Deaccenting in Spontaneous Speech in Barcelona Spanish

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Abstract

Recent literature on Spanish intonation assumes that deaccenting occurs when a lexical item fails to cue stress via an F0 rise or some other pitch movement through its stressed syllable. Inspired by the findings and suggestions for future research by Face (2003), the present study fills in research gaps by examining seven potential influences on deaccenting, working with spontaneous speech, and addressing the understudied Barcelona dialect of Spanish. The analysis of 160-170 minutes of spontaneous speech data collected at the Universitat Autònoma de Barcelona reveals that the odds of deaccenting increase in words that are high frequency in Spanish, have fewer syllables, are verbs or adverbs, are uttered multiple times within a recent timeframe, or are in initial or medial positions of the phonological phrase. Finally, high frequency verbs and adverbs, as well as adverbs, nouns, and verbs with fewer syllables are all especially prone to deaccenting.

1. Introduction

among several others). While the vast majority of such previous work has been conducted using a laboratory approach with scripted speech, Face (2003) encourages work on the more natural, spontaneous speech style. He states that, “while lab speech is invaluable in intonational studies, it cannot be assumed that the intonation patterns produced in lab speech are an accurate representation of the intonation patterns of spontaneous speech” because of “intertwining factors in spontaneous speech that can affect the intonation of an utterance” (116). Such factors that are not present in scripted speech may include different levels of emotion based on the topic at hand, sudden changes in speech rate, turn-taking strategies and pauses of varying lengths while expressing ideas.

One of the main differences between lab and spontaneous speech noted by Face (2003) is the higher presence of deaccenting, which is defined as the lack of F0 movement through stressed syllables as a cue to prominence, in the latter style. These tonal movements in or near stressed syllables are labeled pitch accents, which are phonologically specified tonal targets associated with stressed syllables that occur amongst intervening phonetic interpolation (Hualde 2003). Spanish pitch accents are mainly composed of high (H) and/or low (L) tones. Inspired by Face’s (2003) comments on situations in which pitch accents are absent, the present study’s goal is to investigate potential variables that influence this lack of tonal movement in Barcelona Spanish. Though a definition of deaccenting has been established, very little work has attempted to discover what factors significantly contribute to its occurrence. By focusing on a somewhat understudied aspect of intonation in a speech style and a dialect that both call for further attention, this paper aims to address holes in research in various ways. Before delving into the specifics of the study, it is necessary to address the issue of speech styles and the relationship between stress and accent.

1.1 Speech styles

Lab and spontaneous speech are located on two ends of a continuum of speech styles. Face (2003) describes speech styles on a continuous scale in order to establish that the distinction between lab and spontaneous speech is not categorical. Examples of data elicitation techniques presented on this continuum that depart from lab speech but that are not truly spontaneous speech are story retelling from pictures, dialogue games in pairs to provoke production of specific structures, and map tasks in which participants interact in order for one speaker to figure out a route on the other speaker’s map. According to Face, when comparing these data elicitation techniques, map tasks probably most closely approximate spontaneous speech without reaching this extreme end of the continuum. Story retelling has been employed by Farrar, Grabe & Nolan (1999) and Grabe (1998) to study English intonation, dialogue games by Krahmer & Swerts (2001) in regard to the existence of contrastive accents, and map tasks by Grice & Savino (2003) to examine
questions in Bari Italian. Additionally, others, such as Hualde (2002), have obtained brief examples of (semi-)spontaneous speech by recording native speaker linguists producing intonational patterns that they imagine as appropriate for particular situations. At the extreme opposite end from lab speech on this continuum lies free flowing spontaneous speech, which has received very little attention in previous studies on Spanish intonation.

