Phonetica *30:* 65–100 (1974)

Theories and Methods in Spanish Intonational Studies

Survey

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Abstract. The paper demonstrates and evaluates the various approaches used in Spanish intonational research. Dialectal studies, theoretical and methodological approaches, and intonation representational schemata are reviewed in a chronological order and integrated with the main theoretical currents of the field. The authors suggest directions for future research and present a summary of their own investigations into two dialects of Spanish – Castilian and Mexican – using the computerized intonation extractor of the University of Toronto.

Studies of Spanish intonation span 75 years of research, but despite the length of time studied and the number of published works. Spanish intonation is a field which has had much less detailed investigation compared to other phonological studies of Spanish. It is the purpose of this paper to examine these studies and briefly discuss the approaches the investigators used, in addition to relating to some degree the Spanish studies to those done on other languages; we wish to place Spanish intonational studies in a perspective with intonational studies in general[1]. It is useful to view the studies from these various points of view: dialects, chronology, methodology, theoretical back-

[1] The sources for our bibliography are varied and many; they include the articles themselves. The Modern Language Association's *Annual International Bibliography* and the UNESCO *Bibliographie Linguistique* were the most helpful current sources. Special mention is to be given the following bibliographies which provided sources, reviews, and often annotations which helpfully guided us in examining items not necessarily listed under 'entonación': ANTONIO QUILIS, *Fonética y fonología del español*, Cuadernos Bibliográficos, vol. 10 (Consejo Superior de Investigaciones Científicas, Madrid 1963); HOMERO SERÍS, *Bibliografía de la lingüística española* (Instituto Caro y Cuervo, Bogotá 1964); CARLOS A. SOLÉ, *Bibliografía sobre el español en América 1920–1967* (Georgetown Univ. Press, Washington 1970). We especially thank Prof. CHARLES HOCKETT, Prof. ANTHONY LOZANO, and Prof. NORMAN UNDERWOOD for their kind help in obtaining some of the bibliography.

ground, and manner of representation. An evaluation of the existing literature together with a presentation of new approaches to Spanish intonation by means of a computerized extractor suggest directions the field of intonation studies can follow. The authors include a complete bibliography[2].

Only studies dealing with aspects of Spanish intonation are included, with a few exceptions which are not in the bibliography proper. The exceptions, to be explained, are works we believe to be highly influential or important regarding particular studies of Spanish intonation. Moreover, we will not discuss intonation and its role in resolving syntactical ambiguities, except for brief mention of several works included in the bibliography.

The literature which examines intonation in Spanish is quite diverse. When we included any work in our bibliography, we did not make the decision for inclusion on a narrow set of criteria; the literature is just too varied. We attempted to characterize intonational studies as those which describe the melody of the phrase or sentence, or the pitch *(tono, tonillo, tonada)*, or the fundamental frequency, that is, we did not include studies on 'intensity' or 'quantity'. The description may mean an impressionistic description, an acoustical study, a perceptual description, or a phonological or phonemic description. Those articles which give the author's general impressions are numerous; the author may say, for example, that Castilian is 'grave', whereas dialect X of Spanish is 'agudo'. This impressionistic viewpoint has been included for several reasons: the article or book was important for subsequent investigations, and the interdialect perceptions or impressions are worthy to be studied for the phonetic manifestations that may contribute to the perceptions, in addition to the social-historical-cultural stereotypes among the dialect areas in the Spanish-speaking world. For example, the subjective impressions that the phonetics of a dialect create for the hearer who speaks a different dialect or language may cause or result in certain stereotypes[3].

[2] All citations which occur in the final bibliography appear in the survey in the following manner: GILI GAYA [1924]. The date cited in the survey is that of the earliest version of the article or book, when there is more than one. However, quotations and page numbers are from the later version. We have examined and compared earlier and later versions, where they exist, and have found very little or no basic informational differences between them. Only those review articles are cited in the bibliography itself which we believe give pertinent criticisms or a comprehensive critique relevant to the study of intonation.

[3] DELATTRE [1965] gives interesting phonetic evidence for such perceptions between English, French, German, and Spanish.

By discussing the dialects, methodology and theoretical orientations, and types of display in separate sections in a chronological order (sections I, II, and III, respectively), it is hoped that the field of Spanish intonation will be brought into a focus where the qualities and shortcomings in the works may be seen, as well as the areas where more research is needed. We shall conclude by describing our own research projects, in addition to those plans for future research.

I. Dialects

The dialects which have been studied are varied, especially when the depth and breadth among the studies are considered; Spain, Mexico, Argentina, and Chile are those countries which have received the most attention. For the most part, the works treat one dialect of Spanish, but some are of a comparative nature encompassing two or more dialects, or they compare Spanish with another language.

The dialects in the studies were analyzed in various degrees of detail, ranging from a rather complete study based at least in part on instrumental analysis (kymograph, spectrograph), to a brief description based solely upon the dialectologist's general impressions. That dialects differ in intonation seems to be a principle that most scholars agree on, but that basically has not been studied extensively. Even between 'Received Pronunciation' and 'Standard American English' there are enough intonational differences so that English colleagues have mentioned that perfectly normal patterns of intonation for them were interpreted as 'insolence' or 'sarcasm' by American students. Within Spanish, we have no detailed knowledge of cross-dialectal patterns. Pedagogically, the majority of the material emphasizes 'Castilian' or 'Latin American' Spanish, and segmentals on the whole are given much more attention than intonation, even in phonetics books.

Before any panoramic discussion, special attention should be given the efforts of one scholar, NAVARRO TOMÁS, whose work is still highly influential on scholars working on Spanish intonation and phonetics. His perceptive analysis of the pronunciation and intonation of Castilian in the *Manual de pronunciación española* [NAVARRO TOMÁS, 1918] was the first large-scale attempt at a wide phonetic analysis of any Spanish dialect, including the intonation. The dialect is that of

Castile, 'la que se usa corrientemente en Castilla en la conversación de las personas ilustradas, por ser la que más se aproxima a la escritura; su uso, sin embargo, no se reduce a esta sola región, sino que, recomendada por las personas doctas, difundida por las escuelas y cultivada artísticamente en la escena, en la tribuna y en la cátedra, se extiende más o menos por las demás regiones de lengua española' [NAVARRO TOMÁS, 1957, p. 8]. The *Manual de entonación española* [NAVARRO TOMÁS, 1944] set the course for much of the intonation research on Spanish which followed. This book elaborated on previous work both for ordinary and emotive intonation. The role of intonation and syntax was explored in some detail, along with the types of 'cadences' or *tonemas* which mark the end of a melodic unit. NAVARRO TOMÁS maintained there are five *tonemas: cadencia*, *semicadencia* (two falling types); *anticadencia*, *semianticadencia* (two rising types); *suspensión* (a level tone). We note that these *tonemas* are similar to the terminal junctures of the structuralists. The author states that the dialect described is the literary language of educated Castilians, that is, the research was based on readings of educated people from diverse Spanish regions and shows a 'pan-Castilian' flavor: 'La entonación literaria muestra visiblemente en sus inflexiones esenciales el elemento castellano que le ha servido de base, aunque no sea cosa fácil precisar la procedencia concreta de dicho elemento entre las varias zonas de la región indicada' [NAVARRO TOMÁS, 1966, p. 12].

Hardly a book or article on Spanish intonation appears without mention of NAVARRO's manuals. It is due in large part to NAVARRO that peninsular Spanish has received more attention than other Spanish-speaking areas and that one dialect, Castilian, is the subject of most of the studies of peninsular Spanish. Such attention to Castilian is also due to the fact that it is considered the 'best' or 'purest' Spanish, an idea which has come from literary prestige, sound-to-spelling correspondences, in addition to Spain's being the 'mother country'.

Apart from the *Manual de pronunciación* and the *Manual de entonación* by NAVARRO TOMÁS, there are quite a few articles and chapters or sections from general treatises and pedagogical manuals which deal with Spanish intonation, especially Castilian, Mexican, Argentine, and Chilean Spanish. We shall begin with the studies of Castilian, which will be discussed in chronological order.

Castilian studies may be devoted entirely to Castilian or to a comparison of Castilian with another dialect or language. ASENJO BARBIERI

[1892] was among the earliest of Spaniards to give his impressions of Castilian. He compared the qualities of Spanish with those of music. Both have sound and rhythm for which accent is fundamental. He remarked on the tonal value of the five vowels and their harmonics. He pointed out the difference between accent, quantity, and pitch *(acento, cantidad, tono)*, saying that grammarians had confused these. Accent seems to be the equivalent of intensity for him. He also noticed musical differences in different styles, noting that the language of the court is more musical and that in oratory the tones rise. Moreover, he spoke of the cadences at the end of the spoken period, as well as noting the different tones [levels?] for interrogatives, admiration, and parenthesis [Asenjo Barbieri, 1892, p. 156].

