

Current issues and challenges in Spanish intonational research

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1. Introduction: Functions of intonation in Spanish and main concepts

The goal of this chapter is twofold. First, it will offer a general overview of the set of linguistic functions that intonation serves in the Spanish language, as well as provide a brief historical background of Spanish intonational research. Secondly, it will outline the most important challenges that the field of Spanish intonation will face in the near future, among them the adoption of a universally accepted coding system for transcribing Spanish intonation and the proper integration of intonation into other areas of linguistic inquiry such as syntax and pragmatics.

In very broad terms, intonation can be defined as the linguistic use of pitch variation (or fundamental frequency variation) to affect phrasal meaning, although it is worth noting that pitch variation is typically accompanied by changes in other prosodic features, like duration, amplitude, or voice quality. Regarding the set of linguistic functions that intonation (together with those other prosodic features) may serve, there is good consensus among researchers that it comprises at least the following four: a) to prosodically mark lexical stress/word prominence, as well as phrasal prominence; b) to prosodically mark phrasal units, the so-called prosodic phrases; c) to convey information status and focus markings; and d) to convey information about the semantico-pragmatic value of an utterance typically related to speech act type, as well as epistemic and affective positioning (on the functions of intonation, please refer to Lee 1956; Halliday 1967; Brazil 1975; Couper-Kuhlen

1986; Bolinger 1989; Cruttenden 1996; Ladd 1996; Prieto 2003; Gussenhoven 2004; Wells 2006; Michaud & Vaissière 2015; for a general review, see Hirschberg 2017; for a review on Spanish, see Escandell-Vidal & Prieto forthcoming).

First of all, lexically stressed syllables in Spanish are usually associated with some kind of pitch movement, typically a rise or fall. The tonal events associated with a stressed syllable are called pitch accents (Sp. *acentos tonales*). The pitch accent associated with the last stressed syllable of an utterance (which is generally the most prominent within the prosodic phrase) is known as the nuclear pitch accent (Sp. *acento nuclear*). The presence of either a falling or a rising pitch accent associated with the stressed syllable will depend mainly on the chosen intonational pattern. For example, whereas the nuclear pitch accent of an interrogative intonation contour such as *¿Venden mandarinas?* ‘Do you-pl sell tangerines?’ shows the lowest pitch levels in the pitch contour (i.e., the low pitch associated with the final stressed syllable ‘ri’), in an exclamative sentence like *¡Venden mandarinas!* ‘They sell tangerines!’ this same syllable bears a rising pitch accent which reaches a high peak towards the end of the syllable (see Figure 1) (more information about the pitch-accent types in Spanish dialects may be found in Prieto & Roseano 2010).

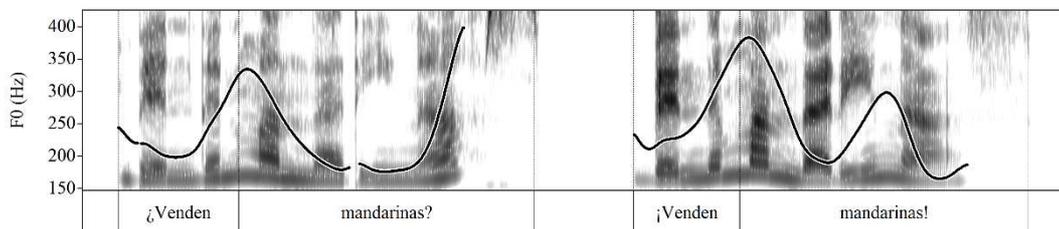


Figure 1. Spectrogram and intonational pitch contour of the interrogative sentence *¿Venden mandarinas?* ‘Do you-pl sell tangerines?’ (left panel) and the exclamative sentence *¡Venden mandarinas!* ‘They sell tangerines!’ (right panel).

A second important function of intonation in Spanish is that of marking prosodic phrasing at the phrasal level. Like speakers of most intonational languages, Spanish speakers use pitch modulations (and also duration and intensity) at the ends of phrasal constituents to give the listener information about syntactic groupings (more information about prosodic phrasing in Spanish may be found in Nibert 2000, and in Prieto 2007, among others). The tonal movements that appear at the edges of prosodic phrases are generally known as boundary tones (Sp. *tonos de frontera* or *tonos de juntura*). In Figure 1, while the intonational contour of a yes-no question (left panel) ends in a high boundary tone, the intonational contour for the exclamative sentence (right panel) ends in a low boundary tone. The use of intonation for syntactic disambiguation is also well-known. In the case of Spanish, the presence of a high boundary tone at the end of a constituent can perceptually disambiguate different syntactic structures. This becomes evident if we consider, for example, the following conversational exchange.

