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INTONATIONAL MARKING OF CONTRASTIVE FOCUS IN MADRID SPANISH

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

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*****

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While the study of Spanish intonation enjoys a rather long history, little consideration has been given to the ways in which intonation is used to mark Spanish narrow focus. Existing studies give a somewhat puzzling picture of the intonational correlates of Spanish narrow focus, and in some cases there are significant inconsistencies across studies. This dissertation is an attempt to sort out the ways that intonation is used to mark narrow, contrastive focus in Madrid Spanish. This study is based on a large data set, collected from 20 subjects (where previous studies have used no more than three), and this allows a comprehensive examination of the different intonational patterns found for marking contrastive focus in this variety of Spanish. The intonational correlates of contrastive focus found in this dissertation are described phonetically and analyzed phonologically within the autosegmental-metrical theory of intonational phonology.

With regard to the local marking (i.e. on the word in contrastive focus), the intonational marking of contrastive focus is not limited to one particular mark. Rather four intonational markings are observed. The first is a rise in fundamental frequency (F0) which begins at or near the onset of the stressed syllable, continues through the stressed syllable, and reaches its peak in a post-tonic syllable. This intonation pattern is analyzed
as the result of a $L^*+H$ pitch accent, where the low tone ($L$) is associated with the stressed syllable and the high tone ($H$) is not. This is the same pattern generally used in broad focus declaratives, but when it is used in cases of contrastive focus the F0 peak is significantly higher than it is in broad focus. Another way in which intonation marks contrastive focus locally is through a rise in F0 which again begins at or near the onset of the stressed syllable and reaches its peak within the stressed syllable. This pattern is analyzed as the result of a $L+H^*$ pitch accent, where the associated $H$ accounts for the peak being reached within the stressed syllable. The unassociated tones of the $L^*+H$ and the $L+H^*$ pitch accents to do align in the same manner with respect to the associated tone. This leads to the postulation that these pitch accents have different internal structures. Two types of structures are considered, and it is argued that Spanish pitch accents have a hierarchical structure.

Besides the two pitch accents mentioned above, an intermediate phrase boundary tone ($H$- or $L$-) may occur at the end of the contrastively focused word. While $H$- is used in broad focus declaratives as well, it is used much more frequently in cases of contrastive focus. $L$-, on the other hand, is not found outside of intonation phrase-final position (in the L-L% terminal pattern typical of declaratives) except to mark contrastive focus.

Contrastive focus is marked globally (i.e. outside of the focal word) as well as locally. Pitch range is used both pre-focally and post-focally. The F0 peak immediately preceding a word in contrastive focus is produced in an expanded pitch range, and the other pre-focal F0 peaks are sometimes affected by this pitch range expansion as well.
Post-focally there is pitch range reduction that reduces the height of F0 peaks. It is argued that this is process is gradient. The strongest gradient reduces post-focal F0 peaks to the point that they are not visible in the pitch track, with a relatively flat, low F0 level maintained for the remainder of the utterance. The weaker gradients reduce the height of F0 peaks, but not the extent that they are not visible in the pitch track. An alternative view is that when there is a low, flat F0 post-focally, there are no post-focal pitch accents. The existence of reduced post-focal F0 peaks in other cases, however, leads to the proposal that the low, flat F0 level is an extreme gradient of post-focal pitch range reduction.

Another global marking of contrastive focus is the use of a pre-focal H- which occurs not immediately preceding the word in contrastive focus (which would qualify it as a local marking), but rather at the beginning of a major syntactic phrase containing the word in contrastive focus. Again, H- is sometimes used in broad focus declaratives, but there is a significant increase in use of H- pre-focally.

Since some contrastively focused words are part of a multi-word syntactic constituent, these were examined to see if syntactic constituency affects the intonational marking of contrastive focus. Besides local marking of the contrastively focused word, an intermediate phrase boundary tone (usually L-) generally follows the entire syntactic constituent. This shows that intonation recognizes the entire syntactic phrase and not just the focal word. Interestingly, however, in some cases a L- is present immediately
following the contrastively focused word and another L- is placed after the syntactic constituent containing that word. While this splits the syntactic constituent into two prosodic phrases, it serves to doubly mark the contrastive focus.

Since the edge of the syntactic constituent containing the contrastively focused word is generally marked with an intermediate phrase boundary tone, the question arises as to how intonation marks the entire syntactic constituent (rather than just one of its words) as being contrastively focused. In these cases, the edge of the syntactic constituent is also marked by an intermediate phrase boundary tone, but there is generally no local focal marking on any one word within the constituent.
I dedicate this dissertation to the memory of my Grandma Face. It is from her that I learned that if you go a day without learning something new, you have wasted a day.
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CHAPTER 1

INTRODUCTION

1.1 Introduction

This dissertation provides an in-depth analysis of the ways that intonation is used both phonologically and phonetically to mark contrastive focus in Spanish. Experimental results are used to demonstrate the particular intonation patterns used to mark contrastive focus, and each pattern found is analyzed within the autosegmental-metrical theory of intonational phonology. Two main reasons can be advanced to justify these goals:

1. The need for a complete description of the ways that intonation is used to mark focus in Spanish.

Few studies have been carried out on the ways in which intonation marks focus in Spanish. Those studies that have examined the topic have been based on small-scale investigations that do not benefit from large corpora of data from which
strong conclusions can be drawn. Furthermore, almost all of these studies consider various aspects of the prosodic marking of focus, and therefore do not take the time required to investigate intonation in its entirety.

2. The need for a phonological analysis able to adequately account for the various intonation patterns that are used to mark contrastive focus.

Due in part to the lack of a complete description of the intonation patterns used to mark focus in Spanish, little attention has been given to accounting for these patterns phonologically. A few recent studies have begun to consider certain aspects of these intonation patterns from a phonological viewpoint (Face 1999, 2001; Hualde 2000; Nibert 2000), but these are small-scale investigations that are not based on large corpora, and therefore the findings of these studies cannot be considered to be conclusive.

By approaching this topic from a descriptive phonetic perspective, this dissertation aims further our understanding of the functions of Spanish intonation. By also considering this topic from a theoretical phonological perspective, this dissertation aims to make a contribution to our understanding of the Spanish phonological system that will be of interest not only to linguists working on Spanish, but also to those with an interest in intonational phonology in general.
The working hypotheses at the outset of this dissertation are as follows:

1. There is more complexity to the intonational marking of Spanish focus than has been recognized in previous research.

Studies on the intonational (and, more generally, prosodic) marking of focus in Spanish have produced inconsistent and even conflicting results. I believe that this is attributable to the fact that existing studies touch on only small parts of the larger system by which focus is marked through intonation. The present study will provide the thorough investigation necessary to see how the smaller parts fit together into the larger and more complex system.

2. Syntactic constituency affects intonation.

While it is well documented that prosodic structure often does not correspond to syntactic structure, I believe that they are not completely independent. Prosody and syntax are two parts of the larger linguistic system, and since both can be used to give structure to an utterance, there is every reason to believe that they are related to some degree. Therefore, the syntactic structure of a sentence should have an effect on the intonation with which that sentence is uttered.
3. The autosegmental-metrical theory of intonational phonology is able to account for the hypothesized complexity of the intonational marking of Spanish contrastive focus.

This theory has been applied successfully not only to many different languages, but also to languages with a variety of tonal typologies (e.g. tone languages such as Mandarin, pitch accent languages such as Swedish, and intonation languages such as English). This versatility of the theory will enable a complete phonological analysis of the intonational marking of Spanish contrastive focus.

4. The Spanish data will motivate the incorporation of an internal structure for pitch accents into the autosegmental-metrical theory of intonational phonology.

While the versatility of the autosegmental-metrical theory of intonational phonology can be seen as a positive characteristic, certain aspects suffer the disadvantage of lacking structure. In the case of the treatment of pitch accents, this lack of structure means a lack of explanatory power. The notion of pitch accent structure has been raised in recent literature (see Section 4.3.5), but no conclusive evidence has been presented either in support of or in opposition to this modification of the theory. I believe that the complexity of the Spanish intonational system will require the incorporation of internal pitch accent structure
in order to adequately account for the Spanish pitch accents, and the large corpus of data on which the present study is based will result in conclusive evidence for pitch accent structure which has been missing in previous studies.

1.2 Focus

1.2.1 Types and Definitions

Since in this dissertation I examine the ways in which intonation is used to mark contrastive focus in Spanish, it must be made clear what is meant by focus, and especially by the more specific terms describing different types of focus. Many definitions of focus and of the various types of focus have been given in the literature, but many of these are unclear and, therefore, not very useful. Rather than present all of the definitions which have been given, I will limit the discussion to the definitions which I assume for the present study.

The term focus refers to an element in a discourse that is being highlighted (Bolinger 1972) or foregrounded (Knowles 1974).¹ That is, it is the element that is at the center of the communicative interest of an utterance. Ladd (1980) makes a distinction between broad focus and narrow focus, where these terms relate to the size of the syntactic constituent referring to the discourse element in focus. Broad focus refers to cases where no one portion of an utterance is highlighted more than the others. To

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¹ The reader is referred also to the related literature on theme and rheme, especially Contreras (1976), Daneš (1968), Firbas (1964, 1971, 1975), and Halliday (1967).
exemplify broad focus, Ladd (1980:74) provides the example in (1), which he takes from Halliday (1967). The acute accent mark in this and the other examples from Ladd (1980) represents the main sentential stress.

(1) John painted the shed yesterday.

With the main sentential stress on the word shed, the focus is broad, since this is the default location for the main sentential stress when the entire utterance is highlighted. This sentence could respond to a question such as What’s up?, where the entirety of the answer is equally important to the communicative intent of the utterance.\(^2\) An example from the present study, in the context of the preceding question, is given in (2), where the acute accent mark is part of standard Spanish orthography and has no additional significance.

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\(^2\) It must be noted that in English the placement of the main sentential stress on shed does not limit the interpretation of the focus to broad. This stress placement leaves the focus unspecified, in that the focus could also be the shed or painted the shed, in response to the questions What did John paint yesterday and What did John do, respectively. Broad focus is merely one of the possible interpretations of this utterance in English if taken out of its discourse context.
In this case the entire answer is at the center of the communicative intent of the utterance, and therefore this can be characterized as a case of broad focus.

In contrast to broad focus, narrow focus refers to a portion of the larger utterance, whether a complex syntactic phrase or a single lexical item, which is highlighted more than the rest of the utterance. Ladd (1980:74-75) gives the examples in (3) and (4), which again come from Halliday (1967).

(3) John painted the shed yesterday.

(4) John painted the shed yesterday.

In (3) the focus can only be interpreted as being John, in response to a question such as Who painted the shed yesterday?, where it is presupposed that somebody painted the shed yesterday, but it is unknown who did the painting. In (4) the focus can only be interpreted as being yesterday, in response to a questions such as When did John paint the shed?, where it is presupposed that John painted the shed, but it is unknown when he painted it. Since in these examples the focus is one portion of the larger utterance, it is
described as narrow. An example of narrow focus from the present study is given in (5).

In this example, and throughout this dissertation, the capitals refer to the word(s) in narrow focus.

(5)  
A: ¿Dijo Ana que le daba documentos pertinentes?
   ‘Did Ana say that she was giving him relevant documents?’

B: No. Que le daba NUMEROS pertinentes.
   ‘No. That she was giving him relevant NUMBERS.’

In this example, *numéros* ‘numbers’ is the center of the communicative intent of the utterance, since it is the piece of information needed to complete the questioner’s knowledge of the situation. Since this is a smaller (i.e. narrower) focus constituent than the whole utterance, it is a case of narrow focus.

A distinction is often drawn between two subsets of narrow focus: *new information focus* and *contrastive focus*. Both of these terms refer to the highlighting of a particular portion of an utterance, but they refer to different reasons for the focus being on that particular portion of the utterance. *New information focus* introduces information into the discourse which is “assumed not to be present at this moment in the addressee’s consciousness” (Chafe 1974:121).³ The example in (3), in response to the question *Who painted the shed yesterday* is an example of new information focus.

³ This definition leaves unclear whether a piece of information must be hearer-new to be considered new information, or whether it can be old information which is reactivated. This lack of clarity is not uncommon in defining focus and types of focus, and it is not crucial for the purposes of the present study since the limited context of the sentences make all cases of contrastive focus new in the discourse.
Contrastive focus is defined by Cruttenden (1986:90) as “involving comparison within a limited set”. This definition is somewhat vague, especially in that all cases of focus could potentially be interpreted as contrastive. More precise definitions have been given, such as by Taglicht (1982:225), who states that an element in contrastive focus is “presented as one of a pair of opposites”. But the limitation to opposites here is too strong. The contrastive focus used in the present study is seen in (5) above, and falls somewhere between Cruttenden and Taglicht’s definitions. Here there is contrast (not merely comparison) of a word in the answer (i.e. números ‘numbers’) with a word in the question (i.e. documentos ‘documents’). While the words números ‘numbers’ and documentos ‘documents’ can hardly be considered opposites in any logical sense, there is explicit contrast between an extremely limited set of two discourse elements. In this case, as in all cases of contrastive focus in the present study, this contrast is achieved through correction of an element presented in the question. In the present study, the focal information is also new information, but contrastively focused information is not always new information, as in the focus on the words John and Mary in the exchange in (6).

(6) A: Did John and Mary go to the movies?
   b: JOHN went to the movies. MARY was too busy.
1.2.2 Traditional View of Spanish Narrow Focus

While much work has been done on how narrow focus is conveyed in Spanish, the majority of it has concentrated on the ways in which word order conveys the interpretation of a grammatical element as focused (e.g. Bolinger 1954, 1954-1955; Contreras 1978, 1980; Hatcher 1956; Zubizarreta 1998). While an element which is focused is more prominent in some way than other elements, this prominence can be conveyed in different ways. In this dissertation I consider the ways in which intonation is used to convey contrastive focus in Spanish, but the traditional studies mentioned above have generally considered only how word order conveys focus in Spanish, to the exclusion of intonational considerations. This traditional view that word order alone can be used to mark focus is still maintained, at least in part, by some scholars. Ladd (1996:191) states that “Word order modifications in languages like Spanish and Italian may indirectly achieve the accentual effects that English accomplishes directly by manipulating the location of the nuclear accent”. This means that where English speakers use intonation to mark a word as focused, Spanish speakers can use word order instead. Examples demonstrating this traditional view are given in (7).
Traditional view of English vs. Spanish strategies for conveying focus (from Face 2000:46)

a. He will give MARY the book. (intonation)

a'. Le dará el libro a María. (word order)

b. He will give Mary THE BOOK. (intonation)

b'. Le dará a María el libro. (word order)

Some scholars of Spanish word order have assumed that prosody plays a role along with syntax in conveying an element as focused, but the nature of its role has only rarely been investigated. For example, Contreras (1978) assumes that a word in focus corresponds to an intonational peak (cima melódica in his terminology), but presents no supporting evidence. Bolinger (1954-1955:56) adds a footnote to the end of his paper stating “In order not to complicate matters I have left intonation out of the account. This much needs to be said, however: that what is usually referred to as ‘contrastive stress’ is rather contrastive intonation”. Statements such as this reflect an inadequate treatment of the role that prosody and intonation play in marking narrow focus in Spanish. Only recently has investigation begun into the ways in which prosody and intonation are used to mark focus in Spanish (de la Mota 1995, 1997; Face 1999, 2000, 2001; García-Lecumberri 1995; Hualde 1999, 2000; Nibert 2000; Toledo 1989).
1.3 The Autosegmental-Metrical Theory of Intonational Phonology

1.3.1 The Nature of the Theory

The phonological analyses presented throughout this dissertation employ the autosegmental-metrical (as termed by Ladd 1996) theory of intonational phonology. The autosegmental-metrical (AM) theory was introduced primarily by Pierrehumbert (1980), though it incorporated many of the insights of Bruce's (1977) work on Swedish, and was further developed by Pierrehumbert and her colleagues throughout the 1980s and 1990s (Beckman and Ayers 1997, Beckman and Pierrehumbert 1986, Pierrehumbert and Beckman 1988, Pierrehumbert and Hirschberg 1990; see Ladd 1996 for an overview). This theory is autosegmental (Goldsmith 1976, Leben 1973) in that tones are phonological units in and of themselves which are independent of, yet associate with, other phonological units. The theory is metrical (Liberman 1975) in that the tones associate with phonological units considered to be strong within metrical phonology. Since stressed syllables are considered metrically stronger than unstressed syllables, stressed syllables are the units with which tones associate. Figure 1.1 provides an illustration of the autosegmental and metrical nature of this theory.
In this figure, there are two separate tiers: 1) the tone tier, and 2) the syllable tier. The tones and syllables are autonomous (hence the term *autosegmental*), but there is an association between the two tiers. The association between these tiers is based on the metrical structure of the language. The tones on the tone tier associate with the stressed syllables because they are metrically stronger than the unstressed syllables.

One of the greatest contributions of the AM theory is that it analyzes even the most complex intonation contours in terms of two phonological tones: 1) a high tone (H) and 2) a low tone (L). While many phonetic pitch levels may exist, the AM theory recognizes that phonologically only two contrasting tones are required. In this way, intonation does not erroneously over-predict the number of phonologically distinct rises and falls in pitch. The strength of the AM theory is evidenced by the success with which it has been used in accounting not only for the tone patterns of a large number of languages, but also by its successful use in accounting for the tone patterns of languages.
which use tone in very different ways (e.g. tone languages such as Mandarin, pitch accent languages such as Swedish, and intonation languages such as English; see Cruttenden 1986 for a typology).

One of the main building blocks of intonation contours within the AM theory is the pitch accent. The pitch accent, which is affiliated with a stressed syllable, may contain either one tone or a sequence of two tones. Therefore a pitch accent may contain the following tones and sequences of tones: H, L, H+L, and L+H. The lack of pitch accents containing two identical tones (though they have occasionally been proposed) can be understood as the result of the application of the Obligatory Contour Principle (Leben 1973) within a pitch accent.

The tonal content of a pitch accent is not the sole determiner of the nature of that pitch accent. It is wholly possible to have two phonologically distinct pitch accents which are both H+L or both L+H tonally. In these instances the distinction between the pitch accents is due to the nature of their association with the stressed syllable. While an entire pitch accent is affiliated with a stressed syllable, one tone is specified to associate with the stressed syllable, in the sense of autosegmental association seen in Figure 1.1. The tone which is associated with the stressed syllable "has priority in establishing the alignment of the pitch accent" (Pierrehumbert and Beckman 1988:125). The distinction between association and alignment is best put by Ladd (1996:55):
Alignment must be defined as a *phonetic* property of the relative timing of events in the F0 contour and events in the segmental string. Association, on the other hand, is the abstract structural property of ‘belonging together’ in some way. The fact of association entails no specific predictions about alignment: if a H tone is associated with a given prominent syllable, we may expect to find a peak of F0 somewhere in the general vicinity of the syllable, but the peak may be early in the syllable or late, and indeed it may be outside the temporal limits of the syllable altogether” (emphasis in original).

The actual physical *alignment* between tones and the speech stream is phonetic. The associated tone of each pitch accent “has priority in establishing the alignment of the pitch accent” (Pierrehumbert and Beckman 1988:125), but there are no specific predictions about the alignment of that tone.

In standard AM notation a tone which is associated with the stressed syllable is suffixed by a *. Thus the inventory of possible pitch accents is H*, L*, H*+L, H+L*, L*+H, and L+H*. The starred tone has priority for alignment with the stressed syllable and the unstarred tone is realized at a phonologically unspecified (i.e. phonetically determined) distance prior to or after the starred tone. Figure 1.2 presents a schematic representation of tonally identical pitch accents with different association to the stressed syllable (S).
In Figure 1.2 the two pitch accents are tonally identical since they both contain a sequence of a low tone followed by a high tone. Each of the tonally identical L+H pitch accents causes a rise in fundamental frequency (F0). In the case of L*+H, the L is associated with the stressed syllable and therefore the beginning of the rise has priority for aligning with the stressed syllable. In the case of L+H*, it is the H which is associated with the stressed syllable, and therefore the end of the rise has priority for aligning with the stressed syllable. This representation should be taken only as a schematic representation, however, as the nature of the actual physical alignment of the tones is not predictable from association.

While pitch accents account for the tonal movement around stressed syllables, they alone cannot account for the complexity of intonation contours. Tones are also associated with the ends of phrases. All languages have intonation phrases, and some languages have additional levels of phrasing. Phrases, regardless of how many levels of
phrasing exist in a language, provide a way of dividing information into chunks. The end of an intonation phrase is marked by either a high tone or a low tone, which is represented as H% or L% respectively.

An example of a language that has more than one level of phrasing is English, which has an intermediate phrase in addition to the intonation phrase (Beckman and Pierrehumbert 1986). The boundary between intonation phrases causes a stronger sense of disjuncture between the two phrases than does the boundary between intermediate phrases. As is the case for intonation phrases, the end of an intermediate phrase is marked with either a high tone or a low tone, which is represented as H- or L- respectively. An intonation phrase is made up of one or more intermediate phrases, so the end of the final intermediate phrase within an intonation phrase will always correspond to the end of the intonation phrase, and in this position both an intermediate phrase boundary tone and an intonation phrase boundary tone are present. This is demonstrated in Figure 1.3, where the intonation phrase contains two intermediate phrases. The ‘T’ represents any tone, either high or low.

[[......T-][......T-] T%]

Figure 1.3: One intonation phrase containing two intermediate phrases.
The sequence of an intermediate phrase boundary tone and an intonation phrase boundary tone, such as in Figure 1.3, can lead to complex tonal movement at the end of an intonation phrase since the two tones may not be identical (i.e. one may be high and the other low). To take an extreme example from English, if a friend exclaims *Johnny's going to the store!*, and I knew he was leaving but am surprised that the store is his destination, I might respond *He's going to the store?* with a L*+H pitch accent on the word *store*, followed by a low intermediate phrase boundary tone L- and a high intonation phrase boundary tone H%. This causes a rise in pitch which begins in the stressed syllable and is attributable to the pitch accent. This rise is followed by a fall attributable to the L- and another rise attributable to the H%. Thus four tones are realized over the monosyllabic word *store* because of its occurrence at the end of not only an intermediate phrase but also of an intonation phrase. This is represented schematically in Figure 1.4.

![Figure 1.4: Schematic representation of L*+H L-L% over the English word store.](image-url)
Through the use of two phonologically contrastive pitch levels, the existence of pitch accents distinguished by their tonal composition and/or their association with the stressed syllable, and the tonal marking of one or more levels of phrasing, the AM theory is able to provide a phonological analysis of the intonation contours of a language.

1.3.2 Phonological Units in Spanish Intonation

Of most interest to this dissertation is the application of the AM theory to Spanish. Much discussion of previous AM analyses of Spanish intonational data occurs at the beginning of subsequent chapters since in many cases specific arguments and analyses have a bearing on the points being discussed in those chapters. The purpose of this section is to provide a brief overview, focusing on the phonological units which have been postulated for Spanish.

It has been recognized at least since Navarro Tomás (1944) that F0 rises within a stressed syllable in Spanish. If the stressed syllable is produced in a broad focus utterance, then the rise begins at or near the beginning of the stressed syllable and generally continues beyond the stressed syllable (Face 1999, 2001; Fant 1984; Garrido et al. 1993; Hualde 1999, 2000; Llistérri et al. 1995; Nibert 2000; Prieto et al. 1995; Sosa 1995, 1999). When there is not sufficient space after the stressed syllable, the rise ends within the stressed syllable (Face 1999, Prieto 1995).

While this rise in F0 has been analyzed in different ways, I will summarize one analysis here in order to demonstrate the application of the AM theory to Spanish. Other analyses will be treated in Chapter 3. Face (1999, 2001), Hualde (1999), and Sosa (1995,
have analyzed this rise as resulting from a L*+H pitch accent. The L+H sequence accounts for the rise in F0, since it begins low and then becomes high. The L* indicates that it is the L rather than the H which is associated with the stressed syllable. This accounts for the L occurring at or near the beginning of the stressed syllable, since the associated tone has preference for establishing the alignment of the pitch accent. The H is not associated with the stressed syllable, so its alignment with the speech stream is left to purely phonetic factors.

Pitch accents other than L*+H have been proposed for Spanish as well, but these analyses require more attention than can be afforded them in this overview. They will be discussed in Chapters 3 and 4. What is important here, however, is that Spanish has tonal movements, such as the F0 rise described above, which can be accounted for by pitch accents, such as L*+H, within the AM theory.

Since all languages have at least one level of phrasing, there has never been any question within AM approaches to Spanish as to whether or not Spanish has intonation phrases and the corresponding intonation phrase boundary tones H% and L%. These were postulated by Sosa (1991) in the first application of the AM theory to Spanish and have never been brought into question. A much more controversial issue has been whether or not Spanish has a second level of phrasing. Sosa (1991, 1999) did not propose a second level of phrasing, but this view was challenged by Nibert (1999). Nibert (1999) demonstrated through perceptual tests that the use of an utterance-medial phrase boundary tone is used in Spanish to disambiguate the interpretation of an utterance with a syntactic or semantic ambiguity. An example is the phrase \textit{lilas y lirios amarillos}
‘yellow lilies and lilacs’, where the adjective *amarillos* ‘yellow’ could have scope over both nouns or just over *lirios* ‘lilies’. Nibert’s (1999) perceptual tests show convincingly that phrase boundary tones can indeed disambiguate this type of utterance. The problem with this analysis, however, is that Nibert merely assumed that this was due to the existence of intermediate phrases in Spanish. An alternative analysis which she provided no evidence against is that the disambiguating phrase boundary tones are caused by intonation phrase boundaries rather than intermediate phrase boundaries.

