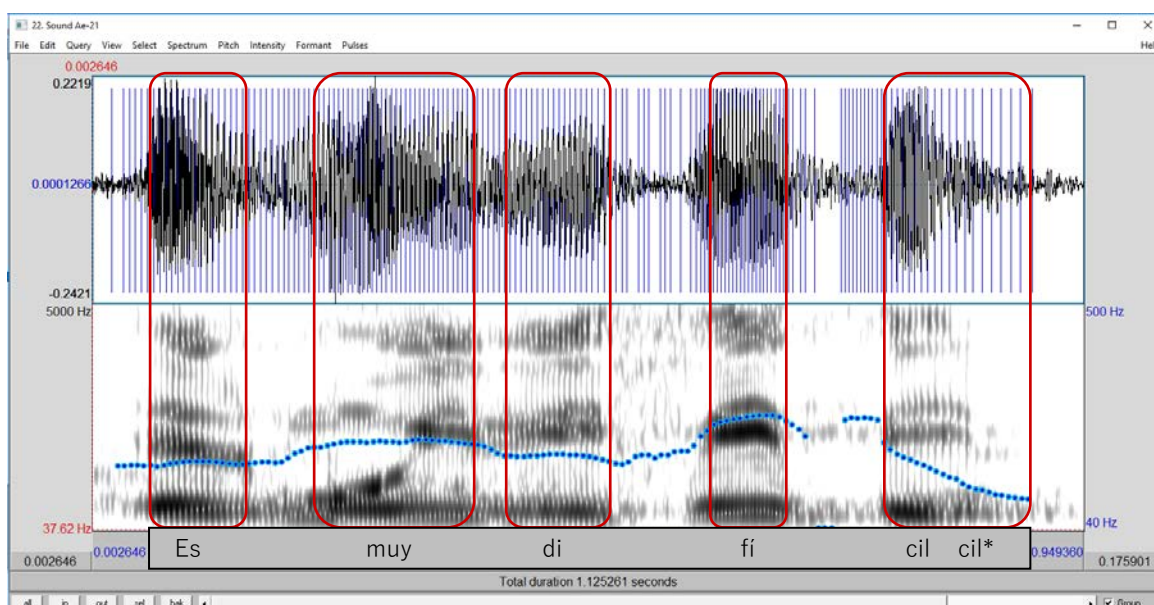


Fig. 3. Extraction of frequency values of the utterance *¡Es muy difícil!* 'It's very difficult!'

When a vowel contains a tonal inflection with a tonal distance of at least 10%⁹ (100% is equivalent to an octave of the musical scale), a value of two tonal segments must be established constituting the inflection or three segments if it is a circumflex inflection, which can be found in any part of the contour. Furthermore, when the inflection ends with a vowel followed by a voiced consonant (especially a nasal, a lateral or a vibrant) with a tonal distance of at least 10%, this consonant usually represents the last tonal segment of the inflection (see perception tests in Font-Rotchés, 2007). This is the case of the

⁹ This tonal distance has been verified in different perception tests carried out by the Applied Phonetics Lab of the University of Barcelona and applied in MAS research since 2011.

segment *-ci**, shown in Fig. 3, the second value of syllable *-ci/*, which is distinguished by an asterisk (*), whose value is obtained from the lateral. In all these cases, values are calculated from the initial and final stable values or from the extreme values of the inflection (if there is no tonal stability).

Subsequently, the relativisation of the absolute values of F0, expressed in Hertz (Hz) is carried out. This procedure is achieved by establishing the percentage relationships between the value of the successive segments. It is calculated by a simple rule of three: 100% is assigned to the first value of the utterance and is calculated by the percentage of the distance between one segment and the next, which will be positive if the next segment is greater, and negative if it is less. The formula for the relativisation of the frequency values and for standardising the relative values¹⁰ is as follows:

$$(1) \text{ Relativisation formula: } \text{RELV}_{n+1} = [(\text{ABSv}_{n+1} - \text{ABSv}_n) / \text{ABSv}_n] * 100$$

The variable ABSv_n corresponds to the absolute value of the vowel segment of reference (in Table 1, 177 is the value in Hertz from the first syllable, *Es*). ABSv_{n+1} is the frequency value of the next vowel segment to the reference value and from which the relative difference in % with respect to the preceding vowel segment is determined (in Table 1, 230 is the value in Hertz of the next vowel segment *muy*). RELV_{n+1} or the relative value expresses the melodic difference as a percentage between the absolute value of reference and ABSv_{n+1} or the value immediately after.

$$(2) \text{ RELV}_{n+1} = [(230-177) / 177] * 100 = 29.9$$

Utterance	Es	muy	di	fi	cil	cil*
Hertz	177	230	176	279	160	105
Percentage	100%	29.9%	-23.5%	58.5%	-29.7%	-46.4%

Table 1. The algorithm of the expression of the melody *jEs muy difícil!* 'It's very difficult!'

So, in Table 1, we see the resulting algorithm from the absolute values of the utterance obtained in Praat: *jEs muy difícil!* 'It's very difficult!': 100%, +29.9%, -23.5%, +58.5%, -29.7%, -46.4%. This step is important because the actual difference in Hertz between two tonal segments will have a different relative value depending on the value of them, as can be seen in this example: tonally, the succession of the values 100Hz–200Hz is not the same as 200Hz–300Hz, despite a difference in Hertz in both cases of 100 Hz. However, in relative terms, the tonal interval is different: in the first case, the difference between one tonal segment and the next is 100%, while in the second it is 50%.

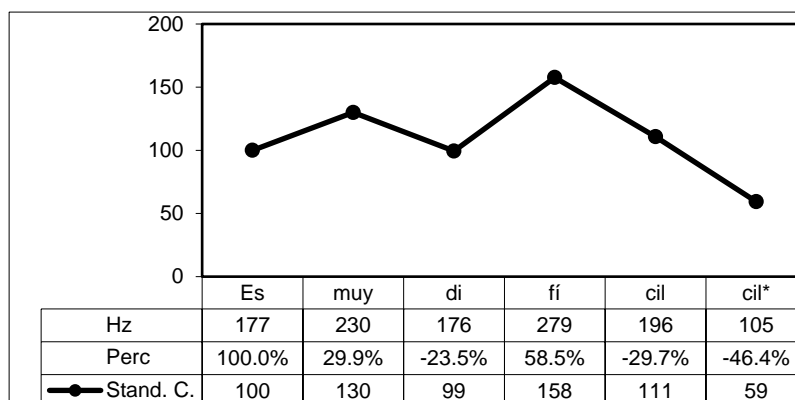
The next step is standardisation, to obtain the normalised values of the melodic curve. Once again, it is based on the arbitrary number 100 and percentages are applied to obtain the standardised value of the curve (see the line "Standard Curve" in Graph 1): to 100, 29.9% is applied and the value of 130 is obtained, to this, -23.5% is applied, and 99 is got, and so on. The formula for normalising the relative values is as follows:

$$(3) \text{ Standardisation formula: } \text{STv}_{n+1} = \text{STv}_n + [(\text{RELV}_{n+1} * \text{STv}_n) / 100]$$

STv_{n+1} corresponds to the standardised value of RELV_{n+1} with respect to STv_n (130 in Graph 1). This last value is the standard value that acts as a reference value. See how the third value of the Standard Curve in Graph 1 is calculated.

$$(4) \text{ STv}_{n+1} = 130 + [(-23.5 * 130) / 100] = 99.5 \text{ (rounded to 99)}$$

¹⁰ From Torregrosa and Font-Rotchés (2017:1318).



Graph 1: Graphic representation of the melody.

The standardised values of the curve permit the creation of a graphic representation, which can be used to classify the utterances and to make formal comparisons¹¹. The result of the normalisation is the melodic expression of the utterance; its standard curve. It is the essential melody of the phrase once variations due to age, gender and also micromelodic ones have been eliminated. From this moment, the melodies can be compared and classified from a formal point of view: generally, according to the direction of the inflection whether it be final, rising, falling, flat, circumflex, etc.

From the standardised values (the values in Hz can also be used), the tonal field (TF) is calculated of each utterance, that is, the percentage distance that exists between the highest value (Hv) and the lowest value (Lv). The following is the formula for obtaining the tonal field values:

$$(5) \text{ Tonal field formula: } TF: [(Hv - Lv) / Lv] * 100$$

Through applying this formula, the tonal field value is obtained in percentages of the utterance in Graph 1, that is, a distance of 167.8% between the highest and lowest point.

$$(6) TF: (158 - 59 / 59) * 100 = 167.8$$

3. Results

From the analysis of the utterances and the interpretation of the graphs, we have been able to draw some conclusions that enable, with a certain amount of rigour, to determine the melodic profile of the speakers of each of the two regions under study, that is, the features of the prelinguistic intonation of the Asturian Spanish and Navarrese dialectal accent, and also the main patterns of their neutral, suspended and emphatic intonation, that is, the characterisation of their linguistic intonation.

