La entonación en español
Intonation Systems
A Survey of Twenty Languages

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Organisation of the Chapters

In order to facilitate comparisons across languages, almost all the chapters in this volume*, including our introductory chapter (A survey of intonation systems), are organised following the same general outline as follows:

1. 
   1.1 General prosodic characteristics of the language.
   1.2 Theoretical background and approach.

2. Description of intonation patterns.
   2.1 Description of a basic non-emphatic pattern.
   2.2 Mode and expressivity.
   2.3 Focalisation and contextual effects.
   2.4 Phrasing and textual organisation.
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3. Comparisons with other intonation systems.
   3.1 Comparisons with other dialects.
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4. Implications and conclusions.

* The chapters which do not follow this outline are Chapter 2 (Intonation in American English by Dwight Bolinger) and Chapter 23 (Intonation in Beijing Chinese by Paul Kratochvil), see notes at the beginning of these chapters.

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Intonation in Spanish

SANTIAGO ALCOBA and JULIO MURILLO

1. Background

The Spanish language has attracted considerable attention from phoneticians and phonologists; functional as well as articulatory and acoustic descriptions are quite numerous. Studies of the prosodic characteristics of Spanish, however, are far fewer, and differences between authors are such that certain publications and handbooks present the different approaches and points of view — at times contradictory — without explicitly propounding any one in particular. These deficiencies and the diversity of points of view oblige us to approach the question of prosody with great caution.

There are few works of a general nature. In Navarro Tomás (1944) we find the first extensive corpus of Spanish intonation, and virtually the only attempt at a general description of the Spanish intonation system, although its focus is fundamentally on reading and interpreting literary language. Later studies have been carefully described in Kvavik and Olsen (1974), and in the different sections of this chapter we refer to the most important of them. A recent (though summary) attempt at a general presentation of the Spanish intonation system is contained in the chapter which Quilis (1993) dedicates to the subject.
Spanish

1.1 General prosodic characteristics

There is general agreement that there are four main features which characterise the Spanish intonation system: stress, juncture, rhythm and tonal variation or melody.

The presence or absence of stress in a syllable constitutes an especially relevant characteristic for the description of the Spanish intonation system. Spanish is a free stress language: válido (court favourite) vs. válido (valid); sa'bana (savannah) vs. sabana (sheet); canto (I sing) vs. canto (He sang).

All Spanish words can be classified as stressed or unstressed according to the presence or absence of a stressed syllable. Evidently, this distinction applies only to words that form part of a sentence or other sequence. Any word mentioned or used metalinguistically becomes stressed, if it is not already inherently so. Stressed words contain only one accented syllable, except for derived adverbs in -mente: /tegnika'mente/ [technically], /ra'ilmente/ [easily], /satisfagtoria'mente/ [satisfactorily], which maintain the stress of the original adjective in addition to the stress on the first syllable of the suffix.

In Spanish, stressed words represent 63.44% of the lexical material in spoken language (Quilis 1978). Accented words can be stressed on the final, penultimate or antepenultimate syllable, but the relative frequency of these patterns is very unequal. Even ignoring monosyllabic stressed words and adverbs in -mente, final-stress represents 17.68%; penultimate stress 79.50% and antepenultimate stress 2.76% of the total number of stressed words (Quilis 1978). These figures reveal the eminently paroxytonic character of the Spanish language and explain the tendency of speakers to place stress on the penultimate syllable of a new or unknown word ('Nobel', 'chofer').

In a stressed word, the location of the accented syllable can be explained by diachronic or morphological reasons (Academia 1973, pp. 64–84), but given a sequence of phonological segments, it is not possible to establish on the basis of the nature of these segments alone which one will be stressed.