In her more recent work, Nibert (2000) has maintained her proposal that Spanish has intermediate phrases. In addition to the perceptual tests which she had previously presented as evidence for intermediate phrasing in Spanish, Nibert (2000) shows convincingly, using production data this time, that there are complex tonal patterns which occur at the end of intonation phrases and that these cannot be accounted for only by the final pitch accent and the intonation phrase boundary tone. The incorporation of intermediate phrasing, and therefore intermediate phrase boundary tones, into Spanish allows for an analysis of these complex tonal patterns. Additionally, and crucially, Nibert (2000) shows that intermediate phrase boundary tones occur utterance-internally, and with uses other than disambiguation, but that the tonal patterns at these phrase boundaries are not as complex as those at the end of an intonation phrase. This indicates that there is only an intermediate phrase boundary tone in these cases, where at the end of intonation phrases there is a sequence of an intermediate phrase boundary tone and an intonation phrase boundary tone (see the representation of this in Figures 1.5 and 1.6 below)
In order to bring the pieces of the AM theory together and demonstrate their relationship to each other, Figures 1.5 and 1.6 present an example of an AM analysis of the broad focus Spanish utterance *El hermano de Manolo le daba el número de vuelo* ‘Manolo’s brother was giving him the flight number’. In Figure 1.6, the beginning (s>) and end (S>) of each stressed syllable are marked by vertical lines.

```
El hermano  de  Manolo  le daba  el  número de vuelo.
| | | | |
[[ L*+H (L+H) H-] [ L*+H L*+H (L+H) L-] L%]
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Figure 1.5: Application of the AM theory to the Spanish broad focus utterance *El hermano de Manolo le daba el número de vuelo* ‘Manolo’s brother was giving him the flight number’.
Figure 1.6: Pitch track of the Spanish broad focus utterance *El hermano de Manolo le daba el número de vuelo* ‘Manolo’s brother was giving him the flight number’, with an AM analysis of the intonation pattern.

In the case represented in Figures 1.5 and 1.6, the entire sentence is produced as one intonation phrase, and it is marked tonally by a L%. This single intonation phrase is divided into two intermediate phrases, with the first being the subject noun phrase *el hermano de Manolo* ‘Manolo’s brother’ and the second being the verb phrase *le daba el número de vuelo* ‘was giving him the flight number’. Each of these intermediate phrases is marked tonally. The first is marked by a H- following the pitch accent, resulting in a sense of disjuncture between the first and second intermediate phrases. The second intermediate phrase is marked tonally by a L-. Thus the end of the intonation phrase in

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4 The division of this sentence into these two particular intermediate phrases (i.e. the subject and the verb phrase) should not be taken as the only possibility. Hualde (2000) and Nibert (2000) provide examples of the subject and verb occurring in the same intermediate phrase and what comes after the verb being in a separate intermediate phrase. Also, not all utterances are divided into multiple intermediate phrases.
this case does not have the complexity that is possible at the end of an intonation phrase when the intermediate phrase boundary tone and the intonation phrase boundary tone are different. Declarative sentences in Spanish generally end in a sequence of L-L% (Nibert 2000).

Lastly, there are L*+H pitch accents affiliated with three of the stressed syllables in this utterance, accounting for the corresponding rises in F0. The other two F0 rises indicative of pitch accents I have simply marked as (L+H) to indicate that there is a rising pitch accent, but without offering a particular analysis of the association of the pitch accent. This is because these pitch accents immediately precede phrase boundary tones, and this affects the realization of the F0 peak of the pitch accent, making difficult a determination of its phonological association with the stressed syllable. These cases will be considered in Chapter 3.

1.4 Overview of the Dissertation

In the following chapter I present the experimental methods which were employed for the present study. The topics of discussion are the corpora of utterances used in the experiment and their contexts, the elicitation of those utterances, the subjects participating in the experiment, and the acoustic and phonological analyses of the utterances elicited in the experiment.

Chapter 3 is a treatment of the intonation of broad focus declaratives in Spanish. This will serve as a comparison for the findings for the intonation patterns used to mark contrastive focus as they are examined in the following chapters. I provide a discussion
of previous studies of broad focus declaratives, focusing on phonological studies employing the AM theory and also present data collected for the present study. The results from the present study are especially important since they were produced by the subjects whose data for contrastive focus intonation patterns will be considered in the chapters that follow. Therefore, they provide the most accurate point of comparison for the findings of the present study for contrastive focus intonation patterns. Based on the broad focus data from the present study, a phonetic description and phonological analysis of Spanish broad focus declaratives is presented.

In Chapter 4 I examine the *local intonation patterns* associated with contrastive focus in Spanish. That is, I look at the intonation pattern which occurs on the particular word which is being conveyed in contrastive focus. I show that there are four local intonational strategies that can be used to mark Spanish contrastive focus. Of the four strategies, one is phonetic and the other three are phonological. In a few cases, some of the strategies produce phonetically similar intonation patterns within the bounds of the word in contrastive focus, raising the level of difficulty of providing a well-motivated phonological analysis. In these cases I show that there are other differences which can be used to distinguish which strategy is being employed in a given utterance. One of the phonological strategies discussed is a pitch accent which is phonologically distinct from that used in broad focus declaratives. I argue that the alignment of the tones in these two pitch accents motivates postulating that pitch accents have an internal structure. The
incorporation of pitch accent structure into the AM theory of intonational phonology allows for a straightforward analysis of these pitch accents which is otherwise impossible within this theory.

In Chapter 5 I look at the global intonation patterns used to mark Spanish contrastive focus. While the vast majority of work on the intonation of focus in Spanish has examined the intonation patterns associated with the word in contrastive focus, it is important to consider how the intonation in the rest of the utterance (both pre-focal and post-focal) is affected. I show that the effects of contrastive focus on the remainder of the utterance are primarily phonetic. Pitch range is manipulated both pre-focally and, more prominently, post-focally. In the case of post-focal pitch range manipulation, this has been observed previously (de la Mota 1997, Hualde 2000, Nibert 2000), but previous analyses have been phonological in nature. I show that a phonological analysis is only able to account for a portion of the data while a phonetic analysis is able to account for all of them. The only phonological global intonation pattern found is the use of a pre-focal intermediate phrase boundary tone in some cases.

Chapter 6 deals with the effects of syntactic constituency on the intonation patterns used to mark contrastive focus in Spanish. I show that when a contrastively focused word is part of a larger syntactic constituent, the intonation pattern is affected by that constituent. Contrastive focus is generally marked both on the word produced in contrastive focus as well as at the end of the entire syntactic constituent. Also, the post-focal pitch range manipulation discussed above does not generally begin until after the syntactic constituent which contains the contrastively focused word. Given the effects of
syntactic constituency on the intonation patterns associated with contrastive focus, I also examine utterances with an entire multi-word syntactic constituent produced in contrastive focus, and show that yet another intonation pattern is generally found in these cases.

Chapter 7 provides a summary of the principal points made throughout the dissertation. In addition, points are raised which will need to be considered in future studies of Spanish intonation and its use in marking contrastive focus.
CHAPTER 2

METHODS

2.1 Introduction

In order to investigate the intonational patterns which convey contrastive focus in Spanish, two experimental corpora were designed using sets of lexically and grammatically identical sentences with contrastive focus appearing on different grammatical entities in each sentence. This design allows for a comparison of sentences which are identical in every respect except for the presence of contrastive focus. In this way it may be seen precisely what differences exist in local intonation patterns when a word is produced with contrastive focus versus when it is produced with broad focus. This method has been used in many studies of the prosody of focus, including several on Spanish (de la Mota 1995, 1997; Face 2000; Nibert 2000; Toledo 1989).

2.2 Corpora

2.2.1 Corpus #1

In order to investigate the intonation patterns used to convey contrastive focus in Spanish and to motivate a phonological analysis of each pattern, sentences were created
having either two or three stressed content words as well as some unstressed words. In those sentences containing two stressed content words, the stressed syllables of the two content words were the target syllables. In those sentences containing three stressed content words, the stressed syllables of only the first two content words were used as target syllables. Each sentence with two content words had a corresponding sentence with three content words that was lexically identical up through the second content word. In this manner each pair of sentences (the corresponding sentences with two and three content words) had one production where the second target syllable was in medial position and one production where it was in final position. In both productions the first target syllable was in initial position.\footnote{By initial, medial and final position I refer to the position of the syllable with regard to other stressed syllables. For example, the stressed syllable in initial position is the first stressed syllable, though it does not indicate that it is the very first syllable of the sentence.} This makes it possible to examine whether the local intonation patterns are affected by the position of the word in contrastive focus within the sentence.

The sentences comprising each set of sentences have segmentally identical target syllables, with zero to five unstressed syllables intervening between the two target syllables. This makes it possible to examine whether a particular tone is realized in its particular location because it is phonologically associated with that position or because it is forced to be realized there due to the phonetic influence of nearby tones. I have shown previously that tonal crowding (i.e. the occurrence of multiple tones in a short period of time) affects the realization of tones in Spanish (Face 1999). While tonal crowding may or may not play a role in the realization of local intonation patterns on words in
contrastive focus, this strategy of spreading out the target syllables allows for the examination of such questions should they arise. Even if such questions do not arise, this design provides a large number of lexically similar sentences for examination in this study.

Two example sentences from one of the sets contained in Corpus #1 are presented in (1) below. These sentences contain three content words, and therefore three stressed syllables. The first two stressed syllables are the target syllables as described above, and are marked here by underlining for the sake of clarity. The first target syllable of each sentence is identical to that of the other, and likewise in the case of the second target syllable. The sentence in (1a) has one unstressed syllable between the two target syllables while the sentence in (1b) has five.

(1)  
   a. Que le *daba* números pertinentes.
      ‘That she was giving him relevant numbers.’
   b. Que se lo *dábamos* para el *núm*ero pertinente.
      ‘That she was giving it to him for the relevant number.’

Each sentence occurred three times in the experiment as the answer to three different elicitation questions. One question forced a reading of the sentence in broad focus, while each of the other two questions forced a reading with contrastive focus on the word containing one of the two target syllables. The use of question and answer pairs is widely accepted in investigating focus, and Kadmon (2001:261) states that “the
intuition that focus is the answer to the question being addressed is a basic and crucial one. Hence, like many researchers before me, I believe in using question-answer pairs as a central means of identifying foci and investigating the empirical behavior of focus.”

The three elicitation questions for the sentence in (1a) are given in (2), where in each answer the capital letters mark the word which was forced to be produced with contrastive focus.

(2)  

a. ¿Qué dijo Ana?
   ‘What did Ana say?’
   Que le daba números pertinentes.
   ‘That she was giving him relevant numbers.’

b. ¿Dijo Ana que le pedía números pertinentes?
   ‘Did Ana say that she was asking him for relevant numbers?’
   No. Que le DABA números pertinentes.
   ‘No. That she was GIVING him relevant numbers.’

c. ¿Dijo Ana que le daba documentos pertinentes?
   ‘Did Ana say that she was giving him relevant documents?’
   No. Que le daba NÚMEROS pertinentes.
   ‘No. That she was giving him relevant numbers.’

A total of 108 question and answer pairs were created (see Appendix A).
2.2.2 Corpus #2

In order to investigate the effects of syntactic constituency on intonation in cases where a complex syntactic constituent contains a word in contrastive focus, or is in its entirety produced in contrastive focus, sets of lexically and grammatically identical sentences were created, with contrastive focus appearing on different words and syntactic constituents in each sentence. This design allows for a comparison of sentences which are identical in every respect except for the presence of contrastive focus, as was the case in Corpus #1. In this way it may be seen precisely in what ways syntactic constituency affects intonation in utterances containing a word or constituent in contrastive focus.

Each set of sentences contained a complex subject noun phrase, a verb, and a complex object noun phrase. There are five stressed content words in each sentence, and between stressed syllables there are either two or three unstressed syllables. Each set of sentences contained nine individual sentences. Each sentence had a different focus pattern. One sentence was produced in broad focus and eight were produced with an element in contrastive focus. The eight sentences in each set which were produced with an element in contrastive focus had contrastive focus on the following elements: 1) subject noun phrase, 2) head of the subject noun phrase, 3) modifier of the subject noun phrase, 4) verb, 5) verb phrase, 6) object noun phrase, 7) head of the object noun phrase, and 8) modifier of the object noun phrase. Each of these focus patterns was elicited from the speakers by a contextualizing question, as was done in Corpus #1. An example set of question and answer pairs is given in (3), where capitalization indicates the element produced in contrastive focus.
a. ¿Qué pasa?

‘What’s happening?’

El hermano de Manolo le daba el número de vuelo.

‘Manolo’s brother was giving him the flight number.’

b. ¿Eduardo le daba el número de vuelo?

‘Was Eduardo giving him the flight number?’

No. EL HERMANO DE MANOLO le daba el número de vuelo.

‘No. MANOLO’S BROTHER was giving him the flight number.’

c. ¿El primo de Manolo le daba el número de vuelo?

‘Was Manolo’s cousin giving him the flight number?’

No. EL HERMANO de Manolo le daba el número de vuelo.

‘No. Manolo’s BROTHER was giving him the flight number.’

d. ¿El hermano de José le daba el número de vuelo?

‘Was Jose’s brother giving him the flight number?’

No. El hermano de MANOLO le daba el número de vuelo.

‘No. MANOLO’S brother was giving him the flight number.’

e. ¿El hermano de Manolo le pedía el número de vuelo?

‘Was Manolo’s brother asking him for the flight number?’

No. El hermano de Manolo le DABA el número de vuelo.

‘No. Manolo’s brother was GIVING him the flight number.’
f. ¿El hermano de Manolo le pedía la fecha de la reunión?
‘Was Manolo’s brother asking him for the meeting date?’
No. El hermano de Manolo le DABA EL NÚMERO DE VUELO.
‘No. Manolo’s brother was GIVING him THE FLIGHT NUMBER.’

g. ¿El hermano de Manolo le daba la fecha de la reunión?
‘Was Manolo’s brother giving him the meeting date?’
No. El hermano de Manolo le daba EL NÚMERO DE VUELO.
‘No. Manolo’s brother was giving him THE FLIGHT NUMBER.’

h. ¿El hermano de Manolo le daba la hora del vuelo?
‘Was Manolo’s brother giving him the flight time?’
No. El hermano de Manolo le daba EL NÚMERO de vuelo.
‘No. Manolo’s brother was giving him the flight NUMBER.’

i. ¿El hermano de Manolo le daba el número de teléfono?
‘Was Manolo’s brother giving him the telephone number?’
No. El hermano de Manolo le daba el número de VUELO.
‘No. Manolo’s brother was giving him the FLIGHT number.’

A total of 27 question and answer pairs were created (see Appendix B).

2.3 Data Elicitation

The question and answer pairs from the two corpora were mixed together and placed in random order. In this manner the questions and answers for each corpus served
as foils for the other. The combined corpus was divided into two halves, and additional foils were added at the beginning and end of each half to prevent any potentially unreliable results as a consequence of a sentence’s location at or near the beginning or the end of each elicitation session.

The elicitation questions for both corpora were recorded on a cassette tape by a male native Spanish speaker in his mid twenties from Madrid, Spain. A Marantz PMD222 cassette recorder and a Shure SM10A head-mount microphone were employed for these recordings. The elicitation questions were then digitized, placed in the random order generated for the combined corpus, and recorded to another cassette tape. The question and answer pairs were printed in paper booklets, eight to a sheet, in the random order generated for the combined corpus. Subjects read each question and answer pair, listened to each elicitation question presented via a Marantz PMD222 tape player and then read the answer as they would in conversation in response to the question asked. The answers were recorded employing a Sony MZ-R90 mini-disc recorder and a Sony ECM-MS907 microphone. The recording sessions were carried out in a quiet office in the Facultad de Filosoﬁa y Letras at the Universidad Autónoma de Madrid, Spain.

2.4 Subjects

The subjects were 20 students at the Universidad Autónoma de Madrid. Of the 20 subjects, 5 were male and 15 were female, and all were between the ages of 22 and 29. Potential subjects filled out a survey to determine their eligibility to be selected to

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2 The random order was determined by the Research Randomizer random number generator (http://www.randomizer.org)
participate in the study. To be selected as a subject, the potential subject had to have been born in the city of Madrid and not lived in any other region of Spain. While participation in study abroad programs (except in other Spanish speaking countries) was permitted, there was a limit of one academic year abroad, and living outside of Spain for any reason other than a study abroad program was cause for not being selected for the study. In addition, no natively bilingual potential subjects were selected, though most subjects had studied one or two foreign languages in school.

2.5 Acoustic Analysis

The 2160 utterances (20 subjects x 108 sentences each) recorded for Corpus #1 and the 540 utterances (20 subjects x 27 sentences each) recorded for Corpus #2 were analyzed using Scicon Research and Development’s PitchWorks program designed specifically for intonation studies. Of the total of 2700 utterances, 23 had to be excluded from the analysis due to pitch track failure as a result of various factors such as creaky voice and interference of external sounds. The remaining 2677 utterances are the basis for the analyses presented in this dissertation.

Various acoustical measurements were made using PitchWorks. For Corpus #1, the following measurements were made: 1) the location of the beginning and end of the F0 rise affiliated with each target syllable in relation to the edges of that syllable, 2) the depth of each F0 valley and the height of each F0 peak, 3) the duration of each target syllable, and 4) the duration of the final syllable of the word containing the target syllable. From these measurements the duration and distance (i.e. height) of each F0 rise
was calculated. These measurements allowed for a phonetic description of the intonation patterns used to convey contrastive focus in Spanish, and also motivated the phonological analyses of these patterns.

Further comment is necessary on a couple of the acoustical measurements in the above list. First, the measurements for the beginning and end of the F0 rise were measured at the deepest part of the valley and at the highest part of the peak, respectively. In those cases where there were plateaus rather than clear peaks or valleys, the measurement was made at the elbow in the pitch contour (i.e. the edge of the plateau closest to the F0 rise). Second, the decision to use the stressed syllable as the measurement of the location of the F0 valleys and peaks is based on our knowledge of Spanish pitch accents. Within the applications of the AM theory to Spanish, the stressed syllable has been claimed to be the unit to which a pitch accent associates (Face 1999, 2001; Hualde 1999, 2000; Nibert 2000; Prieto et al. 1995; Willis 2000). Since Face (1999, 2001) shows that the F0 valley occurs at or near the beginning of the stressed syllable, rather than at some syllable-internal location such as the CV boundary, the entire syllable is taken into consideration, and the location of F0 peaks and valleys is measured with respect to the syllable as a whole. The syllable edges, then, delimit the syllable for purposes of measurement.

For Corpus #2, which was intended primarily to examine the effects of syntactic constituency on the intonation patterns used to convey contrastive focus, the height of each F0 peak was measured. Since Corpus #1 motivated the phonological analyses of the intonation patterns used to convey contrastive focus, fewer acoustical measurements were
needed for Corpus #2. Rather, F0 peak height was measured to look at pitch range, and the rest of the consideration of Corpus #2 was a comparison of the uses of the phonological units (already motivated by the data from Corpus #1) between Corpus #1, with its simple syntactic constituents, and Corpus #2, with its more complex syntactic constituents.

2.6 Phonological Analysis

In certain parts of the dissertation where phonological analyses are discussed, a decision as to the appropriate phonological analysis of the intonation pattern of each utterance was required. This involved decisions such as which pitch accent was used or whether or not an intermediate phrase boundary was present. These decisions were made based on a comparison of the intonation patterns found in the utterance to the canonical intonation patterns caused by each phonological intonational unit.
CHAPTER 3

INTONATION IN BROAD FOCUS DECLARATIVES

3.1 Introduction

In order to provide a basis for comparison for the intonation patterns found on utterances in the experiment which contain a word in contrastive focus, I first examine the intonation patterns found on broad focus declaratives. This is necessary to address the issue of which local intonation patterns found on words in contrastive focus are truly characteristic of contrastive focus and which are shared in common with broad focus declaratives.

3.2 Previous Research

Of the research on Spanish intonation, studies of intonation patterns of broad focus declaratives are certainly the most common. Navarro Tomás provides some discussion of this type of utterance in his monumental work *Manual de pronunciación española* (Navarro Tomás 1918) and later in his groundbreaking work on Spanish intonation, *Manual de entonación española* (Navarro Tomás 1944). Following the work of Navarro Tomás, many studies were carried out, especially examining the intonation of
different Latin American dialects (see Kvavik and Olsen 1974 for a review). More recently, substantial studies have been carried out by Fant (1984), Garrido (1996; Garrido et al. 1993, 1995), Kvavik (1979, 1980, 1981, 1986, 1987), Prieto (1998; Prieto and Shih 1995; Prieto et al. 1995, 1996) and Sosa (1991, 1995, 1999). In this section I will provide a brief overview of the most important of this research for the purposes of the present study.

Navarro Tomás (1944) makes two important observations about the intonation patterns of broad focus declaratives that would be recalled, and perhaps even rediscovered, in recent work. These two points are 1) that in the body of the F0 contour (i.e. that which precedes the final stressed syllable of the utterance) the F0 rises throughout stressed syllables, and 2) that the F0 often reaches its highest point in the post-tonic syllable. Navarro Tomás does not reflect on the importance of these findings, and perhaps their importance beyond mere description could not have been understood prior to the development of recent theories of intonation. Nonetheless, these findings provide important information about the intonation of Spanish. Even outside the scope of a particular theory of intonation, Garrido (1996, Garrido et al. 1993) recognizes that it is the rise itself rather than the peak of the rise that is really important in marking a syllable as stressed.

Recent work employing the AM theory of intonational phonology has brought the issue of the nature of the F0 rise to the forefront of scholarly discussion on Spanish intonation. Phonetic work by Prieto (1998; Prieto and Shih 1995; Prieto et al. 1995, 1996) on declarative sentences in Mexican Spanish shows again, and in much greater
phonetic detail, what Navarro Tomás found decades earlier: there is a rise in F0 through the stressed syllable and the rise generally reaches its peak in the post-tonic syllable. In these invaluable phonetic studies, Prieto also offers a phonological analysis to account for the F0 rises that she finds. Specifically, Prieto analyzes these rises as resulting from H* pitch accents.

While it is true that the observed F0 peak affiliated with the stressed syllable merits an analysis involving a high tone, the observation is that this peak generally occurs on the post-tonic syllable rather than on the stressed syllable. Since the association of the H to the stressed syllable makes no specific predictions about its alignment, this is not a problem. However, the H* analysis has nothing to say about an F0 valley at the beginning of the rise, and Prieto (1998) herself observes that there is an F0 valley that is generally at the onset of the stressed syllable. These points became the basis for further work on the topic of an appropriate analysis for this F0 rise.

Sosa (1995, 1999) proposed that this F0 pattern would be more accurately captured by a L*+H analysis. This bitonal pitch accent contains both a low and a high tone which are affiliated with the stressed syllable. The low tone is associated with the syllable and the high tone follows at a phonetically determined distance. This L*+H analysis has two advantages over the H* analysis: 1) it recognizes that there is a L which causes an F0 valley near the onset of the stressed syllable, and 2) it specifies the L rather than the H as the tone which is associated with the stressed syllable, offering a more straightforward explanation of the stronger alignment of the F0 valley than the F0 peak to
the stressed syllable. While Sosa’s argument seems to be on target, it lacked the support of experimental evidence, and this led me to further investigate experimentally the nature of this F0 rise (Face 1999).

Specific points requiring experimental investigation were the alignment of the low tone to the onset of the stressed syllable and the relative freedom of the high tone due to its not being associated with the stressed syllable. By varying the space between tones by spreading out stressed syllables, as I did also for Corpus #1 in the present study (see Chapter 2), I was able to investigate the effects of tonal crowding on the proposed low and high tones. I found that there indeed is an F0 valley which occurs near the onset of the stressed syllable, though it most often precedes the stressed syllable by a few milliseconds. I also found that the F0 peak occurs after the stressed syllable, except in cases of extreme tonal crowding when it is forced to be realized on the stressed syllable. The specific location of the F0 peak depended on the distance until the next tone. This demonstrates that the high tone truly is not associated with the stressed syllable and that its precise realization is dependent on purely phonetic factors.

I showed that the F0 valley is consistently realized at or near the onset of the stressed syllable regardless of the degree of tonal crowding. This led me to argue that the low tone is indeed phonologically associated with the stressed syllable in Spanish. Since the associated tone has a priority in establishing the alignment of the pitch accent, this analysis explains the consistent alignment near the onset of the stressed syllable. The fact
that this low tone often occurs a few milliseconds before the onset of the stressed syllable is not an issue since association of the tone with the stressed syllable does not require alignment within the boundaries of that syllable.

While Hualde (1999) agreed with the L*+H analysis, he later presented an alternative to the H* and the L*+H analyses. Hualde (2000) argued that the F0 valley at the beginning of the stressed syllable motivates a L+H tonal sequence rather than a simple H. However, rather than specify either of the tones as associated with the stressed syllable, he argues for a (L+H)* analysis, whereby the tonal sequence, rather than one particular tone, is associated with the stressed syllable. The disadvantage of this analysis, though, is that it is unable to account for why the F0 valley is always very near the onset of the stressed syllable and does not move outside of that syllable as freely as does the F0 peak. If the entire rise, rather than one specific tone, is associated with the stressed syllable, neither tone should have priority for alignment. A potential theoretical problem with this analysis is that it opens the door to more than two phonologically distinct rising pitch accents in a language (i.e. (L+H)*, L*+H, and L+H*).

The description of the F0 rise above is only found on non-final stressed syllables. The F0 pattern affiliated with the final stressed syllable still requires mention. There is one important inherent difference in the F0 rise affiliated with the final stressed syllable of an utterance when compared to the non-final stressed syllables: the F0 peak is almost always realized within the stressed syllable. At times the final stressed syllable is also the final syllable of the utterance, and therefore there is no post-tonic syllable upon which the F0 peak can be realized. Even when this is not the case, however, the F0 peak is realized
on the final stressed syllable rather than on a post-tonic syllable in nearly all cases. In quantitative studies, Llisterri et al. (1995) find that the F0 peak occurs on the final stressed syllable over 95% of the time, and I have found that this is the case over 98% of the time (Face 1999). There are two potential explanations for this which have been proposed: 1) that the F0 peak is forced back into the stressed syllable by the upcoming utterance-final boundary tones, and 2) that a different pitch accent is used in final position.

The claim that the realization of the F0 peak on the final stressed syllable is the result of the effects of the upcoming boundary tones is consistent with the behavior of the high tone in cases of tonal crowding, and has been proposed by Garrido et al. (1995), Hualde (2000) and Nibert (2000). I have claimed, however, that the realization of the high tone on the final stressed syllable is the result of a phonologically distinct nuclear pitch accent, L+H* (Face 1999). Nuclear refers to the last pitch accent of a prosodic phrase (i.e. the intermediate phrase for Spanish). Many languages, including Romance languages closely related to Spanish, have a nuclear pitch accent which is phonologically distinct from pre-nuclear pitch accents (D’Imperio 1997 for Neapolitan Italian, Frota 2000 for European Portuguese, Prieto 1995 for Catalan) The reasoning behind my claim that there is a phonologically distinct nuclear pitch accent in Spanish is that when the final stressed syllable is followed by one or two unstressed syllables, the F0 peak is still realized on the final stressed syllable. In tonal crowding cases between pitch accents, however, when there are one or two syllables between tones the F0 peak is quite consistently realized on the post-tonic syllable. This L+H* analysis, however, does not
take into account that the effects of the upcoming boundary tones on the F0 peak might be different than the effects of a tone in the pitch accent. In addition, since the stressed syllable in question occurs at the end of an utterance, there are two boundary tones, L- and L%, which follow the pitch accent, which could cause a more extreme case of tonal crowding. In theory, either of the analyses of the final F0 rise is able to account for the data, and therefore I will not propose one or the other as unequivocally correct. I will return to this issue in Section 3.3, however, examining whether the data from the present study provide evidence for one analysis or the other.

Besides the location of the tones, it should also be noted that each successive F0 peak is generally lower than the preceding peak due to a process of downstep (Prieto et al. 1995, 1996). In addition, Prieto et al. (1996) present solid evidence for a process of final lowering, which causes the height of the final F0 peak of an utterance to be lower than can be accounted for by downstepping. In some cases final lowering causes such an effect that the F0 peak becomes immeasurable.

Lastly, the F0 pattern on the unstressed syllables following the final stressed syllable is characterized by a fall from the F0 peak of the final stressed syllable to the end of the utterance (Navarro Tomás 1944, among many others). Within the AM theory of intonational phonology as applied to Spanish, this fall is analyzed as the result of a low intermediate phrase boundary tone, L-, followed by a low intonational phrase boundary tone, L% (Nibert 2000).

In summary, previous research on the intonation of Spanish broad focus declaratives provides a clear description of the F0 patterns found, though with respect to
the final F0 rise of an utterance there remains a question as to the appropriate phonological analysis. Further investigation is required in order to arrive at a solid conclusion as to which of the possible phonological analyses best accounts for this intonation pattern.

3.3 Broad Focus Declaratives in the Present Study

3.3.1 Introduction

While the description of the intonation patterns of Spanish broad focus declaratives seems clear from previous research, much of that research took place on subjects who are not from Madrid, or not from Spain at all. For this reason it is important to examine briefly the intonation of the broad focus declaratives in the present study. This, then, will allow for a comparison of these intonation patterns with those discussed in the following chapters which are used in marking contrastive focus.

The specific topics that will be investigated in this section are the nature of the F0 rises in both non-final and final positions and what phonological analysis best accounts for the F0 rise data, and the height of successive of F0 peaks and whether these support previous claims for the processes of downstepping and final lowering.

3.3.2 F0 Rises and Pitch Accents

In order to examine the phonetic realization of tones in broad focus declaratives in the present study, Table 3.1 provides average values for the phonetic alignment of the F0 valleys and peaks affiliated with stressed syllables in each of the three positions included
in Corpus #1: initial, medial and final. The location of the F0 valleys and peaks is in relationship to the nearest boundary of the stressed syllable with which the rise in F0 is affiliated. Thus for F0 valleys, which occur near the onset of stressed syllables, a negative value indicates that the valley is realized before the onset of the stressed syllable while a positive value indicates that it is realized after the onset of the stressed syllable. For F0 peaks, which occur nearer to the end of the stressed syllable, a negative value indicates that the peak is realized prior to the final boundary of the stressed syllable (i.e. within the stressed syllable), while a positive value indicates that the peak is realized after the final boundary of the stressed syllable.

<table>