The descriptions we offer are interesting from both an intonational and dialectological perspective; however, here we have tried to study only those aspects of a melodic nature, hence those of a lexical, grammatical or pragmatic nature have been excluded. Obviously, this is an abstraction since intonation does not work if in reality, the lexical, grammatical or pragmatic dimensions were external to it. However, the analysis of the more material realities is a good starting point without forgetting that this study is only the preliminary phase of the task.

Similarly, the intonational varieties from a social, historical or stylistic perspective have not been addressed in this study; we have tried solely to present them from a geographical point of view; what dialectologists usually call *geolects*. In short, the descriptions offered are susceptible to development and can be completed in the future.

¹¹ This phase of the analysis has been automated in a script for Praat by Mateo (2010).

In the sections that follow, the melodic profile of each dialect from the features in the first peak is described — percentage rise of the anacrusis and first peak and location in the tonic vowel or in the posttonic one —; as are the features that take place in the body — internal inflections, location of the inflections, declination and values of the tonal field —; and the values of the features of the final inflection — percentage of rise or fall of the final inflection, location of the beginning of the inflection (tonic vowel, pretonic...). We also compare the contours obtained for each dialect with the patterns already described for Spanish (Cantero and Font-Rotchés, 2007; Font-Rotchés and Mateo, 2013, 2017), which are Falling FI Pattern I (+15 to -40%), Rising FI Pattern II (+70%), Rising FI Pattern VI (15% to 70%), High Nucleus FI Pattern VII and Rising-Falling FI Pattern Xa.

3.1. Asturian Spanish

The melodic regularities that emerge from the examination of the graphs generated when analysing the corpus of Asturian Spanish are those described below.

3.1.1. The first peak

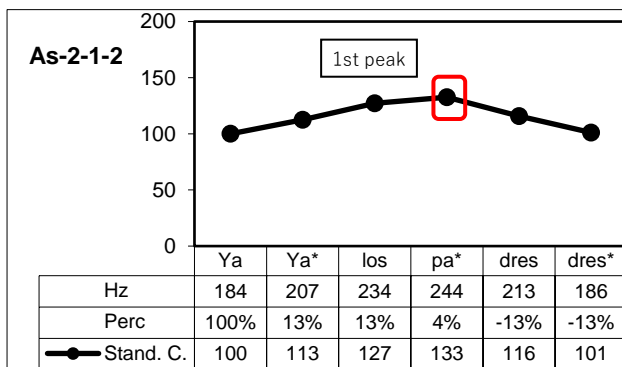
The contours of Asturian Spanish (see Table 2) are characterised by having a first peak (as already described by Ballesteros, 2011a) in 66% of cases, compared to 34% of the contours that lack it. This first peak is usually located on the first tonic syllable of the contour (T) — in 40% of cases — and to a lesser extent with a figure of 20%, on a posterior atonic syllable (PA). Only in a low 6% of utterances is it found on a posterior tonic syllable (PT).

First Peak	With first peak				Without first peak	TOTAL
	In 1 st tonic (T)	In posterior atonic (PA)	In posterior tonic (PT)	Total		
n.	20	10	3	33	17	50
%	40%	20%	6%	66%	34%	100%

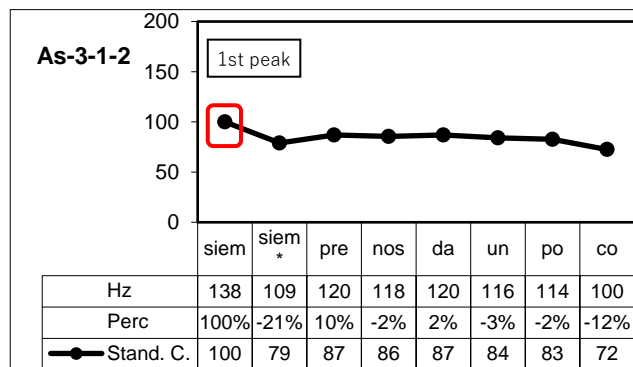
Table 2. Features of the first peak in Asturian Spanish.

Regarding the percentage rise that the first peak can reach, it can be stated that in most cases (81.8%) the rise is between 10% and 40%, and only in some cases, especially when it comes to emphatic contours, it exceeds these percentages and reaches between 41% to 55%, except for one when it reaches up to 88%.

From the results obtained from a spontaneous speech corpus of Asturian Spanish, one aspect, that of the position of the first peak, has already been addressed by Alvarellos et al. (2011:113), who base their methodology on a corpus read from utterances with the structure Subject+Verb+Object. According to these authors, the declaratives present the first peak with a tendency towards a post-realisation in paroxytone and proparoxytone words; however, in the oxytone words, they found that the first peak oscillates between the tonic and the post-tonic vowel. In our corpus, on the other hand, there are different tendencies: firstly, 34% of the contours do not have a first peak; secondly, in cases where there is a first peak in a paroxytone word, which are the majority, it usually takes place in the tonic syllable (see *padres* 'parents' and *siempre* 'always', in the contours of Graphs 2 and 3); thirdly, if it takes place in oxytone words, it is also mostly in the tonic; and, finally, we have just one case of the first peak in the proparoxytone word in which the rise ends in the last syllable of the word (*practicábamos* 'we practise').



Graph 2. Fragment of the contour of the first peak in the tonic:
Ya los padres... 'The parents already...'



Graph 3. Fragment of a contour with the first peak in the tonic:
Siempre nos da un poco... 'It always gives us a little...'

Despite this tendency for the first peak to culminate in a tonic, we also have some utterances with the first peak displaced to an atonic or a posterior tonic syllable, like for example *Y quería preguntar* 'And I wanted to ask', *Es un juguete*, 'It's a toy', *Es una cosa*, 'It's a thing'.

3.1.2. The body: internal inflections and tonal field

There is a large presence of melodic features in the body of the Asturian Spanish contours that provides intonational information.

In the first place, the melodic line of the body from the beginning to the end in almost all of the utterances tends to be slightly descending, as already described by Alvarellós et al. (2011), Díaz Gómez et al. (2007) and López Bobo et al. (2008) for the declaratives of Asturian Spanish. These are long utterances in which the decline can be from an almost imperceptible 15% to a low 50%. On occasion, the decline is greater than 50% or less than 15% and, in a few cases, it has no tonal inflection.

One of the most remarkable and peculiar melodic features of Asturian Spanish, which takes place in the body of the contours (see Table 3), is the presence of internal inflections (Ballesteros, 2011a, already noted this tendency) in 52.1% of the words found in the utterances, which can result in an internal tonic syllable (T) in 32.3% of the utterances, in a final tonic position (FT) in 19.3%, or in a final atonic position (FA) in 22.4%¹². These are followed, with a lesser presence, by internal atonic inflections (A) with a figure of 14.3%, rising-falling circumflexes in 10% and, finally, a testimonial presence of falling-rising circumflexes, with a value of 1.8%.

As for the percentage of rise of these inflections or tonal prominence, the majority amounting to 70.2% (113 tonal inflections of a total of 161) are poorly marked, between 10% and 30%. These inflections are not perceptible in isolation but constitute the melodic features of Asturian Spanish together with the culmination of the rises in the characteristic tonic syllables. Conversely, 29.8% present an emphasis on the word that can be identified perceptively and that is also part of the melody of the utterances that provide them¹³.

¹² An inflection in a tonic syllable (T) can take place in paroxytone words (*estamos* 'we are', *mundo* 'world', *propuesta* 'proposal') and proparoxytone words (*música* 'music', *político* 'politician'). Nevertheless, if it is in an oxytone word, we transcribe as a FT. An atonic inflection (A) can be found in any atonic syllable (*total* 'total', *compruebas* 'you check' or in some atonic particles such as *y* 'and', *que* 'that') except in the last one, which we transcribe as a FA (*minutos* 'minutes').

¹³ In perception tests (Font-Rotchés, 2011), we showed that an isolated rising tonal inflection equal to or greater than 30% in an utterance was perceptible and for this reason, we will consider them *well marked*, as they are also perceptible and characterise the melodic profile of the utterance compared to the different lower inflections between 10% and 30% of rise, which we will consider *poorly marked* or *discrete rises* (Fonseca, 2013).