Nevertheless the presence of an accented syllable in a Spanish word is not random: it depends, in the first place, on the lexical category (noun, verb, etc.) to which the word belongs, on the morphological structure (primitive or simple, derived or compound), on the syntax (possessives placed after a noun are stressed, while those before it are unstressed), on the modality of the sentence (interrogative and exclamatory pronouns are stressed, while relative and declarative pronouns are unstressed) and finally on the difference in function or meaning that an element can have in a sentence: e.g. luego (later) adverb [+stress] / (so) conj. [-stress]); aun/aun (even / still); mientras (while) adverb [+stress] / conj. [-stress]); medio (middle) noun [+stress] / adj. [-stress]); mas/más (but/more) (Quilis 1978, 1981, 1993).

Given what has been said above, it can be stated that the stressed syllable of Spanish words can only be one of the last three syllables of the word (the Three

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In these studies it has been possible to establish the following generalisations: firstly, in order to identify the stressed syllable of each verb form, the segmental characterisation, representation, and morphological structure is a sufficient and necessary condition for the form in question; secondly, for non-verbal word classes (noun, adjective, adverb), the segmental representation and morphological structure is a necessary but not a sufficient condition to identify the stressed syllable, and further information, therefore, is required in the lexical entry; thirdly, as far as markedness is concerned, words ending in a vowel with a stressed prefinal syllable are considered as unmarked, as are words with final syllable stress which end in a consonant; fourthly, stress is assigned cyclically in each cyclic constituent of a derived word.

Given those observations and in harmony with certain principles and theoretical conditions of metrical phonology (Halle and Vergnaud 1987), Harris (1989) puts forward (1) as a definition of the general algorithm for stress in the non-verbal word classes of Spanish.

(1) i. Stressable elements are syllable nuclei (rhyme heads).
   ii. The rightmost stressable element is extrametrical if word final or followed by an inflectional consonant.
   iii. Form constituent(s) on line 0 and mark head(s) on line 1; Parameter settings: a) unbounded, right-headed (general case); b) binary, left-headed, right-to-left (special case)
   iv. Form constituent(s) on line 1 and mark heads on line 2; Parameter settings: unbounded, right-headed
   v. Conflate lines 1 and 2 (= remove asterisks in columns that have no line-2 asterisk).

With this algorithm Harris establishes the metrical grids of the examples republicano in (2a) (accent of Type A, or general case) and democrático in (2b) (accent of Type B, or marked, special case).

(2) a [(re.pu.blí.ca.no)] b [(de.mo.crá.tí.co)]
line 0 . . (*) <*> . . (* ) <*> line 1 . . * . . (*) .
   = republicano = democrático

Roca (1988) examines in detail the stress algorithm of Harris (1983), without reaching a definite decision as to the possibility of a unified stress algorithm for the non-verb word classes (Harris 1992, 1995). Concerning verb forms, Harris (1987) and (1989) tries to combine the general stress algorithm of (1) with the
specific morphological structure and various segmental processes of the verb forms in the different paradigms. However, contrary to the proposal of Núñez-Cedeño (1985) and of Harris (1987), the data seems to indicate a distinction between three different forms of accent (Alcoba 1990):

(3)

a. The forms of the Theme of Preterit (simple past, past imperfect indicative, past imperfect subjunctive, future subjunctive, participle and gerund) belong to the general case.

b. The forms of the Theme of Present (forms of the present indicative, present subjunctive, imperative and infinitive; with some dialectical variation: in some dialects the stress is moved to the thematic vowel of the first and second person plural) are marked and belong to the special case.

c. The forms of the Theme of Future (forms of the future indicative and conditional) are marked as general case exceptions.

On the study of stress in Spanish, the seminal work is the article by Bolinger and Hodapp (1961). Its conclusions that the parameter $F_0$ is the principle defining factor of accent in this language, with intensity and duration playing secondary roles, were corroborated by Quilis (1981, pp. 330–332) who concludes that, from the acoustic point of view,

the most important indication for the perception of stress in Spanish is the fundamental frequency... Length would be a secondary component.

The values related to intensity constitute a very minor factor in the acoustic definition of stress.