<thead>
<tr>
<th>Position</th>
<th>Location of F0 Valley</th>
<th>Location of F0 Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>-4 ms ((N=713, SE=0.6))</td>
<td>+60 ms ((N=607, SE=2.5))</td>
</tr>
<tr>
<td>Medial</td>
<td>+16 ms ((N=317, SE=2.1))</td>
<td>+52 ms ((N=290, SE=3.5))</td>
</tr>
<tr>
<td>Final</td>
<td>+13 ms ((N=233, SE=12.5))</td>
<td>-60 ms ((N=224, SE=5.1))</td>
</tr>
</tbody>
</table>

Table 3.1: Location of F0 valleys and peaks in broad focus declaratives.
The data in Table 3.1 show that the F0 rises in broad focus declaratives in the present study are consistent with the findings of previous research. The F0 valleys occur near the beginning of the stressed syllable, ranging in the data in the table from an average of 4 ms before the onset of the stressed syllable in initial position to an average of 16 ms into the stressed syllable in medial position. An example of a typical broad focus declarative from Corpus #1 is given in Figure 3.1.

Figure 3.1: Broad focus reading of the sentence *Que terminó con la banana de la chica* ‘That she finished with the girl’s banana’.
The effects of tonal crowding must be examined in the broad focus declaratives from the present study as well. Since in previous research (Face 1999) I have varied the degree of tonal crowding in order to provide evidence as to whether the location of tonal events is due to phonological or phonetic factors and have designed Corpus #1 to allow for the same type of analysis for intonation patterns affiliated with words in contrastive focus, it is important to have a basis for comparison with utterances that do not contain a word in contrastive focus. Table 3.2 shows the average location of F0 peaks in initial position, which is the position followed by the varying number of unstressed syllables, by the number of following unstressed syllables before the next stressed syllable and corresponding tonal specification.
The data in Table 3.2 show that in extreme cases of tonal crowding (i.e. when there are no following unstressed syllables), the F0 peak is realized on average just prior to the end of the stressed syllable. As soon as there is even a single following unstressed syllable, however, the F0 peak is realized a substantial distance beyond the end of the stressed syllable.

While the data in Table 3.2 show that the subjects in this study are consistent with the claims of previous research in that the phonetic alignment of the F0 peak is a result of
the degree of tonal crowding, we must also examine the effects of tonal crowding on the phonetic alignment of F0 valleys. Table 3.3 shows the average location of F0 valleys in medial position, which is preceded by the controlled number of unstressed syllables.

<table>
<thead>
<tr>
<th>Preceding Unstressed Syllables</th>
<th>Location in Relation to the Beginning of the Stressed Syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (N=77)</td>
<td>+55 ms (SE=3.5)</td>
</tr>
<tr>
<td>1 (N=80)</td>
<td>+34 ms (SE=3.4)</td>
</tr>
<tr>
<td>2 (N=92)</td>
<td>+15 ms (SE=3.2)</td>
</tr>
<tr>
<td>3 (N=94)</td>
<td>+8 ms (SE=3.2)</td>
</tr>
<tr>
<td>4 (N=104)</td>
<td>-6 ms (SE=3.0)</td>
</tr>
<tr>
<td>5 (N=103)</td>
<td>-8 ms (SE=3.0)</td>
</tr>
</tbody>
</table>

Table 3.3: Location of F0 valley by degree of tonal crowding.

The data in Table 3.3 show that tonal crowding affects the location of the F0 valley, but not to the extent seen for F0 peaks in Table 3.2. Only in cases of moderately extreme and extreme tonal crowding (i.e. zero or one preceding stressed syllable) is the F0 valley realized a substantial distance into the stressed syllable. The difference between the average locations of the F0 valley when cases of moderately extreme and
extreme tonal crowding are ignored is a mere 23 ms (from +15 ms when there are two preceding unstressed syllables to −8 ms when there are five). This is in contrast to the results for the location of F0 peaks in Table 3.2 where when the cases of moderately extreme and extreme tonal crowding are ignored, the difference between the average locations of the F0 peak is 48 ms. In addition to these differences it is important to note the raw numbers for the cases with no tonal crowding (i.e. five unstressed syllables). In these cases the average location of the F0 peak is 109 ms outside of the stressed syllable while the average location of the F0 valley is only 8 ms outside of the stressed syllable.

Based on the data presented in the above tables, an analysis of non-final F0 rises can be proposed. In addition to an F0 peak, there is very clearly an F0 valley near the beginning of the stressed syllable. For this reason a L+H tonal sequence must be proposed. As discussed above, both L*+H and (L+H)* have been proposed previously. A comparison of the data in Tables 3.2 and 3.3 shows that the L and the H do not behave identically in their phonetic alignment with the speech stream. While the F0 peak is realized a substantial distance beyond the edge of the stressed syllable when there is sufficient space before the next stressed syllable, and therefore the next tonal specification, the F0 valley does not precede the syllable in the same way. Even when there are five preceding unstressed syllables, the F0 valley is phonetically aligned on the average only 8 ms before the beginning of the stressed syllable. This indicates that the L is much more strongly aligned to the stressed syllable than is the H, and therefore I
propose an analysis of L*+H, where the association of the L to the stressed syllable gives it priority over the H in alignment. This analysis concurs with those made previously by Face (1999), Hualde (1999), and Sosa (1995, 1999).

While we have looked at the location of the F0 peak in relation to the end of the stressed syllable, if the L is the portion of the pitch accent phonologically specified to associate with the stressed syllable, the H follows at a phonetically determined distance. Thus, in order to confirm the L*+H analysis, Table 3.4 presents the duration of the F0 rise in initial position based on the number of following unstressed syllables.

<table>
<thead>
<tr>
<th>Following Unstressed Syllables</th>
<th>Duration of FO Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (N=119)</td>
<td>137 ms (SE=5.3)</td>
</tr>
<tr>
<td>1 (N=118)</td>
<td>162 ms (SE=5.4)</td>
</tr>
<tr>
<td>2 (N=120)</td>
<td>183 ms (SE=5.3)</td>
</tr>
<tr>
<td>3 (N=117)</td>
<td>195 ms (SE=5.4)</td>
</tr>
<tr>
<td>4 (N=120)</td>
<td>201 ms (SE=5.3)</td>
</tr>
<tr>
<td>5 (N=120)</td>
<td>201 ms (SE=5.3)</td>
</tr>
</tbody>
</table>

Table 3.4: Duration of F0 rise in initial position by the number of following unstressed syllables.
Table 3.4 shows that the duration of the F0 rise increases as the number of following unstressed syllables increases. This supports the proposed L\textsuperscript{*}+H analysis of the non-final F0 rise. The only time when there is no steady increase is between four and five following unstressed syllables, where the rise in both cases averages 201 ms in duration. This could be attributed, however, to there being a maximum duration of the rise so that it remains clear that it is affiliated with the stressed syllable and not one of the following unstressed syllables.

An analysis of the final F0 rise is still needed. Like in non-final position, in addition to an F0 peak affiliated with the final stressed syllable of an utterance, there is also a clear F0 valley near the beginning of the final stressed syllable of an utterance. This indicates that the pitch accent in this position contains a L+H tonal sequence. Since tonal crowding data was instrumental in the analysis of the non-final F0 rise, I will now consider tonal crowding and its effects on the phonetic alignment of the F0 valley and peak in final position.

If the L\textsuperscript{*}+H pitch accent used in non-final position is also used in final position, we would expect the L to be aligned near the beginning of the stressed syllable, and this is what is reported in Table 3.1. The alignment of the H should be determined exclusively by phonetic context. Therefore, when the final stressed syllable is followed by more unstressed syllables, meaning that the next tonal specification (the L- of the final intermediate phrase) is farther away, the distance between the associated L and the H should be more than when there are fewer following unstressed syllables and the proximity of the L- forces an earlier phonetic alignment of the H. Table 3.5 shows the
duration of the F0 rise in final position based on the number of post-tonic syllables.

Since Spanish stress cannot be earlier than the antepenultimate syllable, there is a maximum of two post-tonic syllables.

<table>
<thead>
<tr>
<th>Post-Tonic Syllables</th>
<th>Duration of F0 Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>892 ms (SE=3.3)</td>
</tr>
<tr>
<td>(N=142)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1107 ms (SE=3.2)</td>
</tr>
<tr>
<td>(N=155)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1109 ms (SE=2.9)</td>
</tr>
<tr>
<td>(N=184)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.5: Duration of the F0 rise in final position by the number of post-tonic syllables.

Table 3.5 shows the expected increase in distance between the F0 valley and the F0 peak for a L*+H pitch accent between zero and one post-tonic syllables, but not between one and two. The distance between the F0 valley and the F0 peak is almost identical when there are either one or two post-tonic syllables. This brings into question the validity of claiming that a L*+H pitch accent is used in final position. The only issue to be resolved in rejecting the L*+H analysis is the increase in duration of the rise between zero and one post-tonic syllables. These are cases of extreme tonal crowding,
though, with the two tones of the pitch accent and the two phrase boundary tones (i.e. L-L') needing to be realized within the span of one syllable. This extreme tonal crowding could easily explain the different result when there are no post-tonic syllables.

With L*+H being a questionable analysis of the final F0 rise, I will now consider the possibility that Spanish has a phonologically distinct nuclear L+H* pitch accent. If a L+H* nuclear pitch accent is to account for the final F0 rise, then the H is associated with the stressed syllable, and has priority in alignment. In that case, the F0 peak should be phonetically aligned more strongly with the stressed syllable than in the L*+H pitch accent, and this is what is reported in Table 3.1. The alignment of the F0 valley should be left strictly to phonetic factors such as tonal crowding. In other words, the phonetic shape of the L+H* pitch accent should be the mirror image of the L*+H pitch accent discussed above. In order to determine if the realization of the L is affected by tonal crowding in the way that the H of the L*+H pitch accent is, Table 3.6 reports the duration of the F0 rise based on the number of preceding unstressed syllables.
Table 3.6: Duration of the final F0 rise by the number of preceding unstressed syllables.

Table 3.6 does not show the consistent increase in the length of the F0 rise that was seen in Table 3.4. There is an increase between zero and one and between one and two preceding unstressed syllables. In these cases, though, the rise is so short because there is tonal crowding on both sides (i.e. from the preceding pitch accent on the left and from the phrase boundary tones on the right). The steady increase in the duration of the rise that confirmed the freedom of the H of the L*+H pitch accent, however, is not found here. In the cases of two or more preceding unstressed syllables, the duration of the rise is practically identical in all cases. This is problematic for the proposal that a L+H* nuclear pitch accent accounts for the final F0 rise.

<table>
<thead>
<tr>
<th>Preceding Unstressed Syllables</th>
<th>Duration of the F0 Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (N=22)</td>
<td>60 ms (SE=8.9)</td>
</tr>
<tr>
<td>1 (N=27)</td>
<td>94 ms (SE=8.0)</td>
</tr>
<tr>
<td>2 (N=37)</td>
<td>112 ms (SE=6.9)</td>
</tr>
<tr>
<td>3 (N=41)</td>
<td>111 ms (SE=6.5)</td>
</tr>
<tr>
<td>4 (N=48)</td>
<td>111 ms (SE=6.0)</td>
</tr>
<tr>
<td>5 (N=49)</td>
<td>105 ms (SE=6.0)</td>
</tr>
</tbody>
</table>
Since the data do not clearly motivate analyzing the final F0 rise as either $L^*+H$ or $L+H^*$, I will not propose one or the other analysis, and this issue will be left open until more conclusive evidence is found. In Chapter 4, where I will discuss another Spanish rising pitch accent used in cases of contrastive focus, this topic will be reconsidered to see if the data for the other pitch accent shed any light on the discussion of this final pitch accent in broad focus declaratives and whether it is a special nuclear accent which is phonologically distinct from $L^*+H$.

3.3.3 Downstepping and Final Lowering

In order to examine whether broad focus declaratives in the present study are affected by downstepping and final lowering, Table 3.7 presents the percentage of times an F0 rise is present and the average height of F0 peaks in the broad focus declaratives from Corpus #2. Corpus #2 was chosen for the investigation of this point because it contains longer sentences than Corpus #1, with five stressed syllables in each.

<table>
<thead>
<tr>
<th>Stressed Syllable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrences (%) of F0 Rise (N=58 : 100%)</td>
<td>100</td>
<td>100</td>
<td>95</td>
<td>86</td>
<td>60</td>
</tr>
<tr>
<td>Average Height of F0 Peak</td>
<td>217 Hz (SE=6.9)</td>
<td>196 Hz (SE=10.4)</td>
<td>197 Hz (SE=6.8)</td>
<td>188 Hz (SE=8.0)</td>
<td>153 Hz (SE=7.2)</td>
</tr>
</tbody>
</table>

Table 3.7: Occurrences of F0 rises and the average height of each peak by position of stressed syllable in the sentence.
The data for average F0 peak height in Table 3.7 show that there is downstepping in the broad focus declaratives in the present study. The amount of reduction in peak height is variable, but the reduction is fairly consistent. Only between F0 peaks affiliated with the second and third stressed syllables of the sentence does the average peak height not lower. While it is unclear what might cause the lack of reduction of the peak affiliated with the third stressed syllable, the overall pattern of downstepping throughout an utterance is intact.

A topic related to downstepping is final lowering. If final lowering exists in broad focus declaratives in the present study we should see a larger reduction of the height of the final peak than of the other peaks throughout an utterance. In Table 3.7, the total reduction in average F0 peak height between the first F0 peak and the fourth is 29 Hz, while the reduction in average F0 peak height between the fourth and fifth F0 peak is 35 Hz. Thus the reduction of the final peak is greater than the reduction across the entire preceding portion of the utterance. Also, as discussed above, Prieto et al. (1996) reported that in some cases final lowering was strong enough that there was no visible rise in F0 in final position. Table 3.7 reports that F0 rises were present in final position only 60% of the time, despite the fact that in all other positions the lowest percentage of cases where F0 rises were present is 86%. The data presented in Table 3.7, both for the occurrences of F0 rises and for the average height of F0 peaks when rises are present, demonstrate that the broad focus declaratives in the present study are affected by a process of final lowering.
3.4 Conclusion

The data presented for broad focus declaratives in the present study show that they have the same phonetic shape as has been reported in previous studies. Rises in F0 are affiliated with the stressed syllables of an utterance. The rise begins near the beginning of the stressed syllable, and generally continues beyond the end of that syllable. The end of the rise is only realized within the stressed syllable in final position and in cases of extreme tonal crowding on the right in non-final position.

The data for non-final F0 rises have motivated the analysis of L*+H to account for these rises. In final position it is unclear what the correct analysis of the rise is. While it is clear that the pitch accent must contain a L+H tonal sequence, the data appears inconsistent with either a L*+H or a L+H* analysis. For this reason the question is left open.

In considering the entirety of the utterance, it was seen that F0 peaks become progressively lower throughout an utterance. This is attributable to a process of downstepping. In addition, the reduction in peak height is most extreme in final position, where the average reduction in this position was shown to be greater than the reduction over the entirety of the preceding portion of the utterance. This can be attributed to a process of final lowering, which at times is sufficiently strong as to allow no visible rise in F0.
CHAPTER 4

CONTRASTIVE FOCUS AND LOCAL INTONATION PATTERNS

4.1 Introduction

Having examined the intonation patterns of Spanish broad focus declaratives in Chapter 3, in this chapter I will examine the local intonation patterns of words in contrastive focus. By local intonation patterns, I refer to the F0 contour within the bounds of a word which is in focus.\(^1\) For example, in a sentence such as *MARIANO compró un libro* 'MARIANO bought a book', where the capital letters mark the word in contrastive focus, the term *local intonation pattern* refers to the intonation contour between the beginning of the [m] and the end of the [o] of the word *Mariano*. While it is certainly possible that the intonation pattern beyond the bounds of the focused word might also be affected by focus, an investigation of this possibility will be reserved for Chapter 5. In the present chapter both a phonetic description and a phonological analysis

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\(^1\) In Spanish the beginning and the end of the F0 rise often lie outside the boundaries of the stressed syllable although they are clearly associated with the stressed syllable. In cases where the stressed syllable is at the edge of the word and the F0 rise, therefore, partially falls outside the word boundaries, it will nonetheless be considered part of the local intonation pattern.
of the local intonation patterns will be offered. Of particular interest will be the type of pitch accent used on the word in contrastive focus and any boundary tones associated with one or the other edge of the word in focus.

The following analysis of the local intonation patterns affiliated with words in contrastive focus is divided into two main subsections, distinguishing between focus on non-final stressed words (which I call non-final focus) and on the final stressed word (which I call final focus). I commented in Chapter 3 that final position is inherently different from non-final positions with respect to tonal alignment. Specifically, when the final stressed syllable is also the final syllable of the utterance, there is no phonetic space beyond the stressed syllable upon which tonal events can be realized. For this reason, final position is considered separately from non-final positions.

The two non-final positions (i.e. initial and medial) are considered jointly as neither of them inherently limits the possible tonal patterns affiliated with them, as final position does.\(^2\) This does not mean, however, that there may not be differences between initial and medial position. Whenever non-final positions are being considered, I will examine initial and medial positions independently as well as jointly. This is important in all cases where statistical comparisons will be made between the results of the present study for contrastive focus and the results for broad focus. While the results for broad focus in initial and medial position are phonologically identical, with both positions carrying a L*+H pitch accent, they are not identical phonetically. Therefore, the results for contrastive focus will need to be compared with the results for the same position in

\(^2\) If the first stressed syllable were also the first syllable of the utterance this would not be true, but such cases are not included in the corpora for the present study.
broad focus. So, initial and medial positions will be considered as both separate and joint categories, allowing us the advantage of seeing whether they pattern together or separately.

4.2 Previous Research

Previous studies of Spanish intonation have dedicated much less time to the investigation of the intonation patterns affiliated with utterances containing a word in narrow focus than they have to utterances produced in broad focus. In fact, this lack of investigation is not limited to studies of intonation, but extends to all areas of phonetics. In this section I will provide a discussion of the previous work on narrow focus (see Section 1.2.1). This discussion will include both descriptive phonetic studies, some of which are not limited to intonation, as well as phonological studies employing the AM theory.

The first of three descriptive phonetic studies which I will consider is one in which Toledo (1989) considers the height of F0 peaks, duration, intensity and pauses as markers of narrow focus in the Spanish of Buenos Aires. Toledo's findings were that there is no consistency in the acoustic correlates of narrow focus. He found that there were no significant differences in duration between words in broad and narrow focus, nor were pauses used to mark focus. The results for F0 peaks, of the greatest interest for the purposes of the present study, showed that there were significantly higher F0 peaks in narrow focus cases than in broad focus cases for some speakers but not for others, and that even then the use of higher F0 peaks was inconsistent. Toledo's findings for
intensity are the most surprising. Although there was again inconsistency between speakers, Toledo claims that intensity is the most systematic correlate of narrow focus. This finding contradicts most experimental findings on the acoustical correlates of Spanish stress, another type of prosodic prominence (Enríquez et al. 1989, Quilis 1971, among others).

Another phonetic study, looking more at intonation than Toledo’s, was carried out by de la Mota (1995, 1997) for contrastive focus in Peninsular Spanish. Like Toledo, de la Mota finds that pauses do not play a significant role in marking narrow (and, in the case of her study, contrastive) focus. While pauses are used at times, they are used with approximately the same frequency in broad focus utterances. De la Mota’s results differ from Toledo’s in that she finds that duration is significantly affected by contrastive focus. Unfortunately, de la Mota did not consider intensity, making it impossible to see if her results would corroborate those of Toledo. With regard to F0, she finds that F0 peaks affiliated with words in contrastive focus are higher than those affiliated with the same word in broad focus. A similar result is found in a study by García-Lecumberri (1995), though García-Lecumberri finds that there is inconsistency between speakers. Of great interest to the present study is that de la Mota’s study not only looks at the height of F0 peaks, but also at the location of these peaks. De la Mota finds that F0 peaks in cases of contrastive focus are realized within the boundaries of the stressed syllable rather than after the stressed syllable as is the case in broad focus. These consistently earlier F0 peaks are of great interest to the present study as they indicate a likely phonological difference between the intonation patterns of utterances in broad and contrastive focus.
A third descriptive phonetic study is one in which I examined the effects of narrow focus on the duration, intensity, F0 peak height and prosodic boundaries (which, in that study, were all accompanied by pauses) in the Spanish of Madrid (Face 2000). I found that F0 peak height was not significantly different between cases of broad and narrow focus, contradicting the findings of de la Mota (1995, 1997). In contrast with Toledo, I found that intensity differences between broad and narrow focus were minimal and not statistically significant.

The positive acoustical correlate of narrow focus which I found was the duration of the stressed syllable, which was significantly lengthened in cases of narrow focus. This finding is in agreement with de la Mota (1995, 1997), but contradicts the findings of Toledo (1989), though this could be due to dialectal differences. As for prosodic boundaries, I found that they only played a significant role in marking narrow focus in cases where there was double focus (i.e. two foci within the same utterance). When there was only one word in narrow focus, my findings were in agreement with those of Toledo and de la Mota for pauses in that they did not play a significant role in marking narrow focus.

Navarro Tomás (1944) is the only scholar to present a descriptive study of narrow focus, or énfasis in his terms, which is limited to intonation. Interestingly, Navarro Tomás has nothing to say about the height of F0 peaks. He does, however, uncover two ways in which intonation can be used to convey narrow focus. The first of these, which he says is also the more frequently used, is the rise of the F0 to a high boundary, or antecedencia, equivalent to the prosodic boundary which I considered in Face (2000).
Navarro Tomás considers that placing a word in narrow focus before this type of boundary gives it prominence. Since he indicates that these high boundaries are often used to divide an utterance, regardless of whether it contains a word in focus, it is hard to tell here if Navarro Tomás really considers this to be an intonational strategy for conveying narrow focus or whether he considers it as a type of "focus by position" in which the high boundary would exist anyway, but the narrowly focused word is perceived as more prominent when placed immediately prior to it. If the latter is the case, it is nonetheless true that intonation is involved in conveying focus in this way, even if it is a rather passive involvement.

The second way which Navarro Tomás observed for marking narrow focus with intonation, and which he points out can be used in any position except before a high boundary, is that the F0 peak is reached on the stressed syllable and this high F0 level is maintained throughout the word. The F0 peak being realized on the stressed syllable is consistent with the findings of de la Mota (1995, 1997), though she makes no mention of a sustained high F0, nor do her illustrations indicate that this is the case in her data. It could be that in Navarro Tomás's data this maintained high level is due to a high boundary, as he reports in other cases. However, because Navarro Tomás does not provide pitch tracks to exemplify this description, it is impossible to investigate whether or not the maintained high F0 which he observed can be adequately explained in this way.

The phonological analyses which have considered the local intonation patterns used to convey narrow focus have attempted to explain cases of the F0 peak being
realized within the boundaries of the stressed syllable (what I call an *early F0 peak*) instead of after the stressed syllable as is typical in broad focus. There are two types of analyses which have been proposed to account for early F0 peaks. Face (1999, 2001) and Sosa (1999) argue that early F0 peaks are the result of a different pitch accent than is used in broad focus cases. Hualde (2000) and Nibert (2000) propose that there is one pitch accent, but that the F0 peak is forced to be realized within the boundaries of the stressed syllable due to a low intermediate phrase boundary tone L-, resulting from the focused word being placed at the end of an intermediate phrase. I will elaborate on the arguments of these two opposing views in order to clarify the issues.

Sosa (1999) suggests that a L+H* pitch accent is used in some cases of narrow focus, and I have also argued for the existence of this pitch accent (Face 1999). There are weaknesses with both of these studies, however. Sosa proposed the L+H* in his descriptive study, but did not benefit from a controlled experiment in which he could investigate the exact nature of this pitch accent. While my study was a carefully constructed experiment designed to look at issues of tonal alignment and the issues affecting it, the main purpose of the study was to examine the nature of utterance-final pitch accents. I argued for L+H* in final position, but this placed L*+H and L+H* in complementary distribution, raising questions as to the validity of a phonological distinction between these two pitch accents. If an early F0 peak occurred only in final position, this could be seen as an allotone of the L*+H pitch accent rather than as a phonologically distinct L+H* pitch accent. Looking for evidence of L+H* outside of utterance-final position, I showed examples of words in narrow focus which seemed to
have this pitch accent. This evidence, however, was only preliminary as no study had been carried out specifically looking at the nature of the pitch accent in these narrow focus cases.

Nibert (2000) proposes a L- at the end of a word in narrow focus. This allows her to postulate only one pitch accent and claim that the presence of the L- causes tonal crowding which forces the F0 peak of the pitch accent to be realized within the boundaries of the stressed syllable. Hualde (2000), following Nibert, argues for the same analysis. The problem with this is not so much in the analysis itself as in the lack of evidence. Either the L- explanation or the two pitch accent explanation is able, in theory, to explain the difference in the alignment of the F0 peak between words in broad and narrow focus. But no real evidence is presented by either Hualde or Nibert against the two pitch accent explanation. Hualde makes a couple of attempts to argue that the L+H* analysis is inadequate, but none of them are particularly strong.

The first argument which Hualde (2000) makes against the two pitch accent analysis deals primarily with the proposed broad focus pitch accent, L*+H. Clearly, if this can be shown to be an inadequate analysis, then it cannot be claimed that there is a distinction between L*+H and L+H*. Hualde cites Llisterrri et al. (1995) and Prieto (p.c.) who claim that in phrase-medial oxytones, the F0 peak is generally realized within the boundaries of the stressed syllable. Hualde also presents an example which seems to demonstrate this point. If the F0 peak is realized consistently on the stressed syllable of oxytone words, an unassociated H, as in L*+H, could be brought into question.
I show in Face (2001), however, that while this pattern has been observed by some scholars, it is not present in the Spanish of Madrid. In that study I show that except in cases of extreme tonal crowding, F0 peaks were almost never realized on the stressed syllable of words in broad focus utterances (only 2% of the time, in fact) despite the fact that in over half of the cases the target syllable under investigation was the stressed syllable of an oxytone word. In the present study as well, where one of the sets of sentences in Corpus #1 contains an oxytone word as the first stressed content word, F0 peaks are not hindered from crossing the word boundary. While it may be that F0 peaks are restricted from crossing word boundaries in some dialects, this is clearly not the case in the Spanish of Madrid, which is the target variety of the present study.  

Another argument which Hualde (2000:5) makes against the two pitch accent analysis is that the use of the label L*+H is “at variance with the definition of this contour assumed by other scholars”. Again, if there is no L*+H then it clearly cannot contrast with L+H*. Hualde (2000) cites Ladd (1996:83), who states that “L*+H is an accent contour that is low for a good portion of the accented syllable and then rises sharply, often into the following unstressed syllable if there is one”. As I state in Face (2001), this statement by Ladd is used in describing Pierrehumbert’s (1980) taxonomy of pitch accents for American English. The proposed L*+H for Spanish is similar to that

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3 Another point that should be made clear here is that different dialects, no matter how similar, can have subtle differences that are quite important to phonological analyses of their intonation systems. Especially within studies on Peninsular Spanish this is a concern since many scholars simply refer to their subjects as speakers of “standard Peninsular Spanish”, without identifying where, specifically, they are from. In the case of Llisterr et al. (1995) and Prieto, it is presumable that their speakers are from Cataluña since they are working in Barcelona. And it is likely that Hualde’s (2000) speaker is from north central Spain since this is where his speaker was from in Hualde (1999). It is important to keep these dialectal differences clear and not make general claims about Spanish, or even Peninsular Spanish. It is for this reason that in the present study I restricted the subjects to only speakers who were born and raised in Madrid.
described by Ladd (1996) in that it has a low portion which is aligned with the stressed syllable and a high portion which can trail into the following unstressed syllable. The observation that the exact phonetic instantiation of \( \text{L}^*+\text{H} \) in Spanish differs from the phonetic instantiation of the same phonological pitch accent in English is not a concern. In fact this type of phonetic difference is commonplace and is accepted by scholars in other cases (e.g. the phonetic differences between aspirated stops in English and Korean). Even within intonational studies there is evidence that \( \text{L}^*+\text{H} \) pitch accents in languages other than English do not have to have the same phonetic shape as Ladd describes (D’Imperio 1999 for Italian).

Another claim that Hualde (2000) makes is that an analysis of early F0 peaks based on intermediate phrase boundaries rather than on another pitch accent is able to account for the observed differences in F0 peak alignment without postulating two phonologically distinct pitch accents. Again, in Face (2001) I argue that there is no theoretical reason to desire such a situation, and many languages have contrasting pitch accents. English, for example, has multiple contrasting pitch accents (Beckman and Pierrehumbert 1986, Pierrehumbert 1980, Pierrehumbert and Hirschberg 1990).

In addition, I show in Face (2001) that the two pitch accent analysis and the \( \text{L} \)-analysis make different predictions in one important area and that these predictions are testable. If there is a \( \text{L} \)- following the word in narrow focus, we should expect an F0 valley at the end of this word. If the early F0 peak is the result of a focal pitch accent,
there is no L- at the end of the word in narrow focus, and therefore the F0 valley should not be at the end of the word in narrow focus, but rather at or near the onset of the next stressed syllable, where the L of another rising pitch accent would be realized.

In Face (2001) I examine only cases where there are at least two intervening unstressed syllables between the target syllables, making sure that tonal crowding does not limit the ability of the F0 valley to move around. In these cases, the average location of the post-focal F0 valley was a mere 11 ms prior to the onset of the following stressed syllable. In the cases used in the calculation, in no case was the edge of the word in contrastive focus adjacent to the second target syllable, making it clear that the reason for the alignment of the post-focal F0 valley just before the onset of the second target syllable is not ambiguous, but must be due to it being the realization of the L of the pitch accent affiliated with the second target syllable. Since the L was no less aligned with the stressed syllable than in the L*+H pitch accent, and the H was clearly aligned with the stressed syllable in the focal pitch accent, I analyzed the focal pitch accent as (L+H)*, indicating the association of both tones to the stressed syllable, therefore not giving one priority over the other in alignment.

What is clear from the discussion of previous research is that more work needs to be done on the local intonation patterns used to convey narrow focus in Spanish. Unlike for broad focus intonation where the real question is how to analyze the intonation patterns, for narrow focus intonation there is a lack of agreement on the phonetic shape of the intonation pattern. Therefore it is important to examine the intonation of contrastive...
focus from a descriptive phonetic point of view in order to come to a real understanding of the intonation patterns used. Then a phonological analysis of these intonation patterns can be proposed.

4.3 Non-Final Contrastive Focus

4.3.1 Introduction

In this section I will present the results of the present study for non-final contrastive focus, using data from Corpus #1 which was designed to address this issue. A total of four distinct local intonation patterns were found on non-final words in contrastive focus. In the following subsections each of these patterns will be discussed and a phonological analysis of each pattern will be proposed.

4.3.2 F0 Peak Height

The question of whether or not F0 peak height is used to convey narrow focus has been considered in the previous studies discussed above, and it will be the first issue to be taken up in this section. Of the four distinct local intonation patterns affiliated with words in contrastive focus that were found in Corpus #1 in the present study, the first is similar to the intonation pattern found for broad focus declaratives. An example is shown in Figure 4.1.
Figure 4.1: Reading of the sentence *Que terminó con la banana de la chica* ‘That she finished with the girl’s banana’ with contrastive focus on *terminó* ‘finished’ conveyed through F0 peak height.