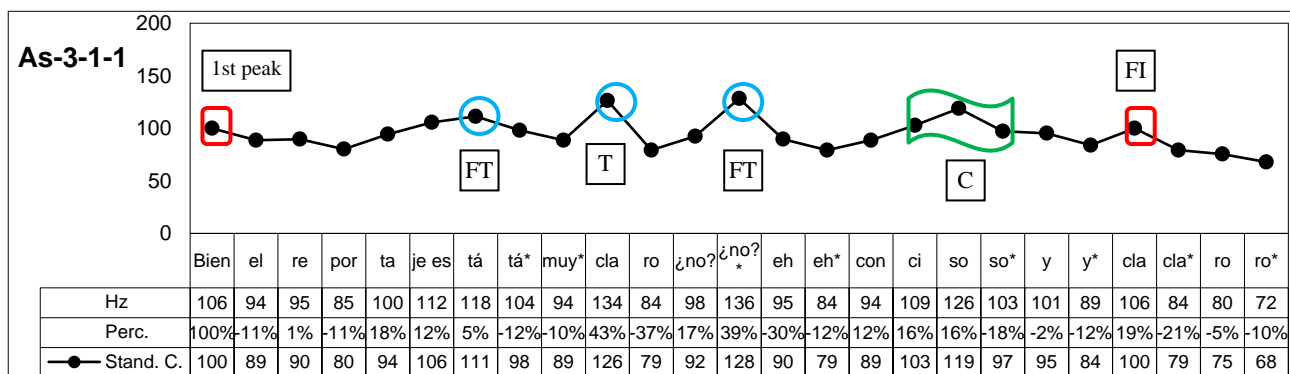
Internal inflections	Rising values				Rising-falling circumflexes		Falling-rising circumflexes		With inflection	Without inflection	Total
	T	A	FA	FT	T	A	T	A	Total	Total	
n.	52	23	36	31	9	7	1	2	161	148	309
%	32.3%	14.3%	22.4%	19.3%	5.6%	4.3%	0.6%	1.2%	52.1%	47.9%	100

Table 3. Melodic features of the body in Asturian Spanish.

With reference to these tonal inflections, Alvarellós et al. (2011) affirm that there is a second peak that takes place in the second word of the declarative, which tends to the post-realisation in the examples of the paroxytone words at their disposal. In spontaneous speech, with very different syntactic structures, this second peak does not appear in a systematic way. As stated, many tonal inflections appear, but most of them are scarcely marked, more in tonic syllables than atonic and not subject to the type of word-accent.

In the contour of Graph 4, a first peak can be observed in the tonic syllable, *Bien* 'Good', and in the slight almost imperceptible fall that the melodic line suffers from the beginning of the body in *el* 'the' (Stand C value 89) to *y** 'and' (Stand C value 84).

In addition, we observe three rising inflections that end in the tonic syllable of *está* 'is', *claro* 'clear' and *no* 'no' (see circles) and a circumflex inflection, rising-falling in *conciso* 'concise' (see banner shape) where the syllable that lengthens and has two values, is the final atonic one: *con-ci-so-so**. Finally, a final inflection of pattern VII with high nucleus is also observed, which is characterised by a rise of 19% initiated in the pretonic syllable *y** 'and' finished in the tonic syllable *cla-*, and by a descent in which the melodic line reaches the lowest line of the contour.

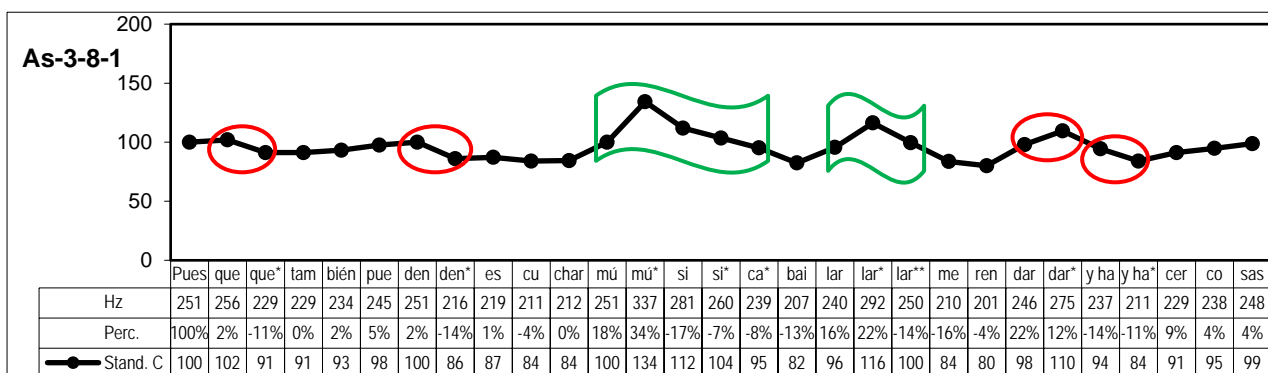


Graph 4. Contour of the utterance *Bien, el reportaje está muy claro ¿no? eh conciso y claro* 'Good, the article is very clear, right? Concise and clear'.

Both the vowel splits (see oval shapes) on this occasion and the circumflex movement (see banner shapes) on two occasions have been identified in Graph 5: two values for the tonic syllable of *música* 'music' and three values for the tonic syllable of *bailar* 'dance'. This is a fragment of an utterance that does not have a first peak.

The internal vocal inflections are not always equally pronounced. However, the most common is to find movements in which the difference between the two tonal segments where the vowel splits are between 10% and 15%. It is worth mentioning that this splitting can occur in tonic and atonic vowels indistinctly and that, sometimes, these are part of a tonal inflection that affects a word, as would be the case of *merendar* 'have a snack', where the rising inflection and the enlarging of the syllable *-dar** coincide.

So far, we have commented on the types of words marked in the contours of Asturian Spanish, which account for 52.1% (Table 3), compared to 47.9% of unmarked — words like *reportaje* 'article' (Graph 4), *también* 'too' or *escuchar* 'listen' (Graph 5).



Graph 5. Contour of the utterance: *Pues también pueden escuchar música, bailar, merendar y hacer cosas...* 'Well, they can also listen to music, dance, have a snack and do things...'

The first peak and the different types of inflections (rising or circumflex and vowel splitting) are those that give variety to the slightly falling melodic line of the body. These tonal movements that occur can be broader, indicating greater emphasis by the speaker and as a result, greater width of the tonal field — the tonal distance between the highest point and the lowest point exceeds 50% in most of the contours —, and can be even greater than one octave of the musical scale (by 100%). Conversely, a narrow tonal field is found in utterances with hardly any touches of stress, in 22% of cases; in the examples we have, 20% are between 100% and 160%. However, this is not a dialectal characteristic, but a pragmatic one.

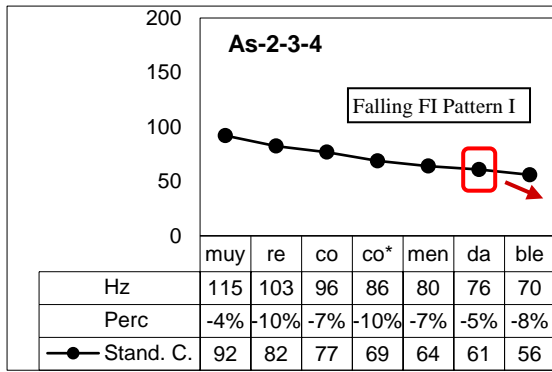
3.1.3. The final inflection

Focusing now on the final inflections, it must be said that, after the analysis, endings belonging to five distinct patterns have been identified, according to the classification of Cantero and Font-Rotchés (2007). In this sense, the final inflection can be (see Table 4): falling FI pattern I — termination already described by Alvarellos et al. (2011) — 38% of melodic contours; rising FI (+70%) pattern II, 4%; rising FI (15% to 70%) pattern VI, 20%; high nucleus FI pattern VII, 30%; and rising-falling FI pattern Xa, 8%.