It is important to acknowledge that it is not implied that the treatment of speech style in Face (2003) is exhaustive. Llisterri & Poch (1992) state that speech styles roughly refer to intra-speaker variation, though no clear agreement has been reached as to its interpretation. Furthermore, as Williams (1993) notes, a discussion of speech styles should address the context in which speech is produced, the tasks involved, the rate of speech, and the conscious attention given to production at the time of speech. Contextual factors refer to the formality of the situation, which could range from formal data elicitation tasks or interviews with unknown investigators to more informal conversations with friends or family. The tasks involved could be controlled, such as reading isolated words or carrier phrases or describing given objects or situations, or more unscripted and conversational. Tasks carried out in a controlled, lab setting can include legitimate utterances or even nonsense phrases serving a specific function (see Prieto, Shih & Nibert 1996). Speech style can also be conceived as rapid versus slow, or casual versus deliberate (see Harris 1969). Additionally, Milroy (1987) explains that variants of speech style occur within different domains. For example, such variations can be tied to prosodic, phonetic and phonemic contrasts, syntactic conditions, lexical items, or even the decision to use one language over another. Overall, Williams (1993), following Labov (1981), points out that we can look at speech style as one continuum where each factor involved has a range of possibilities. This corresponds with Milroy (1987), who says that speech style is a group of specific categories that present intra-style variation.

1.2 Stress and accent

As an introduction to stress and accent, it is important to note that the discussion here is couched within the AM model, which assumes the hierarchy illustrated in (1). Each abstract constituent of this arrangement corresponds with concrete phonetic evidence found in pitch contours. The phrasal constituents represent ways in which prosody is used to chunk information into units with definite size and internal structure (D’Imperio, Elordieta, Frota, Prieto & Vigário 2005, Frota 2000, Zubizarreta 1998).

(1) Phonological constituents (adapted from Gussenhoven 2002, p.271)²

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It is important to note that tonal structure operates above the level of the syllable (and, consequently, above the segment). The tonal structure associates with the syllable level, as well as the IP level. Of the various levels in (1), the IP, PPH and PW are the most pertinent to this paper. In general, IPs have easily perceived pauses before and after the left and right edges, respectively. They also have boundary tones, are non-isomorphic in relation to syntactic structure, and are units that carry meaning (van Heusinger 2007). In Spanish, the conclusion of an IP is mainly signaled by a final high (H) or low (L) boundary tone (%) or by a clear pause (see D’Imperio et al. 2005, Prieto 2006, among others, for Peninsular varieties, Sosa 1999 for a wide range of dialects, and Rao 2007 for examples from Lima, Perú). A PPH provides additional depth of phrasing. It is similar to the intermediate phrase that is commonly used within the AM framework. The common thread between phonological and intermediate phrases is that they are both seen as smaller minor phrases contained within IPs (i.e. major phrases). A major difference between PPHs and IPs is that the disjuncture at PPH boundaries is less clearly defined. The boundaries of PPHs can be located in Spanish by using phonetic cues such as F0 continuation rises ending in the final syllable of a word, longer duration of stressed syllables, large pitch range increases or decreases, and pauses (D’Imperio et al. 2005, Elordieta, Frota, Prieto & Vigário 2003, Hualde 2003, Prieto 2006 and Toledo in press, among others). Although those such as Beckman, Diaz-Campos, McGory & Morgan (2002), Jun (2005) and Sosa (1999) claim that a second level of phrasing is unnecessary in Spanish, Hualde (2002) and Nibert (2000) disagree. In particular, Nibert (2000) provides evidence that two levels of phrasing help disambiguate meaning in certain utterances. The present study follows the point of view of Hualde and Nibert, assuming a major and minor level of phrasing. Finally, a PW is a phonologically relevant idea that plays a metrical role in describing main word stress. Based on the upcoming discussion of stress and accent, we will assume here that a lexical item is a PW if it is prosodically accented, meaning it contains F0 movement through the stressed syllable.