The pitch track in Figure 4.1 shows that the F0 begins to rise just prior to the onset of the stressed syllable of the word *terminó* ‘finished’, which is in contrastive focus. It continues to rise throughout the stressed syllable and into the post-tonic syllable, and reaches its peak approximately three quarters of the way through the post-tonic syllable. While the word *terminó* ‘finished’ is in contrastive focus, this description of the local F0 pattern is identical to that which was described in Chapter 3 for broad focus declaratives.

Since the F0 valley and F0 peak are precisely where they would be expected for a broad focus sentence, no phonological distinction can be drawn between this pattern in sentences containing a word in contrastive focus and the pattern observed for broad focus
declaratives. Therefore this F0 rise is attributable to a L*+H pitch accent. It would be conceivable, however, for speakers to use a higher F0 peak than in broad focus cases as a means to convey contrastive focus in these cases. Table 4.1 shows the average F0 peak height for L*+H pitch accents in initial and medial positions in both broad focus utterances and those utterances with a word in contrastive focus.

Table 4.1: F0 peak height by focus type and position when L*+H pitch accent is employed.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>Initial Position</th>
<th>Medial Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>201 Hz (N=606, SE=2.0)</td>
<td>197 Hz (N=288, SE=2.9)</td>
</tr>
<tr>
<td>Contrastive</td>
<td>250 Hz (N=76, SE=5.7)</td>
<td>222 Hz (N=50, SE=6.9)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p&lt;.0001</td>
<td>p=.0007</td>
</tr>
</tbody>
</table>

The data in Table 4.1 show that in both initial and medial position F0 peaks caused by a L*+H pitch accent on a word in contrastive focus are significantly higher than the F0 peaks on words in the same position in broad focus utterances. This demonstrates that F0 peak height is, in fact, used to convey contrastive focus.

The question must be raised as to why this issue seems so clear in the present study when it has been so disputed in previous studies. I believe that the main reason is that in the present study I did not set out merely to compare the height of the F0 peaks of
all words in contrastive focus with those in broad focus. Rather I included in this calculation only those words in contrastive focus which have the local intonation pattern described above (i.e. a pattern that appears to match the tonal alignment of the pattern used for broad focus and which can be analyzed as resulting from a L*+H pitch accent). But making the comparison in this way required first the realization that there exist multiple intonational strategies that speakers may use to convey contrastive focus.

Manipulation of F0 peak height is only one of those strategies, and may or may not be used in conjunction with the others.

4.3.3 High Intermediate Phrase Boundary Tones

I mentioned above that Navarro Tomás (1944) claims that the most frequent intonational strategy for conveying narrow focus is the placement of the word in focus before an anticadencia, or high boundary. It is not clear, however, whether this is focus by position, where the word in narrow focus is placed before a phrase boundary that would exist anyway (i.e. it is placed in nuclear position), or whether this phrase boundary could be inserted following a word in any position. It sounds more like focus by position since Navarro Tomás specifically states that the other strategy which he finds for conveying narrow focus, the realization of the F0 peak on the stressed syllable, can be employed in any position that does not immediately precede a high boundary.

The second local intonation pattern found for conveying contrastive focus in the present study is precisely the use of a high rise in F0 to the end of the word in contrastive focus. When this strategy is used, the F0 begins to rise near the beginning of the stressed
syllable as is typical in Spanish. The F0 continues to rise until right at or near the end of the word in contrastive focus. The F0 maximum is considerably higher than in broad focus declaratives, and there is also a substantial lengthening of the final syllables prior to the boundary. These high F0 rises are sometimes, though not always, followed by a short pause.

These high F0 rises to the end of the word in contrastive focus can be analyzed as the result of a high intermediate phrase boundary tone H- occurring at the end of the word in contrastive focus. Two examples of the use of a high intermediate phrase boundary tone for conveying contrastive focus are given below. Figure 4.2 shows an example of contrastive focus on the first content word. In this example, the F0 reaches its maximum near the end of the word *daban* 'was giving', which is in contrastive focus. Immediately following the word in contrastive focus is a short period of silence, marked in this figure by the zero, which in this case is approximately 50 ms in length. Further evidence of the break is seen in the glottal release in the waveform at the onset of the post-focal word *el* 'the'. Figure 4.3 is an example of this high intermediate phrase boundary tone occurring with a word in contrastive focus in medial position and with no following pause. Here the F0 reaches its maximum right at the end of the contrastively focused word *nana* 'nanny'. It is extremely evident in this case that the F0 maximum reached greatly exceeds that which would be expected in other cases, and there is again a substantial lengthening of the syllables preceding the intermediate phrase boundary.
Figure 4.2: Reading of the sentence *Que le daban el número pertinente* ‘That she was giving him the relevant number’ with contrastive focus on *daban* ‘was giving’.
Figure 4.3: Reading of the sentence *Que lo terminó la nana de los niños* ‘That the girls’ nanny finished it’ with contrastive focus on *nana* ‘nanny’.

While H- is used following words in contrastive focus, again the question must be raised as to whether this is really an intonational strategy for conveying contrastive focus, or whether the H- would have been present regardless of the need to convey contrastive focus. Hualde (2000) and Nibert (2000) both make reference to the use of H- in utterances that do not contain a word in narrow focus. Hualde argues that H- is positioned at the end of a constituent conveying old information. This is basically the opposite of what happens in the cases where H- is used after a word in contrastive focus. Where H- is used to convey contrastive focus, it follows the focal word, which is, at least
in the cases included in the present study, new information. Nibert's data support Hualde's claim to a point, but she states that this "may not be the complete story" (163).

Nonetheless, both Hualde (2000) and Nibert (2000) present evidence of H- in utterances without contrastive focus. If this is true in the present study, then we must wonder whether it is merely a coincidence that in some cases the H- coincides with the end of the word in contrastive focus. In order to investigate this question, initial and medial positions were examined in all broad focus declaratives as well as in those utterances with contrastive focus in one of these two positions to see how often H- was present in each case. The data for initial position are presented in Table 4.2, and the data for medial position in Table 4.3.

<table>
<thead>
<tr>
<th></th>
<th>Broad Focus</th>
<th>Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>No H-</td>
<td>606</td>
<td>85</td>
<td>573</td>
</tr>
<tr>
<td>H-</td>
<td>108</td>
<td>15</td>
<td>137</td>
</tr>
<tr>
<td>Total</td>
<td>714</td>
<td>---</td>
<td>710</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p=.0369

Table 4.2: Presence of H- following a word in initial position in broad and contrastive focus.
<table>
<thead>
<tr>
<th></th>
<th>Broad Focus</th>
<th>Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>No H-</td>
<td>328</td>
<td>91</td>
<td>285</td>
</tr>
<tr>
<td>H-</td>
<td>31</td>
<td>9</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>359</td>
<td></td>
<td>359</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

Table 4.3: Presence of H- following a word in medial position in broad and contrastive focus.

The data in these tables indicate that while H- can be used at times in broad focus utterances, it actually is a strategy used to convey contrastive focus as it is used significantly more often in these cases. A question that remains, however, is why there is a much higher degree of difference in the use of H- in medial position between broad and contrastive focus than in initial position.

The answer to this question may lie in an observation made by both Hualde (2000) and Nibert (2000). Hualde states that “whereas in English a sentence like John ate the apple would normally be prosodically divided as John, ate the apple, in Spanish we would perhaps more commonly have Juan comió, la manzana with the main prosodic break right after the verb (that is Juan comióH- la manzana)” (11). Nibert’s findings are the same as Hualde’s, and she notes that the Spanish case is similar to that observed by Prieto (1997) for Catalan. Nibert offers two possible explanations for this difference in the position of the H- between Spanish/Catalan and English.
A possible explanation...may be simply that while Spanish and Catalan prefer to group the subject matter into an intermediate phrase constituent in opposition to what follows (i.e., this may be the unmarked case in these Romance languages), English prefers to group the verb and its object together in the unmarked case. A further possible explanation may be that the languages prefer different prosodic word groupings in order to create a particular melodic or rhythmic effect: \[ [w\ w] [w\ ] \] in Spanish/Catalan vs. \[ [w\ ] [w\ w] \] in English. Some marriage of these two possibilities may be called for. (164-165)

Whatever the correct explanation for this observed difference between Spanish/Catalan and English, and it will take significant further research to get at this issue, what matters for the present study is that Spanish seems to have a preference to place H-, when it is used in broad focus utterances, after the verb. 4 Since Corpus #1 takes advantage of the pro-drop nature of Spanish, initial position is always occupied by the verb. This is likely the reason that the difference between the frequency of use of H- in broad and contrastive focus is not as pronounced as it is in medial position. In medial position H- is not used as frequently as in initial position in broad focus utterances, while in contrastive focus the percentage is nearly identical between these two positions. It is this higher frequency of use in broad focus utterances in initial position, rather than a lower frequency of use in contrastive focus utterances, that makes the difference less significant in this position than in medial position.

To summarize these findings, H- is used as one strategy of conveying contrastive focus in Spanish, by its placement immediately following a word in contrastive focus.

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4 It should be noted that in Corpus #2, where complex subject NPs were used, an intermediate phrase boundary was more frequent after the subject NP than after the verb. Further investigation will be required to come to an understanding of what determines the division of a Spanish utterance into intermediate phrases.
While it is true that this is not its only use, there is a significant increase in the use of H- in contrastive focus utterances over broad focus utterances. In the present study the difference in frequency of use is more pronounced in medial position than in initial position, though this seems to be an artifact of the syntactic structure of the sentences in Corpus #1, in which initial position is always occupied by the verb. There is a tendency in Spanish to place a prosodic break, when it is used, after the verb, instead of, for example, after the subject as is the case in English. This accounts for the smaller difference in initial position than in medial position between the frequency of use of H- in broad focus utterances and those containing a word in contrastive focus. While a complete understanding of the reasons for this preference will require further investigation, for the purposes of the present study the important finding is that H- is indeed a strategy used to convey contrastive focus in Spanish.

4.3.4 Early F0 Peaks: The Result of Two Focal Strategies

As discussed in Section 4.2, either a rising pitch accent phonologically distinct from the L*+H broad focus pitch accent (e.g. L+H*) or a L- following the word in contrastive focus can explain early F0 peaks in cases of narrow focus. The two pitch accent analysis and the L- analysis make different predictions in one important area, and these predictions are testable. If there is a L- following the word in contrastive focus, we should expect an F0 valley at the end of this word. If the early F0 peak is the result of a pitch accent, on the other hand, there is no L- at the end of the word in narrow focus, and
therefore the F0 valley should not be at the end of the word in narrow focus, but rather at or near the onset of the next stressed syllable, where the L of another L*+H pitch accent would be realized.

While the data presented in Face (2001) indicate that early F0 peaks in words in contrastive focus are caused by a focal pitch accent rather than by a following L- forcing the F0 peak to be realized on the stressed syllable, it is important that this issue be carefully examined in the data from the present study. We have already seen one case (i.e. that of F0 peak height) where the previous literature was not an accurate reflection of the situation. Recognizing that multiple intonational strategies are used to convey contrastive focus helped to clarify the situation. We must also keep this fact in mind in examining early F0 peaks.

The majority of contrastive focus cases in the present study have early F0 peaks, but determining whether this is due to a focal pitch accent or to a L- following the word in contrastive focus is not that clear. The reason is that the post-focal F0 valley is not always realized in the same place. In some cases it is realized at or near the onset of the following stressed syllable while in other cases it is realized at or near the end of the word in contrastive focus. In those cases where the post-focal F0 valley is located at the end of the word in contrastive focus, there is a substantial lengthening of the syllables immediately preceding this F0 minimum. In these cases the word in contrastive focus is sometimes followed by a pause.

Consider the following figures. Figure 4.4 shows an example of an early F0 peak on the word terminó ‘finished’, which is being produced in contrastive focus. Here the
F0 begins to rise just prior to the stressed syllable, reaches its peak within the stressed syllable, and then falls throughout the rest of the word and beyond until it reaches its valley in the syllable preceding the following stressed syllable.

Figure 4.4: Reading of the sentence Que terminó la banana ‘That she finished the banana’ with contrastive focus on terminó ‘finished’.

Figures 4.5 and 4.6 give examples of cases of contrastive focus with early F0 peaks where the post-focal F0 valley is realized at the end of the word in contrastive focus. In
Figure 4.5 this pattern is in initial position with a short pause following the word in contrastive focus. Figure 4.6 provides an example of this pattern in medial position without a following pause.

Figure 4.5: Reading of the sentence *Que se lo daba para el número pertinente* 'That she was giving it to him for the relevant number', with the word *daba* 'was giving' in contrastive focus.
Figure 4.6: Reading of the sentence * Que se lo daba para el número pertinente* ‘that she was giving it to him for the relevant number’ with the word *número* ‘number’ in contrastive focus.

In Figure 4.5 the low F0 value at the end of the word in contrastive focus is not again reached until the very last syllable of the utterance. As for the pause in this example, it is true that it precedes the voiceless stop [p] of the word *para*, but the silence is 120 ms in duration, considerably longer than the average 85-90 ms duration of Spanish [p] (Martínez Celdrán 1991, 1998). In addition, while there is no audible pause during a normal stop closure, in the case of the utterance in Figure 4.5 there is a very prominent audible pause. In Figure 4.6 the low F0 value at the end of the word in contrastive focus is maintained until the final syllable of the utterance, at which time there is again a slight drop in F0 due to the utterance-final L-L%.

Having observed the patterns described
above and shown in Figures 4.4 – 4.6, we must ask what is an appropriate phonological
analysis of them. Can one analysis explain all of the cases, or are multiple analyses
needed?

We have already seen the arguments presented by Hualde (2000) for a L- analysis
and by me (Face 2001) for the two pitch accent analysis of early F0 peaks in Spanish, but
the three patterns demonstrated above do not all seem to fit into either of these two
analyses. The cases of the post-focal F0 valley being realized at the end of the word in
contrastive focus, as in Figures 4.5 and 4.6, are problematic for the two pitch accent
analysis since, if there is no intermediate phrase boundary after the word in contrastive
focus, the next tonal specification would be the first tone of the pitch accent affiliated
with the next stressed syllable. Therefore we would expect a rather steady line from the
F0 peak on the word in contrastive focus to the low tone of the next pitch accent, at or
near the onset of the next stressed syllable. This is clearly not the case in Figures 4.5 and
4.6, and for these cases it seems that claiming that a focal pitch accent is the cause of the
early F0 peak cannot be maintained. In order to account for the F0 pattern, a L- must be
postulated. This supports the claim by Hualde (2000) and Nibert (2000) that a L-
following the word in narrow focus is the reason for the early F0 peak. Unlike H-, L- is
not found in broad focus declaratives, and therefore there is no question as to whether or
not it is really a focal strategy.

The crucial case to consider, then, is that presented in Figure 4.4, where the post-
focal F0 valley is not realized at the end of the word in contrastive focus, but rather just
prior to the next stressed syllable. Can this pattern somehow be included in the L-

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analysis, or must it be accounted for in another way? The answer to this question is not
immediately obvious and this issue must be investigated further. In order to propose that
the L- analysis is responsible for the early F0 peak in cases of this type, an explanation
must be given for why there is no F0 valley at the end of the word in contrastive focus.
One potential explanation is that there is a phonological L- present in these cases, and
that it forces the F0 peak to be realized on the stressed syllable; the F0 then begins to fall
until the end of the word, headed for the L-, but does not reach its minimum here. Rather
the F0 continues to fall to the L of the pitch accent affiliated with the next stressed
syllable. In fact, in the case of Figure 4.4, it could be argued that since there are only two
unstressed syllables between the two target syllables, there is not sufficient time for a full
phonetic realization of the L-. There is a problem with making this claim, however.
Nibert (2000) criticized Sosa (1999) for not considering the possibility of syllable
lengthening in Spanish to accommodate the realization of multiple tones over a short
span of time. In fact, Nibert does find syllable lengthening in these cases, independent of
whether or not they are followed by a pause. Figure 4.7 shows a case from the present
study where a post-focal F0 valley is clearly realized at the end of the word in contrastive
focus, despite the fact that there are only two following unstressed syllables, the same
number as in Figure 4.4.
Examples such as these call into question the validity of a claim that cases such as Figure 4.4, where the post-focal F0 valley following an early F0 peak is realized near the onset of the next stressed syllable, can be adequately accounted for in the L- analysis. I propose that the early F0 peak in those cases is the result of a focal pitch accent, with the associated H accounting for its alignment with the stressed syllable.

While the evidence leads me to claim that Spanish has a focal pitch accent, it would be a stronger argument if a convincing distinction of some sort could be made based on the proposed difference between those cases of early F0 peaks analyzed as the result of the proposed focal pitch accent and those analyzed as being followed by a L-.
order to further motivate this difference, we need to go beyond the intonation pattern itself and consider the effects of the intonation pattern on another aspect of the utterance: syllable duration. Nibert (2000) shows that there is syllable lengthening preceding intermediate phrase boundaries, regardless of whether or not they are followed by a pause. Therefore I compare the duration of the final syllable of the contrastively focused word between those cases where there is an F0 valley at the end of the word in contrastive focus and those where the F0 valley occurs near the onset of the next stressed syllable. If the syllable duration is significantly longer when the F0 valley is at the end of the contrastively focused word, this would provide evidence for L- in these cases and not in those cases where the F0 valley occurs near the onset of the next stressed syllable. If, on the other hand, no significant difference in duration is found, then the argument for a focal pitch accent is weakened and the L- analysis can explain all early F0 peaks. The results are given in Table 4.4.

<table>
<thead>
<tr>
<th>Location of Next F0 Valley</th>
<th>Initial Position</th>
<th>Medial Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Stressed Syllable</td>
<td>162 ms (N=276, SE=2.8)</td>
<td>162 ms (N=119, SE=6.8)</td>
</tr>
<tr>
<td>End of Word in Focus</td>
<td>201 ms (N=220, SE=3.2)</td>
<td>188 ms (N=113, SE=7.0)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p&lt;.0001</td>
<td>p=.0085</td>
</tr>
</tbody>
</table>

Table 4.4: Duration of the final syllable of words in contrastive focus by position and location of next F0 valley.
For both initial and medial positions there is a statistically significant difference in the duration of the final syllable of words in contrastive focus based on whether the early F0 peak is caused by the presence of a L- following the word in contrastive focus or by a putative focal pitch accent. These results strengthen my argument that cases like that seen in Figure 4.4, where the post-focal F0 valley is realized at or near the onset of the following stressed syllable, cannot be accounted for by the L- analysis, but must instead be the result of a focal pitch accent.

While the data seem to motivate a focal pitch accent, there is one factor that could erroneously produce this result. It is possible that the F0 peak occurs within the stressed syllable because of the lengthening of that syllable. Previous studies have shown that the duration of the stressed syllable is increased in words in narrow focus (de la Mota 1995, 1997; Face 1999, 2001). This is true in the present study as well, as can be seen in Table 4.5.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>Initial Position</th>
<th>Medial Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>124 ms ( (N=714, \text{SE}=1.5) )</td>
<td>144 ms ( (N=359, \text{SE}=3.1) )</td>
</tr>
<tr>
<td>Contrastive</td>
<td>173 ms ( (N=710, \text{SE}=1.5) )</td>
<td>203 ms ( (N=358, \text{SE}=3.1) )</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>( p&lt;.0001 )</td>
<td>( p&lt;.0001 )</td>
</tr>
</tbody>
</table>

Table 4.5: Duration of stressed syllable by position and focus type.

---

I am grateful to Keith Johnson for pointing out this potential explanation.
Since duration is significantly affected by contrastive focus, we must attempt to rule out the possibility that this is responsible for early F0 peaks in what I am claiming to be the use of a focal pitch accent. If the F0 peaks are early because of a different pitch accent, the duration of the F0 rise should be shorter since the F0 valley still occurs near the onset of the stressed syllable in these cases. Table 4.6 shows the duration of the F0 rises for the broad focus L*+H pitch accent and for the proposed focal pitch accent.

<table>
<thead>
<tr>
<th>Pitch Accent Type</th>
<th>Duration of F0 Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Position</td>
</tr>
<tr>
<td>L*+H</td>
<td>180 ms (N=714, SE=2.1)</td>
</tr>
<tr>
<td>Focal</td>
<td>136 ms (N=276, SE=3.4)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p&lt;.001</td>
</tr>
</tbody>
</table>

Table 4.6: Duration of F0 rise by pitch accent type and position.

These results eliminate the possibility that the lengthening of the stressed syllable caused the early F0 peaks in the case of the proposed focal pitch accent, and therefore verify that the analysis of this pattern as the result of a focal pitch accent is accurate and motivated by the data.

As have previous studies, I have noted here that a characteristic of words in contrastive focus is that the F0 peak is often realized within the boundaries of the stressed
syllable rather than after the stressed syllable as in broad focus declaratives. Where the present study makes its biggest contribution on this point is by recognizing that not all of these early F0 peaks can be accounted for by a single phonological analysis. Where Hualde (2000) and Nibert (2000) have argued that early F0 peaks are the result of a L- and Sosa (1999) and I (Face 1999, 2001) have argued that they are the result of a focal pitch accent, all of these scholars were both right and wrong. I have shown here that it is indeed true that the use of L- after a word is one strategy for conveying contrastive focus on that word. I have also shown, however, that Spanish does indeed have a focal pitch accent in its tonal inventory and that it is another strategy which may be used for conveying contrastive focus. This brings to four the number of local intonational strategies which may be used to convey contrastive focus in Spanish: L*+H with a higher F0 peak than in broad focus cases, H-, L-, and focal pitch accent.

4.3.5 The Focal Pitch Accent and Pitch Accent Structure

While I have shown that a focal pitch accent is one of the strategies used to convey contrastive focus in Spanish, I have said nothing to this point about an appropriate analysis of this pitch accent. For the broad focus pitch accent it is clear that the low tone is aligned near the onset of the stressed syllable and that the high tone almost always comes somewhere after the stressed syllable, depending on phonetic factors such as tonal crowding. Thus within the AM theory of intonational phonology this pitch accent is labeled L*+H, where the star on the low tone represents its association with the stressed syllable, giving it priority in alignment. The case of the focal pitch
accent is not as clear, because while the high tone is clearly aligned with the stressed syllable, the low tone is still aligned at or near the onset of the stressed syllable. If the low tone is still as strongly aligned as in the L*+H pitch accent, then L+H* could be considered an inadequate analysis of this pitch accent since the association of the H and not the L to the stressed syllable would mean that the H has priority in alignment. Thus a L+H* analysis would not explain why the L is aligned in nearly the same place as in the L*+H pitch accent where it has priority for alignment. In this section I look deeper into the issues involved with the focal pitch accent by comparing the alignment of tones between the two pitch accents, and show that an adequate resolution to the problem of analyzing the focal pitch accent is possible with one modification to the AM theory of intonational phonology.

In looking at the tonal alignment of the tones in the two Spanish pitch accents, I will begin with what appears to be the clear difference between the two pitch accents: the alignment of the high tones. For the broad focus L*+H, the F0 peak is almost always located beyond the boundary of the stressed syllable. When the focal pitch accent is used, however, the F0 peak is located within the stressed syllable. The data for the alignment of the high tones of these two pitch accents are presented in Table 4.7.
The data in this table confirm that there is a statistically significant difference between the alignment of the high tone in the broad focus \( L^*+H \) pitch accent and the focal pitch accent.

What has not been clear to this point is whether or not there is a difference in the alignment of the low tone between the two pitch accents. The data for the alignment of the low tones are presented in Table 4.8.
Comparing the data in Table 4.8 for the alignment of low tones with the data for the alignment of high tones in Table 4.7, we see that the difference between pitch accents is much greater for the alignment of high tones than for the alignment of low tones, as we had observed in the previous section. What is striking, however, in Table 4.8 is that although there is a small difference, only 8 ms between the average alignment of the low tone in the L*+H and focal pitch accents in initial position, this difference is highly significant. This result indicates that although the difference is small, it is very consistent.

For medial position the difference between the averages is again 8 ms, but this time the difference is not statistically significant. There is a methodological factor, however, that could have influenced the results for medial position in Table 4.8. This table presents the results for medial position, which immediately follows the controlled number of unstressed syllables. Since the low tones in the two pitch accents are realized
in the same general vicinity, it is possible that in cases of more extreme tonal crowding the low tones of both pitch accents were forced into the stressed syllable. Since tonal crowding adjusts the temporal alignment of tones to accommodate the realization of all tones, the preceding tone could have pushed the low tones of both pitch accents to the same position within the stressed syllable. This would cause the measurements of the alignment of these tones to be very similar, skewing the results of Table 4.8. In order to test whether or not this factor entered into play, all instances where there were zero or one intervening unstressed syllables were removed from consideration, and the average alignment of the low tones in medial position was recalculated. The results of this recalculation are given in Table 4.9.

<table>
<thead>
<tr>
<th>Pitch Accent</th>
<th>Alignment of L</th>
</tr>
</thead>
<tbody>
<tr>
<td>L*+H (N=216)</td>
<td>+2 ms (SE=1.6)</td>
</tr>
<tr>
<td>Focal (N=88)</td>
<td>-8 ms (SE=2.5)</td>
</tr>
</tbody>
</table>

Table 4.9: Alignment of L by pitch accent type in medial position, excluding cases with zero or one preceding unstressed syllables.

The recalculation of the low tone alignment in Table 4.9 confirms that tonal crowding did indeed affect the results for medial position presented in Table 4.8. In Table 4.9 we can
see that when these cases of extreme tonal crowding are eliminated, the result is a highly significant difference between the two pitch accents with regard to the alignment of the low tones.

Given the tonal alignment data presented above, we must consider what is an adequate analysis of the focal pitch accent. In the focal pitch accent, the H is clearly aligned with the stressed syllable, and the L is nearly as strongly aligned with the stressed syllable as it is in the L*+H pitch accent. Nonetheless, the results of Tables 4.9 and 4.10 show that the alignment of the L in the focal pitch accent is significantly different than its alignment in the L*+H pitch accent, even though this difference is rather small in absolute terms. The nature of the difference in the alignment of the L is that it is less strongly aligned with the stressed syllable in the focal pitch accent. This would seem to open the door to a L+H* analysis, where the association of the H with the stressed syllable gives it priority in alignment. If this is the case, we would expect to find the alignment of the L affected by the number of preceding unstressed syllables in the same way that the alignment of the H was shown to be affected by the number of following unstressed syllables in Table 3.2. In addition, the association of the H with the stressed syllable would give it priority in alignment, and this should make it less susceptible to the effects of phonetic factors than reported for the L*+H pitch accent in Table 3.2. The results for the alignment of the L of the focal pitch accent in medial position based on the number of preceding unstressed syllables is given in Table 4.10. The results for the alignment of the H of the focal pitch accent in initial position based on the number of following unstressed syllables is given in Table 4.11.
Table 4.10: Alignment of the L of the focal pitch accent by the number of preceding unstressed syllables.

<table>
<thead>
<tr>
<th>Preceding Unstressed Syllables</th>
<th>Alignment of the L in Relation to the Beginning of the Stressed Syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (N=17)</td>
<td>+73 ms (SE=5.9)</td>
</tr>
<tr>
<td>1 (N=14)</td>
<td>+33 ms (SE=6.5)</td>
</tr>
<tr>
<td>2 (N=21)</td>
<td>+1 ms (SE=5.3)</td>
</tr>
<tr>
<td>3 (N=19)</td>
<td>-8 ms (SE=5.6)</td>
</tr>
<tr>
<td>4 (N=24)</td>
<td>-7 ms (SE=5.0)</td>
</tr>
<tr>
<td>5 (N=24)</td>
<td>-18 ms (SE=5.0)</td>
</tr>
</tbody>
</table>
The data presented in Tables 4.11 and 4.12 seem to support the L+H* analysis of the focal pitch accent. The alignment of the L is affected by tonal crowding, being realized earlier when there are more preceding unstressed syllables. The alignment of the H does not vary based on the number of following unstressed syllables, which seems to indicate its association with the stressed syllable, and therefore its priority for alignment. There is still one question that must be answered, however: If the L of the focal pitch accent is not associated with the stressed syllable, and therefore does not have priority for
alignment, why is it always aligned so close to the stressed syllable when the unassociated H of the L*+H pitch accent is often aligned a substantial distance after the stressed syllable?

What we can tell from the tonal alignment data presented for the L*+H and the focal pitch accent is that there is a different relationship between the tones of the pitch accents. In the case of L*+H the L is aligned near the onset of the stressed syllable and the H is generally aligned a considerable distance after the stressed syllable. In the case of the focal pitch accent, the H is clearly aligned within the stressed syllable, but the L does not precede the stressed syllable to anywhere near the same degree as the H follows it in the L*+H pitch accent. Thus it seems that the two tones in the focal pitch accent are more closely related in their alignment than are the two tones in the L*+H pitch accent.

Outside of the sequencing of the tones, little has been said within the AM theory about the relationship between the two tones of a bitonal pitch accent. The standard representation of the bitonal pitch accent is that proposed by Pierrehumbert and Beckman (1988), seen in Figure 4.8.
In this representation, the strong branch (s) contains the tone which is associated with the stressed syllable, meaning that this pitch accent is of the type T*+T. If this representation is taken as being the structure of the pitch accent, then the two tones would always have the same structural relationship to each other, regardless of which tone is associated with the stressed syllable. If this is taken merely as a representation of the sequencing of tones, then there is no structure and therefore predictions cannot be made about the relationship between the tones. In either case, this representation is unable to account for the Spanish tonal alignment data, since there is a different relationship between the tones in the two pitch accents.

Grice (1995) offers two possible alternatives to Pierrehumbert and Beckman's (1988) representation of the bitonal pitch accent, each involving a different structure for the pitch accent. The first is what she calls the flat structure, due to there existing no intermediate level between the tonal root node (i.e. the equivalent of the tone node on the
tone tier in Figure 4.8). This flat structure, based on Yip's (1989) work on Chinese and African languages, produced two types of bitonal pitch accents which are shown in Figure 4.9.

(a) Cluster

(b) Unit

Figure 4.9: Bitonal pitch accents within the flat pitch accent structure adapted from Grice (1995).

In this structure, a tonal root node associates with the stressed syllable, and this tonal root node is marked by a *. In the cluster in Figure 4.9a, there are two tonal root nodes, each containing one tone. The tonal root node which associates with the stressed syllable has priority for alignment, and the other is not structurally related (in fact, Grice states that these pitch accents are not directly generated, but rather derived) and is free to align with an open syllable (i.e. one not associated with another tonal root node), if one is available.
In the unit in Figure 4.9b, the single tonal root node contains two tones, and since that tonal root node is associated with the stressed syllable, both tones should have equal priority in alignment.

The second alternative which Grice (1995) offers to Pierrehumbert and Beckman's (1988) representation of the pitch accent is what she calls the *hierarchical structure*, which is based on Nespor and Vogel's (1986) structure of the prosodic word. She terms this structure hierarchical because some tones may occur within an optional part of the pitch accent (τw) while others occur within the core of the pitch accent (τs). The two possible bitonal pitch accents within this structure are shown in Figure 4.10.