A: *¿Quién vendrá?*

B: *La madre de Ana y María.*

The answer to speaker A's question *¿Quién vendrá?* 'Who's coming?' can be uttered with two different intonational patterns (see Figure 2). If speaker B places a high boundary tone after the word *Ana* (Figure 2, right panel), A will interpret the sentence as meaning that 'Ana's mother is coming and María is coming, too'. Conversely, if no phrase boundary is placed between *Ana* and *María*, then A will probably understand that 'The mother of both Ana and María is coming'.

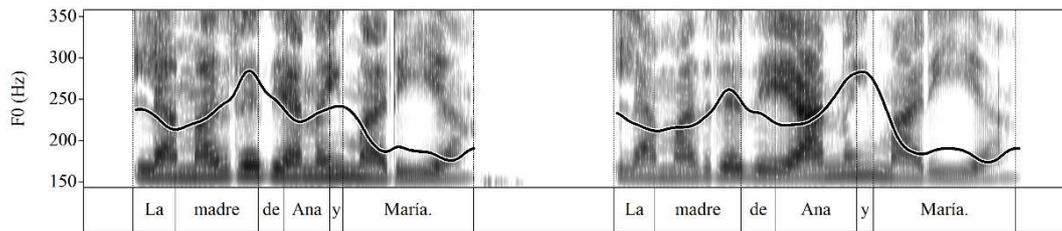


Figure 2. Spectrogram and intonational pitch contour of the sentences *La madre de Ana y María* ‘The mother of Anna and Mary’ (left panel) and *La madre de Ana, y María* ‘Anna’s mother, and Mary’s’ (right panel).

The third function that is commonly attributed to intonation in Spanish is focusing. Many Spanish dialects signal a corrective focused element through a dramatic pitch rise, which allows the listener to identify it. For example, while the word *limones* ‘lemons’ in the Castilian Spanish broad focus statement *He comido limones* ‘I ate lemons’ displays a falling pitch accent, in a corrective sentence like *No, he comido LIMONES* ‘No, I ate LEMONS (not pears)’ it shows a rising pitch accent (see Figure 2). This rising pattern—which is quite different from the pattern seen in broad focus statements—has been documented in the corrective focus pitch contour across a good set of Spanish dialects (see Prieto & Roseano 2010; see also Vanrell et al. 2013, for a prosodic description of contrastive focus in Spanish, Catalan, and Italian).

The fourth universally accepted function of intonation is its contribution to the semantico-pragmatic interpretation of sentences. Several works, including Prieto & Roseano (2010), Hualde & Prieto (2015), and Prieto & Roseano (2018), show that intonation is used in Spanish to convey various communicative meanings that include speech act marking (statement, question, request, etc.), belief status (i.e., the epistemic positioning of the speaker with respect to the information exchange), politeness, and affective states. Typically, the most salient part of an intonation contour—now commonly labeled the nuclear configuration (Sp. *configuración nuclear*) though traditionally called the ‘pitch nuclear configuration’ (Sp. *tonema*)—lies at the end of the

pitch contour. This nuclear configuration is made up of the tonal movements associated with the last stressed syllable (the nuclear pitch accent) together with the boundary tones associated with the end of the prosodic phrase. The part of the pitch contour that precedes the nuclear configuration is called *prenúcleo* (prenucleus) or, in more traditional terms, *cuervo* or *pretonema*.

For example, in several Spanish dialects an information-seeking yes-no question like *¿Venden mandarinas?* 'Do you-pl sell tangerines?' (see Figure 1, right panel) is characterized by a low nuclear pitch accent (associated with the stressed syllable 'ri') followed by a final high boundary tone (associated with the final syllable 'nas'), whereas the broad focus statement like *Venden mandarinas* 'They sell tangerines' displays a falling nuclear pitch accent followed by a final low tone.