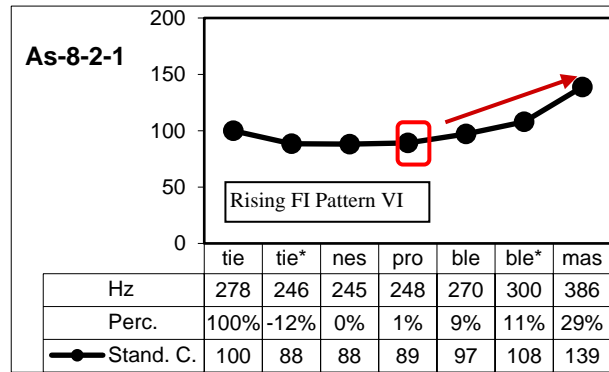
		Patterns					Total
		I. Falling FI +15~-40%	II. Rising FI +70%	VI. Rising FI +15~70%	VII. High nucleus FI	Xa Rising-falling FI	
Asturian	n.	19	2	10	15	4	50
	%	38%	4%	20%	30%	8%	100%

Table 4. Melodic features of the final Inflection in Asturian Spanish.

The notable features are the margins of the final inflection of pattern I from +15% to -15% in 84.3% of the utterances (see final fragment of contour of Graph 6, *Cualquiera de las opciones que tomes cualquiera yo creo que es muy recomendable* 'Any of the options you take, any I think is highly recommended', with a fall of 8%), while the rest exceed a fall of 15% and can reach -27%; and the final rise of pattern VI, which in most of the contours, around 80%, starts in the pretonic stage (see final fragment of contour of Graph 7, *Pero habrá que eso que compruebes con el otro que no tienes problemas* 'But you have to check with the other that you do not have problems', how the rise of 49% (9%+11%+29%) begins in the atonic syllable *pro-* instead of the tonic *-ble-*).



Graph 6. Falling final inflection of Pattern I.



Graph 7. Rising final inflection (15%~70%) of Pattern VI.

Another of the most frequent features of Asturian Spanish (67%) are rises, defined as less than 30%, that take place in the melodies of pattern VII (with high nucleus final inflection), in which the nucleus is its highest point followed by a descent of the melody that reaches an equal or lower point from where it had started, such as the one discussed in Graph 4, where the nucleus is found in the culmination of a rise of 19%. The remaining third of the contours of pattern VII are characterised by having a more marked rise in these preceding syllables, exceeding 30% and reaching up to 55% in our examples. Finally, two melodies of the four rising-falling FI pattern Xa have rises of less than 30%; the other two present rises of 36% and 83%, respectively. In patterns VII and Xa, the more discrete the rise, the more discrete the fall.

3.2. Navarrese

This section analyses the melodic characteristics of Navarrese, based on the most common features that we have identified after analysing the corpus.

3.2.1. The first peak

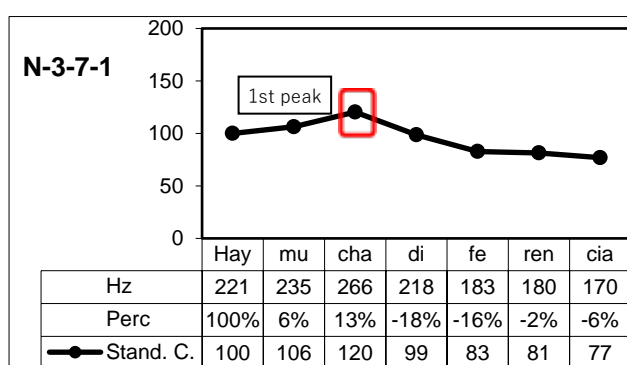
According to Table 5, the contours of Navarrese are characterised by generally having a first peak in 68% of the utterances (compared to 32% without a first peak). This is located in a posterior atonic syllable (PA) in 40% of cases, a tendency already noted by Ballesteros (2011a). We also note a less marked tendency present in the first tonic syllable of the contour, in 16% of cases, or in a later tonic syllable, in 12% of them.

First peak	With first peak				Without first peak	TOTAL
	In 1 st tonic (T)	In posterior atonic (PA)	In posterior tonic (PT)	Total		
n.	8	20	6	34	16	50
%	16%	40%	12%	68%	32%	100%

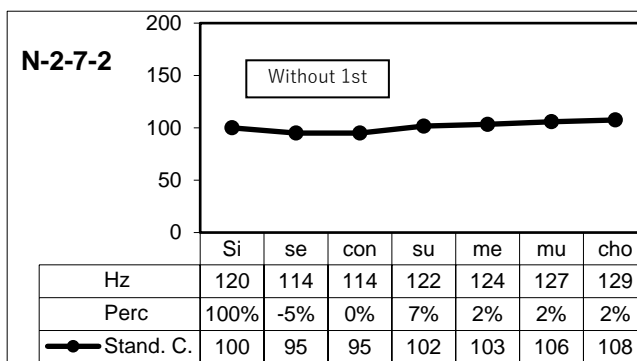
Table 5. Melodic features of the first peak in Navarrese.

Regarding the percentage of the rise that the first peak can reach, in 79.4% of the utterances of this variety, the first peak rises between 10% and 40%. Finally, a few really emphatic ones exceed 40% and, according to the examples of our corpus, can reach up to 80%.

These results, obtained from the analysis of the position of the first peak of spontaneous speech utterances, are difficult to compare with those of the declaratives with structure Subject+Verb+Object described in Iribar et al. (2014), who place the first peak in the first syntactic and word boundary, among other reasons because the syntactic structures of spontaneous speech are distinct and very varied. In our corpus, only 54% of the first peaks would coincide with the description of Iribar et al., that is, they would be in the first syntactic and word boundary either in post-tonic atonic vowels (*Yo tampoco* 'Me neither', *En el pueblo* 'In the town', *Lo del teléfono* 'that of the telephone') or in final tonics (*Y además* 'And furthermore', *la capacidad* 'the capacity'). The rest of the first peaks do not coincide with the first syntactic boundary, examples like *A ver si conoces* 'Let's see if you know', *Hay mucha diferencia* 'There is a lot of difference' (see Graph 8) or, in fewer cases, they place the peak in the medial tonic (*entonces, parece* 'then, it seems'). To all this, we must add that 32% of contours do not have a first peak (see Graph 9).



Graph 8. Fragment of a contour with the first peak in atonic posterior: *Hay mucha diferencia* ... 'There is a big difference...'



Graph 9. Fragment of a contour without a first peak: *Si se consume mucho* ... 'If you consume a lot...'

3.2.2. The body: internal inflections and tonal field

It is in the body of these contours where we find a presence of melodic features, tonal prominences, word emphasis and vowel splitting of a diverse nature, which provide intonational information and which characterise them (as already noted by Ballesteros, 2011a).

The most peculiar feature of Navarrese (Table 6) is the tendency to end the word inflections in the final syllable, especially if it is atonic (FA), 45.9% of rising cases and 6.9% of circumflexes. In addition, there are 17% that terminate at the end of the word, in this case in the final tonic (FT). Thus, we see a tendency to establish an emphasis on the last syllable of the words (a total of 69.8%).

A total of 55.2% of the words contain an internal inflection, that is, half of the words that occur possess it. Their percentage of rise is usually poorly marked, between 10% and 30% in the majority of contours (69.6%), and, as already mentioned for Asturian Spanish, these features characterise the melody; 30.4% have an increase of more than 30% and have a very marked word emphasis that is clearly perceptible and has a pragmatic value in the context.

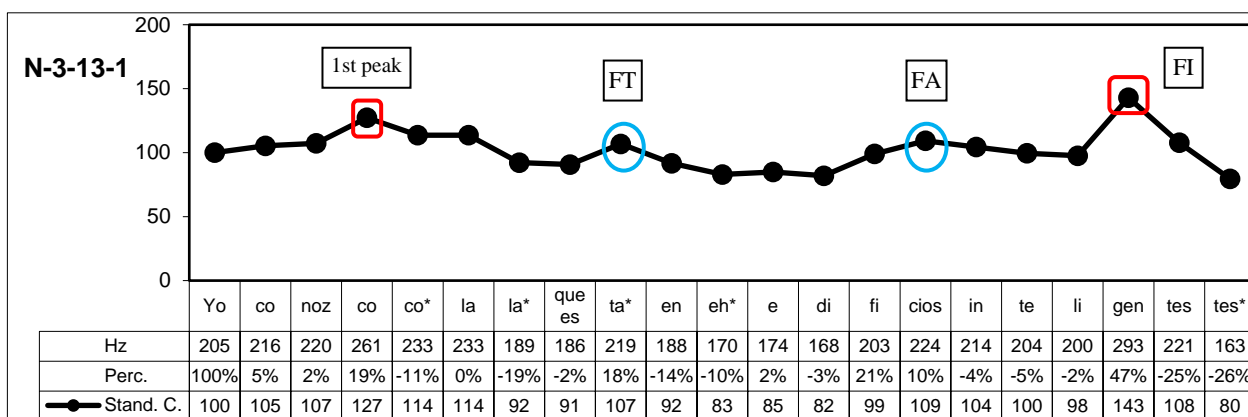
Internal inflections	Rising values				Rising-Falling circumflex		Falling-Rising circumflex		With inflection	Without inflection	Total
	T	A	FA	FT	T	A	T	A	Total	Total	
n.	25	19	72	27	2	11	0	2	159	129	288
%	15.7%	11.9%	45.9%	17%	1.3%	6.9%	-	1.3%	55.2%	44.8%	100

Table 6. Melodic features of the body in Navarrese.