The timing of our phonological system has long attracted the attention of phoneticians. Most studies, however, are based on written language or on the oral production of written language. The first study on the subject was that of Navarro Tomás (1939), which is based on the consideration of Spanish as a syllable-timed language and concludes that prosodic groups of five to ten syllables comprise 67.60% of the prosodic groups, and that of these those of seven or eight syllables form 26.32%. It is on these calculations that Navarro Tomás bases some of his hypotheses about the tendency to use octosyllabic verse in Spanish popular lyrics. Matluck, however, considers that prosodic groups of ten to fifteen syllables predominate in familiar registers of educated speech. The conclusions of Canellada and Madsen (1987, pp. 103–104) are contradictory in this respect, as their calculations on syllable counts in prosodic groups differ considerably from those of working-class Madrid speech, represented by a sainete or short theatrical comedy, by Arniches, which was also written.
2. Basic intonation patterns

2.1 Description of a basic non-emphatic pattern

The intonation system of the Spanish sentence is mainly characterised by the different patterns and distribution of stressed syllables of the sentence: according to whether the stressed syllable is the first, the last or in an internal position of the utterance, and according to whether the word is stressed on the final syllable or not.

Given a sequence of stressed and unstressed syllables which constitute a non-emphatic declarative utterance, L. Fant (1984) proposes a model which we outline briefly as follows adapting his representations to the INTSINT transcription system (Hirst and Di Cristo this volume) In sentences such as (4), with two stressed syllables the intonation forms two tonic groups (TG):

\[
(4) \quad \text{(la saCaron) TG (del garaJe) TG} \quad \text{(they took it out of the garage)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \\
\downarrow \\
\text{In} \\
\\end{array} \quad \text{TG} > \text{down}
\]

For sentences such as (5) with three stressed syllables, the intonation forms three TGs:

\[
(5) \quad \text{(saCaron) TG (la MOto) TG (del garaJe) TG} \quad \text{(they took the motorcycle out of the garage)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \downarrow \\
\uparrow \\
\text{In} \\
\\end{array} \quad \text{TG} > \text{down}
\]

For sentences such as (6) with four stressed syllables, the intonation forms four TGs.

\[
(6) \quad \text{(los MOzos) TG (saCaron) TG (la MOto) TG (del garaJe) TG} \quad \text{(the boys took the motorcycle out of the garage)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \downarrow \downarrow \\
\uparrow \\
\text{In} \\
\\end{array} \quad \text{TG} > \text{down}
\]

Finally, in expressions such as (7a–c) with only one stressed syllable, the intonation follows the same diagram with a single TG.

\[
(7a) \quad \text{(los dePositos) TG} \quad \text{(The tanks)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \\
\text{In} \\
\\end{array} \quad \text{TG}
\]

\[
(7b) \quad \text{(los depoSto) TG} \quad \text{(I’m depositing them)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \\
\text{In} \\
\\end{array} \quad \text{TG}
\]

\[
(7c) \quad \text{(los depoStO) TG} \quad \text{(He deposited them)}
\]

\[
\begin{array}{c}
\text{What} \\
\uparrow \Rightarrow \\
\text{In} \\
\\end{array} \quad \text{TG}
\]

Given examples (4–6), and the tonal realisation of word stress which can be characterised as T [↑], H [↑], D [>] or B [↓], the typical model of short declarative non-emphatic intonation is characterised by, first the presence of an
initial stressed syllable at a level near T; second, by the presence of a last stressed syllable before the final pause, which maintains the F₀ at level D; and, third, by the presence or absence of internal TGs in which the F₀ is situated at level H. In the case of utterances such as (7), with a single TG, the interaction between the ascending orientation of the stressed syllable and falling orientation of the unstressed one, produces the effect that the only stress in the sentence does not reach the T level because of a “truncating” or “compressing” effect due to the tendency to reach levels D and B before a final pause.