To our knowledge, the first schematic description of Castilian intonation is that of Waiblinger [1914]. He compared examples from Castilian with those of Buenos Aires and Barcelona, using three informants for his experiments on Spanish. Gili Gaya [1924] examined stress and pitch in isolated words and in intonation curves, finding that pitch always rises on stress in isolated words, but that in continuous text it usually goes up on words but may remain on the same level, or go down, depending on the place in the intonation curve.

Ettmayer [1925] compared the diverse Romance languages generally as to their registers. Each phrase consists of three registers, the onset, the tensed register, which is a rise until the first stress, and a release, which is the descent of the voice. He also discussed types of 'release' which correspond to different emotive patterns. He lamented the difficulties of notation. For his Spanish examples, he has drawn from both Waiblinger [1914] and Navarro [1918].

Navarro Tomás [1925] studied words having accent in isolation versus their not having accent syntactically in a phrase or sentence in 'Palabras sin acento'. Gili Gaya [1926] studied intonation in verse to determine if intonation, in addition to intensity and length, added to the rhythmical element of Spanish versification. He found that intonation is not necessarily a rhythmical element, but that it remains closely related to stress. The same year, Navarro Tomás and Espinosa [1926] published their *Primer of Spanish Pronunciation*, a manual for students learning Spanish, with a very brief section on intonation.

'Spanish Accent' [Navarro Tomás, 1935] is a classic example of the impressionistic literature. Navarro Tomás maintained that 'just as the sonority is primarily based on the timbre of the vowels, and the

virile firmness on expiratory intensity, the nobility and the dignity observed in the Spanish accent have intonation as their phonetic basis' [p. 92]. He went on to say that 'the musical cadence of Spanish, especially in Castile, is, in effect, relatively low and solemn. Italian and French are spoken, in general, in a higher tone and with a more rapid rhythm than Spanish' [p. 92]. And further on he declared that 'Spanish intonation is not composed of scales, arpeggios, or ligatures, but of prolonged notes, relatively uniform and harmonized with each other by regular intervals. The order and beat of these movements and the purity and sobriety of these lines give the Spanish accent its solemn harmony and its lordly distinction' [p. 93].

STIRLING [1935] used conversational Castilian for his representations of intonation in *The Pronunciation of Spanish*. ALONSO and HENRÍQUEZ UREÑA [1938] described a standard Spanish [we assume the Castilian standard]. NAVARRO TOMÁS [1939] researched the average number of syllables in the 'grupo fónico' in reading style, with fifteen different readers, finding that eight syllables were the usual number counted between pauses. GILI GAYA [1950], in *Elementos de fonética general*, undoubtedly used Castilian for his examples in illustrating principles of intonation. An interesting study of pauses, *cadencias*, and syntactic types was also done by GILI GAYA [1950]. ENTRAMBASAGUAS' [1952] pedagogical manual for students of Spanish is clearly in debt to NAVARRO TOMÁS [1944] for his examples and manner of representing Castilian. CÁRDENAS [1960] based his work on that of NAVARRO TOMÁS [1944] and compared Spanish patterns with those of English. QUILIS' [1964] *Curso de fonética y fonología españolas* is a pedagogical manual of pronunciation for foreign students.

Besides WAIBLINGER [1914], who did a comparative study, CANELLADA [1941] compared the intonation of twelve uneducated informants from Extremadura to that of one informant of average education from Madrid. In that article, the differences that she found in the finality contours between the two dialects is particularily noteworthy. One must bear in mind, however, that she compared the speech of uneducated (illiterate) speakers of one dialect with that of a more educated speaker of another dialect. We believe nevertheless that CANELLADA's study is one of the most revealing and thorough for pointing out differences between dialects, besides being the first article comparing Spanish dialects in a systematic fashion. And, finally, another comparative study is that of LACERDA and CANELLADA [1942,

1943]. The investigators compared the stressed vowel tones of isolated words in Portuguese and Castilian; the words were really also one-word sentences, answers to interviewers' questions and, therefore, the articles are considered part of the intonational literature.

Mexican dialects have been studied individually and also compared with other languages. The earliest study of intonation is that of GUTIÉRREZ ESKILDSEN [1938]. The author briefly discussed emotive intonation and then concentrated on the street calls of vendors she heard in Villahermosa, Tabasco. WALLIS [1951] illustrated speech from or around Mexico City, stating that 'in all cases the examples given are from normal, everyday speech, recorded under natural conditions' [pp. 143–144]. She also gave examples of oratorical or lecture style, which differs from conversational style in the use of more stressed syllables. KING [1952] based his intonational analysis on data of two speakers from Mexico City, checking the material with a third informant. The reader assumes KING described a conversational style. MATLUCK [1965] devoted a section of his analysis of structural points of view on intonation to a discussion of Mexican intonation. His observations were a continuation of those made earlier [MATLUCK, 1951] and repeated to some extent subsequently [MATLUCK, 1952]. MATLUCK [1951, p. 121, fn 404] spoke of the 'circumflex' intonation, in addition to numerous citations of substrata influence mentioned in various articles in HENRÍQUEZ UREÑA [1938]. BOYD-BOWMAN [1960] gave some general impressions of that intonation, that is, the high tone and rapidity of articulation, undoubtedly from indigenous influences. DELATTRE *et al.* [1962] and DELATTRE [1965] based their studies on a recording of an informant from Guanajuato, using a conversational style.

Resuming what has been analyzed with Mexican intonation, we find that, even with WALLIS [1951], KING [1952], DELATTRE *et al.* [1962], and MATLUCK [1965], there is need for more information on Mexican intonation. If we consider that many of our high school teachers are trained by learning 'Mexican Spanish', the lack of research in this area needs remedy for pedagogical reasons.

The third area which has been studied to some degree is Argentina. The various Argentine dialects have been studied individually and compared with each other. ALONSO and HENRÍQUEZ UREÑA [1939], while definitely dealing with standard Spanish, that is, the literary, educated standard of the Peninsula, mentioned *porteño* (Buenos Aires)

intonation: 'Recientemente, en Buenos Aires se ha desarrollado por influencia italiana una entonación un poco cantarina que mantiene con escaso descenso la última sílaba acentuada y que sostiene en el mismo tono la postacentuada, en vez de hacerla bajar más. Este final neoporteño en las frases enunciativas da un poco a su entonación el carácter de salmodia, y va abiertamente contra las tradiciones idiomáticas del país [p. 208].

ALVAREZ PUEBLA DE CHÁVES [1948], while primarily devoting attention to various aspects of experimental phonetics, gave some information on dialectal differences between *porteño* (Buenos Aires) and *cordobés* (Córdoba) speech, with large graphs comparing *¿ Quién vino?* in both dialects.

VIDAL DE BATTINI [1949] described the various *tonadas* of that region and delimited them cartographically. There are three areas with different intonations. The first is that of the extreme south of San Luis, where the intonation is similar to that of Buenos Aires. The second area is the central area and has the *tonada puntana*, with its additional pretonic accent. The *tonada nortina* is found in the northern area with its marked antepretonic accent. The different intonations of the region give special impressions, e.g., 'la *tonada nortina* es quejosa: se la oye como un perezoso lamentarse. En la *tonada puntana* domina el tono rogativo-mimoso subrayado por abundantes elementos afectivos del lenguaje, particularmente de diminutivos, sobre un fondo de indolencia' [p. 24]. Although she used no systematic notation, her comments on voice modulations have been invaluable for subsequent investigations.

MALMBERG [1948] noted exterior influence by Italian in Buenos Aires, in addition to substrata influences in other regions [pp. 24–28]. MALMBERG [1950] discussed the *esdrújula* accent found in regional Argentine Spanish and the special 'rising' intonation which is linked to it. He stated that the strongly descending intonation of Argentine Spanish, in combination with vocalic length was perhaps a development from an existing peninsular dialect and, therefore, not caused by substrata or superstrata. In this article, there are also displayed kymographic tracings made in Paris by an Argentine informant. PAÎS [1953] gave some general impressions of the intonation of Catamarca [pp. 56–58]. VIDAL DE BATTINI [1954] indicated that intonation is not only important in differentiating dialects but also important for regional identification and loyalty in Argentina; in *El español de la*

Argentina she carefully described the six main intonational regions of the country, delimiting them cartographically. According to VIDAL DE BATTINI, *porteño* is considered 'intonation', and the 'traditional' intonation of Buenos Aires is closest to that of Castilian, but there is extended influence from Italian intonation. In addition, she spoke of the intonations peculiar to certain social strata, e.g., *tonada lunfarda.* The five dialects or areas other than *porteño* are the (1) *correntina* or *guaranítica*, (2) *noroeste* or *esdrújula*, (3) *mendocina* and *sanjuanina*, (4) *San Luis* or *puntana* and (5) *cordobesa.*

More recently, there have been three studies which use more formal notations than the previous ones done on Argentine Spanish. FONTANELLA [1966] described the intonation of Tucumán and compared it with that of Buenos Aires, more precisely, with the analysis of *porteño* done by GREGORES and SUÁREZ [1971] in *Curso de lingüística moderna*, the Spanish version of HOCKETT's *A Course in Modern Linguistics.* Her Tucumán informant was a middle-aged female with secondary education. The corpus was later compared with three other informants' language; they were of similar age and education. The description was then adjusted to the Spanish of one of the authors of the Buenos Aires study to avoid discrepancies between the different authors' transcriptions. FONTANELLA [1971], in a very recent article, based her study on four informants who had post-secondary education, ages 20–30, using spontaneous conversation.