As in the case of Asturian Spanish, the tendency of the melodic line of the body from the beginning to the end tends to be slightly falling, as verified by Iribar et al. (2014), and the fact that there is the presence or absence of a first peak does not have an effect on the melody.

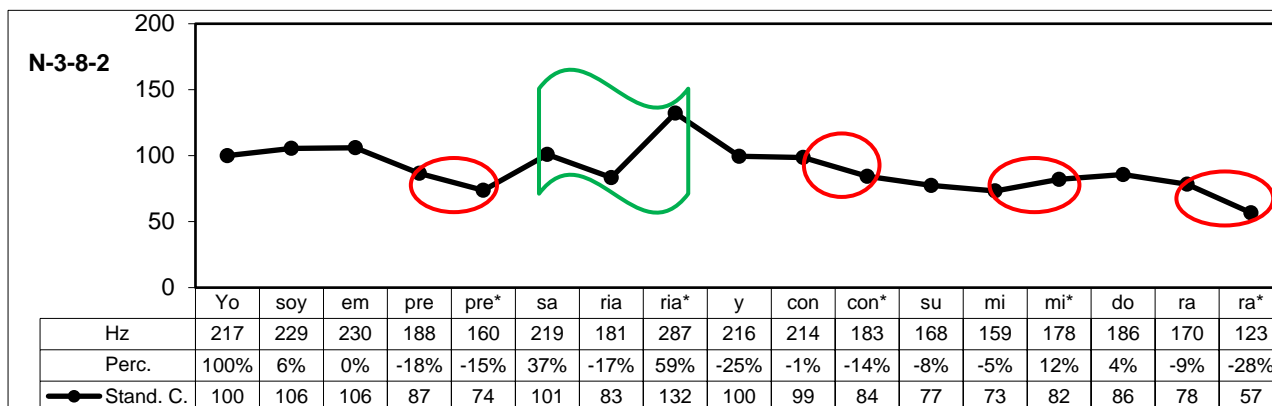
With respect to these tonal inflections, like those of Alvarellos et al. (2011) for Asturian Spanish, Iribar et al. (2014) affirm that there is a second peak that takes place in the second word of the declarative and is found in the post-tonic. In spontaneous speech and with very different syntactic structures, the second peak does not appear in a systematic way. Even so, in some cases in which it appears, it takes place in a post-tonic atonic syllable.

Looking at the contour of Graph 10, it can be observed that the first peak is displaced to a posterior atonic vowel, *conozco* 'I know'. The intonation contour also contains two rising inflections in the last syllable, *está* 'is' and *edificios* 'buildings', and a final inflection with a high nucleus (described later as pattern VII) in *-gen-* that starts in the pretonic syllable *-li* and rises 47%, followed by a decrease in the last syllable *-tes*, in which the melody returns to a point lower than that where the final inflection had begun. The body, like the rest of the contours, remains almost flat.



Graph 10. Contour of the utterance *Yo conozco la que está en edificios inteligentes* 'I know what is found in smart buildings'.

There is a striking and constant feature in the case of Navarrese which has already been found when describing Asturian Spanish contours, namely, the use of internal tonal inflections or splitting in the vowels of a markedly downward direction. A fragment of the utterance is shown in Graph 11 in which there is no first peak, the fourth vowel splits (marked with oval shapes) and there is a circumflex falling-rising inflection, in *empresaria*, 'entrepreneur' (marked with banner shape).



Graph 11. Contour of utterance: *Yo soy empresaria y consumidora* 'I am an entrepreneur and consumer'.

Just as it happened in the intonation contours described for Asturian Spanish, the following also occurs in the intonation contours of Navarrese: internal vocalic inflections, which can occur in tonic and atonic vowels, tend to present a downward movement in which the difference between the two tonal

segments where the vowel splits is roughly around 10% to 15%. These are general tendencies, which at times bring about exceptions, as in Graph 11, where rising vocalic splitting is found, in *-mí-*, with 12%, and another with a difference between the two segments of 28%, in *-ra*.

Finally, with respect to the tonal field, it is worth considering that these do not always have the same width. It has been found that, in most cases, the width of the tonal field of Navarrese exceeds 50% and reaches over 100% in 28% of the utterances; 12% of which exceeds 160% and can reach up to 200%. Therefore, Navarrese, as an identifiable gelect, is characterised by the presence of marked tonal movements, some with remarkable rises.

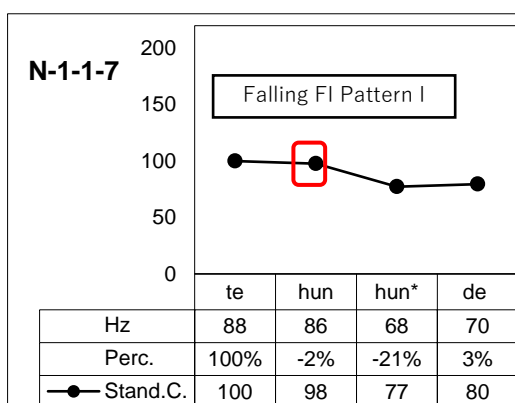
3.2.3. The final inflection

As in Asturian Spanish, we have found, in these randomly chosen utterances, endings belonging to five distinct patterns, according to the classification of Cantero and Font-Rotchés (2007), (see Table 7). The pattern with most presence is the falling final inflection (pattern I), with 40% of the melodic contours, matching the one described by Iribar et al. for the declaratives; followed by the patterns of rising final inflection 15% to 70% (pattern VI), 26%; final inflection with a high nucleus (pattern VII), 24%; and a low presence of rising-falling final inflection (pattern Xa), 8%, and rising +70% (pattern II), 2%.

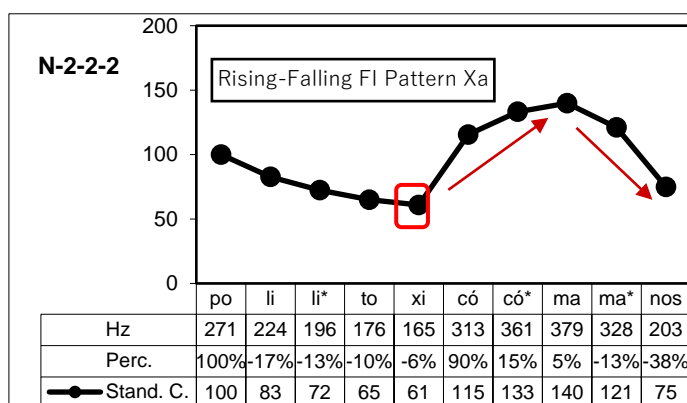
		Patterns					Total
		I. Falling FI +15~-40%	II. Rising FI +70%	VI. Rising FI +15~70%	VII. High nucleus FI	Xa Rising-falling FI	
Navarrese	n.	20	1	13	12	4	50
	%	40%	2%	26%	24%	8%	100

Table 7. Melodic features of the final inflection in Navarrese.

Let us now consider the features in the final inflection of the contours of pattern I. The margins of 70% of the contours are between +15% and -15% (see Graph 12, fragment of the contour *Y la verdad es que eso te hunde* 'And the truth is that it brings you down' with a final inflection of a 3% rise), while the rest exceed a fall of 15% and can reach 52%. Regarding the rising pattern VI, we have seen that in 76.9% of the contours, the rise starts in the pretonic, and the rest, in the tonic.



Graph 12. Falling final inflection of pattern I.



Graph 13. Rising-falling final inflection of pattern Xa.

Other characteristics of Navarrese worthy of mention are the marked rises in the syllable prior to the nucleus or the pretonic in the rises of the high nucleus final inflection of pattern VII, six utterances of twelve exceed a rise of 30%. Of these, two reach 100% (equivalent to one octave of the musical scale). The rising-falling FI pattern Xa presents two contours out of four with a rise of less than 30% and two

with a rise greater than 100% in the final inflection, like the example of Graph 13 (fragment of contour *Y además la mayoría de las personas que son consumidores de sustancias son politoxicómanos* ‘In addition, most people who are substance abusers are politoxicomiacs’), where the rise of the melody begins in the pretonic *-xi-*, rises to 110% until *-ma-* and descends to *-nos*. This also occurs in Navarrese, the more pronounced the rise in the final inflection of these patterns, the greater the fall.