Finally, the stress pattern of a word also influences the pattern of the melodic curve. If the accent of a final TG (8a), an initial TG (8b) or an internal TG (8c) is on the final syllable of a word, then the intonation pattern of the corresponding TG undergoes some variations (L. Fant 1984, p. 31).

\[(8)\]

\[
\begin{array}{c}
\text{(esCUcha)TG (las noTlcias)TG (en cataLAN)TG} \\
\hline
\uparrow \\
\downarrow \\
\uparrow \\
\rightarrow \downarrow \\
\text{(He/She listens to the news in Catalan)}
\end{array}
\]

\[
\begin{array}{c}
\text{(escuCHO)TG (las noTlcias)TG} \\
\hline
\uparrow \\
\rightarrow \downarrow \\
\text{(He/She listened to the news)}
\end{array}
\]

\[
\begin{array}{c}
\text{(queRA)TG (escuCIAR)TG (las noTlcias1TG} \\
\hline
\uparrow \\
\downarrow \\
\uparrow \\
\rightarrow \downarrow \\
\text{(He/She wanted to hear the news)}
\end{array}
\]

To summarise, non-emphatic short declarative utterances in Spanish present a melodic line whose pattern depends, on the one hand, on the number of stressed syllables or TGs which make up the utterance; and, on the other, on whether the word is stressed on the final syllable.

In addition to the number and differing distribution of the stresses in the sentence and the respective T level, of the first, the D level of the last and the H level of the internal ones, the distinct orientation of the final juncture, falling or rising, interphrastic (with or without pause), and strongly falling or rising end juncture with pause affects the description of Spanish intonation. With respect to the terminal juncture or terminal contour the short declarative intonation is usually (Canellada 1941; Fontanella 1980) closed in Spanish by a falling terminal juncture.

In short declarative utterances, the interphrastic juncture or interior juncture does not usually appear and the utterance closes with an absolute terminal juncture. Nevertheless, this intonation pattern of the declarative sentence can be altered by syntactic, semantic or pragmatic factors.

The presence of a falling internal juncture can change the syntactic incidence of an adjective or adverb, as can be seen in (9) (illustrated in figures 1a and 1b).
(9) a. ¡NO CIERRE la ventana! (Don’t close the window)

[↑ > > ↓]

Figure 1a. $F_0$ and oscillogramme for example 9a: ¡No cierre la ventana!
Horizontal lines on the $F_0$ curve correspond to 100 and 200 Hz.

(9) b. ¡NO. CIERRE la ventana! (No, close the window)

[↑ >] [↑ > > ↓]

Figure 1b. $F_0$ and oscillogramme for example 9b: ¡No, cierre la ventana!
Horizontal lines on the $F_0$ curve correspond to 100 and 200 Hz.

Similarly, the different placing of the interphrasic juncture can affect the interpretation of a word, as in (10), or a phrase (11):

(10) a. Cuando HUBO hablado, JUAN se FUE.

[↑ > > ↑ ]

(When he had spoken, Juan left)

b. Cuando HUBO hablado JUAN, se FUE.

[↑ > > ] [↑ > ]

(When Juan had spoken, he left)

(11) a. El presidente DICE el periódico, TIENE nZON.

[↑ > ] [↑ > ] [↑ > ]

(The president, says the newspaper, is right)

b. El presidente DICE el periódico TIENE nZON.

[↑ > ] [↑ > ] [↑ > ↓]

(The president says: the newspaper is right)
In this respect, the difference between restrictive and non-restrictive relative clauses is a classic case (Garro and Parker 1983). As Quilis (1981) indicates, the redistribution of stresses can also produce a change in grammatical category of the constituent words. Nevertheless it should be made clear that these changes are produced, not only by the redistribution of stresses, but also by the resultant modifications of the intonation patterns of (12), as we have proposed:

(12) a Díle QUÉ HAS leído. / Díle que HAS leído.
(Tell him/her what you’ve read/ Tell him/her that you’ve read.)