The fourth area which has received a number of studies is Chile; there are a few short studies of Chilean intonation, plus a dissertation of considerable length. MALMBERG [1948] discussed probable substratum influence on Andean Chilean intonation. GALLARDO [1953] described the regional intonation of the island of Chiloé and she also gave graphic representations of the melodic lines to compare the three different types of intonation on the island, *isleño corriente*, *chonchino*, and *descendiente de indígena*[4]. The 'Estudio fonológico del español de Chile' by SILVA-FUENZALIDA [1953] was concerned with a phonemic analysis of Chilean Spanish. Of the suprasegmentals, only tone levels were analyzed. One idiolect, considered standard, was analyzed; particularly interesting is the differentiation the author makes at the beginning of the article on styles: *coloquial lenta* or *coloquial rápida*, *formal.* He also

[4] The excerpts to which we have had access are reproduced in UNDERWOOD's dissertation [1971, pp. 337–345].

noted a social level, *habla vulgar*. RABANALES [1958] described emotive intonation briefly, with regard to interjections. He classified their meanings and the tone with which they are spoken. The tone with which a particular word is uttered will often signal its meaning. For example, *oh* in a high tone may signal surprise, while in a low tone, pity [pp. 215–238]. Although not an analysis of Chilean intonation *per se*, the experiments conducted by CONTRERAS [1963, 1964] to confirm BOLINGER and HODAPP [1961] used the Chilean Spanish of the author as the basis for perceptual tests.

OROZ [1966] gave a short summary of Chilean intonation, saying that there are four dialect areas for the intonation: extreme north, central area, south, and Chiloé. He maintained that Chilean intonation is quite different compared to Spanish intonation and that the regional intonations have indigenous origins. According to OROZ, in Santiago and Valparaíso, the intonations not only are alike but are not differentiated by social classes. For the most part, his work concerned itself with impressions of the melodic line in the various regions.

UNDERWOOD [1971] used tapes from interviews done with Chilean informants from Santiago to Concepción, including professionals, students, servants, and farmers, as well as tapes made of speeches. UNDERWOOD included a long discussion of various studies on intonation, especially Argentine and Chilean, as well as making schematic drawings of the intonation patterns described by NAVARRO TOMÁS [1944]. He also included a discussion of various Chilean patterns of declarative, interrogative, and emotive sentences.

Specific areas other than Spain, Mexico, Argentina, or Chile have been studied very little, if at all. Although of a general nature, EASTMAN [1926] indicated some tone levels in Colombian Spanish: 'El tono medio de la elocución es bajo, apagado, con amplias cadencias en final de oraciones declarativas ... Los miembros de enumeraciones simples meramente enunciativas y las terminaciones de preguntas pronominales se dicen a menudo con inflexión ascendente' [p. 318]. LOZANO [1964] contributed to the knowledge of styles (e.g., oratorical, informal conversational, etc.), by the intonation patterns which he described as differentiating between them. He also correlated intonation patterns with certain syntactic patterns characteristic of certain styles.

HENRÍQUEZ UREÑA [1940] compared his impressions of the intonation of Santo Domingo with those of other dialects. In speaking

of the educated classes, he said, 'en Santo Domingo existe la entonación grave, semejante a la colombiana'. He continued that 'en las nuevas generaciones empieza a señalarse el uso de registro más agudo, a semejanza de Cuba' [p. 150].

The intonation of Venezuelan Spanish was examined by ANTHONY [1948]. To our knowledge, this was the first work done using the structural approach of levels for any Spanish dialect. The informant was a female from Barquisimeto, Venezuela. A variety of interrogative patterns, plus a few interrogative patterns with emotive overtones were analyzed.

NAVARRO TOMÁS [1948] gave a very general description of intonation in 'el habla popular'. NAVARRO stated that 'el tono medio de la elocución se desarrolla en línea algo más alta que la que sirve de base al castellano ordinario. El descenso final de las oraciones declarativas no suele producir cadencias de plena amplitud. Es frecuente que el intervalo de la cadencia en la aseveración corriente no alcance en Puerto Rico más de cuatro o cinco semitonos debajo de su propia línea media, en lugar de los seis u ocho semitonos que el castellano recorre en esos mismos casos' [p. 112]. NAVARRO also compared the interior and coastal regions' intonations in a general way.

For Ecuador, TOSCANO MATEUS [1953] also gave very general impressions of regions and substrata influence on the intonation of Ecuador.

Finally, one brief study was done on Nicaragua by LACAYO [1962]. LACAYO said that 'la entonación del nicaragüense culto sigue en general las líneas del castellano normal, aunque relativamente atenuadas: ni baja tanto en las cadencias, ni sube tanto en las anticadencias; puede decirse que sólo llega a la semicadencia y a la semianticadencia' [p. 16]. The examples LACAYO used are from 'popular' speech.

After examining the studies on the various dialects of Spanish, it is apparent that not only intonation may signal dialectal differences, but that social differences within the dialects themselves may have different intonation patterns and that styles of speech may be differentiated by intonation. The studies so far have not presented enough detailed evidence for any complete picture of intonation. We do have quite a few studies on Castilian Spanish, but less for Mexican, Argentine, or Chilean Spanish. With regard to the impressions of a particular dialect, we believe that the phonetic correlates of the impressions of 'tono alto' or 'tono grave' must be examined as to their manifestations

in levels and contours. Also, when studying dialects, age, sex, social strata, and conversational style must be kept as equal as possible among the informants.

A final note must be added concerning those studies which have been carried out using speakers from various Spanish dialectal areas, without reference to any specific dialect. The works of STOCKWELL, BOWEN, and SILVA-FUENZALIDA, either published separately or as a team, are based upon extensive observation of speech from both Spain and Latin America[5]. BOWEN [1965] compared the common English and Spanish intonations, using a pedagogical approach. STOCKWELL *et al.* [1956] discussed Spanish juncture and intonation from a theoretical viewpoint, reducing the patterns to levels, stress, and junctures. SILVA-FUENZALIDA [1956–1957] examined the morphology of Spanish intonation, that is, the intonation patterns formed by pitch levels, terminal junctures, and stresses. The patterns presented in the article were taken from the teams' work of [1956]. The pronunciation manual by BOWEN and STOCKWELL [1960] compared Spanish and English intonation patterns from an applied linguistic point of view, using contrastive analysis. The works cited above from [1956, 1960, 1965] have had a great deal of influence on applied linguistics and the teaching of Spanish phonetics[6].

MATLUCK [1965] reviewed the linguistic premises behind the above-mentioned works, as well as those in CÁRDENAS [1960]. The various patterns and their notations and the overall contributions of the authors to Hispanic intonation was the purpose of MATLUCK's [1965] article, in addition to the brief description of Mexican intonation already discussed. REYES-CAIRO [1970] examined fundamental frequency and amplitude using 11 Hispano-american informants and 20 additional listeners from both Spain and Latin America. He also discussed the dialects examined individually with regard to amplitude and frequency.

[5] These three authors, in their article 'Spanish Juncture and Intonation', stated that they worked closely for 3 years with native speakers of Spanish from central and northern Spain, urban Mexico, urban Guatemala, urban Costa Rica, urban Venezuela, upland Colombia, upland Ecuador, west-coast Peru, and urban Chile. In addition, visits were made to every Spanish-speaking capital in the western hemisphere. SILVA-FUENZALIDA [1956, p. 407, fn 5] is a native of Santiago, Chile, and has done extensive field work throughout that country.

[6] We do not list any pedagogical manuals subsequent to 1965 because of the reliance of their authors on works done prior to 1965 for intonational description.