4. Contrastive analysis of dialects

This section offers a comparative study of the melodic characteristics that take place in the studied geolects and their level of significance.

4.1 The first peak

The speech of Asturias and Navarre has distinct melodic features with regard to the first peak, as outlined in the following table.

first peak	With first peak								Without first peak		TOTAL	
	In 1 st tonic (T)		In posterior atonic (PA)		In posterior tonic (PT)		Total		n.	%	n.	%
	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%
Asturian	20	40%	10	20%	3	6%	33	66%	17	34%	50	100%
Navarrese	8	16%	20	40%	6	12%	34	68%	16	32%	50	100%

Table 8. Position of the first peak in the utterances of Asturian Spanish and Navarrese.

Nevertheless, both coincide in the presence of a first peak in around 66% to 68% of the utterances and with an increase of less than 40%; however, there are melodic features that distinguish the two dialects ($p=0.009$)¹⁴. In this sense, we see that the first peak of the contours of Asturian Spanish tends to end in the first tonic in 40% of cases, followed by 20% in the subsequent atonic. On the other hand, Navarrese tends to present a first peak displaced to a posterior syllable, either atonic (PA) — in most cases, 40% — or tonic (PT), 12%, compared to 16%, which is placed in the first tonic.

4.2. The body: internal inflections and tonal field

The body of the contour, in both varieties, is almost flat or slightly falling and around 52% to 55% of the words have, in the vast majority, rising tonal movements, which can be well or poorly marked, depending on the emphasis that is placed when uttering the words. In general, the percentages of the rise in the words are poorly marked and are between 10% and 30%.

The utterances of the two varieties analysed present a wide range of inflections that have been classified into three types: rising — the most frequent, between 88.3% and 90.5% of the inflections —, rising-falling circumflexes, between 8.2% and 9.9%, and falling-rising circumflexes with a scarce presence, between 1.3% and 1.8%.

As confirmed in Table 9, the feature that characterises each geolect is not the type of inflection but the type of syllable in which it ends. Just as Asturian Spanish has a marked tendency to finish the

¹⁴ For the statistical calculations of the research, we used the software SPSS Statistics v. 17.0 and the Pearson's chi-square test. We have compared all the features of the first peak (T, PA, PT and without peak) and the corpus (T, A, FA, FT, and circumflexes) of both dialects to see if they had different melodic tendencies.

inflection in a tonic syllable, the tonic could be initial or medial (T), final (FT), or be part of a circumflex, compared to a final atonic position, which occupies second place. Navarrese, conversely, tends to highlight the final syllable, preferably if it is atonic, 45.9%, but also tonic, 17%. In this regard, both dialects have significant differences that characterise them ($p=0.000$) and follow the trend already observed in the first peak. Both dialects share the feature of vocalic splits with a marked downward direction.

Tonal inflections		Rising Values				Rising-Falling circumflex		Falling-Rising circumflex		With inflection	Without inflection	Total
		T	A	FA	FT	T	A	T	A	Total	Total	
Asturian	n	52	23	36	31	9	7	1	2	161	148	309
	%	32.3%	14.3%	22.4%	19.3%	5.6%	4.3%	0.6%	1.2%	52.1%	47.9%	100
Navarrese	n	25	19	73	27	2	11	0	2	158	129	287
	%	15.7%	11.9%	45.9%	17%	1.3%	6.9%	-	1.3%	55.2%	44.8%	100

Table 9. Position of internal inflections in Asturian Spanish and Navarrese.

As for the width of the tonal field, this is conditioned by these inflections and their percentage of rise: if the words have a low percentage of rise, less than 30%, the tonal field is really narrow, less than 50% to 60%. On the other hand, if it is very high, with a clearly perceptible word emphasis and rises greater than 30%, the tonal field is wider, greater than 50% and can even be higher than 100%. In this sense, Asturian Spanish presents movements of up to 160%, while Navarrese is characterised by the presence of some very pronounced movements, in 12% of the instances exceeding 160% and reaching up to 200%.

4.3. The final inflection

With respect to the description of the utterances of both varieties, five distinct patterns are found (see Table 10).

		Patterns					Total
		I. Falling FI +15~-40%	II. Rising FI +70%	VI. Rising FI +15~70%	VII. High nucleus FI	Xa Rising-falling FI	
Asturian	n.	19	2	10	15	4	50
	%	38%	4%	20%	30%	8%	100%
Navarrese	n.	20	1	13	12	4	50
	%	40%	2%	26%	24%	8%	100

Table 10. Patterns of Asturian Spanish and Navarrese.

In accordance with the direction of the final inflection and the melodic features, we have found that Asturian Spanish presents, in general, more discrete melodic movements than Navarrese in the different utterances. Most of the contours of the Asturian Spanish pattern I, 84.3%, have a movement of +15% and -15%, more so than in Navarrese, at 70%, and furthermore, the rest of the contours of Navarrese have more pronounced falls which can reach 52%. The rises of pattern VII of Asturian Spanish are more discrete: 67% are less than 30% and the rest do not exceed 60%. On the other hand, Navarrese shows an inverse trend: only half of the cases have a rise of less than 30% and the rest are far superior with two examples that exceed 60%. This tendency of Asturian Spanish to present more discrete melodic

movements than Navarrese should be studied in greater depth to rule out that it is not conditioned by the sociopragmatic context.

As regards the point where the rise begins of pattern VI rising (15% to 70%) and also pattern II rising (+70%), both dialects on the whole begin in the pretonic, 80% in Asturian Spanish, and 76.9% in Navarrese, a feature that differs from the suggestion for pattern VI, by Cantero and Font-Rotchés (2007), that the rise would begin in the tonic.

4.4 Utterance types

In the characterisation of the melodic profile of the two dialects, five types of final inflection emerge that correspond to five patterns — already described for Peninsular Spanish — and characterise the melodies of the declaratives, suspended and emphatic utterances of the corpus. Of all of them, only one, the falling FI pattern, shares features with the declining pattern of Asturian declaratives (Alvarellós et al., 2011) — although in our research we have relied on those of Asturian Spanish — and of Navarrese (Iribar et al., 2014), albeit with certain limitations. As we have seen, although this falling pattern mentioned coincides generically with pattern I (Cantero and Font-Rotchés, 2007), when we analyse more specific features, such as the position and the culmination of the “peaks”, that is, first peak and second peak, it is difficult to compare because the structure of the sentences (SN+V+SN) does not correspond to that of spontaneous speech declaratives with utterances of a more complex and varied structure.

Regarding the type of patterns that are used for the different types of spontaneous speech utterances analysed, both dialects appear to coincide, while they differ in the features of the melodic profile previously commented on.

Thus, we find, in general, that declarative utterances occur with the falling FI pattern I, high nucleus FI pattern VII and rising-falling FI pattern Xa.

Falling FI pattern I: this pattern of the declaratives, with a descending termination, presents a first peak and a body with the specific features described for each dialect. However, if the melodies present well-marked tonal inflections or a first peak higher than 40% or a final inflection lower than -40%, they are considered emphatic declaratives, that is, declaratives that contain some features of emphasis.

High nucleus FI (10% to 30%) pattern VII: with a dynamic equal to the melodies of pattern I, referring to the first peak, the body and the tonal inflections, the melodies are only distinguished by a feature in the final inflection, a high nucleus at the top of a rise of between 10% and 30%. In these cases, the speaker highlights the last word of the utterance. These are also emphatic declaratives.

Rising-falling FI (10% to 30%) pattern Xa: with few examples, we see that they follow the trend of pattern I and pattern VII and are distinguished by a final circumflex inflection in which the rise that takes place between the nucleus and the next segment is between 10% and 30%.

The patterns high nucleus FI pattern VII and rising-falling FI pattern Xa when used to pronounce a declarative, present a discrete ascent (10% to 30%). However, we have observed a complementary variant of these patterns with a rise of more than 30%, which is used for the emphatic ones. This will be discussed below.

Suspended utterances, in which the speaker wants to continue his turn, are usually a fragment of a longer declarative utterance and present a melody that follows the rising FI (15% to 70%) pattern VI. In this case too, emphasis features may arise, such as those already mentioned, and these would be deemed emphatic suspended utterances. With very few examples, the utterances of the rising FI (+70%) pattern II would also be emphatic suspended ones in that they present a rise in the final inflection of more than 70%. There are also utterances that have been cut short as a result of the participation of another speaker or interruption by the presenter. In these cases, the melody appears interrupted at a

certain point and can be flat, with a small rise or fall, or with a high nucleus or an incomplete rising-falling in the final descent, since the melody does not return to the point where the rise of the inflection started.