b El TÉ GUSTA mucho. / ÉL te GUSTA Múcho.
(You is enjoyed a lot. / You like him a lot)

2.2 Modality and expressivity

As in many other languages, the presence or absence of certain interphrasic junctures, generally rising, makes clear (Quilis 1981, 1993) if an utterance is direct (13a), indirect (13b) or vocative (13c) [for the first two cf. figures 2a, 2b]:

(13) a JUAN pregünde QUIÉN VA a enTRAR.
[ ] [ ] [ ] [ > > > ]
(Juán is asking who’s going to come in)

b JUAN pregünde: ¿QUIÉN VA a enTRAR?
[ ] [ ] [ ] [ > > > ]
(Juán is asking: “who’s going to come in?”)

c JUAN, pregünde QUIÉN VA a enTRAR.
[ ] [ ] [ ] [ > > > > ]
(Juán! Ask who’s going to come in!)

Differences of quantity or mere changes of direction of a terminal juncture can also indicate substantial semantic and pragmatic changes, as in (14):

(14) a SI SI
[ ] [ ] [ > > ] (= Yes, OK)

b SI SI
[ ] [ ] [ > > ] (= No, only a fool would believe that)

c SI
[ ] [ ↓ ] (= Is that so?)

Similarly, changes in intonation permit the expression of a single utterance with varying modality: declarative, as in (15a) or imperative as in (15b):

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(15) a  En el Aula NO se fuma  (One doesn’t smoke in class.) [= declarative]

b  En el Aula NO se fuma  (One doesn’t smoke in class!) [= imperative]

Figure 2a. $F_0$ and oscillograms for example 13a: *Juan pregunta quién va a entrar.*

Figure 2b. $F_0$ and oscillograms for example 13b: *Juan pregunta “¿Quién va a entrar?”*

Intonation can also play an essential role in the realisation of the interrogative modality. There should also be a clear difference between two types of interrogative utterances. If the question presents a grammatical element, either pronominal or of a different type which manifests the interrogative sense of the utterance, the intonation is manifested in a pattern which is substantially identical to the declarative:

the terminal juncture is falling, and the tonal levels that precede it, are low; that is to say, a similar pattern to declarative utterances. (Quilis 1981, p. 420).

On the other hand, yes/no questions, absolute or not pronominal (cf. 16b) present a model of intonation which substantially coincides with the characteristic pattern of incomplete utterances, with a rising terminal juncture (cf. figure 3).

(16) a  ¿QUÉN VIEne mAÑana?  (Who’s coming tomorrow?)

b  ¿MaRIa VIEne mAÑana?  (Is Maria coming tomorrow?)

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Now that this difference has been made, it is interesting to note that these
general intonation patterns of Spanish questions can undergo alterations to show
different secondary meanings such as "courtesy", "repetition", "confirmation" or
"order" (Quilis 1981, pp. 435–442, 1993, pp. 448–453). These different
interrogative meanings are expressed by different procedures, such as the presence
of a maximum level in some of the stresses in the utterance; by the change in
the corresponding direction in the juncture; or by a combination of the two.

2.3 Focalisation and contextual effects

Variations in the intonation patterns can occur without any syntactic
motivation, simply with the purpose of focalising or highlighting an element,
without any alterations in syntactic structure. This is the role which sentential
stress plays in other very well-known languages.

Contreras (1977, pp. 121–123) supposes the existence of a special accent of
melodic peak, which is assigned to the last rhematic element in all sentences in
Spanish. The function of this peak consists precisely in focusing on this
rhematic element. When there is more than one rhematic element, Contreras
proposes a Melodic Peak Assignment Rule, with inter-dialectal validity, to also
assign a melodic peak to that rhematic constituent. For this reason Contreras
(1980) argues that sentential stress and the word order of the sentence depends at
least in part on the information structure, theme/rheme, of the sentence.