II. Methods of Research and Theoretical Orientations

Each study of Spanish intonation has a particular approach or method of research, from recording of impressions, to instrumental and theoretical analyses, to perceptual tests. The studies may be written solely for fellow scholars, for a more general audience, or for the student learning Spanish. Therefore, in their methods of research and theoretical orientation, the studies can be highly technical, comparative and/or contrastive with another dialect or language, and/or pedagogical in intent. Although notation is often closely connected with method and theory, we will discuss the various types of display in the following section. This section will be devoted solely to methods of research and theoretical background.

Most linguists and phoneticians identify pitch or fundamental frequency as the basic element of intonation, but most also imply or explicitly mention length and intensity as important factors. This group of scholars, as PIERRE LÉON and PHILIPPE MARTIN [*Prolégomènes à l'étude des structures intonatives*, Didier, Montréal 1969] have indicated, usually consider intonation from the point of view of *substance* or of *form*. Those concerned mainly with substance describe intonation in purely phonetic terms, mentioning such acoustic elements as fundamental frequency, duration, and amplitude or their perceptual manifestations of pitch, length, and intensity. Those concerned mainly with form describe intonation in linguistic terms by identifying phonemic pitch levels, stress, and juncture along with their function in a given language system. In the following discussion, therefore, we will first examine the instrumental phonetic studies, then the purely perceptual phonetic studies, and finally those concerned with linguistic theory. The few studies which offer only general and impressionistic comments will not be included.

Much of the early work on Spanish intonation was based on kymographic analysis. The kymograph was designed around the turn of the century by the French experimental phonetician, Abbé P.-J. ROUSSELOT, and is described in his *Principes de phonétique expérimentale* [Welter, Paris, vol. 1, 1897–1901, vol. 2, 1901–1908]. This instrument offered a representation of the speech wave in the form of a tracing etched on blackened paper. Much of the complexity of the wave was lost in transmission, but enough remained to provide objective data on various physical aspects of speech. Duration was measured on the

horizontal axis, amplitude on the vertical axis, and fundamental frequency could be calculated by counting the number of vocal cord vibrations which were displayed in a given segment of time. Even though all measurements were made by hand on a simplified representation of the speech wave, this analysis was precise enough to warrant an article by GILI GAYA [1924] in which the influence of consonants on the melodic line was already observed. Other kymographic studies of note are WAIBLINGER [1914], NAVARRO TOMÁS [1918, 1925, 1944], GILI GAYA [1926, 1950b], CANELLADA [1941], and MALMBERG [1950]. LACERDA and CANELLADA [1942, 1943] report both kymographic and perceptual research.

The second instrument of major importance for the analysis of intonation is the spectrograph. This machine, which was developed during World War II and made available to researchers near the end of the 1940s, is superior to the kymograph in several respects. Being made of electronic circuitry and later transistorized, the spectrograph is able to offer precise information on duration and amplitude, in addition to giving a complete frequency analysis of the speech wave. The measurement of duration can take into account such factors as consonantal transitions which perceptually belong to the consonant and not to the vowel. Amplitude can be read either as an over-all display for each syllable or in a section for individual frequency levels. And frequency variation can be studied directly in the harmonic structure, usually by following the tenth harmonic on a normal scale or the fundamental or second harmonic on an expanded scale. The, normal scale displays frequency by approximately 2,000 cps/inch, while the expanded scale magnifies the lower portion of the spectrum and displays frequency by approximately 200 cps/inch.

The first scholar in our bibliography to use spectrography as a technique of research was SAPON [1958–1959]. SAPON demonstrated the usefulness of the spectrograph in studying intonation, in addition to offering intonation curves for Spanish, French, and Italian. Using two Spanish, two French, and two Italian informants, SAPON had them read proverbs. An expanded scale was used to study frequency variation, and results were compared [pp. 171–175]. BOLINGER and HODAPP [1961] used spectrograms to show the movement of the fundamental frequency in sentences. Forced choice tests were then given a group of listeners in order to determine whether the word with tone height or intensity would be perceived as the 'accented' one. They

concluded that tone was the most important element in Spanish accent. In order to confirm BOLINGER's investigation, CONTRERAS [1963] conducted a series of three experiments accompanied by listener tests. Spectrograms were made of the recordings so that various dimensions – fundamental frequency, duration, and intensity – could be measured. In the first experiment, isolated words were used. In the second experiment, words used were taken from sentences which had been recorded by the listeners. In the third experiment, minimal pairs within sentences were studied, e.g., *paro, paró*. CONTRERAS as well as all listeners were Chilean. Conclusions indicate that tone is more important than intensity in the perception of stress and even more important than length. NAVARRO TOMÁS [1964] criticized the measurements of intensity made by CONTRERAS and stated that intensity is an 'elemento constitutivo de la estructura fonológica de las palabras españolas y de los apoyos rítimicos del acento en la prosa y en el verso de nuestra lengua [p. 235]. CONTRERAS [1964] replied to NAVARRO's article and gave more spectrographic data to show the importance of the rapid ascent or descent of the tonal line in the perception of stress. Although this series of experiments beginning with that of BOLINGER are primarily concerned with the perception of sentence stress, they are important for the study of intonation in that stress is related to the over-all melodic contour of the sentence. Examples are often given of complete sentences, or words are extracted from larger units.

DELATTRE *et al.* [1962] analyzed 5 min. of continuous speech for both English and Spanish by spectrographic techniques. Intonation curves were related to major and minor continuation within the sentence and to finality at the end of the sentence. Later, DELATTRE [1965] offered schematic displays of declarative intonation which were based on previous spectrographic analyses and verified by speech synthesis and perceptual tests.

Most recently, the two dissertations by REYES-CAIRO [1970] and UNDERWOOD [1971] used the spectrograph as their major tool in studying Spanish intonation. REYES-CAIRO used listener evaluations to accompany his instrumental study of interrogative intonation. UNDERWOOD coupled spectrographic analysis with perceptual and musical interpretation as a research technique in studying Chilean intonation.

The remaining research, which includes most of the studies, was conducted without the aid of specialized equipment. This research is what we term *perceptual phonetic*, attempting a representation of

intonation purely by ear, or *phonemic*, attempting a representation of the contrastive phenomena of stress, pitch, and juncture with a description of their function.

The main works based on a perceptual phonetic description are: EASTMAN [1926], STIRLING [1935], GUTIÉRREZ ESKILDSEN [1938], ALONSO and HENRÍQUEZ UREÑA [1938], VIDAL DE BATTINI [1949, 1964], GILI GAYA [1950a], ENTRAMBASAGUAS [1952], BOLINGER [1961], LACAYO [1962], and QUILIS [1964]. What these studies have in common is that they offer a description apparently made completely by ear without the aid of research equipment. VIDAL DE BATTINI [1949] clearly mentions this fact by stating: 'No podemos hacer, como desearíamos, la descripción de nuestra tonada sobre rigurosas experiencias físicas. Sólo anotaremos aquí observaciones tomadas al oído, sin el auxilio de aparatos especiales' [p. 21]. Some of the authors have done instrumental research, however, such as BOLINGER and GILI GAYA, who were mentioned previously. But in the perceptual phonetic studies, there is no instrumental data presented. It should be stressed that the lack of such scientific information does not at all negate a work based entirely on a perceptual analysis.

The phonemic analysis of intonation does not find its roots in Spanish studies but can be traced to the works of such American structuralists as KENNETH L. PIKE's *The Intonation of American English* [Univ. of Michigan Press, Ann Arbor 1945], and GEORGE L. TRAGER and HENRY LEE SMITH's *An Outline of English Structure* [Studies in Linguistics. Occasional papers No. 3. Battenburg Press, Norman 1951]. The major British and American works are expertly summarized by PHILIP LIEBERMAN's *Intonation, Perception, and Language* [Research Monograph No. 38. MIT Press, Cambridge 1968], while LÉON and MARTIN's work *Prolégomènes* ... [1969] gives an excellent evaluation of the practical and theoretical problems of intonation analysis along with an extensive general bibliography on intonation. In our bibliography, MATLUCK [1965] summarizes the phonetic and phonemic studies of NAVARRO TOMÁS, CÁRDENAS, and STOCKWELL, BOWEN, and SILVA-FUENZALIDA, while REYES-CAIRO [1970] traces the development of American studies on English intonation and correlates them with studies on Spanish intonation.

The first articles based on phonemic principles in Spanish [ANTHONY, 1948; WALLIS, 1951] follow PIKE's system of analysis. The affinity which these authors show to PIKE is readily seen in the number

of levels postulated and the order of numbering. Both use four contrastive levels with /1/ being the highest and /4/ the lowest. ANTHONY states that the levels are relative rather than absolute with the distances differing between them. Levels /2/ and /3/ are closer together than /2/ and /1/, and /3/ and /4/. WALLIS, who is primarily concerned with intensity as a correlate of stress, nevertheless discusses the function of the four levels by stating that level /1/ is used to emphasize or to express surprise or questions. Levels /2/and/3/ are used in normal conversational style of speech with stress occurring on level /2/. Level /4/ indicates finality and is also used for contrast and emphasis.