The present chapter contains three main sections. In the Introduction we have summarized the main functions of intonation in Spanish and explained a few basic concepts that will appear in the following pages. The second section contains a summary of the most important advances in Spanish intonational research in the past few decades. The third section presents a panorama of the main research issues that are currently being investigated and will probably gain momentum over the next few years.

2. Historical background: Spanish intonational research

Despite the importance of intonation in the linguistic system of Spanish, prior to the last two decades of the twentieth century its study was relatively limited. In a survey of the literature, Quilis (1984) identified only about 60 related to Spanish phonetics and phonology. In the last few decades, however, Spanish intonation has truly taken off, probably stimulated by the burgeoning research in linguistic prosody in the

international arena coupled with the greater affordability of speech analysis programs, which allow for easy and accurate acoustic analyses of intonation. The first scientific description of Spanish intonation can be dated back to 1918, when the phonetician Tomás Navarro Tomás published his *Manual de pronunciación española*. This handbook contained a phonetic description of the intonation of Central Peninsular Spanish read speech, which Navarro Tomás was able to describe experimentally thanks to one of the technical innovations of that time, the kymograph, an instrument which recorded variations in sound waves by means of a stylus trace on a rotating cylinder (Navarro Tomás 1918: 166). Navarro Tomás's work was fully in line with the most innovative intonational research being carried out in Europe at the time, and showed close ties with the so-called British School of intonation (see García-Lecumberri 2003, for a detailed description of intonational analysis as practiced by the British School). Thanks to his scientific thoroughness, Navarro Tomás' works on intonation (the *Manual de pronunciación española* and a handbook published in 1944 in the US under the title *Manual de entonación española*) continue to be widely referenced in Spanish intonational research even today.

While Navarro Tomás worked within the tenets of the British School, other influential traditional authors found inspiration in the American School of intonation (see Martínez Celdrán 2003, for an overview of their work). Anthony (1948), the first study within this framework, focused on the phonetic description of a set of Spanish intonational contours. This approach returned to favor in the 1970s and 1980s, possibly because a group of influential Spanish and American linguists including Emilio Alarcos Llorach, Charles Hockett, and Joseph Matluck had begun to apply to Spanish the concept of tonal levels put forward by the American School. Work by Antonio Quilis in the last two decades of the twentieth century was pivotal in the subsequent upsurge of

interest in Spanish intonation, and even the intonation section of the Spanish grammar published by the Real Academia Española in 1973 played a role.

The resulting flurry of empirical research on the intonation of Spanish and its dialects has been carried out from within a variety of theoretical models. Among the models focusing on the phonetic aspects of intonation, we find the so-called Dutch School or 'IPO model' (see Garrido Almiñana 2003, for a review), the 'Aix-en-Provence model' (see Baqué & Estruch 2003, for a review), and Cantero Serena's (1999) Melodic Analysis of Speech model. Though developed several decades ago, the majority of these models are still currently in use.

However, the most influential model of intonation at present is arguably the Autosegmental Metrical (henceforth AM) framework, which claims that suprasegmentals should be described at two complementary levels of representation, the phonetic and the phonological (Pierrehumbert 1980; Ladd 1996; Gussenhoven 2004). Initially developed in the 1980s by Janet Pierrehumbert, the AM framework asserts that intonational pitch contours can best be understood as sequences of two main types of phonologically distinctive tonal units, pitch accents and edge tones. Pitch accents are pitch movements associated with stressed syllables, while edge tones (which can be separated into phrase accents and boundary tones) are associated with the ends of prosodic phrases. These units are represented in terms of H(igh) and L(ow) targets. For edge tones the symbol '%' indicates that a tone is associated with the final edge of an utterance (e.g., L%, H%, and LH%, among other possibilities), whereas the symbol '- ' indicates that a tone is associated with utterance-internal phrase boundaries (like L- and H-, among other possibilities). For pitch accents an asterisk '*' signals the tone associated with the stressed syllable (e.g., H*, L*, L+H*, or H+L*).