Other studies, however, claim that not all sentences present this special
maximum level accent, and that it only appears in emphatic declarative
utterances and emphatic pronominal questions. This type of utterance, and only
this type, is characterised by the presence of a maximum level stress in one of
its words, which becomes the rhematic element:

the intonational pattern of emphatic pronominal questions coincides with that of
emphatic affirmations. The distinction between these intonations is made only by
the grammatical structure: the presence or absence of grammatical words (pronouns or
interrogative elements). (Quilis 1981, p. 437, cf. also Quilis 1993, pp. 447–450)
L. Fant (1984, p. 49) considers that the strongest candidate for the function of sentential stress is the T stress (which he calls H+ stress), which normally appears in the first TG of the sentence; but after presenting various arguments and studies, he concludes from a test using the expression botellas en el frigorífico (bottles in the refrigerator) shown in (17), and its comparison with equivalent data from other languages, that unlike German and Swedish, Spanish, like Danish, does not manifest sentential stress in all utterances, at least in the central peninsular variety spoken by his Spanish informants.

(17) a  – Tengo sed. ¿Nos queda cerveza en el sótano?
    – No, pero hay un par de botellas en el frigorífico.
    – Tómálas si quieres.
        (– I’m thirsty. Do we have any beer left in the cellar?
        – No, but there are a couple of bottles in the refrigerator.
        – Would you get them?)

b  – Oye, Juan Carlos. Hay un par de botellas en el frigorífico.
    – ¿Me las quieres traer, por favor?
        (– Hey Juan Carlos. There are a couple of bottles in the refrigerator.
        – Would you bring me them?)

In any case, it is clear that interphrasic junctures serve to emphasise the preceding constituent, especially if that juncture is rising and coincides with the extraposition of a syntactic constituent of the sentence. The T stress, which is usually the first accent of the utterance, is interpreted as a signal of emphasis if it appears in a non-initial TG.

2.4 Phrasing and textual organisation

Examples such as (11–14), above, show how the interior breaks of the utterance can be motivated by semantic, pragmatic (presupposition and emphasis) and, in general, syntactic factors. In this respect, L. Fant indicates, correctly, that, the hierarchy of a syntactic limit in a compound sentence, utterance, clause or phrase, in addition to the syntactic and semantic determinants of the different interior junctures in (11–14) and similar ones such as relatives (as he points out with the test of the absent commas) is essential for the presence of an interphrasic boundary (L. Fant 1984, pp. 46–48).

In the breaking up of long utterances into shorter phonic groups, we find the intervention of tempo factors. The length of the sequence of syllabic segments, however, or of the TG defined by a stressed syllable, is the principle factor which determines the presence of internal boundaries in long utterances (Alcoba et al. 1993). In this respect, L. Fant accepts the arguments of Borzone de Mannique and Signorini (1983) against the traditional hypothesis that considers Spanish a syllable-timed language (probably on the basis of observations of speakers reading from literary texts) and tends more toward the theory (which he
Spanish

considers not yet sufficiently demonstrated), that Spanish is a stress-timed language and that

it is the number of stresses and not that of syllables which counts in terms of the

L. Fant also argues in support of this hypothesis by stating the obvious fact that:

with a longer duration of the prosodic phrases which characterise a rapid tempo, there
results a reduction in the number of stresses.

Spanish cannot be strictly classified as a stress-timed language (like English, Dutch, etc.), nor as a syllable-timed language (like Italian cf. Bertinetto 1983) as Toledo (1988) has shown, so that neither the syllable nor the foot seem adequate operational segments for a phonetic description of Spanish intonation. Unlike English or Dutch, Spanish seems to behave as a trailer-timed language, with sequences of phonetic segments distinct from the syllable and the foot, in which the stressed syllable together with the preceding syllables forms a unity whose behaviour is distinct from the melodic units of leader-timed languages (Wenk and Wioland 1982).

The operative rhythm unit of Spanish is, then, the tonic group (TG), providing an explanation for the well-known phenomenon of syllabic reduction via vowel contact between words (Toledo 1988).