Ladd (1996), who considers the proposals by those such as Abercrombie (1991), Bolinger (1954), and Halliday (1967), says that stress concerns perceived prominence of lexical items in an utterance. In terms of Metrical Theory (Liberman 1975, Liberman & Prince 1977), stress is associated with metrical prominence of words, phrases and utterances. In terms of the utterance level, nuclear (i.e. final) position is considered to carry main stress, and thus is the most salient stress position. This idea is connected to Chomsky & Halle’s (1968) Nuclear Stress Rule, which posits that the last word of a domain should be given prominence. This rule is
followed closely in constituents in broad focus in Romance languages (see Frascarelli 2000 and Prieto 2005), as opposed to some Germanic languages, in which prominence in broad focus is often located to the left of the nuclear position of a domain. In fact, even repeated information in IP-final position usually has stress in Spanish and Italian (Gussenhoven, 2004, Hualde in press, Ladd 1996). In contrastive narrow focus contexts (see Face 2001), in which a word or portion of an utterance are emphasized, main stress may fall in pre-nuclear position. However, Face (2000, 2001, among others) has shown that although intonational means can be used to mark narrow focus, doing so via syntactic rearrangement seems to be the unmarked strategy. Moreover, previous research on a variety of languages has looked at segmental effects in phrase initial position. For example, Pierrehumbert & Talkin (1992) show that /t/ in an English word such as *tomahawk* has a longer voice onset time in initial position of the IP than in medial position. On a related note, Jun’s (1993, 1995) work on Korean reports that glottal gestures are fortified in domain-initial positions, which leads to a larger glottal opening that stays open for a longer duration. Foug eron & Keating’s (1997) results for English suggest that consonants are articulated with increased linguopalatal contact when occupying initial position of a prosodic domain. In fact, this 1997 study claims that higher prosodic positions correspond with more linguopalatal contact. This phenomenon is deemed domain-initial strengthening. For further studies on segmental strengthening in initial position see Foug eron (1999) for French, Hsu & Jun (1998) for Taiwanese and Keating, Cho, Foug eron & Hsu (1999) for cross-linguistic observations.

With regard to domains, Hualde (in press) analyzes several types of compound words in order to demonstrate that in Spanish, only the right most stress is maintained at the word level. At the phrase level, he shows that individual words keep their stress. Following Liberman & Sproat (1992), he maintains that the PW is a constituent that contains only one word level stress. This proposal allows for an explanation of the prosodic difference between stressed and unstressed function words. Unstressed function words are seen as part of the PW domain of the following stressed word, while those that are stressed comprise their own PW domain. For example, in *para los niños* ‘for the children’, the unstressed *para* and *los* are part of the PW domain in which the content word *niños* carries stress. However, in a case like *estos niños* ‘these children’, the first word is a stressed function word, which forms its own PW domain (examples from Hualde in press).

Accent refers specifically to prominent intonational F0 movement that takes place in or around stressed syllables and serves as one possible phonetic cue to the location of stress (Gussenhoven 2004, Hualde in press, Ladd 1996, Xu & Xu 2005, among others). This idea is also relevant to the AM model, in which F0 contours are seen as the result of phonetic interpolation between pitch accents and boundary tones, both of which are phonologically labeled tonal targets associated with stressed syllables and ends of constituents, respectively. In terms of previous work
on Spanish intonation, Face (2003) and Quilis (1993) claim that F0 is the principle acoustic expression of stress and that intensity and duration have a reduced role. Following this train of thought, the current study expands on the presence or absence of F0 movement as a cue to stress. In terms of tonal movement, Garrido (1996) and Garrido, Llisterrri, de la Mota & Ríos (1993) posit that a rise in F0, as opposed to its peak, is the most important phonetic signal to a stressed syllable. A rise in F0 is common in prenuclear pitch accents in broad-focus statements. Therefore, in these cases, a flat F0 contour through the stressed syllable is strong evidence in favor of deaccenting. However, in nuclear position of declaratives as well as in some interrogatives, Spanish pitch accents contain a decrease in F0 (which does not equate to lacking accent). Therefore, for the purposes of this study a stressed lexical item is considered as deaccented when any tonal movement is absent from its stressed syllable. A threshold for F0 movement between peaks and valleys of 7 hertz (Hz) is used in order to determine the presence of a pitch accent (following O’Rourke 2006). Therefore, we expect deaccented portions of pitch contours to be very flat in nature, void of significant F0 excursions.

An example from the present data of a lack of accent is provided below in Figure 1. In this case, the highlighted stressed word, color, belonging to the portion of the sentence y el mundo es de color de rosas ‘and the world is the color of roses’, does not contain a pitch excursion and thus is considered to be deaccented. In contrast, the other stressed words, mundo, es and rosas, all demonstrate accent via some degree of F0 increase through their stressed syllables. The minor phrase containing these words ends in an H- boundary tone, which is a typical edge for this type of phrase in Spanish. For further physical evidence of deaccenting in the present data, see the figures in the appendix.