Based on the AM model, a set of language-specific prosodic annotation conventions called Tones and Break Indices (abbreviated as ToBI) has been developed

for a variety of languages (see Jun 2005, for a review). The first ToBI model for Spanish—labeled Sp_ToBI—was proposed by Beckman and colleagues in 2002 (Beckman et al. 2002) and has subsequently been revised several times (see Prieto & Roseano 2010, and Hualde & Prieto 2015, for a review). The first comprehensive analysis of Spanish intonation within the AM model was Sosa's influential book *La entonación del español* (1999), which generated great interest. In the following decades, hundreds of papers, books and multimedia atlases have shown the robustness of the AM model—along with Sp_ToBI—for describing Spanish intonation. Even the 2011 edition of the Real Academia Española official grammar endorsed the AM model, applying Sp_ToBI in its description of Spanish intonation.

Nonetheless, despite the appeal of Sp_ToBI, total consensus on a framework for the transcription of Spanish intonation remains elusive (see section 3.1). By the same token, further research is needed to fully characterize and understand the semantic effects of pitch events within Spanish intonational phonology (see section 3.2).

3. Current issues and challenges

The present section contains a brief discussion of some of the current issues and challenges faced by Spanish intonational research nowadays.

3.1 Intonation and the phonetics-phonology interface: The transcription of intonation

The most important consequences of the long-lasting coexistence of different theoretical approaches and traditions in Spanish intonation research are that there is as yet agreement on neither the level of description (e.g., phonetic or phonological) at which intonation should be transcribed nor a universally accepted set of labels for

those target pitch events. The current variability in pitch labels is clearly a shortcoming, particularly because it renders comparisons across studies difficult. Though there is full agreement that phonetic and phonological analyses must both be present and must complement each other, the truth is that while phonetic models of intonation have provided detailed descriptions of pitch contours, but given little weight to phonological analysis, for their part phonological analyses have tended to pay insufficient attention to phonetic realization. Nevertheless, since the rise in the 1990s of what is known as Laboratory Phonology approaches, which combine acoustic phonetic analyses, perception studies, and phonological representations, there has been a progressive reconciliation between the two lines of research. As a result, recent work has dealt explicitly with the phonetics-phonology interface in Spanish intonation, with studies focusing on issues such as the alignment of tonal targets or the phonetic outcomes of tonal crowding and stress clash (see Hualde & Prieto 2015, for a review).

Another initiative undertaken has had the goal of clarifying the mapping between phonological and phonetic transcriptions of intonation. Recently, some researchers have explicitly argued in favor of incorporating another layer of phonetic transcription—be it narrow (Roseano & Fernández Planas 2013) or broad (Hualde & Prieto 2016)—into an AM-based phonological transcription system, though such proposals for prosodic labeling at the broad or narrow phonetic level are not conceived as alternatives to the phonological ToBI transcription systems but rather as complementary tools. For example, when describing how the phonological $L^* HL\%$ nuclear configuration surfaces in Cantabrian Spanish yes-no questions, the prosodic annotation provided must necessarily account for the difference between a prototypical phonetic realization of such contour (Figure 3, left) and a truncated realization (Figure 3, right). To this end,

the phonetic label [H!H%] might be used in order to signify that the second utterance ends with a fall from high to mid level, instead of a fall from high to low level [HL%].

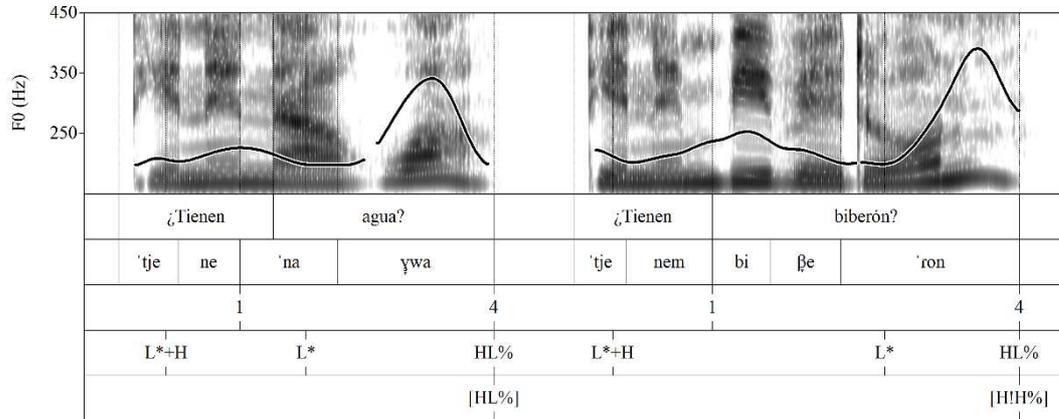


Figure 3. Spectrogram, pitch contour, phonological and phonetic transcription of the intonation of two yes-no ques questions in Cantabrian Spanish (the question on the left shows the prototypical realization of the contour, while the question on the right shows a truncated realization of the same contour).