The existence of different prosodic groups in long utterances carries in itself the question of hierarchical levels of terminal junctures. To characterise the different boundaries, the presence or absence of a pause must be taken into consideration as well as the rate of slowing down (Quilis 1981, 1993; L. Fant 1984). L. Fant (1984, p. 44) distinguishes three types or levels of interphrasic boundaries: a "strong" boundary [+syllabic turnover; +pause]; a "medium" boundary [+syllabic turnover; -pause], and a "weak" boundary [-syllabic turnover; -pause].

2.5 Other patterns

In Spanish, as in other languages, there exist intonation clichés or stereotyped patterns, which are manifested in child language, as in (18), a children's choosing chant (cf. "eeenee meenee minee mo") which resembles chanted more than ordinary speech.

(18) \[
\begin{array}{cccccc}
\text{Pto} & \text{Pto} & \text{COlo} & \text{Rlo} & \text{DOnde} & \text{VASu} & \text{TAN bo Nlto} \\
[\uparrow \rightarrow > ] & [\uparrow \rightarrow > ] & [\uparrow \rightarrow > ] & [\uparrow \rightarrow > ] & [\uparrow \rightarrow > ] \\
\end{array}
\]
In these cases, the prosodic structure imposes a certain stress figure on the distribution and structure of the feet, whereas in normal speech it is the distribution of the accents which determines the melodic pattern of the utterance.

3. Comparisons with other systems

3.1 Dialectal variations

It is obvious that the tonal characteristics of Spanish described above vary according to dialect not only throughout the Hispanophone world in general, but even within the Peninsular. However, few studies have addressed this subject. The first study of dialectal variation of Spanish intonation is that of Canellada (1941), which pointed out the existence of rising intonation contours in declarative utterances in the Spanish of Extremadura (Spain). In Argentina, the difference in tone between the Spanish of Buenos Aires, Tucumán and Córdoba has been studied. The melodic Spanish of Buenos Aires is less complex than that of either Tucumán or Córdoba. In the Spanish of Tucumán, the fourth contrasting position is only discerned in utterances which end with an unstressed syllable. With regard to the number of pitch levels, in Buenos Aires and Tucumán, there are thought to be three, and in Córdoba four.

In Tucumán Spanish (...) there are only two terminal contours: rising and level. The absence of falling contours, together with the existence of glides that are always rising and the frequent occurrence of very high final unstressed syllables in statements, cause certain sequences to appear as interrogative ones to Buenos Aires ears.

While the acoustic analysis of the Argentinean Spanish of Tucumán and that of the Peninsular Spanish of Extremadura confirms the hypothesis of Fontanella (1980) and Canellada (1941), respectively, it is evident that it constitutes an argument against the hypothesis of Lieberman (1967) which considers the “falling terminal frequency contour” of statements as a “linguistic universal”. Finally,

Buenos Aires Spanish has a definitely syllabic rhythm, in Tucumán Spanish there are height and quality differences between stressed and unstressed syllables, a compression of the central part of the macrosegment, and glides in the stressed syllables that produce a typical stressed-time rhythm. (Fontanella 1966, 1971 and 1980, pp. 124–125).

The investigations carried out by Kvavik (1974, 1975) dealt with Mexican Spanish. Some of Quilis’s studies and investigations collected in L. Fant (1984) have been made with spontaneous speech or recording of informants in the centre of the peninsula. In Quilis (1985) the different forms of the \( F_0 \) in the Spanish of Puerto Rico, Mexico and Madrid were studied. Puerto Rican Spanish has a circumflexed \( F_0 \) both in declarative statements and pronoun interrogatives.
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Castillian and Mexican dialects are the same in that both have a terminal rising contour in absolute interrogatives. But for Quilis, the small difference that can be perceived, is one of the different treatment of \( F_0 \) in the syllable which precedes the absolute terminal juncture; in the configuration of the \( F_0 \) in the penultimate TG of the utterance; or in the different positioning of the beginning of the terminal rising.