In Spanish neutral declarative utterances, content words such as adjectives, adverbs, nouns and verbs are normally stressed and are associated with a pitch accent (Sosa 1999). However, the stress in function words depends on syntactic, morphological or semantic factors (Hualde in press). Studies such as Quilis (1993) categorize lexical items as generally stressed or unstressed. Some examples of generally unstressed function words are para ‘for’, a ‘to’, el ‘the, masc. sg.’ and la ‘the, masc. fem.’ to name a few. For the purposes of this study, and following Hualde (in press), I see such function words as completely unstressed. Therefore, neutrally speaking, the pitch contour of the sequence para las chicas (‘for the girls’) will be perceived as containing similar overall perceptual salience to the F0 movement in just one content word, such as chicas (‘girls’). Conversely, function words such as the indefinite determiners un/una ‘a, masc./fem.’ unos/unas ‘a few, masc./fem.’ and the demonstrative pronouns este/esta ‘this, masc./fem. sg.’ and estos/estas ‘these, masc./fem. pl.’ are normally stressed.
Figure 1. Deaccenting of the word *color* (‘color’), belonging to *y el mundo es de color de rosas* ‘and the world is the color of roses’. F0 movement through the stressed syllable, *lor*, is less than 7 Hz, and thus this item does not contain a pitch accent.

Hualde (in press) provides additional insight into the distinction between stress and accent. He states that in general, in languages containing contrastive stress at the word level, prominent F0 movement occurs in syllables that have a certain amount of stress. The degree of stress that is conducive to such tonal movement, which is accent, varies from language to language. Therefore, Hualde asserts that accent deals with a certain level of prominence at the prosodic level, or stress, which highly depends on the language in question. Assuming this point of view means that investigating the phonetic correlates of stress specifically involves examining varying levels of stress. Furthermore, with respect to the autosegmental and the metrical tiers of the AM model, Hualde (in press) says that when syllables on the metrical tier have a certain degree of prominence, a pitch accent on the autosegmental tier is anticipated. However, it is crucial to mention that the frequency and prosodic domain of pitch accents are also language dependent. For example, Spanish pitch accents are much more frequent in stressed words (i.e. a low level of the prosodic or metrical hierarchy of constituents), while English pitch accents are manifested at the higher, phrase level.

As Willis (2002) notes, it is important to mention that deaccenting does not always directly correspond with a lack of lexical stress. Prior studies on Spanish have revealed that lexical stress can be expressed acoustically in syllables via increases in intensity, duration, and F0. In fact, older studies such as Contreras (1964) and Navarro Tomás (1964) propose that increased intensity of the stressed syllable is the strongest correlate to stress in Spanish. One more recent study by
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Ortega-Llebaria (2006), which attempts to tease apart cues to stress and accent, finds that both pitch and duration (but not intensity) are employed to indicate stress, accent, and the presence of IP boundaries. Another key study to identify is that of Ortega-Llebaria, Prieto & Vanrell (2007), which details the perceptual evidence for acoustic correlates of stress in Spanish. In particular, stress is examined in deaccenting contexts in order to see whether factors other than accent, such as duration, intensity, and spectral tilt, serve as indicators of stress. The significant finding of this study is that spectral tilt does not seem to cue stress, while duration and intensity do. Finally, in a related but more extensive study, Ortega-Llebaria & Prieto (2007) also look at differences in stress in cases of deaccenting in order to uncover whether stress is still conveyed via other means besides accent. The main findings reveal that vowel quality, syllable duration, and spectral tilt are all acoustically correlated with stress in Spanish. They also show that differences in accent are cued via intensity. Overall, these studies detailing the importance of non-accentual factors as cues to stress evidence the fact that F0 movement is just one piece of the complete picture of stress.