In the remaining phonemic studies, a system of analysis was developed which covered not only levels of pitch, but degrees of stress and a variety of juncture phenomena. For this more inclusive description, linguists used as their model the well-known analysis of English structure by TRAGER and SMITH. In their search for clues which signal syntactical units, TRAGER and SMITH had proposed for English four levels of pitch, four degrees of stress, three terminal junctures, and one internal juncture. Pitch levels were indicated from lowest to highest by numbers /1/ through /4/ (a reverse numbering from that of PIKE), stress was marked from strongest to weakest by the symbols /ˊˆˋˇ/, terminal juncture was indicated by /#/ for falling pitch, /||/ for rising pitch, and /|/ for sustained pitch, and internal juncture was transcribed as /+/. Basically the same analysis, including most of the symbols, was used for future studies of Spanish. Those studies are briefly summarized in the following paragraphs.

KING [1952] recognizes two phonemic degrees of stress, one strong /ˊ/ and one weak /ˇ/ or unmarked. He postulates three levels of pitch numbered from lowest to highest by /1/ through /3/. In addition to the three numbered levels, KING finds a contrast between a contour that rises at the end and one that remains level or falls. The level and falling contours are regarded as a repetition of the preceding pitch level, and the rising contour is assigned to an additional pitch phoneme which is written /ˆ/. This author also recognizes open juncture /+/, called 'plus juncture', within the phrase and a single bar juncture /|/ at the end of the phrase. 'Plus juncture' is considered a phenomenon of transition from one sound to the next and is illustrated by such pairs as /elautomóbil/ and /la+utilísa/; /subráso/ and /sub+ráya/. Single bar juncture is marked by a lengthening of the final stressed syllable, a slowing down of tempo, and a relaxing of articulation, even though

there is no actual pause. The final phoneme to be postulated is 'pause' which is written /#/ and is signaled by the phrase-final characteristics just mentioned along with complete cessation of phonation and the beginning of silence.

SILVA-FUENZALIDA [1952–1953] postulated one internal open juncture, one external open juncture, two phonemes of stress, and four phonemes of pitch. Internal open juncture /./ is identified only in substandard speech and is illustrated by the consonant group /bl/; *sub-lunar* is considered to have open juncture while *sublimar* does not. External open juncture /+/ is signaled by such allophonic variants as the fortis allophones of /p, t, k/ and the occlusive allophones of /b, d, g/, but it does not necessarily indicate a pause. The two degrees of stress are termed strong /ˊ/ and weak (unmarked). The four pitch levels are numbered from low to high /1/ through /4/. Level /1/ has only falling allophones and level /4/ has only rising allophones. The allophones of levels /2/ and /3/ are correlated with phonemes of pitch juncture. Single bar juncture /|/ is identified with pitch level [3+] and double bar juncture /||/ with pitch levels [2–] and [3–], while sustained juncture /:/ is correlated with an element of tonal quantity.

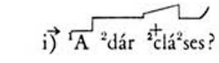
STOCKWELL, BOWEN and SILVA-FUENZALIDA offer a series of articles and books between the years 1956 and 1965, some written in collaboration and others written individually. They give their most complete description in the first study of the series 'Spanish Juncture and Intonation' [1956]. In this article, they postulate three phonemes of stress, three levels of pitch, one open juncture, and three terminal junctures. The three phonemes of stress are strong /ˊ/, medial /ˆ/, and weak (unmarked). Pedagogically, however, these authors feel that only two phonemes of stress are necessary, strong and weak, because medial has a very low functional yield. The three levels of pitch are numbered from low to high as /1/ through /3/. Internal open juncture /+/ is identified, as in the preceding studies, as a transitional phenomenon at certain morpheme boundaries. The terminal junctures are terminal fall /↓/, terminal rise /↑/, and terminal level /|/. The same basic description is used by these authors in their remaining works: BOWEN [1956], SILVA-FUENZALIDA [1956–1957], BOWEN and STOCKWELL [1960], and STOCKWELL and BOWEN [1965].

CÁRDENAS [1960] attempted to reconcile NAVARRO's description with the phonemic description of STOCKWELL *et al.* [1956]. He postulates three phonemes of pitch: primary /ˊ/, secondary /ˆ/, and

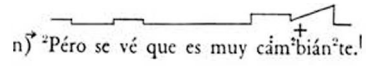
weak /ˇ/ or unmarked. Three levels of pitch numbered from low to high by /1/ through /3/ are proposed for normal conversation, but two additional levels, /0/ for extra-low and /4/ for extra-high, are added for oratorical and emotional speech. The five terminals of NAVARRO are retained and given the following symbols: *cadencia* /↓/, *anticadencia* /↑/, *semicadencia* /⊥/, *semianticadencia* /⊤/, and *suspensión* /|/.

LOZANO [1964] uses the BOWEN, STOCKWELL, SILVA-FUENZALIDA analysis for his descriptions of intonation. Notation for terminal juncture, however, follows the TRAGER and SMITH system of /||/ for rising, /#/ for falling, and /|/ for sustained.

FONTANELLA [1966] describes the dialect of Tucumán and compares it with that of Buenos Aires. Data for the *porteño* dialect of Buenos Aires were taken from a work in progress by GREGORES and SUÁREZ. (See paragraph for HOCKETT, below.) For Tucumán, FONTANELLA [1966] recognizes two degrees of stress – strong /ˊ/ and weak (unmarked), three levels of pitch numbered /1/ through /3/ for low to high, and two terminal inflections – rising /↑/ and sustained /|/. Two additional phonemes are also recognized for this dialect: a rising glide /+/ and a secondary pitch level /:/. The rising glide can occur on the first or last stressed syllable of a macrosegment and is described as an 'inflexión interna, cuya realización fonética consiste en una elevación de la altura de la sílaba hasta un tono más alto del inicial' [p. 22]. The following example shows this feature both in phonemic notation and by a schematic pitch line above [FONTANELLA, 1966, p. 23].



The secondary pitch level occurs on certain unstressed syllables and is described as 'un nivel tonal secondario, cuya realización fonética consiste en mayor altura relativa, alargamiento silábico y posible ascenso de la voz' [p. 27]. This combination of phonetic features is symbolized in the following example [FONTANELLA, 1966, p. 24]:



In a comparison of the dialects, FONTANELLA [1966] offers the following six points:

(1) In final stressed syllables, Tucumán has one contrastive pitch level, Buenos Aires has two [FONTANELLA, 1966, p. 28].

q) ¹Sí.| ²Sí.| (Tucumán)

r) $^{2}\overset{1}{\text{Sí}}.\downarrow$ $^{2}\overset{2}{\text{Sí}}.\downarrow$ (Buenos Aires)

(2) The rising glide and secondary pitch level of Tucumán are absent in Buenos Aires.

(3) In Tucumán, unstressed syllables are markedly shorter and lower in pitch than corresponding stressed syllables, a difference which is much less perceptible in Buenos Aires.

(4) The difference in stressed and unstressed syllables along with the rising glide of stressed syllables give to Tucumán a 'ritmo acentual' as opposed to a 'ritmo silábico' which is characteristic of Buenos Aires.

(5) In addition to the two terminal inflections of Tucumán, rising /↑/ and sustained /|/, Buenos Aires has a falling inflection /↓/.

(6) A frequent high rise on final unstressed syllables of declarative sentences in Tucumán is misinterpreted by the Buenos Aires speakers as a question [FONTANELLA, 1966, p. 29].

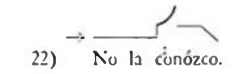
s) ²En pri²me³ro|.

FONTANELLA [1966] concludes that the high finality, the lack of falling terminal inflections, and the rising glides of Tucumán give this dialect the impression of rising intonation which is typical of northwestern Argentina.

HOCKETT [1971], as translated and adapted by GREGORES and SUÁREZ, uses as an example of Spanish the dialect of Buenos Aires. The chapter on intonation [pp. 40–53], offers a description using three distinctive levels of pitch and three terminal inflections. Pitch is indicated from low to high by numbers /1/ through /3/, and terminal inflections are described as rising /↑/, falling /↓/, and level /|/. Other elements of stress and juncture are treated in following chapters. Stress is considered in degrees of prominence; more prominent syllables are marked by /ˊ/, and less prominent ones are unmarked. A discontinuous transitional phoneme within the macrosegment is postulated and called 'juncture'. This last feature is represented by a dash /–/ and can be observed in numerous sequences such as that of two consecutive stressed vowels: *no hablas* is transcribed as /nó-áblas/.