In addition, the emphatic or exclamatory utterances are characterised by well-marked internal tonal inflections and final inflections characteristic of high nucleus FI pattern VII and a rising-falling FI Xa pattern; in both final inflections, the rise from the pretonic syllable until the tonic of the final inflection of pattern VII and the rise from the nucleus to the next tonal segment of the final inflection of the rising-falling Xa pattern is greater than 30%, that is to say, there are two complementary patterns to those of the declaratives: high nucleus FI (+30%) pattern VII and rising-falling FI (+30%) pattern Xa.

5. Conclusions

After analysing the results, we note that the dialectal varieties of Asturian Spanish and Navarrese have a series of melodic profiles in common, specifically:

- Presence of a first peak that is located in a rise of more than 10% and less than 40%.
- A body, almost flat or slightly falling, with rising tonal inflections (more frequent) and circumflexes that affect more than half of the words. These tonal inflections, which are on the whole discrete (rises between 10% and 30%), are very much present in the melodies and, although they are not perceptible in isolation, they define them. In this sense, we also confirm the presence of word emphasis and vocalic splits that are mostly falling.
- A final inflection: from the five different endings obtained, it has been verified that in the case of pattern I, the final inflection is rising up to +15% or falling to -15%. With regard to the rising in pattern VI (15% to 70%) and pattern II (+70%) a special feature is present in both dialects: the final inflection starts in the pretonic syllable (for Peninsular Spanish, Cantero and Font-Rotchés (2007) placed it at the beginning of the first tonic syllable). The dialects also present contours which follow the final inflection VII pattern with a high nucleus or Xa pattern, with a rising-falling final inflection.
- A tonal field: this exceeds 50% in most contours and is usually conditioned by the presence and movements that take place in the first peak, in the internal inflections and in the final inflection. The more pronounced the rises are, the broader the tonal field will be. However, there is also another type of contour, to a lesser extent in both corpora, with hardly any prominence, in which the tonal field can become really narrow: less than 40% in long utterances.

Although it seems that the melodic profiles of both dialects, Asturian Spanish and Navarrese, have many shared characteristics, there are several characteristic features of each dialect that allow us to distinguish them.

- First peak: in Asturian Spanish, the syllable in which the first peak ends is usually the first tonic syllable and less frequently in the posterior atonic syllable to this syllable. On the other hand, in Navarrese, it is displaced in the posterior atonic position, and in fewer cases, in the posterior tonic position.
- Body: in the ending of the tonal inflections that affect half of the words, there is a preference for tonic syllables in Asturian Spanish (middle or final) and for the final syllables, especially atonic but also tonic, in Navarrese.
- Final inflection: tonal movements in the final inflection are, on the whole, more discrete in Asturian Spanish than in Navarrese. The dispersion pattern of the ending of pattern I is between

+15% of rise and -15% of fall in both dialects, but in Navarrese, there are some contours that reach a fall of 52%. The greatest fall in Asturian Spanish reaches a figure of 27%. In addition, the rises in the pretonic syllable of those with a high nucleus FI pattern VII and in the tonic syllable of rising-falling FI pattern Xa are generally minor and discrete in Asturian Spanish. Navarrese, on the other hand, presents higher rises that are followed by more pronounced falls.

- Tonal field: in this aspect, Navarrese has also some contours with a wider tonal field: 12% exceed 160%, a maximum percentage reached by Asturian Spanish. Furthermore, Asturian Spanish has 22% of contours with a narrow tonal field while that of Navarrese has only 14%.

To conclude, we have contributed, in the first place, the melodic features, which take place in the first peak, body, final inflection and tonal field, with exact values that have allowed us to determine the melodic profile of both dialects, Asturian Spanish and Navarrese. Thus, we have been able to compare them objectively, since they have features that shed light on the explanation of the melodic differences between both dialects, located in the east and the west, respectively, of the north of the peninsula.

However, we have found the existence of three patterns for declarative utterances in both dialects, which can be neutral or in the case that they contain some emphatic feature, emphatic — falling FI pattern I, high nucleus FI (10% to 30%) pattern VII and rising-falling FI (10% to 30%) pattern Xa —, two patterns for the suspended, neutral or emphatic utterances — rising FI (15% to 70%) pattern VI and rising FI (+70%) pattern VI, as well as considering different endings when the utterance is truncated, and two patterns for the emphatic ones — high nucleus FI (+30%) pattern VII and rising-falling FI (+30%) pattern Xa.

The presence of these coincident melodic patterns and features in northern dialects, one in the west, Asturian Spanish, and the other in the east, Navarrese, suggest a potential dialect continuum across the north from east to west at an intonational level, as demonstrated by Cuevas et al. (2012), who found an interrogative falling pattern in Galician Spanish, Asturian Spanish and Cantabrian Spanish. In light of this observation, this research should be expanded to the rest of the dialects in the north, to verify whether or not there are shared intonation features and to describe the features in the transition or interference zones between neighbouring linguistic varieties, as well as the specific characteristics of each dialect. This research, together with that of other zones on the peninsula, is relevant as it provides useful information for the creation of a map of dialectal varieties that not only includes linguistic features, such as phonetics, morphology, syntax or semantics, but also those of intonation.

References

- Alvarellos, M., Muñiz, C., Díaz Gómez, L., González, R., 2011. La entonación en las variedades lingüísticas de Asturias: estudio contrastivo. *Revista Internacional de Lingüística Iberoamericana* 17, 111–120.
- Araújo Leite, M., 2014. Entonação das interrogativas e das declarativas do português brasileiro falado em Minas Gerais: Modelos para o Ensino de Línguas. Universidade de Brasília. <http://repositorio.unb.br/handle/10482/15755> (Accessed 3 January 2019).
- Ballesteros Panizo, M., 2011a. La entonación del español del norte. Universitat de Barcelona. <http://hdl.handle.net/2445/35060> (Accessed 3 January 2019).
- Ballesteros Panizo, M., 2011b. Pensamiento complejo y estudio de la comunicación. *Phonica* 7.
- Boersma, P., Weenink, D., 2017. Praat: doing phonetics by computer [Computer program]. Versión 6.0.30. <http://www.praat.org>
- Cantero Serena, F.J., 2002. Teoría y análisis de la entonación. Edicions de la Universitat de Barcelona.
- Cantero Serena, F.J., 2014. Códigos de la entonación y entonación emocional. *Comunicación, cognición, cibernética*. 31er Congreso Internacional de la Asociación Española de Lingüística Aplicada, Actas. Universidad de la Laguna, Tenerife, 619-629.
- Cantero Serena, F. J., Alfonso, R., Bartolí, M., Corrales, A., Vidal, M., 2005. Rasgos melódicos de énfasis en español. *Phonica* 1, 1–40.