1.3 Studies on deaccenting

The investigation of Face (2003) is among few that have focused on deaccenting in spontaneous speech in Spanish. Overall, he shows that different intonational trends are present in the declaratives of spontaneous speech when compared to those of lab speech. In particular, he examines four variables in both speech styles: downstepping, extreme reductions of F0 at the end of utterances (i.e. final lowering), deaccenting and peak alignment. In terms of F0 rises through stressed syllables, Face notes that there are few cases in lab speech where this pattern does not occur. However, in spontaneous speech, he finds that examples of deaccented words are more common. In his corpus, 30% of accentable words in spontaneous speech in prenuclear position do not have a pitch accent. Rao’s (2006) study of unscripted speech reveals that deaccenting occurs at approximately the same rate as that found by Face (2003), while also adding that deaccenting is pragmatically associated with low levels of emotion. Furthermore, of all the deaccented words in the corpus used by Face (2003), the majority are verbs, adverbs and syntactic determiners. The verbs that are more inclined to deaccent, such as ser ‘to be’, haber ‘to have; to have to’ and estar ‘to be’ seem to share the feature of being commonly used. Such verbs, which are also short in length, would fall under the category of high frequency words. Bybee (2002) posits that we see articulatory reduction in high frequency words because the fact that they are used so much creates a higher degree of automaticity in production. Therefore, it is quite possible that high frequency words are more prone to deaccenting, since a lack of F0 movement is a type of reduction. Also, many of these high frequency words tend to be short in length. Therefore, one would intuitively think that words with fewer syllables
deaccenting at higher rates, as their decreased duration also decreases the time for F0 movement to occur in stressed syllables.

The status of deaccenting in Romance and Germanic languages is quite different. As Avesani & Vayra (2005) note, previous findings for Germanic languages state that accent is often employed by speakers to prosodically signal information that is new to the hearer or to point out two elements that are in contrast to one another. Conversely, deaccenting in these languages is, in many cases, indicative of a word that represents given information or information that is anticipated to appear in speech. This perspective, which is generally assumed in the literature, derives from evidence supporting the claim that there is an intimate tie between information status and the presence or absence of accent in Germanic languages (Hirschberg 1993, Horne 1990, Müller 2006, Nooteboom & Terken 1982, Terken 1984, among others). This connection between given information and the absence of F0 movement has been the object of in-depth study for Germanic languages, but not so much for Romance. However, the link is not so straightforward. For example, Terken & Hirschberg (1994) show that deaccenting of second mentions of words is not universal by any means. Rather, this phenomenon is most likely to take place when the two mentions occur in the same sentence position and fulfill the same grammatical role in two consecutive sentences. This investigation is crucial because it emphasizes that repeated information and deaccenting have a complex connection that deserves further consideration. Another idea, emerging from Swerts (2007), is that specific syntactic contexts can bring on higher resistance to deaccenting in contrastive settings in Romance than what is observed in Germanic languages. As such, we see that the concept of resistance identified in literature on Romance is highly context dependent as well.

Some work on deaccenting in Romance seeks to discover if its occurrence is tied to information structure. Cruttenden (1993), in his study on old information in laboratory speech, affirms that an increase in F0 through the stressed syllable is crucial to expressing stress in Spanish by showing that such syllables rarely occur without F0 rises regardless of information structure. He finds that unlike Germanic languages such as English, Spanish and Catalan resist deaccenting of old information. Based on Ladd (1996), it is apparent that low levels of deaccenting extend to other Romance languages such as Romanian and Italian. While other studies such as Avesani, Hirschberg & Prieto (1995) and Hirschberg & Avesani (1997) suggest that deaccenting of constituents like simple NPs and clauses is similar in Italian to what takes place in Germanic languages, Swerts, Krahmer & Avesani (2002) find that Italian and Germanic languages differ in that the former tends to accent more words in longer NPs than the latter. García-Lecumberri (1995) also cites varying degrees of deaccenting between nouns and verbs in her comparative study of English and Spanish, further suggesting an effect of grammatical category on the likelihood of including or excluding a pitch accent. With regard to information structure, Avesani (1997), in a study utilizing
broadcasted speech, reveals that, unlike English, items previously uttered in discourse are often accented regardless of grammatical role and position within the sentence. She also suggests that the manifestation of pitch accents is at times dependent on information structure in Italian (commonly seen in Pierrehumbert & Hirschberg 1990 for English). Other studies supporting a preference for including accent are those by Avesani & Vayra (2005) and Bard & Aylett (1999), who analyze deaccenting of repeated structures in Italian through dialogue tasks, and arrive at a conclusion reflecting that of Ladd (1996). Gussenhoven (2004) echoes this tendency against deaccenting for French as well. Finally, although Spanish does not particularly favor deaccenting, de la Mota (1995, 1997), Face (2001, 2002) and Hualde (2002), among others, have described cases of pitch reduction in post-focal contexts and in examples of final lowering. Final lowering results in the reduction or disappearance of tonal movement in nuclear position within the phrase, even in lab speech (Prieto, Nibert & Shih 1995 and Prieto, Shih & Nibert 1996). However, in these conditions, nuclear phrase position and other cues such as final lengthening are sufficient in providing the impression of greater stress, even though pitch excursions are greatly reduced or absent. Therefore, final lowering is not a type of deaccenting, since the latter relates to prominence, which can still be achieved via other means in nuclear phrase position.