FONTANELLA [1971] skillfully describes yet another dialect of Argentina, that of Córdoba. For this area, she posits two phonemes of stress, strong and weak (unmarked), as is found in Tucumán and Buenos

Aires. Differing from the other two dialects, Córdoba has four levels of pitch numbered from /1/ to /4/. Differing from Tucumán but similar to Buenos Aires, Córdoba has three terminal inflections: rising /↑/, falling /↓/, and level /|/. But the most characteristic trait of the Cordoban dialect is described as a special lengthening and possible pitch change: 'en la sílaba inmediatamente anterior a la última tónica, en la propia tónica final, o en una pretónica interna, puede darse un marcado alargamiento en la cantidad, junto a un posible deslizamiento tonal ...' [p. 21]. In the following sentences, this characteristic is shown first by a colon for length and a superimposed schematic line for pitch variation, then by a sequence of two pitch phonemes joined by a dash [FONTANELLA, 1971, pp. 17, 20].



22) No la cónózco.

35) ¹No la ²-³co²nózco¹↓.

NAVARRO TOMÁS [1971] again asserts that there are five terminations or *tonemas* and that *semicadencia* and *semianticadencia* are not mere variants. 'Ha influido probablemente la idea de que esos mismos tres tonemas son los que se consideran como base general de entonación del inglés, lo cual ha podido sugerir la manera de simplificar la materia en la relación entre ambas lenguas' [p. 9]. He calls *semicadencia* and *semianticadencia* 'tonemas menores'. 'El papel de los tonemas menores consiste de ordinario en determinar la relación de los elementos complementarios con los miembros principales' [p. 10].

As can be seen in reviewing the studies from ANTHONY [1948] to NAVARRO TOMÁS [1971], there is both agreement and disagreement in the phonemic analysis of Spanish intonation. The majority of the structuralists agree in describing Spanish with three levels of pitch (low, mid, high), two degrees of stress (strong, weak), and three terminal junctures (rising, falling, level). In addition to these eight phonemes, KING [1952], SILVA-FUENZALIDA [1952–1953], STOCKWELL *et al.* [1956], and HOCKETT [1971] add one phoneme of internal open juncture. SILVA-FUENZALIDA [1952–1953] also adds a phoneme of external open juncture. There are, however, differing analyses for all three categories of pitch, stress, and terminal juncture.

Pitch is described in four levels by ANTHONY [1948], WALLIS [1951], SILVA-FUENZALIDA [1952–1953], and FONTANELLA [1971], and in five levels by CÁRDENAS [1960]. ANTONY and WALLIS, in describing dialects of Mexico, and SILVA-FUENZALIDA, in analyzing standard Spanish of Chile, refer to the levels as low to high. FONTANELLA in describing the dialect of Córdoba, Argentina, refers to the highest level as 'extra-high' and states that it is used only for emphasis. In somewhat the same manner, CÁRDENAS, in interpreting the Castilian data of NAVARRO TOMÁS, adds to the normal three-level system an extra-low level and an extra-high level which are described as being used only in oratorical and emotional speech. Finally, FONTANELLA [1966] adds two new phonemes for the Tucumán dialect of Argentina a rising glide and a secondary pitch level. Both phonemes are described as having pitch characteristics, and the secondary pitch level has a feature of length.

Stress is described in three degrees as strong /ˊ/, medial /ˋ/, and weak (unmarked) by STOCKWELL *et al.* [1956] and SILVA-FUENZALIDA [1956–1957], although these authors feel that only two degrees, strong and weak, are necessary for pedagogical purposes. CÁRDENAS [1960] also recognizes three degrees: primary /ˊ/, secondary/ˋ/, and weak /ˇ/ or unmarked.

Terminal juncture is referred to by SILVA-FUENZALIDA [1952–1953] as single bar, double bar, and sustained which correspond to the later terminology of rising, falling, and level. KING [1952] also seems to have three terminal junctures, but they are called single bar, pause, and final rise. These junctures, although described in part by features of tempo, length and pause, seem to correspond to level, falling, and rising respectively. CÁRDENAS [1960] and FONTANELLA [1966] are the only linguists who modify the three-terminal system. CÁRDENAS retains the five terminals still subscribed to by NAVARRO TOMÁS [1971] and gives them corresponding symbols: *cadencia* /↓/, *anticadencia* /↑/, *semicadencia* /⊥/, *semianticadencia* /⊤/, and *suspensión* /|/. FONTANELLA recognizes only two terminals for the Tucumán dialect of Argentina: rising /↑/ and sustained /|/.

It is evident that the disagreement observed in the number of phonemes for pitch, stress, and juncture is due in part to dialect differences. It seems certain, however, that all disagreement cannot be justified on a dialectal basis. The result is that the contrastive function of the suprasegmentals has been brought into question in a discussion

which has centered mainly around the theory of levels. In an early article, BOLINGER [Intonation: Levels versus Configurations. Word *7:* 199–210, 1951] questions the nature and number of levels used to describe American English intonation. By the use of listener tests involving group reaction to a series of intonations, BOLINGER concludes that it is not a particular series of levels that counts, but rather a configuration continuum. Pitch range plays a secondary role to that of pitch pattern. Somewhat later, PHILIP LIEBERMAN [On the Acoustic Basis of the Perception of Intonation by Linguists. Word *21:* 40–54, 1965] conducted an experiment by which two competent linguists transcribed various English sentences using the TRAGER-SMITH method of notation. Results revealed that 60% of the levels and junctures of the transcriptions varied. Furthermore, LIEBERMAN found that pitch levels and terminal symbols have no distinct physical basis and concluded that intonation is perceived in terms of complete contours of fundamental frequency and amplitude as a function of time. On the other hand, DELATTRE [1965] seems to accept the structuralist theory of levels but supports it with detailed phonetic data.

III. Displays

One of the goals of most of the studies has been the development of a system of notation by which intonation phenomena can be represented in a clear and objective manner. The result of this effort is the emergence of a number of displays which reflect the methods of research and theoretical orientations as discussed in the preceding section, as well as the audience for which the research is written. In the discussion which follows, therefore, displays will be discussed under the following headings: those which are based on an instrumental analysis, kymographic or spectrographic, those which are the result of a perceptual phonetic analysis, and those which reflect a phonemic interpretation of intonation. Within each category, displays tend to evolve naturally from technical to applied as the phonetician or linguist moves away from his basic research or theoretical framework to communicate with the general public or the student in the classroom.

Since the kymograph was the first instrument to give a major impetus to the study of intonation, the first displays reflect the calculations made from its transcription of the speech wave. The raw data

in a purely numerical form were offered by GILI GAYA [1924]. Average frequency in cycles per second was calculated for each voiced sound and placed under the phonetic transcription of the text. Pauses were indicated in centiseconds [GILI GAYA, 1924, p. 156].

l	a	ż	m	u	l	ɯ	ś	*Pausa:*	e	ś	e	l	e	ś
260	300	300	280	400	420	440		*0,54*	360		380	320		

				¹							²					
p	ę	k	t	á	k	u	l	o	d	e	t	ɔ	d	ǫ	ż	l	ǫ	ż
320				400		340	340	360	300			380	380			320		

m	o	m	e	ę	t	ǫ	ś	*Pausa:*
300		260	320		340			*0,73*

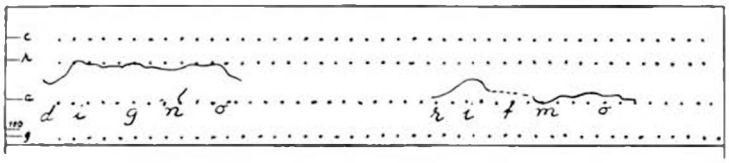
The same author, in his study of poetry [GILI GAYA, 1926, p. 130] modified this presentation by indicating stressed syllables in larger bold-faced numbers,

I.—	no	me	mwe	be	mi	djos	pa	ra	ke	rer	te
	540	440	*440*	420	360	**400**	360	380	380	**400**	480
II.—	el	θje	lo	ke	me	tje	nes	pro	me	ti	do
	320	*400*	380	380	340	**420**	340	420	360	**400**	220

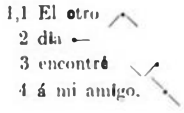
while NAVARRO [1925, p. 342] added the corresponding musical note for each syllable.

Em	pe	za	ron	los	ni	ños	a	llo	rar.
300	274	**368**	372	366	370	342	350	316	200
re$\#_2$	*do*$\#_2$	**fa**$\#_2$	*fa*$\#_2$	*fa*$\#_2$	*fa*$\#_2$	*fa*$_2$	*fa*$_2$	*mi*$_1$	**sol**$\#_1$

A method of display which became quite popular was to convert the frequency calculations of kymograms into a continuous line where length was represented horizontally and frequency vertically. In this manner, a certain continuum and movement were presented for the eye which approximated what was perceived by the ear. A typical display is one by MALMBERG [1950]. In curves above the text, voiced sounds are shown by a continuous line and voiceless sounds by a broken line. These data are superimposed on a musical scale with a frequency of 100 cps given as a point of reference [MALMBERG, 1950, p. 221].