Importantly, recent computational work has led to the development of several different ToBI automatic labeling systems which operate at either the phonological (Escudero et al. 2017) or the phonetic level of transcription (Elvira-García et al. 2016). Nonetheless, though a general consensus has been reached on the basic building blocks of intonation (to wit, pitch accents and boundary tones, as well as nuclear and prenuclear pitch contours) across several Spanish dialects, further work will be needed to achieve full agreement on a set of accepted labels and levels of representation.

3.2 Intonational meaning: The intonation-pragmatics interface

Despite the fact that intonation is now regarded as an integral part of linguistic grammar, the study of intonational meaning has been generally neglected, and Spanish intonational research is no exception (for example, the models reviewed in section 2 have focused mainly on the representational issues without paying attention to

meaning). One of the first authors to seriously investigate intonational meaning in Spanish was Escandell-Vidal (1998, 2011). Her papers have investigated the semantic effects of certain intonational contours (and also the effects of prosodic lengthening) in Spanish through a set of detailed conversational and acoustic analyses. For example, in Escandell-Vidal (1998) she discusses the meaning associated with three main nuclear configurations for Peninsular Spanish yes-no questions, the low-rise, the rise, and the rise-fall or circumflex (see Figure 4 below). She argues that the low rise ($L^* H\%$) pitch contour encodes a general meaning of interrogativity, while the other two are pragmatically marked and encode restrictions on the inferential process. While the rise-fall pattern ($L+H^* L\%$) encodes an echoic meaning with an attribution of the proposition to someone other than the speaker (typically the hearer), the rising contour ($L+H^* H\%$) encodes speaker knowledge about the proposition, that is, the notion that the speaker already knows the answer to the question.

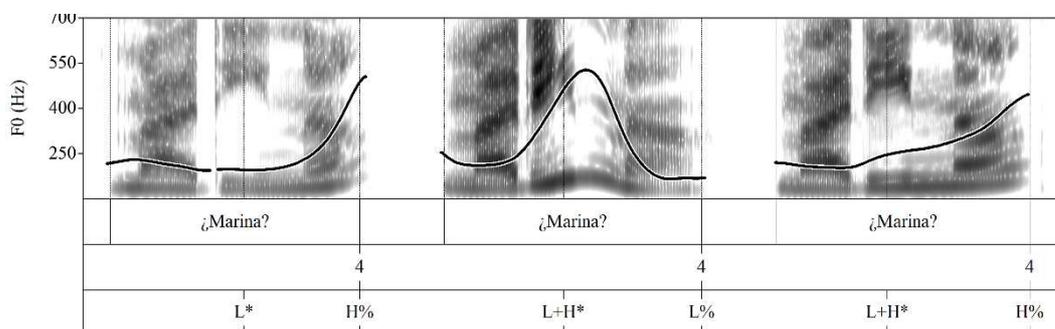


Figure 4. Spectrogram and intonational pitch contour of the three main nuclear configurations of yes-no questions in Spanish exemplified by the utterance *¿Marina?* ‘Marina?’. A low rise $L^* H\%$ (left panel) encodes an open interrogative; a rise-fall pattern $L+H^* L\%$ (center) encodes an echo question where the proposition is attributed to the interlocutor, not the speaker; and a rising contour $L+H^* H\%$ (right panel) encodes a tentative attribution of the proposition to the speaker him/herself.

Recently, good progress has been made in the description of the use of intonation patterns to convey pragmatic meanings related to sentence types and epistemic meanings (see also Section 3.3). One of the most widely used methods for intonation

elicitation is the Discourse Completion Task (henceforth DCT), a method which prompts the speaker to respond to a given situation (see Vanrell et al. 2018, for a review of the benefits and disadvantages of this method for intonational research). However, despite these advances, more empirical and theoretical work would be helpful to unify prosodic and pragmatic models (for a review, see Prieto 2015).