Mexico, Madrid and Puerto Rico are all the same in their presentation of one of the complete forms of declarative utterance, by moving the final circumflex. (Quilis 1985, pp. 166–167).

Finally, Quilis (1989) studies the intonation in the Canary Islands and Sosa (1991) is a general study on American Spanish.

3.2 Comparisons with other languages

With regard to the melodic system of Spanish in relation to other languages of the same geographical area, what stands out is the trochaic character of the rhythm of the Spanish language, and its tendency to converge with the Greek language, while there is a divergent tendency between French and Spanish which manifests itself not only in the phonemic systems, but in the saw-like aspect of Spanish melody, as opposed to the isosceles figure in French melody.

In recent years, and particularly since L. Fant (1984), a greater interest in the phonetic and acoustic characterisation of Spanish intonation can be observed; however no published acoustic studies exist which enable one to quantify, or even simulate, the tonal variations characteristic of Spanish. In this sense, in works synthesising the Spanish voice (Santos 1981; Olabe 1983; Pardo et al. 1987) a representative number of oral productions have been analysed. Resulting values permit an acceptable simulation of pitch variations. Nevertheless, Pardo et al. (1987: 175) admit that at present they are only creating an algorithm for text to speech conversion and they hope to use their data to create a theory about intonation in Spanish.

In this sense we must consider studies such as those by Cid and Roach (1990), Prieto et al. (1995) and Garrido (1996). As far as sentence rhythm is concerned, L. Fant considers that Spanish is a stress-timed language, following the arguments made in Borzone de Manrique and Signorini (1983), indicated above. But, independently of the evident effects of tempo on the greater or lesser number of syllables of a prosodic group or of the number of stressed syllables which form a given prosodic group, the question of the timing of the different intonation models of Spanish, based on the analysis of continuous spoken spontaneous Spanish are still in need of systematic studies, such as Toledo (1988), in order to define the valid parameters statistically and the operative units and sequences for an adequate description of the melodic system.
Unlike stress-timed languages like English or Dutch or syllable-timed languages like Italian, Spanish seems to behave like a trailer-timed language. The tonic syllables group together with the preceding unstressed syllables to constitute a unit which behaves differently from the syllable or the foot.

The operative rhythmic unit should be the "tonic group", a set of syllables grouped around the tonic syllable of a word and circumscribed by the final borders of the stressed words (Alcoba et al. 1993, Hirst et al. 1993).

4. Conclusions

In the research into the phonetic representations of intonation, two basic types of models can be seen: perception-based models (like the one developed in Eindhoven), and production-based models (like the one developed in Aix-en-Provence).

A perception-based model gives no information, from a theoretical point of view, about the nature of phonological representations, and its representation of intonation is essentially syllabic. But, as has been shown, the intonation contour is not restricted to the confines of the syllable. In any case, while the perception-based model may be perfectly adequate for describing the melodic system of stressed-timed or syllable-timed languages, it does not appear to be so appropriate for a trailer-timed language like Spanish.

For languages like Spanish, where the stress group is the operative rhythmic unit, and where there seems to be no correspondence between the syllables and the contours of phonetic constituents of the intonation, an intonation model based on production seems more appropriate.

The lack of a general consensus as to what constitutes a phonological representation of the sentence also privileges a production-based approach in phonetic research into intonation. The results of a perception-based approach would be difficult to evaluate within a phonological model, because without an explicit phonological model it is difficult to see how to handle the results of a process of stylisation whether we use the empirical (Dutch) or quantitative (French) model. In any case, a representation of intonation, like the one proposed by Hirst (1987, §4.4), when reduced to a sequence of significant points distributed in two or three different levels and calculated from a declining reference line, without being adapted to a specific operative rhythmic sequence, would be perfectly adequate for one language type or another, for English, French or Spanish.