Various studies show schematic forms and generalized shapes which are based on kymographic analysis. WAIBLINGER [1914] was able to reduce the analysis of his Spanish corpus basically to four simple forms, / \ ⟋ ⟍, and four compound forms, ∧ ∨ /\ \/. Dots represent the nucleus of an intonation group and dashes extend out to show general direction of pitch variation in contiguous unstressed syllables as is shown in the following example [WAIBLINGER, 1914, p. 224].



The remaining types of schematic displays based on kymographic analysis were designed by NAVARRO TOMÁS for teaching Spanish intonation. The most widely used display is that found in his *Manual de pronunciación española* [NAVARRO TOMÁS, 1918], in which Spanish intonation is represented by combinations and modifications of two basic shapes, referred to as A and B [NAVARRO TOMÁS, 1957, p. 212].

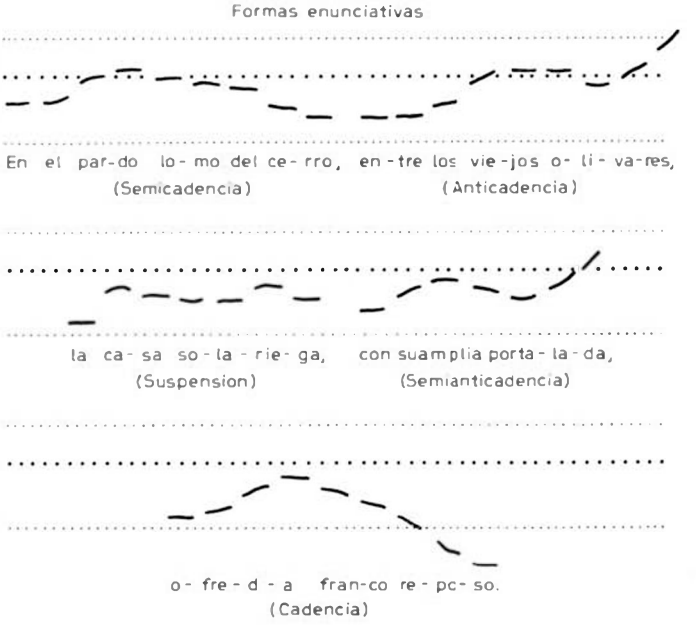
The following examples from NAVARRO's handbook show these shapes in combination [1957, p. 222].

Habita una
casa de un solo piso, |
con portalón oscuro | *y escalera de piedra. Me senté con*
un gesto de cansancio, | *de resignación* | *y de tristeza.*

In the same manual, a second schematic display is used in a few phonetic texts as an additional aid in teaching. Pitch movement is indicated by arrows both above and below the line. Phonic groups are divided by vertical bars [NAVARRO TOMÁS, 1957, p. 277].

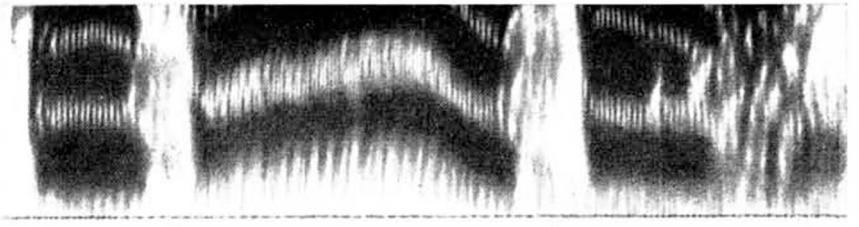
254. — ãnteɻ də lo kə yó pensába ˈ kerído tío ‖ mə
dcθɪdjó mɪ pádre ˈ a kə mõntásə ən luθéro ‖ ayér- e les
séiɻ də la mãnãna | kabélgé en- éste ármósa fjéra ˈ komo
lə lâme mɪ pádre ‖ ɪ mə fwi kõ mɪ pádrə él kámpo ‖ mɪ
pádrę ibe kabelléro ‖ ən- ũnè xáke eleθáne ‖

A final display is found in NAVARRO's *Manual de entonación española* [1944], in which each syllable is represented by a line superimposed over a grid showing relative pitch levels of low, medium, and high. No attempt is made to display natural length or stress [NAVARRO TOMÁS, 1966, p. 293].

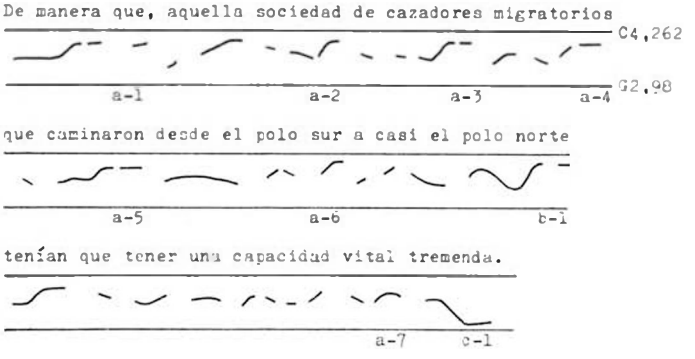


Shortly after World War II, the spectrograph gradually replaced the kymograph in the instrumental analysis of intonation. New techniques of electronic analysis permitted the spectrograph to give a complete acoustic display in terms of frequency, duration, and amplitude. Actual spectrograms were published by SAPON [1958]. The following example taken from his article shows an expanded display

in which the fundamental and one or two harmonics are visible. Frequency is read from bottom to top, length from left to right, and intensity by the darkness of the display. Phonetic script of the text analyzed is added below the zero frequency line [SAPON, 1958, p. 170].

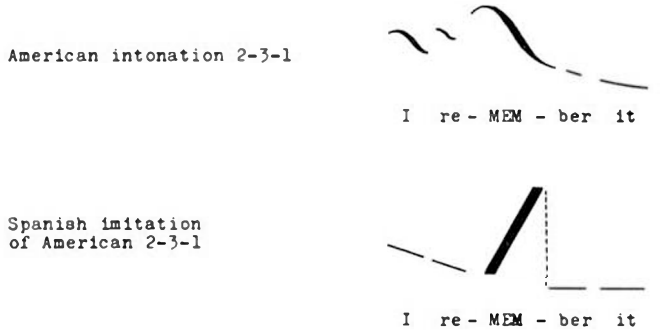


In an attempt to make spectrographic data more accessible to students and the public in general, DELATTRE *et al.* [1962] copied the detailed shapes and movements of spectrograms and placed them under a type-written text. These hand-drawn contours appear between two lines representing voice register limits. Letters below identify sense-group terminals. Letters a and b identify two types of continuation within the sentence, while c identifies sentence finality. Numbers are added only as a means of referring to a specific group terminal [DELATTRE *et al.*, 1962, p. 239].



Somewhat later, DELATTRE [1965], in comparing the declarative intonation of English, Spanish, French, and German, presented a schematic display based on spectrographic analysis. In the following example, DELATTRE gives an English sentence with English intonation,

then the same English sentence with Spanish intonation superimposed. Frequency variation is shown on the vertical axis, duration on the horizontal axis, and intensity by thickness of the line [DELATTRE, 1965, p. 23].



Displays which are based on perceptual phonetic studies are not tied to any instrumental analysis and show great variety in their representation of intonation. They range from an abstract expression of pitch, length, and stress by numbers and diacritical marks [EASTMAN, 1926], to a purely musical notation [GUTIÉRREZ ESKILDSEN, 1938], to the use of dots and lines [STIRLING, 1935; QUILIS, 1964], to the typing of words themselves in various shapes to show pitch variation [BOLINGER, 1961].

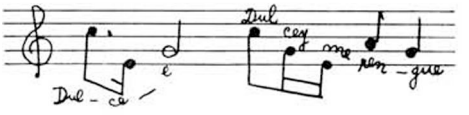
EASTMAN [1926], in a purely phonetic description, offers a display which shows a striking resemblance to later phonetic notation. In a phonetic text, this author uses large numbers to show degree of syllable length, accent marks to show degrees of stress, and small numbers to indicate levels of pitch. Four pitch levels are identified in which 0 represents the medium height of the voice, while levels 1 and 2 are progressively higher, and 3 is the lowest. Two extra-high levels are also indicated by x^1 and x^2, while two compound tones are recognized: one falling from 1 to 0 and one rising from 0 to 1. The following example is taken from EASTMAN's [1926, p. 38] study in which *¡Vamos! ¡Alza! ¡No faltaba más!* is transcribed.