- Cantero Serena, F. J., Devís, E., 2011. Análisis melódico de la interlengua. In: Hidalgo, A., Congosto, Y., Quilis, M. (eds.): El estudio de la prosodia en España en el siglo XXI: perspectivas y ámbitos. *Quaderns de Filologia* anejo 75. Universitat de València, 285-299.
- Cantero Serena, F.J., Font-Rotchés, D., 2007. Entonación del español en habla espontánea: patrones melódicos y márgenes de dispersión. *Moenia* 13, 69-92.
- Cantero Serena, F.J., Font-Rotchés, D., 2009. Protocolo para el análisis melódico del habla. *Estud. Fonética Exp.* 38, 17-32.
- Cantero Serena, F.J., Mateo, M., 2011. Análisis Melódico del Habla: complejidad y entonación en el discurso. *Oralia* 14, 105-127.
- Congosto, Y., 2011. Continuum entonativo: declarativas e interrogativas absolutas en cuatro variedades del español peninsular y americano. *Revista Internacional de Lingüística Iberoamericana* 9, 75-90.
- Congosto, Y., 2005. Una primera aproximación al habla urbana de Sevilla. *Estud. Fonética Exp.* 14, 225-246.
- Crystal, D., 1968. *Prosodic systems and intonation in English*. Cambridge University Press.
- Cuevas Alonso, M., López Bobo, M. J., 2011. Dialectos en contacto y prosodia. Análisis contrastivo de la entonación del oriente y occidente de Cantabria. *Revista Internacional de Lingüística Iberoamericana* 17, 39-51.
- Cuevas Alonso, M., López Bobo, M. J., Arias, A., Bleorțu, C., 2012. El patrón entonativo norteño. Evidencia del español hablado en Galicia, Asturias y Cantabria. *Language and Literature. European Landmarks of Identity* 11, 434-439.
- Díaz Gómez, L., Muñiz Cachón, C., López Bobo, M.J., González Rodríguez, R., Cuevas Alonso, M., 2007. La entonación en dos zonas rurales del centro de Asturias. *Archivum LVI*, 263-289.
- Dorta J., Jorge, C., 2015. Estudios prosódicos en Canarias: análisis de la duración en habla formal de El Hierro y Fuerteventura. *Estudios de Fonética Experimental* 24, 11-33.
- Elejabeitia, A., Iribar, A., Miren, R., 2008. La prosodia del castellano en tres ciudades vascas: oraciones con y sin expansión. *Language Design, Special Issue 2, Experimental Prosody*, 147 - 154.
- Estebas - Vilaplana, E., Prieto, P., 2008. La notación prosódica del español: una revisión del SpToBI. *Estudios de Fonética Experimental* 17, 263-283.
- Estebas - Vilaplana, E., Prieto, P., 2010. Castilian Spanish Intonation. In: Prieto, P., Roseano, P. (coords.). *Transcription of Intonation of the Spanish Language*. Lincom Europa, München, 17-48.
- Face, T.L., 2003. Intonation in Spanish declaratives: differences between lab speech and spontaneous speech. *Catalan Journal of Linguistics* 2, 115-131.
- Face, T.L., 2008. The Intonation of Castilian Spanish Declaratives and Absolute Interrogatives. *Stud. Phonetics* 2.
- Fernández Planas, A.M., Dorta, J., Roseano, P., Díaz, C., Elvira-García, W., Martín Gómez, J.A., Martínez Celdrán, E., 2015. Distancia y proximidad prosódica entre algunas variedades del español: un estudio dialectométrico a partir de datos acústicos. *RLA. Rev. Lingüística Teórica y Apl.* 53, 13-45. <https://doi.org/10.4067/S0718-48832015000200002>
- Fernández Planas, A.M., Dorta, J., Muñiz, C., Roseano, P., Elvira, W., Cerdà, R., 2017. La prosodia palentina en el Atlas Multimedia de Prosodia del Espacio Románico en España. *Anadiss, special issue*.
- Fernández Rei, E., 2016. Dialectal, historical and sociolinguistic aspects of Galician intonation. *Dialectología. Special issue VI*, 147-169.
- Fernández Rei, E., Engroba, N., 2014. Estudio perceptivo de la entonación de la interrogativas totales del gallego central. In: Congosto, Y., Montero, M.L., Salvador, A. (eds.). *Fonética Experimental, Educación Superior e Investigación. III Prosodia*. Arco/Libros, 245-266.
- Fonseca De Oliveira, A., 2013. Caracterización de la entonación del español hablado por brasileños. Tesis doctoral. Departamento de Didáctica de la Lengua i la Literatura. Universitat de Barcelona. <http://www.thesisred.net/handle/10803/134929> (accessed 3 January 2019).
- Font Rotchés, D., 2007. L'entonació del català. *Publicacions de l'Abadia de Montserrat*, Barcelona.
- Font Rotchés, D., 2011. Èmfasis bàsics de l'entonació en els contorns del català central. In: Lloret, M.R., Pons, C. (ed.): *Noves aproximacions a la fonologia i la morfologia del català*. Institut Interuniversitari de Filologia Valenciana, 193-216.
- Font-Rotchés, D., Mateo, M., 2013. Entonación de las interrogativas absolutas del español meridional en habla espontánea. *Onomázein* 28, 256-275.
- Font-Rotchés, D., Mateo, M., 2017. Melodías para confirmar, preguntar, sugerir o pedir en español. *Phonica* 13, 49-67.
- Hidalgo, A., 1997. La entonación coloquial. Función demarcativa y unidades de habla. Universitat de València, Valencia, *Quaderns de Filologia*, anejo 21.
- Hualde, J. I. & Prieto, P. (2015). Intonational variation in Spanish. In: Frota, S. Prieto, P. (eds.) *Intonational variation in Romance*. Oxford: Oxford University Press, 350-391.
- Hualde, J. I. & Prieto, P. (2016). Towards an International Prosodic Alphabet (IPRA). *Laboratory Phonology: Journal of the Association for Laboratory Phonology* 7 (1): 5, 1-25.

- Iribar, A., Miren, R., Túrrez, I., 2014. Datos para la descripción de la prosodia del castellano en Navarra. In: Congosto, Y., Montero, M.L., Salvador, A. (eds.). *Fonética Experimental, Educación Superior e Investigación. III Prosodia*. Arco/Libros, 267-286.
- Ladd, R. 2008. *International Phonology*. Cambridge University Press.
- Jakobson, R., 1991. *Ensayos de lingüística general*. Barcelona. Seix Barral.
- López Bobo, M. J., Cuevas Alonso, M., Díaz Gómez, L., Viejo Lucio-Villegas, M., 2008. Análisis contrastivo de la prosodia del asturiano central y occidental. In: Pamies, M. C. Amorós y J. M. Pazos (eds.) *Experimental Prosody. Language Design. Journal of Theoretical and Experimental Linguistics. Special Issue, Granada Lingvistica*, 267-282.
- López Bobo, M. J., Cuevas Alonso, M., 2010. *Cantabrian Spanish Intonation*. In Prieto, P., Roseano, P. (eds.). *Transcription of Intonation of the Spanish Language*. Lincom Europa: München.
- López Bobo, M. J., M. Cuevas Alonso, M., 2014. Estratificación sociolingüística de la entonación cántabra: la variable sexo. In: Congosto, Y., Montero, M.L., Salvador, A. (eds.) *Fonética Experimental, Educación Superior e Investigación. III Prosodia*. Arco/Libros, 287-308.
- Martínez Celdrán, E., Fernández-Planas, A., Romera, L., 2011. La influencia del bilingüismo en la entonación del español de Lleida. *Revista Internacional de Lingüística Iberoamericana* 17, 27-28.
- Mateo, M., 2010. Análisis melódico del habla : protocolo para la automatización de la obtención de los datos de la curva estándar. *Phonica* 6.
- Mateo, M., 2014. *La entonación del español meridional*. PhD thesis. Dep. Didáctica de la Lengua y la Literatura. Universidad de Barcelona. <http://tdx.cat/handle/10803/132583>. (Accessed 3 January 2019).
- Mendes, R. S., 2013. *Modelos de entonação do português do Brasil em enunciados interrogativos – Estado de São Paulo (Tesi de Masters)* . Universidade de Brasilia. <http://repositorio.unb.br/handle/10482/14347>(Accessed 3 January 2019)
- Navarro Tomás, T., 1944. *Manual de entonación española*. Hispanic Society, New York. 1974. Guadarrama, Madrid.
- Palmer, H.E. 1922. *English Intonation with systematic exercises*. Heffer, Cambridge.
- Pierrehumbert, J., 1980. *The Phonology and Phonetics of English Intonation*. PhD Thesis, MIT.
- Pike, K.L., 1945. *The intonation of American English*. Ann Arbor, University of Michigan Press.
- Pons J., 2012. *Tendències bàsiques de l'entonació del menorquí*. Masters Thesis. Department of Catalan Philology, Universitat de Barcelona.
- Prieto, P., Roseano, P. (eds.), 2010. *Transcription of Intonation of the Spanish Language*. Lincom Europa, München.
- Quilis, A., 1993. *Tratado de fonología y fonética españolas*. Gredos, Madrid.
- Ramírez, D., 2005. Aproximación a la prosodia de Madrid. *Estudis de Fonética Experimental* XIV, 309-326.
- Rius-Escudé, A., Pérez, M., 2012. El parlar pallarès. Aproximació als trets melòdics bàsics. *Phonica* 8, 84-105.
- Sosa, J.M., 1999. *La entonación del español. Su estructura fónica, variabilidad y dialectología*. Cátedra, Madrid.
- 't Hart, J., Collier, R., Cohen, A., 1990. *A Perceptual Study of Intonation. An Experimental-Phonetic Approach to speech melody*. Cambridge University Press.
- Torregrosa, J., Font-Rotchés, D., 2017. Melodic patterns of absolute interrogative utterances in northern German in spontaneous speech. *Linguistics* 55(6), 1311-1335. <https://doi.org/10.1515/ling-2017-0029>.