Figure 4.10: Bitonal pitch accents with the hierarchical pitch accent structure adapted from Grice (1995).
In this structure a pitch accent node (PA) dominates the entire pitch accent. Below that is the supertone level, containing supertones (τ), which is an organizational level in the hierarchy. The supertones dominate the tones themselves. Association, and priority for alignment, is determined by a language-specific parameter setting for headedness at both the supertone and tone levels. For the hypothetical language represented in Figure 4.10, the supertone level is right headed, as evidence by the strong supertone being on the right in Figure 4.10a, and the tone level is left headed, as evidenced by the strong tone being on the left in Figure 4.10b.

The question that must be addressed is whether one of these structures can adequately represent the Spanish tonal alignment data. The focal pitch accent, where both tones are relatively strongly aligned with the stressed syllable, could be represented by either structure. In the flat structure, the focal pitch accent would be a unit (Figure 4.9b), with both tones contained by an associated tonal root node. This would give both tones equal priority in alignment. In the hierarchical structure, the two tones would be dominated by the same supertone (Figure 4.10b), making them more closely related than if they were dominated by different supertones (Figure 4.10a).

With either structure able to account for the focal pitch accent, I turn now to the broad focus L*+H pitch accent. The tones in this pitch accent are not as closely related in their alignment as the tones in the focal pitch accent, and this should be the result of their being less closely related in the structure of the pitch accent. Both the cluster in the flat structure (Figure 4.9a) and the representation in the hierarchical structure where the tones
are dominated by different supertones (Figure 4.10a) could account for the tones being less closely related than in the corresponding structures for the focal pitch accent. Nonetheless, the two structures make very different predictions.

In the cluster in the flat structure, each tone pertains to a different tonal root node, but these tonal root nodes are not structurally related. Therefore the two tones should demonstrated complete independence from each other. In the hierarchical structure, although the tones are dominated by different supertones, they are dominated by the same pitch accent node, meaning that they are structurally related. Therefore the two tones should demonstrate more independence than when they are dominated by the same supertone node, but not total independence.

The question of the degree of independence between the two tones can be addressed by looking at the alignment of the tones when there is little to no tonal crowding forcing the alignment of the H near the L, and therefore near the stressed syllable. We saw in Table 3.4 that when there are more unstressed syllables immediately following a stressed syllable with which a \( L^* + H \) pitch accent is associated, the H is aligned further from the L. Nonetheless, even in the most extreme case of five following unstressed syllables, the H is aligned on the average 201 ms after the L. And as Table 3.2 shows, this means that the average alignment of the H is 109 ms after the stressed syllable. When there are five following unstressed syllables, the alignment of the H 109 ms after the stressed syllable means that it is almost always aligned within the very first of the five unstressed syllables. If the two tones were completely independent, as predicted by the flat structure, the alignment should be near the middle of the string of
five unstressed syllables, due to the phonetic influence of the preceding and following tones. This clearly is not the case. This indicates that the tones, while more independent than in the focal pitch accent, are not completely independent, and this motivates postulating the hierarchical structure as the best representation of the Spanish tonal alignment data. In addition, the hierarchical structure is preferable on theoretical grounds since the entire pitch accent is unit. In the cluster in the flat structure, it would need to be explained why two tones are independently generated, and then why the unassociated tone is attracted to the preceding tone rather than to a following tone. All in all, it seems that the flat structure cannot account adequately for the Spanish $L^*+H$ pitch accent.

If the hierarchical pitch accent structure is adopted into the AM theory, an analysis of the two Spanish pitch accents under discussion here falls out nicely. These pitch accents are represented in Figure 4.11

(a) Broad focus — $L^*+H$

(b) Focal — $L+H^*$

![Diagram of the Spanish pitch accents](image)

Figure 4.11: The structure of the Spanish pitch accents.
The alignment of the L to the onset of the stressed syllable in the L*+H pitch accent is evidence that the L is associated with the stressed syllable, and that Spanish is left-headed at the supertone level. With the high tone dominated by the supertone node that is not the head of the pitch accent, it is somewhat independent in its alignment, explaining why the L but not the H is aligned with the stressed syllable.

In the focal pitch accent there is only one supertone node, which explains why both tones are relatively strongly aligned with the stressed syllable. Since in this case the H is dominated by the strong (and only) supertone node, it should be more strongly aligned with the stressed syllable than in the L*+H pitch accent. In Face (2001), not having examined pitch accent structure, I analyzed the focal pitch accent as (L+H)* in an attempt to represent the alignment of both tones to the stressed syllable. Considering the alignment data presented in the present study and the hierarchical structure of pitch accents, it is not necessary to use this parenthetical notation. The alignment data of the low tone in the focal pitch accent show that while it is still rather strongly aligned with the stressed syllable, it is less strongly aligned than in the L*+H pitch accent. This is exactly what we would expect if the tone level in Spanish is right-headed. The low tone pertains to the head at the supertone level, so it is aligned relatively strongly with the stressed syllable, but it is not the head at the tone level, meaning that it is slightly more independent in its alignment than when it is the head of the pitch accent, as is the case in the L*+H pitch accent.

Assuming the hierarchical pitch accent structure, the star can be taken to mark the head tone of the pitch accent, which associates with the stressed syllable. In the case of
the broad focus pitch accent the head is the L, and in the case of the focal pitch accent it is the H. This gives us a L*+H broad focus pitch accent and a L+H* focal pitch accent. The crucial point to this being an adequate representation, however, is the adoption of the hierarchical pitch accent structure. This same notation of the pitch accents makes inaccurate predictions about tonal alignment within Pierrehumbert and Beckman’s (1988) approach to the pitch accent, as discussed above.

In summary, the Spanish tonal alignment data support a hierarchical pitch accent structure. In Spanish, the supertone level is left-headed and the tone level is right-headed. In the broad focus pitch accent, analyzed as L*+H, the two tones are dominated by different supertones, meaning that the L is the head of the pitch accent since the supertone level is left-headed. In the focal pitch accent, analyzed as L+H*, the two tones are dominated by the same supertone, and therefore headedness is determined at the tone level. Since the tone level is right-headed, the high tone is the head of the pitch accent.

4.3.6 Pre-Boundary Pitch Accents

We have seen that there are two phonologically distinct rising pitch accents which are used in Spanish: the focal L+H* and the typically broad focus L*+H. We have also seen that a word in contrastive focus can be followed by an intermediate phrase boundary tone. H- is used in both broad focus declaratives and following words in contrastive focus and L- is used exclusively following words in contrastive focus. When one of these two intermediate phrase boundaries is used to convey focus, however, it must still be preceded by a pitch accent. There is still an F0 valley at or near the onset of the stressed
syllable, indicating a phonological L, and in the case of L- there is a clear F0 peak, indicating a phonological H before the fall to the L-. In the case of H-, the F0 peak is generally not visible, since the F0 continues to rise to the H-. Since there is a pitch accent used prior to the intermediate phrase boundary, it is of interest to examine which pitch accent is used. Are intermediate phrase boundary tones used instead of a focal L+H* pitch accent, or are they used in addition it?

This is an issue which has not been considered previously, and for good reason. The two scholars who have proposed that intermediate phrase boundary tones are used to mark focus have also claimed that there is no focal pitch accent, and that Spanish has only one pitch accent (Hualde 2000, Nibert 2000). Thus, for these scholars the question of which pitch accent precedes an intermediate phrase boundary was not an issue. While I have investigated the nature of the Spanish focal pitch accent, I did not recognize the existence of intermediate phrase boundaries as a strategy for conveying contrastive focus (Face 2001). Only now that I have found that both a focal pitch accent and intermediate phrase boundaries may be used to convey contrastive focus is this question a legitimate one to be answered.

The fact that this question is now a legitimate one does not mean that it is easy to answer. We have seen that F0 peaks occur within the stressed syllable as the result of the high tone being the head of the L+H* focal pitch accent. While we know that F0 peaks occur within the stressed syllable preceding a L-, it could be because a L+H* pitch accent is used or because the L- forces the high tone of a L*+H pitch accent to be realized within the stressed syllable. And prior to a H-, it is impossible to tell where the high tone is
aligned. Still, it is possible to examine the alignment of the H to investigate the nature of the pre-boundary pitch accent. We can examine the duration of the F0 rise as a factor of the number of post-tonic unstressed syllables in the contrastively focused word. If a \( L^*+H \) pitch accent is used, we would predict that as there is more room after the stressed syllable, the H would be aligned further to the right (i.e. closer to the end of the stressed syllable or outside of it). Since it is generally impossible to identify the F0 peak when the pitch accent is followed by H-, I look at those cases where the pitch accent is followed by L-. Table 4.12 presents the results of this measurement for both initial and medial position.

<table>
<thead>
<tr>
<th>Post-Tonic Unstressed Syllables in the Contrastively Focused Word</th>
<th>Duration of F0 Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Position</td>
</tr>
<tr>
<td>0</td>
<td>148 ms</td>
</tr>
<tr>
<td>1</td>
<td>150 ms (N=67, SE=5.5)</td>
</tr>
<tr>
<td>2</td>
<td>144 ms (N=94, SE=4.6)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p=.6631</td>
</tr>
</tbody>
</table>

Table 4.12: Duration of F0 rise by post-tonic unstressed syllables in the contrastively focused word and position in the utterance when followed by L-.
Table 4.12 shows that there is not the increase in duration of F0 rise that would be expected for L*+H as there are more unstressed syllables following the stressed syllable of the word in contrastive focus. This seems to indicate that the focal L+H* pitch accent is used to convey focus even when that word is placed at the end of an intermediate phrase. In order to confirm this, and to be able to draw on data from those cases where H- is used to convey contrastive focus, I look at data for L alignment. We already know that there is a difference in the alignment of L between the L*+H and L+H* pitch accents. If the data in Table 4.12 can indeed be interpreted as evidence that L+H* is used when the contrastively focused word immediately precedes an intermediate phrase boundary, then the L of the pitch accent in these cases should pattern with the L of the L+H*, rather than the L*+H, pitch accent.

In order to examine this issue I look only at medial position. The reason for this is that medial position follows the controlled number of unstressed syllables. Since the difference in alignment of the L between the pitch accents is not that large, I consider only those cases where there are three or more preceding unstressed syllables, avoiding the worst tonal crowding between the H of the preceding pitch accent and the L of the pitch accent in question. Table 4.13 presents the alignment of the L of the pitch accent in medial position for the two pitch accents when not followed by an intermediate phrase boundary tone and for the pitch accent in cases where H- and L- are used to convey contrastive focus.
Table 4.13: Alignment of the L of the pitch accent by intonation pattern used in medial position.

<table>
<thead>
<tr>
<th>Intonation Pattern</th>
<th>Alignment of the L of the Pitch Accent</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L^*+H) (\text{N}=162)</td>
<td>-2 ms (\text{SE}=1.8)</td>
</tr>
<tr>
<td>(L+H^*) (\text{N}=67)</td>
<td>-11 ms (\text{SE}=2.8)</td>
</tr>
<tr>
<td>Pitch Accent + L- (\text{N}=50)</td>
<td>-13 ms (\text{SE}=3.2)</td>
</tr>
<tr>
<td>Pitch Accent + H- (\text{N}=30)</td>
<td>-10 ms (\text{SE}=4.1)</td>
</tr>
</tbody>
</table>

The data presented in Table 4.13 demonstrate that the alignment of the L of the pitch accent preceding H- and L- in cases of contrastive focus patterns with the L of the focal \(L+H^*\) pitch accent rather than with that of the \(L^*+H\) pitch accent. This reinforces the evidence from Table 4.12, and we can conclude that when H- and L- are used to convey contrastive focus, they are used in addition to the focal \(L+H^*\) pitch accent rather than instead of it. This could be because \(L+H^*\) is the focal pitch accent, and the addition of an intermediate phrase boundary tone after it adds more prominence to the focal word, or it could be that \(L+H^*\) is a nuclear pitch accent, as was considered in Sections 3.2 and 3.3.2. Further consideration will be given to the notion of a nuclear pitch accent in the following section.
4.4 Final Contrastive Focus

4.4.1 Introduction

In this section I will present the results of the present study for final contrastive focus, using data from Corpus #1 which was designed to address this issue. As discussed in Chapter 3, final position is inherently different from the two non-final positions because the final stressed syllable of an utterance is also sometimes the very final syllable of the utterance. This means that there are times when it is simply impossible for an F0 peak to occur after the stressed syllable. Even when there are post-tonic syllables, however, the F0 peak is realized on the stressed syllable over 95% of the time (Llisterrri et al. 1995, Face 1999), in contrast to the pattern found in non-final position.

Now that we have seen the four local intonation patterns used for conveying contrastive focus in non-final position, we can imagine that final position could be very different in the way in which contrastive focus is conveyed. Since the biggest difference between \( L^*H \) and \( L+H^* \) is the alignment of the H, and given that even in broad focus declaratives the F0 peak in final position is realized within the stressed syllable, it seems unlikely that a contrast between these two pitch accents could be used effectively in final position. In addition, \( L-L\% \) is the characteristic tonal marker of the end of a declarative utterance, meaning that an intermediate phrase boundary tone exists in final position in all cases, whether focal or not. Because of these differences in final position, it seems that manipulation of F0 peak height is the most likely way in which contrastive focus could be conveyed in this position.
In the remainder of this section I will examine the local intonation patterns found in final position in cases where the word in that position is in contrastive focus. I will provide an explanation of how contrastive focus is conveyed in this position as well as provide a phonological analysis of the patterns found.

4.4.2 F0 Peak Height

I will begin by looking at the effects of contrastive focus on the height of F0 peaks, since this seems to be the most likely way for intonation to convey contrastive focus in final position. Table 4.14 presents the height of F0 peaks in final position by focus type.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>F0 Peak Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad (N=224)</td>
<td>159 Hz (SE=2.8)</td>
</tr>
<tr>
<td>Contrastive (N=257)</td>
<td>162 Hz (SE=2.6)</td>
</tr>
</tbody>
</table>

Probability (ANOVA): p=.4196

Table 4.14: F0 peak height in final position by focus type.

The data in this table show that there is not a significant difference between the height of final F0 peaks in broad and contrastive focus. This result is somewhat surprising since
this is the one local intonational strategy observed for non-final contrastive focus which would seem applicable to final position. Nonetheless, it appears that F0 peak height is not used to convey contrastive focus in final position.

4.4.3 Final Lowering and the Zero Allophone

In Chapter 3 the concept of final lowering was discussed in relation to final position in broad focus declaratives. Prieto et al. (1996) observe that the Spanish downstepping pattern is more extreme between the final two F0 peaks of an utterance. They propose that Spanish has a process of final lowering, much like has been observed for other languages, in which the final F0 peak is reduced (i.e. lowered) from the height at which it would otherwise be expected to be realized. Nibert (2000) also finds evidence of this process in Spanish, and the present study supports its existence as well (Section 3.3.3). As noted by both Prieto and Nibert, and as observed in the present study, sometimes the effect of final lowering is the reduction of the F0 peak to the point that it is immeasurable. Nibert refers to this as the zero allophone, meaning that it is one of the allophones of the final pitch accent, and specifically one in which there is no visible pitch obtrusion. This is much like the weakening of word-final /s/ in some Caribbean dialects of Spanish where one of the allophones is zero (i.e. complete deletion).

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6 The other way to analyze this is to claim that there is no pitch accent present. There are two reasons which lead me not to make this analysis. First, final lowering is gradient in nature, with some of the F0 rises in final position rising a considerable distance, others less, and others so little that the F0 peak is just barely visible. This makes likely the next step on this gradient scale: an F0 peak that is not visible at all. The second reason for preferring the final lowering analysis over the no pitch accent analysis is that in the Sp-ToBI workshop held at The Ohio State University in October 1999, native speakers felt strongly that there was a pitch accent present in these cases.
One possible difference between final position in broad and contrastive focus could be the degree to which this zero allophone is found. While the height of F0 peaks might not be significantly different, it is possible that the zero allophone is used less in contrastive focus cases so that there is a pitch obtrusion marking the word as prominent.

Table 4.15 shows the frequency of occurrence of the zero allophone in final position in both broad and contrastive focus utterances.

<table>
<thead>
<tr>
<th>F0 Pattern</th>
<th>Broad Focus</th>
<th>Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>F0 Peak Present</td>
<td>233</td>
<td>66%</td>
<td>257</td>
</tr>
<tr>
<td>Zero Allophone</td>
<td>122</td>
<td>34%</td>
<td>101</td>
</tr>
<tr>
<td>Total:</td>
<td>355</td>
<td>---</td>
<td>358</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p=.0764

Table 4.15: Zero allophone frequency in final position by focus type.

The data in Table 4.15 show that the zero allophone is present in final position less often in cases of contrastive focus than in cases of broad focus, but that this difference is not statistically significant. This indicates that there may be a phonetic difference in the degree of final lowering between broad and contrastive focus utterances, but it is clear that there is no great decrease in the occurrence of the zero allophone in contrastive focus utterances.
4.4.4 Pitch Accent in Final Position

In Chapter 3 an analysis was not made of the pitch accent in final position in broad focus declaratives. This was because there was conflicting evidence. The data for the alignment of the H, and specifically its relationship to the L, motivated a L+H* analysis of this pitch accent. The data for the alignment of the L, however, was not as sensitive to phonetic influence as was expected of an unassociated tone. Now that we have seen that a L+H* pitch accent does exist, however, we can reconsider the final pitch accent in broad focus declaratives. The only argument against the L+H* analysis of the pitch accent in this position was that the L of the pitch accent did not align as far prior to the stressed syllable as the unassociated H of the L*+H aligned after it. Now that we have seen the alignment patterns for the focal L+H* pitch accent, however, we know that the L does not precede the stressed syllable in the way that the unassociated H follows it because the L+H* pitch accent has a different structure than the L*+H pitch accent.

Since the data for the alignment of the H of the final pitch accent in broad focus declaratives motivates a L+H* analysis, and the L aligns consistently with the L of this pitch accent when used to convey contrastive focus, I propose that Spanish does have a nuclear pitch accent (See Section 3.2 and 3.3.2) which differs from the typically broad focus L*+H, and which can be analyzed as L+H*. This means that the L+H* pitch accent is used both as a nuclear pitch accent and to mark contrastive focus. So when the word bearing the nuclear pitch accent is also produced in contrastive focus, there is no
special focal marking, as L+H* is used in nuclear position regardless of focus type. This means that the L+H* pitch accent found to occur before H- and L- in Section 4.3.6 is a nuclear pitch accent.

If the nuclear pitch accent in Spanish is indeed L+H*, and this is also the focal pitch accent, the prediction is that L+H* should be used in final position in cases of contrastive focus since in these cases we have contrastive focus in nuclear position. Therefore there should be no contrast between pitch accents in final position based on focus type. Still, we must compare the tonal alignment data between broad and contrastive focus in order to verify this. Table 4.16 presents the data for the alignment of the H with respect to the end of the stressed syllable in final position for both broad and contrastive focus.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>Alignment of H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad (N=224)</td>
<td>-60 ms (SE=4.9)</td>
</tr>
<tr>
<td>Contrastive (N=257)</td>
<td>-92 ms (SE=4.6)</td>
</tr>
</tbody>
</table>

Probability (ANOVA): p<.0001

Table 4.16: Alignment of the H of the final pitch accent by focus type.
The data presented in this table show a highly significant difference in the alignment of the H of the final pitch accent with respect to the end of the stressed syllable depending on whether it is produced in broad or contrastive focus. But we must remember that contrastive focus causes lengthening of the stressed syllable (cf. Table 4.5). Table 4.17 reports the average duration of the stressed syllable in final position by focus type.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>Duration of Stressed Syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>178 ms (N=355, SE=3.6)</td>
</tr>
<tr>
<td>Contrastive</td>
<td>205 ms (N=358, SE=3.6)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p&lt;.0001</td>
</tr>
</tbody>
</table>

Table 4.17: Duration of the final stressed syllable by focus type.

The data in Table 4.17 show that on the average the final stressed syllable is 27 ms longer when produced in contrastive focus than when produced in broad focus. That means that 27 ms of the 32 ms difference found in Table 4.16 for the alignment of the H of the final pitch accent with respect to the end of the stressed syllable is attributable to the syllable being longer. In non-final position, the duration of the F0 rise was examined to rule out that syllable duration accounted for the difference in alignment of the H.
(cf. Table 4.6). It was found that the L*+H pitch accent had a significantly longer F0 rise than the focal (now known to be L+H*) pitch accent. Table 4.18 presents the duration of the F0 rise in final position by focus type.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>Duration of Final F0 Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>132 ms (N=355, SE=3.7)</td>
</tr>
<tr>
<td>Contrastive</td>
<td>134 ms (N=358, SE=3.7)</td>
</tr>
</tbody>
</table>

Probability (ANOVA): p<.7232

Table 4.18: Duration of final F0 rise by focus type.

Table 4.18 shows that the duration of the F0 rise in final position is approximately the same regardless of whether it is produced in broad or contrastive focus. This confirms that the different alignment of the H seen in Table 4.16 is due to the longer stressed syllable in cases of contrastive focus. Therefore, the H alignment data do not motivate a difference in pitch accent in final position between cases of broad and contrastive focus. L+H* is the pitch accent used in final position, both as the nuclear pitch accent in broad focus declaratives and as the focal pitch accent.
4.4.5 Focus by Position

In chapter 1 I commented that while this dissertation focuses on the ways in which intonation is used to convey contrastive focus, the majority of research on Spanish focus has concentrated on the way in which word order conveys the interpretation of a grammatical element as focused (e.g. Bolinger 1954, 1954-1955; Contreras 1978, 1980; Hatcher 1956), which I refer to as focus by position. It would be easy to ignore this research as irrelevant to an intonational study, but this would be a mistake. We have seen throughout this chapter that there are multiple intonational strategies for conveying focus, and there is no reason to believe that there are not other strategies outside of the realm of intonation.

Simplifying somewhat, the general consensus in work on focus and word order in Spanish is that the focused information is contained in the rightmost position in a sentence (i.e. final position). In a study where subjects had relative freedom in answering questions which forced a particular word to be in narrow focus, I found that subjects placed the focused word in sentence-final position 71% of the time (Face 2000). This certainly indicates that there is a preference for words in narrow focus to be placed in final position, though it is not obligatory. Taking this in combination with the results of the present study for contrastive focus in final position, what does this tell us?

The results of the previous sections have shown that there is basically no local intonational difference in final position between words in broad focus and those in
contrastive focus. At best there is a slight weakening of final lowering as evidenced by the lower frequency of occurrence of the zero allophone of the final pitch accent. If we had found that in Spanish there are specific intonational strategies used to convey focus in final position, this would have merged nicely with the preference for focal elements to be in final position. This would have allowed us to say that there is a preference for focal elements to be in a particular syntactic position, and that in that position intonation is used to further mark the element as focused. That, however, does not appear to be the case.

What we have is a situation where contrastive focus is conveyed locally by intonation only when the word in contrastive focus is in non-final position. When the word in contrastive focus is in final position, no local intonational marking of contrastive focus is used. This means that focus by position is very much a reality. A word in contrastive focus in final position is conveyed as focused by its position without the aid of local intonational marking. Thus syntax and intonation do not seem to conspire to convey contrastive focus, but rather each has its own domain for doing so.

4.5 Conclusion

In this chapter I have considered the ways in which intonation is used locally to convey contrastive focus. I showed that in non-final position there are four local intonational strategies used. First, F0 peak height can be used to convey contrastive focus. There very well may be prosodic strategies other than intonation which are used. In fact, Table 2.19 shows that the duration of the stressed syllable is significantly longer in final position when it is in contrastive focus.
focus. When this is the case, the L*+H pitch accent typical of broad focus declaratives is used, but the F0 peak reaches a higher frequency than is the case in broad focus.

Secondly, it was seen that H- can be used after a word in contrastive focus. While H- sometimes follows words in broad focus, especially the verb, there is a higher frequency of use of H- in cases of contrastive focus. The other two strategies dealt with early F0 peaks. Early F0 peaks have been observed to be typical of words in narrow focus in Spanish, but there has been disagreement as to the correct phonological analysis to account for this. I provided evidence that there are actually two separate local intonational strategies which both result in early F0 peaks. One of these is a focal L+H* pitch accent, where the high tone is strongly aligned with the stressed syllable. The other is the use of L- following the word in contrastive focus.

In final position I showed against expectations that there is no clear intonational marking of contrastive focus. While it seems that there is some reduction in the strength of the final lowering process which causes final F0 peaks to be lower than would otherwise be expected, this reduction is not sufficient to cause a statistically significant difference in the height of F0 peaks between broad and contrastive focus. A L+H* pitch accent is used in final position in cases of contrastive focus, but this is also the nuclear pitch accent. Rather than through intonation, contrastive focus seems to be conveyed in final position through syntactic placement.

I also offered a modification to the treatment of pitch accents within the AM theory. Using the tonal alignment data of the L*+H and L+H* pitch accents, and specifically the different relationship between the tones in the two pitch accents, I argued
that Spanish provides evidence that pitch accents have internal structure. A comparison of the tonal alignment data with the predictions of a flat and a hierarchical pitch accent structure led me to conclude that pitch accents have a hierarchical structure.
CHAPTER 5

CONTRASTIVE FOCUS AND GLOBAL INTONATION PATTERNS

5.1 Introduction

In Chapter 4 I considered the local intonation patterns associated with words in contrastive focus. In this chapter I will move beyond these local patterns and consider what global patterns are also used in conveying contrastive focus. By *global* intonation patterns I refer to the intonation pattern of the portions of the utterance which are outside of the boundaries of the word in contrastive focus. Whereas in chapter 4 I examined such issues as pitch accents, boundary tones at the edge of the word in contrastive focus, and the height of the F0 peak of the pitch accent associated with the word in contrastive focus, in this chapter I will examine the height of F0 peaks on words preceding and following words in contrastive focus and the use of boundary tones away from the edges of the word in contrastive focus.

5.2 Previous Research

In Chapter 4 I noted that in studies of Spanish intonation, the quantity of research on broad focus declaratives far exceeds that on sentences containing a word in narrow
focus. In the literature on the intonation of sentences containing a word in narrow focus, the investigation of local intonation patterns far exceeds that on global intonation patterns. In fact, there is no study which is dedicated to examining the global intonation patterns of sentences containing a word in contrastive focus, though some do observe global patterns as well as local patterns.

Navarro Tomás (1944) was the first to observe global effects of narrow focus on the intonation contour of an utterance. As stated in Chapter 4, Navarro Tomás recognized two local intonational strategies for conveying narrow focus: placing the word in focus before a high boundary and, when the word did not precede a high boundary, reaching the F0 peak within the stressed syllable and maintaining a high F0 level throughout the word in narrow focus. Navarro Tomás reports that when the latter strategy is used, the portions of the utterance both preceding and following the word in narrow focus are produced with a below average F0 level.

De la Mota (1995, 1997) reports that the portion of the utterance following the word in narrow focus is characterized by a low F0 level which remains relatively flat. In contrast with Navarro Tomás (1944), however, she does not find this low F0 level in the portion of the utterance preceding the word in narrow focus. De la Mota also found that when the head of a complex subject noun phrase is in contrastive focus, the low F0 level does not begin until after the conclusion of the noun phrase. This claim will not be addressed until Chapter 6, however, since it is there that I will consider syntactic constituency.
Both Hualde (2000) and Nibert (2000) also recognize a low F0 level after the word in narrow focus. As these two scholars are working within the AM theory, they attempt to offer explanations for this pattern. Nibert claims that there are no tonal specifications associated with post-focal words, and thus the low F0 level is present because the L- at the end of the word in narrow focus "extends its influence over the remainder of the utterance" (93). Thus the L- after the word in narrow focus is claimed to join with the intonation phrase boundary L% and create the final L-L% of the utterance. Hualde agrees with Nibert that there is a L- following the word in narrow focus, but does not go so far as to claim that there are no following tonal specifications. Rather Hualde leaves open the question as to whether the following low F0 level is the result of there being no following tonal specifications or of an extreme compression of the pitch range.

5.3 Global Intonation Patterns in the Present Study

5.3.1 Pitch Range

5.3.1.1 Pre-Focal Pitch Range

I will begin the investigation of pitch range by looking at pre-focal position. Recall that while scholars have more frequently recognized a low F0 level following words in narrow focus, Navarro Tomás (1944) reports that this is also the case preceding the word in narrow focus.

In order to investigate the possibility of pre-focal pitch range reduction, I will look at the F0 peak height associated with the first target syllable in those cases in Corpus
where the second target syllable pertains to a word in contrastive focus. This means that the cases of interest are those utterances with medial and final focus. The results will be compared to results for broad focus utterances not only to describe the pattern found, but also to determine if it is characteristic of contrastive focus. In cases of medial focus, the broad focus declaratives compared will be those with three content words, while for final focus the broad focus declaratives with two content words will be used. In this way, the broad focus and contrastive focus declaratives being compared will be the same length.

If there is pre-focal pitch range reduction, there are two things which we would expect to find based on the findings of previous studies for the same basic F0 pattern. First, if there are pre-focal F0 peaks, we would expect that they would be lower than the F0 peaks in the same position in broad focus declaratives. Secondly, it is possible that this reduction would be like final lowering and sometimes be strong enough to reduce the peaks to the extent that no rise in F0 can be seen. This would also mirror the post-focal findings of de la Mota (1995, 1997), Hualde (2000) and Nibert (2000). The results for the height of F0 peaks are given in Table 5.1.
Table 5.1: Height of first F0 peak by focal context of the second content word and number of content words in the utterance.

Table 5.1 shows a statistically significant result for the height of the first F0 peak between utterances in broad focus and those with contrastive focus on the second content word. But these results are a surprise based on everything which has been discussed in previous literature and which we could have foreseen. Rather than the pre-focal F0 peak being significantly lower than the same peak in broad focus declaratives, it is significantly higher. In addition, supporting this lack of pre-focal pitch range reduction is the fact that there are no cases where an F0 rise is not found in pre-focal position.

Navarro Tomás (1944) only states, however, that this pre-focal low F0 level occurs before early F0 peaks (see Sections 4.2 and 4.3.4). In order to see if this is the case in the present study, I will look again at medial focus, where various local...