From a methodological point of view, the last few decades have witnessed a major shift from a reliance on descriptive methods largely based on the reading of isolated sentences to the application of a variety of empirical methods that integrate intonation into discourse. For example, recent experimental work has explored the dynamic interplay between intonational meaning and discourse context in different types of yes-no questions in Puerto Rican Spanish (Armstrong & Prieto 2015). The study examined the effect of five types of bias found in intonation contours used for polar questions. Through an experimental task in which subjects were asked to rate the degree of appropriateness between a given polar question pitch contour and its discourse context, the study revealed that (a) the listener uses both intonation and discourse context to infer information about the speaker's belief states, and that (b) some clear implicatures are conventionally derived from pitch contours that may clash with contextual expectations.

3.3 Intonational variation: Geolectal differences

From the very beginning, research into Spanish prosody has pointed to significant differences in intonation across Spanish dialects. Navarro Tomás himself noted that “intonation [...] shows a multitude of special circumstances whereby not only languages of different linguistic families, but also those with a common origin and even the smallest regional and local varieties of the same language differ from each other. Many

differences of pronunciation between Castilians, Andalusians, Aragonese, Argentines, Mexicans, etc., are basically differences in intonation” (1918: 162). Nevertheless, Navarro Tomás did not expand on this idea but limited his meticulous description to the intonation of Central Peninsular Spanish, which at that time was the variety with highest prestige. The first intonation studies of Spanish dialects appeared a few decades later, in the 1940s (Canellada 1941, about *extremeño* Spanish, and Álvarez 1948, about Argentinian Spanish). Nevertheless, it was only in the 1960s and 1970s that dialectal variation in Spanish intonation began to receive the attention it deserved, with key work carried out by researchers such as Fontanella de Weinberg (1966), García Riverón (1976-1977), Kvavik (1974), and Matluck (1965).

A turning point in the study of geolectal variation in intonation came with Quilis (1987). Though the study showed a strong bias towards Peninsular Spanish, its novelty consisted in systematically comparing a set of intonational contours produced in three dialects of Spanish, namely those of Madrid, Mexico City, and Puerto Rico. Quilis' work contributed to moving the field of intonational dialectology towards a more pan-Hispanic approach. The same can be said of Sosa's (1999), which analyzed intonational contours in a considerable number of Spanish varieties, from both Latin America (Buenos Aires, Bogotá, Mexico City, San Juan de Puerto Rico, Caracas, Havana, and Lima) and the Iberian Peninsula (Seville, Barcelona, Pamplona, and Madrid).

The first decade of the twenty-first century saw what could be called the “globalization” of studies about Spanish intonation. The intensification of international academic networking (thanks to the internet) and technological progress which greatly facilitated recording techniques and acoustic analysis bore fruit in the creation of two interactive online atlases, the Spanish section of the *Atlas Multimédia Prosodique de l'Espace Roman* (AMPER-ESP; Martínez Celdrán & Fernández Planas 2003-2017), and

the *Interactive Atlas of Spanish Intonation* (IASI; Prieto & Roseano 2009-2013), both of which are compendia of information about the intonation of all Spanish dialects which incorporate descriptive and explanatory text, interactive maps, audio tracks, and animated diagrams. Crucially, the two works have used largely the same methodology to gather their data, with the result that entries can be easily compared. Nevertheless, as we will see below, the two projects—both of them still underway—are somewhat different in nature and can therefore be seen as complementary.

The AMPER (Contini et al. 2003) is an ambitious project whose ultimate goal is to compile intonational information about all the Romance languages and make it accessible online. The specific aim of the Spanish section (AMPER-ESP) is to describe, from a phonetic point of view, the intonation of two sentence types in Spanish, broad focus statements and information-seeking yes-no questions. The data have been collected using four different methodologies, namely read sentences, map tasks, interviews, and (in a small number of cases) DCTs. Nevertheless, the reproducible audio materials at the moment only consist of excerpts of read speech. As of 2017, the varieties covered by the AMPER-ESP are those spoken in Spain, Mexico, the US, Cuba, the Dominican Republic, Honduras, Venezuela, Colombia, Ecuador, Peru, Argentina, Uruguay, and Chile.