[vámòs2_3 s, álzà2_3, nó^1 faltaba mâ2_3].

GUTIÉRREZ ESKILDSEN [1938], in her purely musical analysis, writes intonation as notes on a treble-clef staff. The spoken text is

added in appropriate spots. This display is especially interesting because it shows in a striking manner the relationship which intonation has with music [GUTIÉRREZ ESKILDSEN, 1938, p. 83].

Los que venden dulce y merengue dicen:



STIRLING [1935], in his method for teaching Spanish intonation to English-speaking students, used a series of dots to represent intonation. Relative height of the dots shows pitch variation, and the size of the dots, large or small, corresponds to stressed and unstressed syllables respectively. A fall in pitch on the stressed syllable in absolute final position is indicated by a descending tail from the final dot [STIRLING, 1935, p. 65].

(4) Hablaba muy poco, aun con mi madre.

(5) No quiero pintar la grita y la zalagarda que en aquella

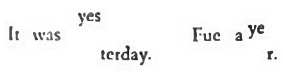
bendita casa se armó.

QUILIS [1964] used a series of dots and connecting lines. Large dots represent stressed syllables and small dots unstressed syllables. In the use of dots, this display is similar to that of STIRLING, and with the addition of joining lines, it is reminiscent of the schematic representation of kymographic data by WAIBLINGER [QUILIS, 1968, p. 164].

El emperador francés,/muy emocionado,/besaba su bandera.

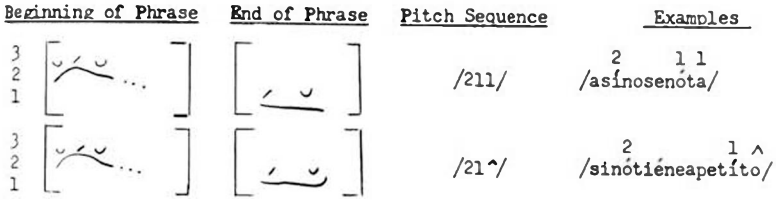
BOLINGER [1961] is known for a very readable and direct method of representing intonation. Pitch movement is shown by typing words, syllables, and individual letters in various relative positions on the

page. This display shows in a concrete manner the various configurations which BOLINGER [1961, p. 135] wishes to represent.



The final development which strongly influenced the types of displays to emerge came from the structuralist school of linguistics. By trying to apply the techniques of structural analysis to the study of intonation, the tendency was to move away from a representation in terms of frequency, shapes, and curves and to offer a display by using a series of diacritical marks to represent the phonemes of stress, pitch, and juncture. There is, however, one work [KING, 1952] which shows a transition from the earlier phonetic works to the later structural studies.

KING [1952], in addition to giving a phonemic display which includes segmental and suprasegmental phonemes, added a hand-drawn phonetic curve for the beginning and end of the phrase. This phonetic representation is apparently based on a purely perceptual analysis [KING, 1952, p. 61].

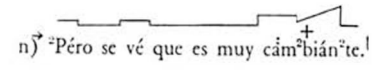


The structural analysis came into full and independent development with the team STOCKWELL, BOWEN and SILVA-FUENZALIDA, who published a series of articles and books between the years 1952 and 1965. These authors used a series of numbers and symbols to represent phonemes of pitch, stress, and juncture. In their most complete analysis, they recognized three degrees of stress: strong /ˊ/, medial /ˋ/, and weak (unmarked), three levels of pitch, from lowest to highest indicated by /1/ through /3/, three terminal junctures: rising /↑/, falling /↓/, and level /|/, and one internal juncture /+/. To illustrate this notation, an example is taken from SILVA-FUENZALIDA [1956–1957, p. 181] in which the structural device of commutation is employed to identify intonation contours.

/akíbyénemaría↓/	*Aquí viene María.*
/akíbyéne |maría↓/	*Aquí viene, María.*
/akíbyénemaría↑/	*¿Aquí viene María?*
/akíbyéne |maría↑/	*¿Aquí viene, María?*
/akíbyénemaría |/	*Aquí viene María* ... ("hay que resignarse").

In a later work by BOWEN [1960], a new display was employed for teaching Spanish to English-speaking students. In this applied work, the usual phonemic information was given, but only two degrees of stress were used – strong /ˊ/ and weak /./, and these symbols were placed above on a simulated musical staff where intervals represent pitch levels [BOWEN, 1960, p. 107].

A final display to be mentioned which illustrates a structural approach is that of FONTANELLA [1966]. This linguist used the usual diacritical notation for phonemes of stress, pitch, and juncture but also added a symbol /+/ for a rising glide and a colon /:/ for a secondary pitch level, both of which are characteristic of the Argentine dialect of Tucumán. The striking innovation which she added to her display, however, is a superimposed schematic line representing pitch variation. The following example shows these combined features [FONTANELLA, 1966, p. 24].



As a final comment, we hope that we have been able to show that the various types of displays mentioned above reflect different methods of analysis, different theoretical points of view, and different audiences to be reached. It should be noted that, above all, these displays are an

attempt to show in a clear and precise manner information which is especially difficult to describe. Even the choice of data to be displayed is a difficult problem to resolve in that only recently have perceptual tests begun to indicate the relative importance in the study of intonation of such factors as duration, amplitude, and frequency. It is also evident that the type of display is shaped to a certain extent by the constraints of typing and printing.

In conclusion, we have examined an extensive body of data which comprehends quite a few dialectal areas in an uneven way, a variety of theoretical approaches and types of display. Generally speaking, most of the studies deal with a limited corpus, and the sentences examined are usually only a few of the declarative or interrogative types. Most works neglect to control the variables of age, sex, social background, and style in their samples. We believe that intonation studies should control these variables as well as possible; otherwise, we do not receive a perspective of what the individual variations versus the dialectal variations may be.

Intonation in Spanish needs much more study because many of the studies have not been based on objective data, partly because there has been a lack of precision instrumentation until recently. The reader is not always sure what the linguist's impression, description, or displays concretely mean. What is needed is basic research, detailed instrumental work or experimentation, then perceptual tests to confirm or refute the hypothesized acoustic parameters of pitch. It is a current, but unproved assumption that fundamental frequency is closely tied to our perception of intonation, that is, more definitive evidence is needed.

Recently, we have begun a pilot study of intonation between two dialects of Spanish, using the intonation extractor developed by PHILIPPE MARTIN and PIERRE LÉON at the University of Toronto. The main advantage of this instrument, in addition to its accuracy of analysis, is its speed. The analysis in terms of frequency, duration, and amplitude is made nearly instantaneously, for the computerized extractor gives a printout with an oscillographic display, amplitude display, and extracted fundamental frequency line. Thus, with the aid of this recently developed instrumentation, we hope to offer some results of our study in the near future.

So far, we have used a limited number of informants of Mexican Spanish (students from Mexico City), and Castilian Spanish (students

from Madrid, for the most part). We are especially interested in the contours for declarative sentences between the two dialects, the continuation and finality contours, the perceptual correlates of the acoustic data, as well as the syntactic correlates of intonation. It has been our experience that even in advanced undergraduate phonetics classes, where students have approached near-native pronunciation, intonation is probably the most difficult part of the problems to be remedied and is usually the last to be overcome. More knowledge about Spanish intonation is particularly urgent in language teaching.

Zusammenfassung

Theorien und Methoden in Untersuchungen zur spanischen Intonation

Der vorliegende Artikel stellt die verschiedenen Ansätze in der Erforschung der spanischen Intonation vor und bewertet sie. Dialektuntersuchungen, theoretische und methodologische Zugriffe und Darstellungssysteme der Intonation werden in chronologischer Reihenfolge besprochen und mit den wichtigsten theoretischen Strömungen des Gebietes integriert. Die Autoren weisen Richtungen für zukünftige Forschungen und geben eine Zusammenfassung ihrer eigenen Untersuchungen zweier spanischer Dialekte – kastilisch und mexikanisch –, die mit dem rechnerunterstützten Intonationsextraktor der Universität Toronto durchgeführt wurden.

Résumé

Théories et méthodes des études de l'intonation espagnole

Le présent article dégage et apprécie les diverses approches utilisées dans les recherches sur l'intonation espagnole. Les études de dialectes, les approches théoriques et méthodologiques et les schèmes intonationnels décrits sont examinés dans un ordre chronologique et mis en rapport avec les principales tendances théoriques de la discipline. Les auteurs proposent des orientations pour la recherche future et présentent un résumé de leurs propres investigations relatives à deux dialectes castillan et mexicain. Pour ces investigations, on a utilisé l'ordinateur d'intonation de l'Université de Toronto.

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