intonational strategies are used to convey contrastive focus. Table 5.2 presents the average F0 peak height in cases with contrastive focus in medial position by the local intonational strategy used to convey contrastive focus.

<table>
<thead>
<tr>
<th>Local Intonational Strategy</th>
<th>Height of First F0 Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>L*+H with higher F0 peak</td>
<td>236 Hz</td>
</tr>
<tr>
<td>(N=27)</td>
<td>(SE=10.6)</td>
</tr>
<tr>
<td>L+H* H-</td>
<td>227 Hz</td>
</tr>
<tr>
<td>(N=44)</td>
<td>(SE=8.3)</td>
</tr>
<tr>
<td>L+H* L-</td>
<td>217 Hz</td>
</tr>
<tr>
<td>(N=70)</td>
<td>(SE=6.6)</td>
</tr>
<tr>
<td>L+H*</td>
<td>210 Hz</td>
</tr>
<tr>
<td>(N=84)</td>
<td>(SE=6.0)</td>
</tr>
<tr>
<td>Probability (ANOVA): p=.1303</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2: Pre-focal F0 peak height by local intonational strategy used to convey contrastive focus in medial position.

While there is variation of the height of the pre-focal F0 peak based on the local intonational strategy used to convey focus, the difference is not significant. Also, even in the case of L+H*, which has the lowest average pre-focal F0 peak height in Table 5.2, the pre-focal peak height is still higher than the 206 Hz shown for broad focus declaratives in Table 5.1. This shows that the data in the present study do not support Navarro Tomás's (1944) claim that there is a low F0 level preceding a word in narrow focus. Whether
Navarro Tomáš's data truly are different from the data in the present study or whether he was in error in making this claim will, unfortunately, never be known since he does not provide any pitch tracks of utterances containing a word in narrow focus.

While the data presented in Tables 5.1 and 5.2 show that there is no pre-focal pitch range reduction, we must deal with the findings presented in Table 5.1 that pre-focal F0 peaks are significantly higher than the F0 peaks in the same position in broad focus utterances. A pair of example utterances showing this difference is presented in Figures 5.1 and 5.2. Figure 5.1 contains a pitch track of a broad focus utterance with two content words. Figure 5.2 contains a pitch track of the same speaker reading the same sentence with contrastive focus on the second content word.
Figure 5.1: Broad focus reading of the sentence Que lo terminó la nana ‘That the nanny finished it’.
We must ask why the pre-focal F0 peak is higher than the same peak in broad focus utterances. One of the difficulties with this is that we saw in Chapter 4 that one of the strategies for conveying contrastive focus was to use a higher F0 peak than would be used in broad focus on the L*+H pitch accent affiliated with the word in contrastive
focus. Now we see that the use of a L*+H pitch accent with a higher peak than is used in broad focus is also found when the next content word is produced in contrastive focus. It could be that the F0 range is expanded during the pre-focal portion of the utterance, and perhaps including the word in contrastive focus itself. We saw in Table 4.1 that when the L*+H pitch accent is used on the word in contrastive focus in initial and medial position, the F0 peak is higher than it is in broad focus utterances. Maybe, however, the F0 peak is higher no matter which local intonational strategy is used to convey contrastive focus. This, coupled with the higher pre-focal F0 peak, would indicate that sentences containing a word in contrastive focus are produced in a higher pitch range. We know that this is not true of final position, as was seen in Table 4.15, but we have also seen that final position is different from other positions, and it is certainly possible that final lowering would have an effect on these results. The data for F0 peak height in initial and medial position are presented in Table 5.3.

<table>
<thead>
<tr>
<th>Focus Type</th>
<th>F0 Peak Height</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Position</td>
<td>Medial Position</td>
<td></td>
</tr>
<tr>
<td>Broad</td>
<td>201 Hz (N=606, SE=2.1)</td>
<td>197 Hz (N=288, SE=3.0)</td>
<td></td>
</tr>
<tr>
<td>Contrastive</td>
<td>208 Hz (N=573, SE=2.2)</td>
<td>198 Hz (N=279, SE=3.1)</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3: F0 peak height in initial and medial position by focus type, but including all local intonational strategies for conveying contrastive focus.
The results of Table 5.3 show that there is a difference in F0 peak height between broad focus and contrastive focus in initial position that is statistically significant. This is in contrast to the results for medial position where no significant difference is found. This result for medial position provides evidence that in sentences containing a word in contrastive focus a high F0 level is not maintained from the beginning of the sentence through the word in contrastive focus. This leads to the conclusion that there is an expanded pitch range in the pre-focal portion of the utterance, but that this expanded pitch range does not necessarily apply to the word in contrastive focus. What cannot be determined from the results of Corpus #1 is whether this pre-focal pitch range expansion occurs over the entire pre-focal portion of the utterance or only on the word immediately preceding the word in contrastive focus. I will return to this issue in Chapter 6.

While we have seen that the F0 peak in initial position is higher if the utterance contains a word in contrastive focus, it is possible that this does not fully characterize pre-focal pitch range expansion. It is also possible that the F0 valleys are deeper, indicating a two-way pitch range expansion involving both the high and the low end of the pitch range rather than just a one-way pitch range expansion involving only the high end. The results for the depth of the F0 valley of pre-focal pitch accents are given in Table 5.4.
Table 5.4: Depth of first F0 valley by focus type on the second content word in utterances with three content words.

<table>
<thead>
<tr>
<th>Focus Type on Second Content Word</th>
<th>Depth of First F0 Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>165 Hz (N=359, SE=2.1)</td>
</tr>
<tr>
<td>Contrastive</td>
<td>162 Hz (N=358, SE=2.1)</td>
</tr>
<tr>
<td>Probability (ANOVA): p=.3481</td>
<td></td>
</tr>
</tbody>
</table>

The data presented in Table 5.4 show that there is no significant difference in the depth of the first F0 valley between broad focus utterances containing three content words and utterances with contrastive focus on the word in medial position. This shows that pre-focal pitch range expansion is a one-way expansion involving only the high end of the pitch range.

5.3.1.2 Post-Focal Pitch Range

Having examined pre-focal pitch range, I will now investigate the pitch range of the portion of the utterance that follows the word in contrastive focus. As discussed in Section 5.2, several scholars report that there is a low F0 level throughout the post-focal portion of an utterance containing a word in contrastive focus. It is unclear, however, whether this low F0 level is the result of there being no pitch accents present in the post-focal portion of the utterance or whether it is due to pitch range reduction. In this section
I will examine the intonation pattern associated with the second target syllable when the first target syllable belongs to a word in contrastive focus. This will allow us to look separately at medial position and final position when they occur post-focally and compare them with the same position in broad focus declaratives. In this way it will be possible to address whether or not there exists a post-focal low F0 level in the present study and, if so, whether it is the result of pitch range reduction or lack of post-focal pitch accents.

First, let us consider whether F0 peaks are present following a word in contrastive focus. If F0 peaks are not present, this would strongly support the claim in previous literature that there is a low F0 level in the post-focal portion of the utterance. The results for the presence of F0 peaks post-focally are presented in Table 5.5 for medial position and Table 5.6 for final position.

<table>
<thead>
<tr>
<th>F0 Peak in Medial Position?</th>
<th>Focal Context of First Content Word</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Broad</td>
<td>Contrastive</td>
</tr>
<tr>
<td>Yes</td>
<td>N 317</td>
<td>% 88</td>
</tr>
<tr>
<td>No</td>
<td>N 42</td>
<td>% 12</td>
</tr>
<tr>
<td>Total</td>
<td>N 359</td>
<td>---</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

Table 5.5: Presence of an F0 peak in medial position by focal context.

138
<table>
<thead>
<tr>
<th>F0 Peak in Final Position?</th>
<th>Focal Context of First Content Word</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Broad</td>
<td>Contrastive</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>233</td>
<td>66</td>
</tr>
<tr>
<td>No</td>
<td>122</td>
<td>34</td>
</tr>
<tr>
<td>Total:</td>
<td>355</td>
<td>---</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): $p < .0001$

Table 5.6: Presence of an F0 peak in final position by focal context.

The data presented in these tables show that in both medial and final position, there is a higher frequency of no F0 peak being present after a word in contrastive focus than is the case in broad focus utterances. In medial position, however, a post-focal F0 peak is absent only 35% of the time, meaning that in the other 65% of the cases there is visible evidence in the pitch track for a pitch accent. In final position there is a higher frequency of the absence of an F0 peak in both broad focus utterances and following a word in contrastive focus. This can be attributed to the final lowering process discussed in Sections 3.2 and 3.3.3. Even so, there is a much higher frequency of no F0 peak being present post-focally. These results show that there often is a low F0 level in the portion of an utterance following a word in contrastive focus, but that this is not always the case, especially outside of final position. Figure 5.3 shows an example of an utterance with contrastive focus in initial position and no visible pitch accents post-focally.
Figure 5.3: Reading of the sentence *Que le dábamos el número pertinente* ‘That we were giving him the relevant number’ with contrastive focus on the word *dábamos* ‘were giving’.

We can see in this figure that L- is used locally to convey contrastive focus on *dábamos* ‘were giving’. After the L-, the F0 remains at a fairly stable low level, without obvious protrusions indicating the presence of pitch accents.

While we have seen that the absence of a visible pitch accent is more frequent following a word in contrastive focus than it is in broad focus utterances, there are still many instances when there is a pitch accent visibly present. An example of this is given in Figure 5.4.
Figure 5.4: Reading of the sentence *Que se lo dábamos para el número pertinente* ‘That we were giving it to him for the relevant number’ with contrastive focus on the word *dábamos* ‘were giving’.

In this figure we see that the same L- which was shown in Figure 5.3 is used to convey contrastive focus on the word *dábamos* ‘were giving’. In this case, however, there are visible pitch accents in the post-focal portion of the utterance. This brings up the question as to whether the low F0 level seen in Figure 5.3 is the most extreme case of a gradient pitch range reduction, as was argued to be the nature of final lowering in Section 3.3.3, or whether this low F0 level is an independent strategy to convey, jointly with local strategies, contrastive focus.

If the low F0 level is a strategy unto itself rather than an extreme case of a gradient pitch range reduction, we would expect to find no difference in the height of
broad focus and post-focal F0 peaks, when they are present. If, on the other hand, the low F0 level is an extreme case of a gradient pitch range reduction, lesser gradients would exist and we would expect that when there are visible F0 peaks present post-focally, they would be lower than F0 peaks in the same position in broad focus utterances. The results for post-focal F0 peak height are given in Table 5.7.

<table>
<thead>
<tr>
<th>Focal Context of Word in Initial Position</th>
<th>F0 Peak Height of Second Content Word</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medial Position</td>
</tr>
<tr>
<td>Broad</td>
<td>197 Hz (N=288, SE=2.9)</td>
</tr>
<tr>
<td>Contrastive</td>
<td>187 Hz (N=212, SE=3.4)</td>
</tr>
<tr>
<td>Probability (ANOVA):</td>
<td>p=.0275</td>
</tr>
<tr>
<td></td>
<td>Final Position</td>
</tr>
<tr>
<td></td>
<td>159 Hz (N=224, SE=2.7)</td>
</tr>
<tr>
<td></td>
<td>156 Hz (N=126, SE=3.6)</td>
</tr>
<tr>
<td></td>
<td>p=.4089</td>
</tr>
</tbody>
</table>

Table 5.7: F0 peak height of second content word by focal context and position.

The data in Table 5.7 show very different results for medial and final positions. Perhaps this should not come as a surprise since final position has consistently behaved differently than the non-final positions. What we see for final position in Table 5.7 is that there is no significant difference between the height of F0 peaks in broad focus utterances and those following a word in contrastive focus. In addition, we see that in both cases the F0 peaks in final position are much lower than those in medial position. This can be attributed to final lowering, as suggested in Section 3.3.3. For medial position, there is a
statistically significant difference between the height of F0 peaks in broad focus utterances and those following a word in contrastive focus. With final lowering able to explain the lack of difference in final position, the difference found in medial position can be said to be the result of a post-focal pitch range reduction. This means that post-focal pitch range reduction is a gradient process. When peaks are present they are lower than corresponding peaks in broad focus declaratives and, as was seen in Table 5.6, in 34% of the cases there is no visible F0 peak.

I will now look at post-focal pitch range reduction with respect to the local intonational strategy used for conveying contrastive focus. The main question to be addressed here is whether or not there is a higher degree of final lowering after certain local strategies than after others. In order to do this, I will examine the same cases already examined in this section, but this time I will not group all cases of contrastive focus into one category. Rather each local intonational strategy for conveying contrastive focus will be considered separately.

I begin by looking at the absence or presence of F0 peaks. Table 5.8 presents the results for medial position and Table 5.9 presents the results for final position.
### Table 5.8: Presence of post-focal F0 peaks in medial position by local intonational strategy used to convey contrastive focus.

<table>
<thead>
<tr>
<th>Post-Focal F0 Peak Present?</th>
<th>Local Intonational Strategy for Conveying Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L*+H with higher peak</td>
<td>L+H* H-</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>32 86</td>
<td>76</td>
</tr>
<tr>
<td>No</td>
<td>5 14</td>
<td>4</td>
</tr>
<tr>
<td>Total:</td>
<td>37</td>
<td>---</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

### Table 5.9: Presence of post-focal F0 peaks in final position by local intonational strategy used to convey contrastive focus.

<table>
<thead>
<tr>
<th>Post-Focal F0 Peak Present?</th>
<th>Local Intonational Strategy for Conveying Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L*+H with higher peak</td>
<td>L+H* H-</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>18 46</td>
<td>33</td>
</tr>
<tr>
<td>No</td>
<td>21 54</td>
<td>24</td>
</tr>
<tr>
<td>Total:</td>
<td>39</td>
<td>---</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

The data in these tables show that the local intonational strategy used for conveying contrastive focus is a significant factor in whether or not post-focal F0 peaks are present.
When L*+H with a higher F0 peak than in broad focus cases or L+H* H- is used, post-focal F0 peaks are generally present in medial position. When L+H* L- or L+H* are used, post-focal F0 peaks are absent much more frequently. In final position F0 peaks are absent much more often than in medial position, as we saw in Table 5.6, but L+H* L- and L+H* are still the two local strategies which have the highest percentage of absence of an F0 peak following them. Before any comment can be made about the apparent groupings seen in the above tables, it is important to see if similar patterns exist for the height of post-focal F0 peaks when they are present.

If the absence of an F0 peak in post-focal position is the most extreme case of pitch reduction, then we would expect that when there are post-focal F0 peaks present, their height would be affected by the local intonational strategy used to convey focus. We can predict, then, that those strategies which had the highest frequency of absence of a following F0 peak will be followed by the lowest F0 peaks when post-focal F0 peaks are present. The results for post-focal F0 peak height in medial and final positions following each specific local intonational strategy to convey contrastive focus are presented in Table 5.10.
Local Intonational Strategy for Conveying Contrastive Focus | Post-Focal F0 Peak Height
---|---
| | Medial Position | Final Position |
| L*+H with higher peak | 221 Hz (N=30, SE=8.4) | 178 Hz (N=18, SE=8.2) |
| L+H* H- | 202 Hz (N=62, SE=5.9) | 172 Hz (N=34, SE=5.9) |
| L+H* L- | 174 Hz (N=55, SE=6.2) | 145 Hz (N=36, SE=5.8) |
| L+H* | 167 Hz (N=64, SE=5.8) | 141 Hz (N=38, SE=5.6) |

Probability (ANOVA): p<.0001  p<.0001

Table 5.10: Post-focal F0 peak height by local intonational strategy for conveying contrastive focus and position.

The data presented in Table 5.10 for post-focal F0 peak height are similar to those presented in Tables 5.8 and 5.9 for the presence or absence of a post-focal F0 peak. Specifically, the local intonational strategy used to convey contrastive focus is a significant factor in determining the height of post-focal F0 peaks. In Table 5.10 we see that F0 peaks following L*+H with a higher peak than when in broad focus are the highest, followed by L+H* H-, L+H* L- and L+H* respectively. This pattern is consistent with that found in Tables 5.8 and 5.9 in that the most extreme cases of post-focal pitch reduction follow L+H* L- and L+H*.

While there is a gradient difference between all four local intonational strategies for conveying contrastive focus, in Tables 5.8 and 5.9 and for final position in Table 5.10.
there appears to be a grouping together of L*+H with its higher peak and L+H* H- as the local strategies followed by a weaker degree of post-focal pitch range reduction and of L+H* L- and L+H* as those followed by a stronger degree of post-focal pitch range reduction. This grouping is true to a much lesser extent for medial position in Table 5.10. The question which we must ask is why L*+H with its higher peak and L+H* H- pattern one way and L+H* L- and L+H* pattern another.

One potential explanation would be that the claim made in Section 4.3.4 that early F0 peaks are caused by two different local intonational strategies for conveying contrastive focus is wrong. If this were the case, L+H* would be removed from the tonal inventory of Spanish, and all early F0 peaks would be explained by a L- after the word in contrastive focus. In this way there would be no need to explain why L+H* L- and L+H* pattern together and differently from L*+H with its higher peak and L+H* H-. There is a problem with this analysis, however. I presented evidence in Section 4.3.4 that early F0 peaks cannot be accounted for by any one phonological representation. There are clear cases where an F0 valley occurs at the end of the word in contrastive focus, serving as evidence for L-. In other cases the F0 valley occurs at or near the onset of the next stressed syllable, which inhibits proposing a L- in these cases. Recall that a phonological L- not fully realized phonetically was considered for these cases, but that an additional difference in syllable length was found, with the final syllable of those words in focus with an F0 valley at the end of the word being longer than the final syllable of those words in focus where the F0 valley was realized at or near the onset of the following stressed syllable. This is totally predictable if in some cases there is a L- following the
word in contrastive focus and in other cases there is not, since in the cases with a following L- we would predict final lengthening as Nibert (2000) found in her study of intermediate phrasing in Spanish.

With the tonal alignment evidence motivating the existence of both the L+H* L- and L+H* strategies for conveying contrastive focus, the patterning of these two strategies together, yet separately from the other strategies, must be accounted for. An explanation can be found in the uses of the different pitch accents and boundary tones involved in conveying contrastive focus. L*+H is used with a higher F0 peak than in broad focus cases to convey contrastive focus. Nonetheless, this is phonologically the same pitch accent as the L*+H used in broad focus declaratives. We saw in Section 4.3.3 that H- is used both in broad focus declaratives and to mark contrastive focus. These two local intonational strategies for conveying contrastive focus, then, have broad focus uses as well, which make them less prominent intonational strategies for conveying contrastive focus. The lesser prominence of these strategies is reflected in the corresponding weakness of the post-focal pitch range reduction that accompanies them.

The other two local intonational strategies used for conveying contrastive focus are L+H* L- and L+H*. Unlike H-, L- is not used in broad focus declaratives except utterance finally (e.g. L-L% terminal contour typical of declaratives). Likewise, L+H* is a focal pitch accent, and is not used in broad focus declaratives outside of nuclear position. These local intonational strategies, then, are quite prominent markers of
contrastive focus. This explains why these are the most common strategies used for conveying contrastive focus, and their prominence is reflected in the relatively strong post-focal pitch range reduction which follows them.

The results of the present study on post-focal pitch range reduction have implications for an analysis of those cases where there are no visible F0 rises after the word in contrastive focus. Nibert (2000) argues that early F0 peaks in cases of narrow focus are the result of a L- immediately following the word in focus. I have shown in Section 4.3.4 that a L- does indeed follow the focal word in some cases, but that this analysis cannot explain all early F0 peaks. Leaving that point behind for a moment, though, there is an important part of Nibert’s analysis which must be addressed. She claims that in those cases where L- is used at the end of a word in narrow focus, “as no other tonal specification is present after the L-, it extends its influence over the remainder of the utterance” (93). This wording is somewhat confusing. While it sounds like the word in focus is the last word of the intermediate phrase, this is not the case. What Nibert claims is that the focused word is always in the last intermediate phrase within the intonation phrase. In this way the L- at the end of that intermediate phrase, and therefore the utterance, is claimed to be realized at the right edge of the word in narrow focus, and the next tonal specification is the L% at the end of the intonation phrase. The interpolation between these two tones would cause a largely flat, low F0 level throughout the remainder of the utterance. Figure 5.5 shows Nibert’s representation of this.
Mariana mima al nene.

[[ H* L- ] L%]

Figure 5.5: Nibert's (2000:90) representation of L- marking narrow focus on the word Mariana in the sentence Mariana mima al nene 'Mariana spoils the baby'.

In this figure the pitch accent H* is associated with the stressed syllable of the word Mariana. The brackets indicate that this sentence is produced as a single intermediate phrase. Since there are no other pitch accents, the L- that is phonologically placed at the edge of the intermediate phrase is realized right after the last tonal specification, which is H*. The next tonal specification is the L% at the end of the intonation phrase, so the F0 maintains a low level throughout the post-focal portion of the utterance.

My findings in the present study on post-focal pitch range reduction have implications for Nibert's (2000) analysis of the L- marking narrow focus. Nibert's analysis assumes that there are never any pitch accents following the word in narrow focus. We have seen, however, that pitch accents do sometimes follow the word in contrastive focus, including when L- is used locally to mark the contrastive focus. If other pitch accents are possible following L-, it is impossible for this L- to be the

1 Nibert (2000) follows Prieto (1998; Prieto and Shih 1995; Prieto et al. 1995, 1996) in using H* rather than a L+H sequence. While Prieto assumes this is the only pitch accent, Nibert does propose others in some cases.
intermediate phrase boundary of the last intermediate phrase of the utterance.

Intermediate phrase boundaries mark the *boundary* of the intermediate phrase. While they may be realized somewhere besides at the very edge of the intermediate phrase, they must be the last tonal specification of the intermediate phrase. That is, *tonally* they must be the boundary of the intermediate phrase, even if they are not realized at the lexical boundary of that phrase.

Since the findings of the present study show that there are sometimes post-focal pitch accents in cases where L- is used to mark contrastive focus, the L- cannot be claimed to be the L- of the final intermediate phrase of the utterance. Rather the utterance must be broken into more than one intermediate phrase, with one of them ending with the word in contrastive focus. This raises the question as to whether this L- is ever the intermediate phrase boundary of the final intermediate phrase of the utterance. Since there is evidence that when there are no visible post-focal pitch accents this is the result of a gradient post-focal pitch range reduction process, this means that phonologically there are post-focal pitch accents, even if they are in some cases reduced to the extreme of not being visible in the pitch track. In this case we have a zero allophone of the post-focal pitch accent much like was shown in Section 4.4.3 to exist in final position as a result of final lowering, which is another gradient pitch range reduction process.

While the finding of a gradient post-focal pitch range reduction provides crucial evidence that the L- is not the boundary tone of the last intermediate phrase but rather must be the result of breaking the utterance into more than one intermediate phrase, there
are other problems which the findings of the present study pose for Nibert’s (2000) analysis. One problem is posed by the H- strategy for conveying contrastive focus. If when a post-focal L- is followed by a low F0 level throughout the remainder of the utterance this is due to the L- being the boundary tone of the final intermediate phrase of the utterance, the same should be true of H- if it is not followed by visual evidence of pitch accents throughout the remainder of the utterance. This would mean, however, that the intonation phrase ends in H-L%, which does not fit into Nibert’s description of standard declaratives, which she convincingly shows to end in L-L%. The use of H-L% would introduce a meaning difference as well as a different F0 shape to the utterance.\(^2\)

Another, and perhaps more serious, problem which the results of the present study pose for Nibert’s (2000) analysis is that a low F0 level with no visible pitch accents is found after L*+H with a higher F0 peak than in broad focus utterances and after L+H*. In these cases the low F0 level is generally reached at or near the onset of the following stressed syllable. In order for this to be the result of the L- of the final intermediate phrase, Nibert would have to propose that the final intermediate phrase boundary tone L- has an inconsistent realization in that it is not always realized in the same place in cases of contrastive focus, but is consistent in that it is always realized either at the end of the word or at or near the onset of the stressed syllable following the word in contrastive focus. This would be an arbitrary stipulation in an attempt to maintain her analysis.

In summary, I have shown that Spanish has a process of post-focal pitch range reduction which is gradient in strength. In some cases F0 peaks are lower than they

\(^2\) Nibert (2000) is not clear as to the meaning of H-L%, though she indicates that it “might imply some uncertainty, hesitation, or deliberation on the part of the speaker” (206).
would be if produced in broad focus, and in other cases the peaks are reduced to the extreme of not being visible in a pitch track. In addition, these go against Nibert's (2000) analysis that the low and flat post-focal F0 level can be analyzed as the lack of any following tonal specifications. Rather, pitch accents are specified phonologically, but the phonetic process of post-focal pitch range reduction sometimes results in a lack of F0 rise.

5.3.2 Pre-Focal High Intermediate Phrase Boundary Tone

In Section 4.3 it was shown that intermediate phrase boundary tones can be used following a word in order to convey contrastive focus on that word. Both H- and L- are used in this way, though H- is also used in broad focus declaratives. What we have not yet considered, however, is whether an intermediate phrase boundary may precede a word in order to convey contrastive focus on that word. It would seem that this would be one possible focal strategy since it would set off the word in contrastive focus from what precedes it. If followed by another intermediate phrase boundary, the word in focus would be set off from the entire rest of the utterance. This strategy might be especially productive for conveying final focus since local intonational strategies are basically not used to convey final contrastive focus. I will investigate this possibility in this section, though H- will be the only intermediate phrase boundary tone considered since L- is not found anywhere in this study except immediately following a word in contrastive focus.

One very obvious question requires an answer at this point: Why are pre-focal intermediate phrase boundary tones being considered along with global intonation.
patterns when post-focal intermediate phrase boundaries were considered to be a local intonation pattern? The post-focal intermediate phrase boundaries are realized at the edge of the word in contrastive focus, making them a local intonation pattern as defined in Section 4.1. If pre-focal intermediate phrase boundary tones were realized at the edge of the word preceding the word in contrastive focus, this would also be the edge of the word in contrastive focus, and therefore these would be considered a local intonation pattern. Interestingly, however, that is not the case. Rather pre-focal intermediate phrase boundaries are realized at a major break in the utterance, which in Corpus #1 is after the verb. In a sentence such as *Que se lo daba para el NÚMERO* ‘That she was giving it to him for the NUMBER’, where capitalization indicates contrastive focus, the pre-focal intermediate phrase boundary does not come at the boundary between the focal word *número* ‘number’ and its article *el* ‘the’, nor does it come at the noun phrase boundary between the article *el* ‘the’ and the preposition *para* ‘for’. The pre-focal intermediate phrase boundary comes between the verb *daba* ‘was giving’ and the preposition *para* ‘for’. The only time that the pre-focal intermediate phrase boundary is realized at the edge of the word in contrastive focus is when the focal word immediately follows the main boundary of the utterance, which, as we saw in Section 4.3.3, has been claimed by Hualde (2000) and Nibert (2000) to generally follow the verb. Only in a sentence such as *Que le daba NÚMEROS* ‘That she was giving him NUMBERS’ would the pre-focal intermediate phrase boundary actually be realized at the edge of the word in contrastive focus. For this reason pre-focal intermediate phrase boundaries are considered to be global intonation patterns. Figure 5.6 provides an example of a pre-focal H-.
Figure 5.6: Reading of the sentence *Que le dábamos el número pertinente* ‘That we were giving him the relevant number’ with contrastive focus on the word *número* ‘number’.

In this example there is a pre-focal H- after the verb *dábamos* ‘were giving’. Contrastive focus is also conveyed locally by the use of L- at the end of the focal word *número* ‘number’. Post-focally we see that there is no visible pitch obtrusion within the stressed syllable of the final content word *pertinente* ‘relevant’, indicating that post-focal pitch reduction and final lowering are rather strong in this case.

In order to look at non-final intermediate phrase boundaries, I must examine those cases where contrastive focus is present in medial and final positions, but not initial position since there is nowhere for an intermediate phrase boundary to be located before the initial content word of the utterance. By limiting the investigation to medial and final
positions, this means that any pre-focal intermediate phrase boundaries will be placed after the first content word of the utterance, which is always the verb in Corpus #1. We have seen in Section 4.3.3 that H- sometimes follows the verb even in broad focus declaratives. We also saw, however, that there is a significant increase in the occurrence of H- in this position when the verb is in contrastive focus, indicating that H- can be used to convey contrastive focus on the word which it follows.

In order to investigate whether H- is used pre-focally to help convey contrastive focus, I will use a similar comparison of frequency of use of H- pre-focally when the word in medial or final position is in contrastive focus and in the same position in sentences with the same number of content words in broad focus declaratives (i.e. three content word broad focus declaratives compared with utterances with medial focus and two content word broad focus declaratives compared with utterances with final focus.) The results of these comparisons are shown in Table 5.11 for medial focus and Table 5.12 for final focus.

<table>
<thead>
<tr>
<th>H- Present After First Content Word?</th>
<th>Broad Focus</th>
<th>Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>18</td>
<td>131</td>
</tr>
<tr>
<td>No</td>
<td>296</td>
<td>82</td>
<td>227</td>
</tr>
<tr>
<td>Total:</td>
<td>359</td>
<td>---</td>
<td>358</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

Table 5.11: Presence of H- following first content word by focal context of second content word when in medial position.
The results of the comparisons shown in Tables 5.11 and 5.12 show that in cases of medial and final focus, a pre-focal H- is significantly more likely to be present in contrastive focus than in the same position in broad focus declaratives. This indicates that a pre-focal H- is a global intonational strategy which can be used to convey contrastive focus.

As was done for post-focal pitch range reduction in Section 5.3.1, I will consider whether the local intonational strategy used for conveying contrastive focus has an effect on the use of a pre-focal H-. In looking at post-focal pitch range reduction, we saw that it is stronger when L+H* L- and L+H* were used locally to convey contrastive focus. I argued that these two strategies are the most prominent local intonational strategies for conveying contrastive focus since L*+H and L+H* H- are used in broad focus cases as

<table>
<thead>
<tr>
<th>H- Present After First Content Word?</th>
<th>Broad Focus</th>
<th>Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>45</td>
<td>13</td>
<td>129</td>
</tr>
<tr>
<td>No</td>
<td>310</td>
<td>87</td>
<td>229</td>
</tr>
<tr>
<td>Total:</td>
<td>355</td>
<td>---</td>
<td>358</td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p<.0001

Table 5.12: Presence of H- following first content word by focal context of second content word when in final position.
We would expect, then, that there would also be a higher frequency of a pre-focal H- when these stronger local intonational strategies are used. In this way the pre-focal H- would reinforce the strength of the contrastive focus being conveyed.

In order to examine this question, I will look at the case of medial contrastive focus. Final focus cannot be considered here since local intonational strategies for conveying contrastive focus are not used in this position. Table 5.13 presents the data for the presence of a pre-focal H- based on the local intonational strategy used to convey contrastive focus.

<table>
<thead>
<tr>
<th>Pre-Focal H- Present?</th>
<th>Local Intonational Strategy for Conveying Contrastive Focus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L*+H with higher peak</td>
<td>L+H*</td>
</tr>
<tr>
<td>Yes</td>
<td>23 46 30 41 43 38 35 29</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>27 54 44 59 70 62 84 71</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>50 --- 74 --- 113 --- 119 ---</td>
<td></td>
</tr>
</tbody>
</table>

Probability (Chi-Square): p=.1597

Table 5.13: Presence of pre-focal H- by local intonational strategy used to convey contrastive focus in medial position.

[^3]: L+H* is also the nuclear pitch accent, but in no case other than marking focus is it not immediately followed by an intermediate phrase boundary.
The results presented in this table show that there is not a significant difference in the frequency of use of a pre-focal H- depending on the local intonational strategies for conveying contrastive focus. We can see that the percentage of use of pre-focal H-ranges only from 29% for L+H* to 46% for L*+H with a higher F0 peak than in broad focus declaratives, never reaching use in a majority of cases.

5.4 Conclusion