For its part, the IASI, one of a set of similar websites related to the *Interactive Atlas of Romance Intonation* (Prieto et al. 2010-2014), takes a more phonological and pragmatic approach. Here, though some data have been collected by means of map tasks and interviews, pride of place is given to the abundant data gathered by means of DCTs, which cover a wide range of sentence-types and subtypes, including yes-no questions, wh-questions, echo questions, exclamatives, imperatives, and vocatives. As of 2017, the IASI offers intonation data for Spanish varieties spoken in Spain, Mexico, the

Dominican Republic, Puerto Rico, Venezuela, Colombia, Ecuador, Peru, Argentina, and Chile. An analysis of the data collected in IASI was published in book form in 2010 (Prieto & Roseano 2010), and the chapter by Hualde and Prieto in *Intonation in Romance* (Frota & Prieto 2015) constitutes an updated summary of this report.

These two atlases clearly show that the study of the geolectal variation of Spanish intonation is no longer in its infancy. Nevertheless, the picture is far from complete. To begin with, many varieties of Spanish lack a full intonational description. In addition, and even more importantly, there is still no agreed classification of Spanish dialects from an intonational point of view, largely because the mapping of Spanish prosody is still incomplete, but also in part because there is a lack of adequate instruments for the kind of quantitative analysis of dialects that is required (Elvira-García et al. 2018). In the upcoming years, researchers will need to continue the description of Spanish intonation patterns across dialects (especially in the Americas) in order to, for example, sketch out intonational isoglosses, describe sociolinguistic variation, and explore the effects of language contact on intonation patterns, including the intonation systems of Spanish-based creoles and of heritage Spanish (Ronquest & Rao 2018).

4. Future directions

As we have seen, the last three decades have witnessed an upsurge of interest in Spanish intonational research. This chapter has presented a panorama of Spanish intonational research as it now stands and has highlighted a set of advances made in the field.

First, the chapter has shown how great progress has been made in the description of intonation patterns and their pragmatic meanings related to sentence types and epistemic meanings across Spanish dialects (see Hualde & Prieto 2015, for a review). Substantial

advances have been made on cross-dialectal intonational variation, with two recent interactive online atlas projects which have provided a systematic description of the phonetic and phonological realization of intonation patterns across a set of geographical areas and their effects on pragmatic meaning. Similarly, these atlases exemplify the shift from a reliance on descriptive methods based on reading and production of isolated sentences to the use of a much wider variety of empirical methods that integrate intonation into conversational discourse.

However, as noted above, several challenges lie ahead. The first—which concerns intonational research on not only Spanish but other languages as well—is to work towards a universally accepted, standardized system of intonational transcription that includes and integrates both phonological and broad/narrow phonetic levels. As we saw in Section 2, Spanish intonational research has traditionally been framed in a variety of theoretical models, and although the AM model has gained wide acceptance, a variety of tonal labels and intonation frameworks continue to be in use today. There is also a clear need to work for internationally accepted prosodic labels. Recent proposals for a common international prosodic alphabet (IPrA; see Hualde & Prieto 2016) and the inclusion of either a broad or a narrow phonetic level of transcription (Roseano & Fernández Planas 2013) will need to be assessed in the coming years. Similarly, current work on intonation needs to explore the interface between intonational and non-intonational prosodic features such as duration, intensity, and voice quality. Another important challenge is developing research about the acquisition of prosody, which—in spite of a few recently published studies (like Armstrong 2018)—does not yet constitute a main trend in Spanish (see Prieto & Esteve-Gibert 2018 for an overview).

Perhaps the most overarching challenge for intonational research is its progressive integration with the study of other parts of grammar, especially semantics and syntax.

Although some recent studies have investigated in detail certain aspects of Spanish intonational meaning, more work is needed in this area. In order to have a complete analysis of intonational patterns in a given language, the description needs to encompass co-occurring lexical and syntactic properties, such as the use of discourse particles and the order of constituents. In connection with this, the field needs to incorporate a new set of empirical methodological techniques that allow for a full integration of the study of intonation with research on interactive discourse. While we are witnessing a trend towards greater empiricism in general, much needs to be done to fully integrate the study of prosody with other branches of theoretical and experimental linguistics, as well as areas of applied linguistics like language development, computation, and speech therapy.

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