In this chapter I have examined the global intonational strategies which are used to convey contrastive focus. Three such strategies were found. First, in the portion of an utterance preceding the word in contrastive focus, there is no pitch range reduction, contra the claim of Navarro Tomás (1944). Rather there is pitch range expansion which affects the height of pre-focal F0 peaks. It is not yet clear, however, whether pre-focal pitch range expansion affects all pre-focal F0 peaks or only the one immediately preceding a word in contrastive focus. Secondly, there is a gradient post-focal pitch range reduction which lowers the F0 peaks on the portion of an utterance following the word in contrastive focus. In some cases the reduction is strong enough to cause a low and relatively flat F0 level without significant F0 protrusions. Thirdly, a pre-focal H- may be used to convey contrastive focus. When this strategy is used, it does not immediately precede the word in contrastive focus, but is realized at a major syntactic break, which in Corpus #1 was always following the verb.

Post-focal pitch range reduction was shown to be affected by the local intonational strategy used to convey contrastive focus. When the stronger local
intonational strategies for conveying contrastive focus (i.e. L+H* L- and L+H*) are used, the post-focal pitch range reduction is stronger, causing lower F0 peaks when post-focal F0 peaks are present as well as a higher frequency of a low and flat F0 throughout the post-focal portion of the utterance. This stronger post-focal pitch range reduction adds to the strength of these local intonational strategies for conveying contrastive focus.

I have shown that the findings of the present study indicate that when a word in contrastive focus is marked by L+H* L-, there are sometimes visible pitch obtrusions which evidence the existence of post-focal pitch accents. This is evidence that the L- is the result of the utterance being broken into more than one intermediate phrase. Nibert (2000) has argued that the L- is the boundary tone of the final intermediate phrase of the utterance being realized after the last tonal specification, which she claims to be the pitch accent on the word in narrow focus. Since there is evidence that there are pitch accents following the word in contrastive focus in the present study, Nibert’s explanation of the L- must be rejected.

The place of global intonation patterns in conveying contrastive focus must be addressed. None of the global intonation patterns discussed in this section convey contrastive focus on their own. In fact, they have other uses. We have already seen that H- is not only used pre-focally, but that it is also used following words in contrastive focus and in broad focus declaratives. Pitch range reduction is seen in broad focus declaratives in final lowering. The height of F0 peaks is increased not only in pre-focal position, but can be used to convey contrastive focus locally as well.
In all cases of contrastive focus there is a local intonational strategy which is used to convey contrastive focus. The global intonational strategies seen in this section add reinforcement of this conveyance of contrastive focus, playing a supporting role to the local intonational strategies. We have seen that there are local intonational strategies for conveying contrastive focus which are stronger than others. This indicates a gradience in the prosodic conveyance of contrastive focus. The global intonational strategies add to this gradience by giving the speaker the option of using them to further mark focus.
6.1 Introduction

In the preceding chapters I have examined the local and global intonation patterns of utterances containing a word in contrastive focus and have provided statistical support for the analyses proposed. In doing so, however, I have drawn a distinction between local and global patterns, viz., local patterns refers to the patterns found on a word in contrastive focus, and global patterns refers to the remainder of the utterance which contains the focal word.

In this chapter, using data from Corpus #2, I will examine the syntactic constituent containing the word in contrastive focus. I will not argue for the existence of specific focal intonation patterns. Rather, I will apply the findings of the previous chapters to syntactic constituency issues. In doing so I will investigate whether contrastive focus on a particular word affects the intonation of the entire syntactic constituent, and how this differs from cases where the entire syntactic constituent is
produced in contrastive focus. Consider the examples in (1), where capitals indicate contrastive focus and underlining shows the syntactic constituent containing the contrastive focus.

(1) Examples of syntactic constituency
   a. Single word in focus
      A: Did Mary’s mom go to the store?
      B: No. JOHN’S mom went to the store.

   b. Entire constituent in contrastive focus
      A: Did Mary go to the store?
      B: No. JOHN’S DAD went to the store.

In (1a), contrastive focus is on the single word John, though this word is part of the larger noun phrase John’s mom, which is the subject of the sentence. In (1b), the entire subject noun phrase John’s dad is in contrastive focus.

In this chapter I will limit the investigation of the effects of syntactic constituency to noun phrases. It is known that prosodic structure often does not correspond to syntactic structure (see Ladd 1996:237 for a discussion). For this reason it is an open question whether intonation recognizes the hierarchical structure of syntax or only surface syntax. If intonation recognizes the hierarchical structure of syntax, then it would see the verb phrase as in Figure 6.1, where it contains the object noun phrase, as syntactic
theories, such as Government and Binding (Chomsky 1981) and Head-driven Phrase Structure Grammar (Pollard and Sag 1994), recognize the object as part of the verb phrase. On the other hand, if intonation only sees the surface syntax, then it may not recognize the verb phrase as a whole, but rather may see the verb and object noun phrase separately, especially since they have different grammatical roles, as in Figure 6.2.

Figure 6.1: Verb phrase containing a verb and object noun phrase.

\[
\begin{array}{c}
\text{VP} \\
\text{V} \\
\text{NP}
\end{array}
\]

Figure 6.2: Surface syntactic constituency determined by grammatical role.
By examining only noun phrases in this chapter, I will limit the investigation to the subject and object of the sentences in Corpus #2, and these subjects and objects can clearly be seen as a syntactic unit, regardless of whether intonation sees the hierarchical structure of syntax or only surface syntax.

In this chapter the effects of syntactic constituency on the intonation patterns used to convey contrastive focus are considered in two categories: 1) its effects on the phonology of focal intonation, and 2) its effects on the phonetics of focal intonation. This will allow us to see whether syntactic constituency affects only one of these ways of conveying contrastive focus, whether it affects both, or whether it does not affect either one.

6.2 Previous Research

Almost no research has considered the effects of syntactic constituency on Spanish focal intonation or even Spanish intonation in general. Only de la Mota (1995, 1997) has given this issue any consideration, and her observations are quite limited. De la Mota observes (see discussion in Chapter 5) that the pitch becomes low and relatively flat after a word in contrastive focus. In some of her test utterances there is a complex subject noun phrase with contrastive focus on the first word of this phrase. When this is the case, she notes that the low and flat pitch level does not occur until after the entire subject noun phrase. While de la Mota's finding is of great interest to the study of Spanish intonation, it is merely an observation. She presents no experimental data which address this issue in any sort of detail.
While de la Mota's (1995, 1997) observation that the post-focal low and flat pitch level is not reached until after the end of the entire subject noun phrase containing a word in contrastive focus is significant, it opens up an additional large issue. It is not only possible that syntactic constituency affects when post-focal pitch range reduction occurs, but it could be that it has significant effects on other aspects of intonation as well. Since no previous work has addressed this possibility, the experimental results presented in this chapter comprise the first analysis of the relationship between the Spanish intonational system and syntax.

6.3 Phonological Issues
6.3.1 Introduction

In this section I will look at the effects of syntactic constituency on the phonological issues involved in conveying contrastive focus through intonation. In the preceding chapters I have shown that there are multiple ways that intonation can convey contrastive focus phonologically. In Chapter 4 I showed that Spanish uses two pitch accents (L*+H and L+H*) and two intermediate phrase boundary tones (H- and L-). L*+H is the pitch accent generally used in broad focus declaratives. When it is marks a word in contrastive focus the F0 peak is higher than when used in broad focus. L+H* is a focal pitch accent and is also used as the nuclear pitch accent (see Section 4.4.4), meaning that this is the pitch accent which immediately precedes an intermediate phrase boundary. Of the two intermediate phrase boundary tones which were shown to convey contrastive focus, H- is often used in broad focus declaratives, but it is used with greater
frequency after a word in contrastive focus in order to convey contrastive focus on that word. L- was found to be used only to convey contrastive focus when it is used other than at the end of the intonation phrase (e.g. in the typical L-L% sequence found at the end of a declarative utterance).

Syntactic constituents in Corpus #2 are examined in this section in order to see what phonological intonation patterns are used to mark contrastive focus. This includes cases where a single word within the constituent is produced in contrastive focus (Section 6.3.2) as well as cases where the entire constituent is produced in contrastive focus (Section 6.3.3).

6.3.2 Single Word in Contrastive Focus

In this section I address the intonational phonology of noun phrases in which one of the words within that phrase is in contrastive focus. The questions to be addressed are 1) Is focus marked only on the word in contrastive focus?, 2) Is it marked on all words in the noun phrase?, and 3) When an intermediate phrase boundary is used, must it coincide with a syntactic phrase boundary? I will show that while all of these questions must be answered in the negative, the situation is more complex than such a simple answer.

Consider first the local intonation pattern found on a single word in contrastive focus. Table 6.1 presents a breakdown of the occurrences of each of the local phonological strategies reported in Chapter 4 for marking contrastive focus on the head of the subject noun phrase when it is the word in contrastive focus and on the modifier of the subject noun phrase when it is the word in contrastive focus. In Corpus #2 the head
of the noun phrase always precedes the modifier. Object noun phrases are not considered here because in Corpus #2 the modifier of the object noun phrase is the final content word of the utterance, and therefore the intonation pattern on this word is restricted (see Section 4.4).

<table>
<thead>
<tr>
<th>Local Intonation Pattern</th>
<th>Occurrences on Contrastively Focused Word</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head</td>
</tr>
<tr>
<td>L*+H</td>
<td>15</td>
</tr>
<tr>
<td>L+H*</td>
<td>25</td>
</tr>
<tr>
<td>L+H* H-</td>
<td>1</td>
</tr>
<tr>
<td>L+H* L-</td>
<td>19</td>
</tr>
<tr>
<td>Total:</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 6.1: Local intonation pattern on a single contrastively focused word within a multiple word subject noun phrase.

One thing that is striking about the results reported in Table 6.1 is the frequency with which intermediate phrase boundary tones are used locally to convey contrastive focus. Intermediate phrase boundaries are used locally in 20 of 60 cases after the head of the subject noun phrase when it is in contrastive focus and in 58 of 60 cases after the object of the subject noun phrase when it is in contrastive focus. A possible explanation for this could come from syntactic constituency. In the case of the modifier of the subject noun phrase, the contrastively focused word is the last word in the noun phrase (recall
that in Corpus #2 the head always precedes the modifier). Thus in these cases the intermediate phrase boundary coincides with the syntactic phrase boundary, and it may be that intermediate phrase boundaries are more likely to be used when they would co-occur with a syntactic phrase boundary.

These results for intermediate phrase boundaries raise another question about intermediate phrase boundaries marking contrastive focus. When the contrastively focused word is not the last word of the syntactic phrase, is an intermediate phrase boundary used at the end of the syntactic phrase? It is not unreasonable to think that focus on a particular Spanish word could be marked at the edge of the syntactic phrase, seeing the entire constituent rather than the individual word as the focal domain. In order to consider this possibility, the 40 cases (15 L*+H, 25 L+H*) reported in Table 6.1 where no intermediate phrase boundary immediately follows the contrastively focused head of the subject noun phrase must be examined in order to see if there is an intermediate phrase boundary following the entire subject noun phrase. These results are presented in Table 6.2.
<table>
<thead>
<tr>
<th>Pitch Accent on Head of Subject Noun Phrase</th>
<th>Intermediate Phrase Boundary Tone Following the Noun Phrase</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H-</td>
<td>L-</td>
</tr>
<tr>
<td>L*+H (N=15)</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>L+H* (N=25)</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Total:</td>
<td>12</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 6.2: Occurrences of intermediate phrase boundary tones following subject noun phrases where the head of the noun phrase is in contrastive focus and is not immediately followed by an intermediate phrase boundary tone.

This table shows that in 35 of the 40 cases where no intermediate phrase boundary immediately follows the head of the noun phrase produced in contrastive focus, an intermediate phrase boundary does follow the entire noun phrase. Based on the findings of Chapter 4, it should not come as a surprise that H- would be used in these cases, since it has uses beyond conveying contrastive focus. The most significant result presented in Table 6.2 is that L- is used following the entire noun phrase in more than half of the cases considered. Since no use of L- has been found outside of conveying contrastive focus (with the exception of at the end of an intonation phrase), this shows that syntactic constituency does play a role in the intonational phonology used to convey contrastive focus. Intermediate phrase boundaries being used to convey contrastive focus may occur
immediately after the single word being produced in contrastive focus, or at the end of its syntactic constituent. An example of L- occurring after the entire subject noun phrase with only the head of that phrase in contrastive focus is given in Figure 6.3.

Figure 6.3: Production of the sentence *El hermano de Manolo le daba el número de vuelo* 'Manolo’s brother was giving him the flight number’ with contrastive focus on the word *hermano* ‘brother’, the head of the subject noun phrase.

In this figure, L+H* occurs on the head of the subject noun phrase, marking contrastive focus on the head, and L- occurs at the end of the entire subject noun phrase. If there were an L- immediately following the word in contrastive focus, the F0 would drop to a low level at the end of that word (cf. Figures 4.5 and 4.6). Instead, the low level
is not reached until the end of the subject noun phrase. We can see that the L- causes final lowering (see Section 3.3.3), perhaps working together with post-focal pitch range reduction (see Section 5.3.1.2), resulting in no visible F0 peak in this case on the modifier within the subject noun phrase. I have marked the modifier tentatively as having a L+H* pitch accent since it is in nuclear position and there is evidence that the lack of an F0 rise is due to phonetic processes rather than to a lack of phonological tonal specification (see Sections 3.3.3 and 5.3.1.2).

The finding that an intermediate phrase boundary may occur after a single word in contrastive focus or after the syntactic constituent containing that word is an interesting one, but even more interesting is the fact that intermediate phrase boundaries may occur in both of these positions within the same utterance. In the 20 cases reported in Table 6.1 where an intermediate phrase boundary immediately follows the contrastively focused head of the subject noun phrase, in some cases another intermediate phrase boundary follows the entire subject noun phrase. Table 6.3 reports the occurrences of this double marking of a single focus with intermediate phrases.
Table 6.3: Occurrences of intermediate phrase boundary tones following subject noun phrases where the head of the noun phrase is in contrastive focus and is immediately followed by an intermediate phrase boundary tone.

This table shows that in half of the cases (i.e. 10 of 20 cases) where an intermediate phrase boundary immediately follows the contrastively focused head of the subject noun phrase, another intermediate phrase boundary follows the entire noun phrase. It is especially important to note that in 8 of these 10 cases, both intermediate phrase boundary tones are L-. Since L- is used solely for conveying contrastive focus when it is not at the end of an intonation phrase, this shows quite clearly that contrastive focus can be doubly marked through intermediate phrasing. An example of two occurrences of L- marking contrastive focus is given in Figure 6.4.
In this figure the use of L- following the head of the noun phrase, madre ‘mother’, conveys contrastive focus on that word. Another L- is also used following the entire subject noun phrase la madre de María ‘Maria’s mother’. In both cases of L- there is a substantial lengthening of the preceding syllables, as Nibert (2000) showed to be typical of pre-intermediate phrase boundary syllables (see also Section 4.3.4).

Since contrastive focus is marked phonologically on the word in contrastive focus and at the end of its syntactic constituent, it seems that a pre-focal word within the same syntactic constituent should not be affected. Since the pre-focal word is neither in contrastive focus nor at the end of the syntactic constituent, we would expect to find a
L*+H pitch accent on this word. Table 6.4 shows the occurrences of the various local intonation patterns on the pre-focal head of noun phrases with the modifier produced in contrastive focus.

<table>
<thead>
<tr>
<th>Local Intonation Pattern</th>
<th>Noun Phrase</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subject</td>
<td>Object</td>
</tr>
<tr>
<td>L*+H</td>
<td>54</td>
<td>51</td>
</tr>
<tr>
<td>L+H*</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>L+H* H-</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>L+H* L-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 6.4: Occurrences of local intonation patterns on the pre-focal head of noun phrases with the modifier produced in contrastive focus.

As expected, in the vast majority of cases in Table 6.4 the pre-focal head of noun phrases with a modifier produced in contrastive focus is affiliated with a L*+H pitch accent. The focal L+H* L- is never found in these cases, and L+H* and L+H* H- occur sporadically here. The use of L+H* H- places the contrastively focused word at the beginning of an intermediate phrase, perhaps giving it more prominence. The few cases where a non-nuclear L+H* (i.e. L+H* not followed immediately by an intermediate phrase boundary) is used are so infrequent (3%) that they seem insignificant, and may even be attributable to production error.
There is one more phonological issue which must be considered. I showed in Section 5.3.2 that there is often a pre-focal H- which occurs after the stressed word which precedes the word in contrastive focus. The question must be raised as to whether this pre-focal H- is affected by syntactic constituency. This is an especially valid question since we have seen above that there is an increase in the use of an intermediate phrase boundary to locally mark contrastive focus when that boundary coincides with a syntactic phrase boundary (see Table 6.1). To investigate this issue, the object noun phrases must be considered since in Corpus #2 there is no stressed word preceding the head of the subject noun phrases. Table 6.5 reports the findings for a pre-focal H- when the head of the object noun phrase is produced in contrastive focus, and therefore a pre-focal H- would be at the initial boundary of the object noun phrase, and when the modifier of the object noun phrase is produced in contrastive focus, and therefore a pre-focal H- would be within the object noun phrase.

<table>
<thead>
<tr>
<th>Pre-Focal H- Present</th>
<th>Contrastive Focus on a Word in the Object Noun Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head</td>
</tr>
<tr>
<td>Yes</td>
<td>22</td>
</tr>
<tr>
<td>No</td>
<td>38</td>
</tr>
<tr>
<td>Total:</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 6.5: Pre-focal H- by focal word within the object noun phrase.
Table 6.5 shows that there is an increase in the use of pre-focal H- when the H-
coincides with a syntactic phrase boundary. Since H- is used in broad focus utterances as
well, we need to be sure that this increase in use is not due exclusively to the presence of
the syntactic phrase boundary, but also to the following word being produced in
contrastive focus. While Table 6.5 reports a pre-focal H- at the beginning of the object
noun phrase in 22 of 60 cases, in the broad focus declaratives in Corpus #2 an H- is used
in the same position only once in 58 utterances. This confirms that the increase in the use
of H- preceding the word in contrastive focus when the H- corresponds to the syntactic
phrase boundary is indeed due to marking contrastive focus with the pre-focal H- argued
for in Section 5.3.2. The increased usage cannot be explained solely by the existence of
the syntactic phrase boundary, though it is clear that the syntactic phrase boundary makes
more likely the use of a pre-focal H-.

I now return to the three questions asked at the beginning of this section regarding
the marking of contrastive focus when a single word within a multiple word syntactic
constituent is in contrastive focus. The first question was “Is focus marked only on the
word in contrastive focus?” We have seen that the answer to this question is negative.
While there is a local focal intonation pattern used in most cases (either L+H*, L+H* H-,
or L+H* L-), there is also generally an intermediate phrase boundary at the end of the
entire syntactic constituent. In many cases this is L-, which outside of the end of an
intonation phrase has not been found to be used for anything other than marking focus.
The second question was “Is it marked on all words in the noun phrase?” Again the
answer is negative. We have seen that pre-focal words within the same syntactic

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constituent generally bear the typically broad focus $L^{*}+H$ pitch accent. The third question was “When an intermediate phrase boundary is used, must it coincide with a syntactic phrase boundary?” Again, the answer is negative. There are cases when an intermediate phrase boundary is used within a syntactic phrase, though there is a substantially more frequent use of an intermediate phrase boundary in positions where it does co-occur with a syntactic phrase boundary.

6.3.3 Entire Syntactic Constituent in Contrastive Focus

In the preceding section we saw that syntactic constituency has an effect on the intonational phonology of noun phrases containing a word in contrastive focus. Specifically, even though local intonation patterns were used to convey contrastive focus on the head of the noun phrase, the entire noun phrase was often followed by an intermediate phrase boundary. In the case of $L-$, this is particularly interesting since outside of the end of intonation phrases $L-$ had so far only been found to immediately follow the word in contrastive focus. Since it can also follow the syntactic constituent containing the word in contrastive focus, focus seems to take into account the syntactic constituent as well as the contrastively focused word. This raises another question which I will consider in this section: How does the intonation of the syntactic constituent differ when it contains a word in contrastive focus from when the entire constituent is produced in contrastive focus?

Table 6.6 reports the local intonation pattern found on the head and modifier of both subject noun phrases when the entire noun phrase is produced in contrastive focus.

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Local Intonation Pattern Occurrences on Individual Words

<table>
<thead>
<tr>
<th>Local Intonation Pattern</th>
<th>Occurrences on Individual Words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head</td>
</tr>
<tr>
<td>L*+H</td>
<td>48</td>
</tr>
<tr>
<td>L+H*</td>
<td>8</td>
</tr>
<tr>
<td>L+H* H-</td>
<td>1</td>
</tr>
<tr>
<td>L+H* L-</td>
<td>2</td>
</tr>
<tr>
<td>Total:</td>
<td>59</td>
</tr>
</tbody>
</table>

Table 6.6: Local intonation patterns on the words of a subject noun phrase which is produced, in its entirety, in contrastive focus.

The results in Table 6.6 for the modifier of the subject noun phrase show that when the entire noun phrase is in contrastive focus it is almost always followed by an intermediate phrase boundary. This is also what we found in Section 6.3.2 when just one word in the noun phrase was in contrastive focus. However, there are clearly different intonation patterns on the head of the subject noun phrase when the head of the noun phrase is in contrastive focus by itself and when the entire noun phrase is in contrastive focus. When the head of the noun phrase is in contrastive focus, we have seen that it is marked locally by L+H*, L+H* H-, or L+H* L- in 45 of 60 cases (see Table 6.1). Table 6.6 shows that when the entire noun phrase is produced in contrastive focus, one of these patterns is used locally on the head of the noun phrase in only 11 of 59 cases. The most common local intonation pattern is the typically broad focus L*+H pitch accent.

Considering both the head and the modifier together in cases where the entire noun

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phrase is in contrastive focus, the most common pattern, used in 35 of 59 cases for subject noun phrases, is $L^*+H$ on the head and $L^-$ following the entire noun phrase. An example of this pattern is given in Figure 6.5.

Another interesting result in Table 6.6 is the distribution of $L+H^*$ used by itself (i.e. not immediately followed by an intermediate phrase boundary, where it is then a nuclear accent) as a marker of contrastive focus. Table 6.6 reports that the focal $L+H^*$ is used 8 times, and in every case it is on the head of the noun phrase. While it is true that
there are very few cases for the modifier of the noun phrase where an intermediate phrase boundary does not follow, the use of L+H* exclusively on the head of the noun phrase brings up an interesting possibility. The distribution of L+H* seems to indicate that in those cases where the entire syntactic phrase is produced in contrastive focus, this focus can be projected onto the head of the pitch accent and marked locally there. Such a finding would be of great interest as it would give us further insight into the interface between intonation and syntax. Before this type of focus projection onto the head can be claimed, however, future research will need to examine more cases where the modifier is not followed by an intermediate phrase boundary. In this way it will be possible to determine if indeed the focal L+H* pitch accent is used only on the head of the noun phrase when that entire phrase is in contrastive focus.

6.4 Phonetic Issues

6.4.1 Introduction

So far in this chapter I have dealt with the phonological issues involved in the intonation both of syntactic constituents containing a single word in contrastive focus and of syntactic constituents where the entire constituent is produced in contrastive focus. Now I move beyond phonology and look at the phonetic issues involved. There are two phonetic effects of contrastive focus that will be considered here, both dealing with pitch range: 1) post-focal pitch range reduction, and 2) pre-focal pitch range expansion. Just as syntactic constituency was shown to affect the phonology of intonation, it is likely that there are phonetic effects as well. In fact, as discussed in Section 6.2, de la Mota (1995,
observes that the low and flat pitch level which she finds after words in contrastive focus (i.e. post-focal pitch range reduction, see Section 5.3.1.2) does not begin until after the entire subject noun phrase when the head of the noun phrase is produced in contrastive focus. This is an important observation which has motivated the present chapter. Nonetheless, this issue and the issue of the effects of syntactic constituency on pre-focal pitch range expansion require experimental investigation. I present the results of the present study for the effects of syntactic constituency on post-focal pitch range reduction in Section 6.4.2 and for pre-focal pitch range expansion in Section 6.4.3.

6.4.2 Post-Focal Pitch Range Reduction

In Section 5.3.1.2 I showed that there is a process of post-focal pitch range reduction whereby F0 peaks after the word in contrastive focus are lower than they otherwise would be. In many cases these peaks are lowered to the extreme of not being visible in pitch tracks. The evidence presented showed that when post-focal F0 peaks are visible, they are lower than F0 peaks in the same position in broad focus utterances.

In this section I examine whether syntactic constituency affects post-focal pitch range reduction. As previously discussed, de la Mota (1995, 1997) observes that in her study post-focal pitch range reduction (though she refers only to a low and flat pitch level, not raising the question of visible, but reduced, F0 peaks) does not begin until after the syntactic constituent containing the word in contrastive focus. In order to
experimentally investigate de la Mota’s observation, there are two factors which I will take into account for post-focal F0 peaks: 1) the presence or absence of visible post-focal F0 rises in the pitch track, and 2) the height of F0 peaks which are present.

In order to examine the effects of syntactic constituency on post-focal pitch range reduction, the data for post-focal F0 peaks (or lack thereof) will be compared with the data for the same position in broad focus declaratives. Subject noun phrases will be under consideration here since there is no information following the object noun phrases in Corpus #2, meaning that there can be no following F0 peaks. I will look at cases where the head of the subject noun phrase is produced in contrastive focus and compare the results with the results for cases where the modifier of the subject noun phrase is in contrastive focus. In this way the comparison will include one set of cases (i.e. those with contrastive focus on the head of the subject noun phrase) where the first post-focal F0 peak is associated with a word that is part of the same syntactic constituent as the contrastively focused word and one set of cases (i.e. those with contrastive focus on the modifier of the subject noun phrase) where it is not.

In looking at post-focal pitch range reduction, the two things that must be kept in mind are existence of post-focal F0 rises and the height of the peak when a rise does exist. Table 6.7 presents the percentage of occurrence of F0 rises and their average height in the broad focus utterances in Corpus #2. This table will serve as a comparison for the contrastive focus data examined below.
Table 6.7: Existence F0 rises and height of F0 peaks in broad focus utterances.

In this table we can see that there are usually F0 rises present in all positions except on the modifier of the object noun phrase, which, since it is in final position within the utterance, is subject to final lowering (see Section 3.3.3). The second of two consecutive F0 peaks is generally lower than the first, though this is not seen between the second and third peaks (i.e. those associated with the modifier of the subject noun phrase and the verb) in the present study.

In order to examine whether syntactic constituency affects post-focal pitch range reduction, Table 6.8 presents the existence of F0 rises and the average height of existing F0 peaks in each position when the head of the subject noun phrase is in contrastive focus.
By comparing this table with Table 6.7, we see that when the head of the subject noun phrase is in contrastive focus, there is a smaller percentage of cases where the modifier of the subject noun phrase has a visible F0 rise than is true in broad focus utterances. When there is a rise present, its peak is generally lower than in broad focus utterances. The modifier of the subject noun phrase is within the same syntactic constituent as the head of the subject noun phrase, and in order to see if syntactic constituency plays a role in pre-focal pitch range reduction, we must look at the first position after the subject noun phrase (i.e. the verb).

We see that there is a large decrease in the percentage of occurrence of an F0 rise on the verb in Table 6.8 in comparison with the modifier of the subject noun phrase. The

<table>
<thead>
<tr>
<th>Position in the Utterance:</th>
<th>Head of Subj. NP</th>
<th>Mod. of Subj. NP</th>
<th>Verb</th>
<th>Head of Obj. NP</th>
<th>Mod. of Obj. NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrences (%) of F0 Rise (N=60 : 100%)</td>
<td>100</td>
<td>72</td>
<td>40</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Average Height of F0 Peak</td>
<td>225 Hz</td>
<td>176 Hz</td>
<td>188 Hz</td>
<td>187 Hz</td>
<td>147 Hz</td>
</tr>
<tr>
<td>Difference from Broad Focus</td>
<td>+8 Hz</td>
<td>-20 Hz</td>
<td>-9 Hz</td>
<td>-1 Hz</td>
<td>-6 Hz</td>
</tr>
</tbody>
</table>

Table 6.8: Existence of F0 rises and height of F0 peaks in utterances with contrastive focus on the head of the subject noun phrase.
F0 peak on the verb is also lower than in broad focus utterances. While it seems that there is a bigger drop in the existence of F0 rises on the verb (i.e. after the constituent containing the contrastively focused word) than on the modifier of the subject noun phrase (i.e. the post-focal word within the same constituent as the contrastively focused word), there are two possible explanations for this. One explanation is that post-focal pitch range reduction occurs more frequently after the syntactic constituent containing the word in contrastive focus, and the other is that post-focal pitch range reduction is stronger later in the utterance (i.e. farther away from the word in contrastive focus). Based on Table 6.8 and the percentages of cases with an F0 rise in each position, it seems that the distance from the contrastively focused word could be a possible explanation.

In order to investigate further whether syntactic constituency has an effect on post-focal pitch range reduction, I look at utterances with contrastive focus on the modifier of the subject noun phrase. If the decrease in existing F0 rises seen between the modifier of the subject noun phrase and the verb in Table 6.8 is due to syntactic constituency, then the same difference should be seen in the same position when the modifier of the subject noun phrase is in contrastive focus, even though there is less space between the contrastively focused word and the verb. If, on the other hand, the decrease in Table 6.8 is due to the distance between the contrastively focused word and the verb,

---

1 The peak is actually higher here than on the modifier of the subject noun phrase in the same utterances. There are a couple potential explanations for this. One is that since the modifier of the subject noun phrase is the last word of the syntactic constituent, there is often a L- following it, causing final lowering on the modifier of the subject noun phrase. Another possibility is that those speakers with higher pitch ranges in the present are those which most often produce an F0 peak in this position.
then the difference in the percentages of F0 rises between the contrastively focused modifier of the subject noun phrase and the verb should be similar to the difference between the head and modifier of the subject noun phrase in Table 6.8.

Table 6.9 presents the existence of F0 rises and height of existing F0 peaks in utterances where the modifier of the subject noun phrase is produced in contrastive focus.

<table>
<thead>
<tr>
<th>Position in the Utterance:</th>
<th>Head of Subj. NP</th>
<th>Mod. of Subj. NP</th>
<th>Verb</th>
<th>Head of Obj. NP</th>
<th>Mod. of Obj. NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrences (%) of F0 Rise (N=60 : 100%)</td>
<td>100</td>
<td>100</td>
<td>55</td>
<td>38</td>
<td>13</td>
</tr>
<tr>
<td>Average Height of F0 Peak</td>
<td>235 Hz</td>
<td>195 Hz</td>
<td>181 Hz</td>
<td>191 Hz</td>
<td>143 Hz</td>
</tr>
<tr>
<td>Difference from Broad Focus</td>
<td>+18 Hz</td>
<td>+1 Hz</td>
<td>-16 Hz</td>
<td>+3 Hz</td>
<td>-10 Hz</td>
</tr>
</tbody>
</table>

Table 6.9: Existence of F0 rises and height of F0 peaks in utterances with contrastive focus on the modifier of the subject noun phrase.

The data in Table 6.9 show that there is a considerable drop in the percentages of existence of F0 peaks and the height of the existing peaks between the contrastively focused modifier of the subject noun phrase and the verb. In comparing this result with previous results, we see that this drop is larger than that between the contrastively focused head of the subject noun phrase and the modifier of the same phrase in Table 6.8. It is not as large, however, as the drop between the contrastively focused head of the
subject noun phrase and the verb in Table 6.8. This indicates that there are two interacting factors in the degree of post-focal pitch range reduction. Syntactic constituency does have an effect, with post-focal pitch range reduction being more common and stronger after the syntactic constituent containing the word in contrastive focus. Nonetheless, the distance of a post-focal word from the contrastively focused word is also a factor in the degree of post-focal pitch range reduction, especially when looking at cases where no F0 rise is present.

6.4.3 Pre-Focal Pitch Range Expansion

In Section 5.3.1.1 I presented evidence that there is a process of pre-focal pitch range expansion in Spanish, whereby at least the F0 peak immediately preceding the contrastively focused word is higher than it would be in a broad focus declarative. Due to the design of Corpus #1, I was unable to determine if this process affected all pre-focal F0 peaks or only the immediately preceding peak. I will revisit this question at the end of this section.

The primary purpose of this section is to determine whether syntactic constituency has an effect on pre-focal pitch range expansion. I will consider this possibility by looking at the F0 peak associated with the stressed word immediately preceding the contrastively focused word in cases where these words are part of the same syntactic constituent and in cases where they are not. In all cases, F0 peak heights will be compared with the height of peaks in the same position in broad focus declaratives. I begin by considering cases where the contrastively focused word and the stressed word
immediately preceding it are part of the same syntactic constituent. In order to accomplish this, I examine the F0 peaks associated with the head of the subject and object noun phrases when the modifier of the same noun phrase is in contrastive focus.

The height of F0 peaks when the modifier of the subject noun phrase is in contrastive focus is shown above in Table 6.9. In this table we see that the F0 peak on the head of the subject noun phrase, which is the stressed word immediately preceding the contrastively focused word, averages 18 Hz higher than in the same position in broad focus declaratives. The height of F0 peaks when the modifier of the object noun phrase is in contrastive focus is reported in Table 6.10.

<table>
<thead>
<tr>
<th>Position in the Utterance:</th>
<th>Head of Subj. NP</th>
<th>Mod. of Subj. NP</th>
<th>Verb</th>
<th>Head of Obj. NP</th>
<th>Mod. of Obj. NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Height of F0 Peak</td>
<td>219 Hz</td>
<td>205 Hz</td>
<td>199 Hz</td>
<td>209 Hz</td>
<td>157 Hz</td>
</tr>
<tr>
<td>Difference from Broad Focus</td>
<td>+2 Hz</td>
<td>+9 Hz</td>
<td>+2 Hz</td>
<td>+21 Hz</td>
<td>+4 Hz</td>
</tr>
</tbody>
</table>

Table 6.10: Height of F0 peaks when the modifier of the object noun phrase is in contrastive focus.

In this table we see that the head of the object noun phrase, the stressed word immediately preceding the contrastively focused word, has an F0 peak which averages 21 Hz higher than peaks in the same position in broad focus declaratives.
In order to determine whether syntactic constituency has an effect on pre-focal pitch range expansion, I now look at cases where the contrastively focused word and the stressed word immediately preceding it are not in the same syntactic constituent. For this I examine cases where the head of the object noun phrase is in contrastive focus and where the verb is in contrastive focus, since the preceding stressed word (i.e. the verb and the modifier of the subject noun phrase, respectively) are not part of the same syntactic constituent (i.e. the object noun phrase and the verb phrase, respectively). The following tables report the height of F0 peaks when the head of the object noun phrase is in contrastive focus (Table 6.11), and when the verb is in contrastive focus (Table 6.12).

<table>
<thead>
<tr>
<th>Position in the Utterance:</th>
<th>Head of Subj. NP</th>
<th>Mod. of Subj. NP</th>
<th>Verb</th>
<th>Head of Obj. NP</th>
<th>Mod. of Obj. NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Height of F0 Peak</td>
<td>222 Hz</td>
<td>206 Hz</td>
<td>207 Hz</td>
<td>203 Hz</td>
<td>145 Hz</td>
</tr>
<tr>
<td>Difference from Broad Focus</td>
<td>+5 Hz</td>
<td>+10 Hz</td>
<td>+10 Hz</td>
<td>+15 Hz</td>
<td>-8 Hz</td>
</tr>
</tbody>
</table>

Table 6.11: Height of F0 peaks when the head of the object noun phrase is in contrastive focus.

---

The verb phrase is considered here since we are dealing with the subject noun phrase and the verb. While syntactic theory sees the object as part of the verb phrase, the subject and verb are always seen as separate constituents.
Tables 6.11 and 6.12 show that even when the contrastively focused word and the immediately preceding stressed word are not in the same syntactic constituent, pre-focal pitch range expansion is active. In Table 6.11 the F0 peak immediately preceding the contrastively focused word averages 10 Hz higher than in broad focus utterances, and in Table 6.12 it averages 16 Hz higher.

I return now to the question left open in Section 5.3.1.1: Does pre-focal pitch range expansion affect all pre-focal F0 peaks or only the one immediately preceding the word in contrastive focus? In each of Tables 6.10-6.12, the stressed word immediately preceding the contrastively focused word has an F0 peak which is considerably higher (i.e. 10 to 21 Hz higher) than peaks in the same position in broad focus utterances. While in all cases this is the biggest difference in height between the pre-focal F0 peaks and the corresponding peaks in broad focus utterances, all pre-focal F0 peaks in these tables are higher on the average than F0 peaks in the same position in broad focus utterances. In some cases, however, the average height of the pre-focal F0 peaks which do not

<table>
<thead>
<tr>
<th>Position in the Utterance:</th>
<th>Head of Subj. NP</th>
<th>Mod. of Subj. NP</th>
<th>Verb</th>
<th>Head of Obj. NP</th>
<th>Mod. of Obj. NP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Height of F0 Peak</td>
<td>218 Hz</td>
<td>212 Hz</td>
<td>204 Hz</td>
<td>186 Hz</td>
<td>160 Hz</td>
</tr>
<tr>
<td>Difference from Broad Focus</td>
<td>+1 Hz</td>
<td>+16 Hz</td>
<td>+7 Hz</td>
<td>-2 Hz</td>
<td>+7 Hz</td>
</tr>
</tbody>
</table>

Table 6.12: Height of F0 peaks when the verb is in contrastive focus.
immediately precede the contrastively focused word is only one or two Hz higher than in broad focus utterances. These results seem to show that pre-focal pitch range expansion primarily affects the F0 peak on the stressed word which immediately precedes the contrastively focused word, but that it may have some effect on the entire pre-focal portion of the utterance.

6.5 Conclusion

Throughout this chapter I have considered the ways in which syntactic constituency affects the intonation patterns used to convey contrastive focus. I looked first at the effects of syntactic constituency on the phonology and then on the phonetics of intonation. In considering phonology, I found that when a single word within a syntactic constituent is produced in contrastive focus, that word has a focal intonation pattern associated with it, whether it be a focal L+H* pitch accent or the use of a following intermediate phrase boundary. Furthermore, in these cases an intermediate phrase boundary normally follows the entire syntactic constituent containing the contrastively focused word. It is interesting that the marking of contrastive focus can be split temporally, with the focused word being marked by a focal pitch accent, L+H*, and the entire constituent being followed by an intermediate phrase boundary tone, usually the focal L-. A surprising finding is that the contrastively focused word may be immediately followed by a L-, and second L- may follow the entire syntactic constituent. The use of L+H* on the contrastively focused word and a L- following the syntactic constituent means that the constituent is produced as an intermediate phrase, but the contrastively
focused word is highlighted by the focal pitch accent. The use of a L- both after the contrastively focused word and after the syntactic constituent, however, means that the constituent is being divided into two intermediate phrases. While such division of the constituent may be surprising, it provides two very prominent markers of contrastive focus.

The use of intermediate phrase boundaries, and specifically the focal L-, after the syntactic constituent containing the contrastively focused word raises the question as to what happens when the entire syntactic constituent is produced in contrastive focus. In these cases an intermediate phrase boundary generally follows the constituent, but no focal intonation pattern is associated with a particular word within the constituent. Rather, the typically broad focus L*+H pitch accent is used in the majority of cases. So, while there is some phonological similarity (i.e. the use of an intermediate phrase boundary following the syntactic constituent) in the intonation patterns on syntactic constituents produced in contrastive focus and those containing a single word produced in contrastive focus, there is also a phonological difference between the two (i.e. the intonation patterns associated with the words within the constituent).

With regard to phonetic processes, I found that syntactic constituency has an effect on post-focal pitch range reduction, as suggested by de la Mota (1995, 1997). While post-focal pitch range reduction can take place within the syntactic constituent containing the contrastively focused word, it takes place more frequently and to a greater degree after the syntactic constituent. In addition, I found that the distance between the
contrastively focused word and a post-focal word has some effect on the degree of post-focal pitch range reduction found on a post-focal word.

Unlike for post-focal pitch range reduction, I found that syntactic constituency does not have an effect on pre-focal pitch range expansion. There is a considerably higher F0 peak on a stressed word immediately preceding the contrastively focused word than in the same position in broad focus utterances, but this is true both when the pre-focal word and the contrastively focused word belong to the same syntactic constituent and when they do not. In addition, I answered a question which I left open in Section 5.3.1.1 with regard to the nature of pre-focal pitch range expansion by showing that it primarily affects the F0 peak associated with the stressed word immediately preceding the contrastively focused word, but may affect other pre-focal F0 peaks as well.
CHAPTER 7

CONCLUSIONS

7.1 Introduction

Throughout this dissertation I have examined the ways in which intonation is used phonologically and phonetically to mark contrastive focus in Madrid Spanish. Working within the AM theory of intonational phonology I have analyzed the intonation contours found for marking contrastive focus and have offered analyses which are able to account for these contours. The intonational model proposed for Madrid Spanish based on the present study makes use of phonologically distinct rising pitch accents, internal pitch accent structure, and two levels of prosodic phrasing. In addition, it is sensitive to syntactic constituency, despite the lack of a one-to-one correspondence between prosodic phrasing and syntactic phrasing. In this chapter I review the most important findings from the previous chapters based on the experimental results of the present study. I then consider the larger implications of these findings and address areas that must be addressed by future research.
7.2 Review of Findings

In Chapter 3, I discussed the intonation of broad focus declaratives in the present study as a basis for comparison in the examination of the intonation patterns used to mark contrastive focus. I found that the intonation of broad focus declaratives in the present study is consistent with previous research on broad focus declaratives in Spanish. F0 begins to rise near the beginning of a stressed syllable, and it generally rises beyond the end of that syllable. Only in cases of extreme tonal crowding due to stress clash is the F0 peak realized within the stressed syllable. This pattern was argued to be the result of a L*+H pitch accent. The exception to this pattern is the final F0 rise of an utterance, where the F0 peak is almost always realized within the stressed syllable. In Chapter 3 the question was left open as to whether this pattern in final position was a phonetic variant of the L*+H pitch accent, or whether it was a result of a nuclear L+H* pitch accent. It was later shown using non-utterance-final nuclear position that this pattern is indeed the result of a L+H* nuclear pitch accent.

I also showed in Chapter 3 that broad focus declaratives in the present study are consistent with previous studies on downstepping, in that each F0 peak is lower than the previous one. The final F0 peak is lower than would be expected, even considering downstepping, and sometimes it was not visible at all in the pitch track. This pattern is consistent with a process of final lowering which reduces the height of the final F0 peak.

One of the simplest, yet most important, findings of Chapter 4 is that there are multiple local intonational strategies which may be used to mark contrastive focus. While there is no reason that it should not be so, this has not been recognized in previous
research and this has led to ambiguity in the interpretation of experimental results. This is especially true for studies which have considered whether or not F0 peak height is used to mark contrastive focus. The results of some studies have shown that F0 peak height is used to mark contrastive focus, other studies have found that it is not, and yet others have indicated that it may be used but that this use is inconsistent. By acknowledging that there are multiple local intonational strategies for marking contrastive focus, the ambiguity of previous experimental results is resolved. While F0 peak height is one strategy for marking contrastive focus, it does not necessarily accompany the other strategies. Therefore, when applying statistical analyses, it is important to compare with broad focus utterances only those cases where manipulation of F0 peak height is used to mark contrastive focus. By mixing all cases of contrastive focus, regardless of the intonational strategy used, previous researchers have unknowingly complicated their experimental results.

The local intonational strategies which were found in Chapter 4 to mark contrastive focus are F0 peak height, a high intermediate phrase boundary tone following the word in contrastive focus, a contrastive focus pitch accent, and a low intermediate phrase boundary tone following the word in contrastive focus. When F0 peak height is used, a L*+H pitch accent is employed, as is the case in broad focus declaratives, but the F0 peak reaches a higher level than in broad focus declaratives. A high intermediate phrase boundary tone, H-, may follow a word in contrastive focus, but it also may divide a broad focus declarative. I showed that the frequency of use of H- is significantly higher following a word in contrastive focus than in the same position in a broad focus
declarative. A L+H* focal pitch accent may be used in place of the typically broad focus L*+H pitch accent to mark contrastive focus. A low intermediate phrase boundary tone, L-, may also follow a word in contrastive focus. Unlike H-, L- was not used outside of final position in the present study except to mark contrastive focus. Interestingly, in final position contrastive focus does not seem to be marked intonationally, although a L+H* pitch accent is used since it is the nuclear pitch accent.

While I distinguish between the broad focus L*+H and the contrastive focus L+H*, this distinction requires the incorporation of pitch accent structure into the AM theory of intonational phonology. Traditionally within the AM theory the starred tone indicates the tone of a pitch accent which is associated with the stressed syllable. The unstarred tone of a bitonal pitch accent either precedes or follows the starred tone by a phonetically determined distance. Outside of the sequencing of tones, however, the relationship between the two tones of a bitonal pitch accent has been largely overlooked. The tonal alignment data for the Spanish L*+H and L+H* pitch accents show, however, that the relationship between the tones is different in the two pitch accents. In the L*+H pitch accent, the L is clearly aligned with the stressed syllable and the H clearly comes at a distance later. In the L+H* pitch accent, while the H is clearly aligned with the stressed syllable, the L does not precede the H in the same way that the H follows the L in the L*+H pitch accent. Rather, in the L+H* pitch accent the L aligns only a few milliseconds earlier than it does in the L*+H pitch accent. This difference in the relationship between the two tones of the two pitch accents is explained by proposing that these pitch accents have different internal structures.
I considered two possible internal pitch accent structures which were suggested by Grice (1995) and showed that the hierarchical structure, based on Nespor and Vogel's (1986) structure of the prosodic word, is able to accurately account for the Spanish tonal alignment data. This hierarchical structure contains three levels. The highest level is the pitch accent level, where a pitch accent node dominates the entire pitch accent. Below the pitch accent level is the supertone level. Each pitch accent node contains either one or two supertones. Below the supertone level is the tone level. Each supertone node contains either one or two tones. Headedness at the supertone and tone levels determines the association of the pitch accent with the stressed syllable and the alignment of the tones of the pitch accent with the speech stream.

In Chapter 5, I showed that there are three global intonation patterns used to mark contrastive focus. Pre-focally, there is pitch range expansion which causes the F0 peak immediately preceding the word produced in contrastive focus to be higher than it otherwise would be. This has not previously been noted, and goes against Navarro Tomás's (1944) claim that when words are emphasized what comes before and after them is produced with a low and relatively flat pitch. Another pre-focal intonation pattern found in some cases is the use of a H- preceding the word in contrastive focus. Rather than immediately preceding the word in contrastive focus, however, the H- occurs at a preceding syntactic phrase boundary.

It has been observed previously that there is a low and relatively flat pitch on the post-focal portion of an utterance (de la Mota 1995, 1997; Navarro Tomás 1944). It has been unclear, however, how this should be analyzed phonologically since either
proposing that there are no pitch accents present over this portion of the utterance or proposing a post-focal pitch range reduction can account for this intonation pattern. I showed that in many cases there are F0 obtrusions visible in the pitch track which cannot be explained without postulating that there are pitch accents present. In these cases, however, the F0 peaks are not as high as they would be in broad focus declaratives. Thus I argue that there is a post-focal pitch range reduction in Spanish, and that this is a gradient process which, at its extreme, can cause the total flattening of the F0. In these cases pitch accents are present phonologically, but they are not visible in the pitch track due to the phonetic effects of the post-focal pitch range reduction. I also showed that this gradient post-focal pitch range reduction is strongest following the contrastive focus pitch accent L+H* and following the focal L-. The explanation for this is that these are the strongest intonational markers of contrastive focus, due to their near-exclusive use for marking focus, and this strength is shown in the degree of post-focal pitch range reduction as well.

In Chapter 6, I considered the effects of syntactic constituency on the intonation patterns used to mark contrastive focus. When a single word in contrastive focus is part of a larger syntactic constituent, the word in contrastive focus is marked with one of the local intonation patterns which are used to mark contrastive focus, and an intermediate phrase boundary tone generally follows the entire syntactic constituent. The word in contrastive focus may show any of the four local intonational strategies discussed in Chapter 4. When an intermediate phrase boundary is used following the word in contrastive focus, another usually follows the entire syntactic constituent. This means
that two intermediate phrase boundaries may be used at different points in the syntactic constituent to mark contrastive focus on a single word. This division of the syntactic constituent into more than one intermediate phrase is surprising, but provides two prominent markers of contrastive focus.

When the entire syntactic constituent is produced in contrastive focus, most often there are no intonational markers of this contrastive focus other than an intermediate phrase boundary following the entire syntactic constituent. In this way no single word is conveyed in contrastive focus, but the setting off of the entire constituent in an intermediate phrase conveys that the entire phrase is produced in contrastive focus. In some cases a local intonational strategy for marking contrastive focus may also be used on a word within the constituent which is being produced in contrastive focus. When this is the case, it is always the head of the constituent which is marked. This seems to be due to the projection of focus onto the head of the syntactic constituent.

With regard to pitch range, syntactic constituency does not have an effect on pre-focal pitch range expansion, but it does affect post-focal pitch range reduction. While post-focal pitch range reduction can occur within the same syntactic constituent as the contrastively focused word, it occurs more frequently and to a greater degree after the syntactic constituent. This supports the observation made by de la Mota (1995, 1997) that the low and flat post-focal pitch level seems to be delayed until after the syntactic constituent, but also shows that this is not always so.
7.3 Implications

The findings of the present study have implications beyond the identification and analysis of Spanish focal intonation patterns. The first is that the focal intonation patterns found will be useful in identifying the focus of an utterance. Since focus is a pragmatic notion that is not predictable based on syntax alone, it is often difficult to identify the focus of a given utterance. While identification of the focus may at times be determined from the discourse context, this identification is not always clear and requires a subjective decision on the part of the researcher. The intonation patterns reported in the present study to mark contrastive focus provide more objective criteria for determining the focus of a given utterance.

Another implication of the present study relates to a typology of languages based on the use of intonation or syntax for the marking of focus, and specifically to the place of Spanish within such a typology. In the introduction I cited Ladd (1996:191), who states that “Word order modifications in languages like Spanish and Italian may indirectly achieve the accentual effects that English accomplishes directly by manipulating the location of the nuclear accent”. Ladd goes on to say that “This means that languages like Spanish or Italian, whose normal word order is subject-verb-object (SVO) and which allows VS word order in intransitives, are bad places to look for different accentual treatment of predicates and arguments”. The multiple intonational markings of Spanish contrastive focus reported in the present study bring into question a typology of languages based on intonational vs. syntactic marking of focus (or other prominent elements in the utterance). While intonation may be used more often or in a
larger variety of ways in one language than in another to mark focus, the present study shows that even languages which are generally considered to use word order may employ a variety of intonational markings. This means that these languages must not be written off as “bad places to look” for different intonational markings. Rather, the present study shows that Spanish makes use of an extensive intonational system and that this system is used in marking focus.

7.4 Future Research

There are various topics that must be addressed in future research. While I have shown that there are four local intonational strategies used to mark contrastive focus, I have not addressed the differences in use between them. In fact, this cannot be addressed through the experiments used in the present study. Future studies will need to examine corpora of naturally occurring speech to investigate whether pragmatic or discourse factors favor the use of one strategy over the others. While all of the strategies occurred in basically identical contexts in the present study, the contexts were minimal. For this reason the contexts may not have limited the possible intonational strategies in the way that a more developed pragmatic and discourse context might.

The global intonation patterns found to be associated with contrastive focus have received almost no attention in previous studies. Further examination of these will be needed in future studies to clarify their role in marking contrastive focus. Of particular
interest will be the interaction between local and global intonational strategies for marking contrastive focus. It seems certain that both types of strategies are used, though the exact function of each merits further investigation.

Future studies will be needed to investigate the nature of pitch accent structure, especially with regard to its implementation in languages other than Spanish. In this way we will be able to determine to what extent the structure is universal and in what ways its implementation is language specific. In addition, it will be important to determine to what extent the incorporation of internal pitch accent structure into the AM theory will require a reanalysis of tonal alignment in other languages. In Spanish it simply eliminated the need for a non-standard parenthetical notation (Face 2001), but the consequences could be more significant for previous analyses of the intonation of other languages.

The interaction of intonation and word order will be an important topic for future research to consider. It must be determined if word order and intonation are always used separately, as appears to be the case in utterance-final position, or whether there are cases where they are used jointly to mark focus. If they are used jointly, it must be determined if certain syntactic constructions are accompanied by particular intonational markings, or whether there is variation in the intonational marking used.

The present study has dealt exclusively with Madrid Spanish, but it is important that other dialects be considered as well. It must be determined whether other dialects have the same or different intonational markings of focus. Of interest also is whether some of the markings used for focus in Madrid Spanish have a different use in other
dialects. If so, this could pose misunderstandings of the pragmatic intent of the speaker by a listener from another dialect. In addition, different dialects of Spanish have a more fixed word order than does Madrid Spanish. This may have an effect on the number and type of focal intonational markings used.

7.5 Conclusion

Throughout this dissertation I have shown that intonation is used in different ways, some phonological and some phonetic, to mark contrastive focus in Spanish. I have been able to answer questions raised by previous research and at the same time have raised questions for future investigation. Perhaps the greatest lesson to be learned from the present study is that no matter how we may try to reduce the Spanish intonational system to convenient notational conventions such as H, L, and *, it is an extensive system which we are only beginning to understand. The door is wide open to further investigate the nature and functions of this system, and I hope that my walk through that door prepares the way for others to further the work which I have presented here.
APPENDIX A

QUESTION AND ANSWER PAIRS IN CORPUS #1

The question and answer pairs in Corpus #1 are listed below. The versions including all contents resulted in the sentences with three stressed words. The versions with the parenthetical content excluded resulted in the sentences with two stressed words. Words in contrastive focus are in capitals.

SET A

No intervening unstressed syllables

A: ¿Qué dijo Manuel?
B: Que le da números (pertinentes).

A: ¿Dijo Manuel que le pide números (pertinentes)?
B: No. Que le DA números (pertinentes).

A: ¿Dijo Manuel que le da documentos (pertinentes)?
B: No. Que le da NÚMEROS (pertinentes).
One intervening unstressed syllable

A: ¿Qué dijo Ana?
B: Que le daba números (pertinentes).

A: ¿Dijo Ana que le pedía números (pertinentes)?
B: No. Que le DABA números (pertinentes).

A: ¿Dijo Ana que le daba documentos (pertinentes)?
B: No. Que le daba NÚMEROS (pertinentes).

Two intervening unstressed syllables

A: ¿Qué dijo Pepe?
B: Que le daban el número (pertinente).

A: ¿Dijo Pepe que le pedían el número (pertinente)?
B: No. Que le DABAN el número (pertinente).

A: ¿Dijo Pepe que le daban el documento (pertinente)?
B: No. Que le daban el NÚMERO (pertinente).
**Three intervening unstressed syllables**

A: ¿Qué dijo María?
B: Que le dábamos el número (pertinente).

A: ¿Dijo María que le pedíamos el número (pertinente)?
B: No. Que le DÁBAMOS el número (pertinente).

A: ¿Dijo María que le dábamos el documento (pertinente)?
B: No. Que le dábamos EL NUMERO (pertinente).

**Four intervening unstressed syllables**

A: ¿Qué dijo Ignacio?
B: Que se lo daba para el número (pertinente).

A: ¿Dijo Ignacio que se lo pedía para el número (pertinente).
B: No. Que se lo DABA para el número (pertinente).

A: ¿Dijo Ignacio que se lo daba para el documento (pertinente)?
B: No. Que se lo daba para EL NÚMERO (pertinente).
Five intervening unstressed syllables

A: ¿Qué dijo Pilar?

B: Que se lo dábamos para el número (pertinente).

A: ¿Dijo Pilar que se lo pedíamos para el número (pertinente)?

B: No. Que se lo DÁBAMOS para el número (pertinente).

A: ¿Dijo Pilar que se lo dábamos para el documento (pertinente)?

B: No. Que se lo dábamos para EL NÚMERO (pertinente).

SET B

No intervening unstressed syllables

A: ¿Qué dijo Víctor?

B: Que lo terminó Nana (ayer).

A: ¿Dijo Víctor que lo comenzó Nana (ayer)?

B: No. Que lo TERMINÓ Nana (ayer).

A: ¿Dijo Víctor que lo terminó Pablo (ayer)?

B: No. Que lo terminó NANA (ayer).
**One intervening unstressed syllable**

A: ¿Qué dijo Sonia?

B: Que lo terminó la nana (de los niños).

A: ¿Dijo Sonia que lo comenzó la nana (de los niños)?

B: No. Que lo TERMINÓ la nana (de los niños).

A: ¿Dijo Sonia que lo terminó la abuela (de los niños)?

B: No. Que lo terminó LA NANA (de los niños).

**Two intervening unstressed syllables**

A: ¿Qué dijo Raúl?

B: Que terminó la banana (de la chica).

A: ¿Dijo Raúl que vio la banana (de la chica)?

B: No. Que TERMINÓ la banana (de la chica).

A: ¿Dijo Raúl que terminó la manzana (de la chica)?

B: No. Que terminó LA BANANA (de la chica).
Three intervening unstressed syllables

A: ¿Qué dijo Carmen?

B: Que terminó con la banana (de la chica).

A: ¿Dijo Carmen que jugó con la banana (de la chica)?

B: No. Que TERMINÓ con la banana (de la chica).

A: ¿Dijo Carmen que terminó con la manzana (de la chica)?

B: No. Que terminó con LA BANANA (de la chica).

Four intervening unstressed syllables

A: ¿Qué dijo Eduardo?

B: Que terminó lo de la banana (de la chica).

A: ¿Dijo Eduardo que comenzó lo de la banana (de la chica)?

B: No. Que TERMINÓ lo de la banana (de la chica).

A: ¿Dijo Eduardo que terminó lo de la manzana (de la chica)?

B: No. Que terminó lo de LA BANANA (de la chica).
Five intervening unstressed syllables

A: ¿Qué dijo Manuela?
B: Que terminó con lo de la banana (de la chica).

A: ¿Dijo Manuela que comenzó con lo de la banana (de la chica)?
B: No. Que TERMINÓ con lo de la banana (de la chica).

A: ¿Dijo Manuela que terminó con lo de la manzana (de la chica)?
B: No. Que terminó con lo de LA BANANA (de la chica).

SET C

No intervening unstressed syllables

A: ¿Qué dijo José?
B: Que los comparará Mar (en enero).

A: ¿Dijo José que los leerá Mar (en enero)?
B: No. Que los COMPARARÁ Mar (en enero).

A: ¿Dijo José que los comparará Pilar (en enero)?
B: No. Que los comparará MAR (en enero).
One intervening unstressed syllable
A: ¿Qué dijo Nieves?
B: Que los comparara Mar (en enero).

A: ¿Dijo Nieves que los leyera Mar (en enero)?
B: No. Que los COMPARARA Mar (en enero).

A: ¿Dijo Nieves que los comparara Pilar (en enero)?
B: No. Que los comparara MAR (en enero).

Two intervening unstressed syllables
A: ¿Qué dijo Antonio?
B: Que los comparara con Mar (en enero).

A: ¿Dijo Antonio que los leyera con Mar (en enero)?
B: No. Que los COMPARARA con Mar (en enero).

A: ¿Dijo Antonio que los comparara con Pilar (en enero)?
B: No. Que los comparara con MAR (en enero).
Three intervening unstressed syllables

A: ¿Qué dijo Isabela?
B: Que los comparara para Mar (en enero).

A: ¿Dijo Isabela que los leyera para Mar (en enero)?
B: No. Que los COMPARARA para Mar (en enero).

A: ¿Dijo Isabela que los comparara para Pilar (en enero)?
B: No. Que los comparara para MAR (en enero).

Four intervening unstressed syllables

A: ¿Qué dijo Pablo?
B: Que los comparáramos para Mar (en enero).

A: ¿Dijo Pablo que los leyéramos para Mar (en enero)?
B: No. Que los COMPARÁRAMOS para Mar (en enero).

A: ¿Dijo Pablo que los comparáramos para Pilar (en enero)?
B: No. Que los comparáramos para MAR (en enero).
Five intervening unstressed syllables

A: ¿Qué dijo Rosa?

B: Que los comparáramos para Lamar (en enero).

A: ¿Dijo Rosa que los leyéramos para Lamar (en enero)?

B: No. Que los COMPARÁRAMOS para Lamar (en enero).

A: ¿Dijo Rosa que los comparáramos para Pilar (en enero)?

B: No. Que los comparáramos para LAMAR (en enero).
APPENDIX B

QUESTION AND ANSWER PAIRS IN CORPUS #2

The question and answer pairs in Corpus #2 are listed below. The versions including all contents resulted in the sentences with three stressed words. Words or phrases in contrastive focus are in capitals.

SET A

A: ¿Qué pasa?
B: El hermano de Manolo le daba el número de vuelo.

A: ¿Eduardo le daba el número de vuelo?
B: No. EL HERMANO DE MANOLO le daba el número de vuelo.

A: ¿El primo de Manolo le daba el número de vuelo?
B: No. EL HERMANO de Manolo le daba el número de vuelo.
A: ¿El hermano de José le daba el número de vuelo?

B: No. El hermano de MANOLO le daba el número de vuelo.

A: ¿El hermano de Manolo le pedía el número de vuelo?

B: No. El hermano de Manolo le DABA el número de vuelo.

A: ¿El hermano de Manolo le daba la fecha de la reunión?

B: No. El hermano de Manolo le daba EL NÚMERO DE VUELO.

A: ¿El hermano de Manolo le daba la hora del vuelo?

B: No. El hermano de Manolo le daba EL NÚMERO de vuelo.

A: ¿El hermano de Manolo le daba el número de teléfono?

B: No. El hermano de Manolo le daba el número de VUELO.

A: ¿El hermano de Manolo le pedía la fecha de la reunión?

B: No. El hermano de Manolo le DABA EL NÚMERO DE VUELO.

SET B

A: ¿Qué pasa?

B: El niño gallego admira a la niña de Málaga.
A: ¿La mujer andaluza admira a la niña de Málaga?

B: No. EL NIÑO GALLEG0 admira a la niña de Málaga.

A: ¿La mujer gallega admira a la niña de Málaga?

B: No. EL NIÑO gallego admira a la niña de Málaga.

A: ¿El niño andaluz admira a la niña de Málaga?

B: No. El niño GALLEGO admira a la niña de Málaga.

A: ¿El niño gallego odia a la niña de Málaga?

B: No. El niño gallego ADMIRA a la niña de Málaga.

A: ¿El niño gallego admira al hombre catalán?

B: No. El niño gallego admira a LA NIÑA DE MÁLAGA.

A: ¿El niño gallego admira al hombre de Málaga?

B: No. El niño gallego admira a LA NIÑA de Málaga.

A: ¿El niño gallego admira a la niña catalana?

B: No. El niño gallego admira a la niña de MÁLAGA.
A: ¿El niño gallego odia al hombre catalán?
B: No. El niño gallego ADMIRA A LA NIÑA DE MÁLAGA.

SET C

A: ¿Qué pasa?
B: La madre de María examina la nave morada.

A: ¿El hombre catalán examina la nave morada?
B: No. LA MADRE DE MARÍA examina la nave morada.

A: ¿El padre de María examina la nave morada?
B: No. LA MADRE de María examina la nave morada.

A: ¿La madre de Pablo examina la nave morada?
B: No. La madre de MARÍA examina la nave morada.

A: ¿La madre de María pinta la nave morada?
B: No. La madre de María EXAMINA la nave morada.

A: ¿La madre de María examina el barco de vela?
B: No. La madre de María examina LA NAVE MORADA.
A: ¿La madre de María examina el barco de vela morado?
B: No. La madre de María examina LA NAVE morada.

A: ¿La madre de María examina la nave amarilla?
B: No. La madre de María examina la nave MORADA.

A: ¿La madre de María pinta el barco de vela?
B: No. La madre de María EXAMINA LA NAVE MORADA.
LIST OF REFERENCES


Garrido, Juan M.; Joaquim Llisterri; Carme de la Mota; Rafael Marín; and Antonio Ríos. 1995. Prosodic markers at syntactic boundaries in Spanish. *ICPhS* 13.2: 370-373.


Hualde, José Igancio. 1999. Basic intonational contours in Spanish. Paper presented at the First Sp-ToBI Workshop, Columbus, Ohio, 1-3 October.


Llisterri, Joaquim; Rafael Marín; Carme de la Mota; and Antonio Rios. 1995. Factors affecting F0 peak displacement in Spanish. *EUROSPEECH* '95:2061-2064.


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