1.4 Goals of the present study

Previous literature on stress, accent and deaccenting motivates a series of research questions about this phenomenon in the spontaneous speech of Barcelona Spanish. The studies on given information in Germanic and Romance languages, as well as Bybee’s (2002) comments on frequency, inspire the following question related to the current body of data: i. Does the previous use of a word in a speaker’s discourse increase the likelihood of deaccenting it in later occurrences? Inspired by the insight of Terken & Hirschberg (1994), general repetition is distinguished from recent repetition, which triggers the question: ii. Do subsequent repetitions of a word within a short timeframe tend to deaccent more? After discussing Bybee (2002), Face (2003), Terken & Hirschberg (1994), and others, some further questions that arise are: iii. Do words belonging to certain grammatical categories tend to show higher levels of deaccenting?; iv. Do high frequency words increase the likelihood of deaccenting?; v. Since high frequency words are generally shorter, does a fewer number of syllables correlate with a higher degree of deaccenting? The position taken in Section 1.2 on positional prominence in prosodic domains, and the manifestation of different pitch accents based on position in a prosodic domain, leads to posing the following question: vi. How does position of a word within the PPH and the IP affect the propensity to deaccent?

The remainder of this paper seeks to address the research questions just outlined. That is, the study examines the effects of seven independent variables on
deaccenting of words in spontaneous speech in Barcelona Spanish. The seven variables are shown in (2).

(2) Seven variables examined in this study
   a. Repetition in discourse
   b. Recent repetition in discourse
   c. Number of syllables
   d. Grammatical category of word
   e. Global high frequency (i.e. generally frequent in Spanish)
   f. Position in the PPH
   g. Position in the IP

The remainder of this paper is divided into three sections. Section 2 provides information on methods of data collection and analysis. Section 3 presents statistical results showing which variables significantly affect the odds of deaccenting. Specifically, the empirical results of statistical tests will reveal the following: i. which of the variables have significant effects on deaccenting; ii. how the significant variables affect the odds of deaccenting; iii. the interactions among the variables. Finally, Section 4 explores the implications of the statistical results in relation to our previous knowledge of deaccenting and delivers suggestions for future research.

2. Methods

2.1 Data collection

Spontaneous speech data was collected in Barcelona, Spain, at the Universitat Autònoma de Barcelona, in a phonetics laboratory. Since Barcelona is a city of constant language contact between Spanish and Catalan, a language history questionnaire helped screen potential participants. The data comes from a total of 17 participants; 12 females and 5 males, all between the ages of 19 and 28, with 15 being students at the previously mentioned university. Each participant conversed with the investigator about various topics ranging from his/her daily routine to the political situation in Spain. For each participant, large chunks of discourse approximately one to three minutes in length were obtained dealing with five or six different topics. The speakers each produced, on average, a total of nine to ten minutes of spontaneous data.

The collection and analysis of data were carried out using the PitchWorks software package, a laptop computer, and a head-mounted microphone. In order to minimize the participants’ awareness of the microphone, they performed ten to fifteen minutes of other recorded activities, such as a map task, prior to the conversation with the investigator (see Rao 2008 for a discussion of the map task
data). By the time the conversation began, participants had minimal awareness of the microphone, which allowed for the production of a natural speech style.

2.2 Coding scheme for the seven variables

Upon completion of the data collection process, which yielded 160-170 minutes of recordings, the corpus was transcribed. Since deaccenting applies to words that are stressed, the data set had to be coded to separate stressed and unstressed words. This process was done with the aid of the list of stressed and unstressed word types found in Quilis (1993). Each stressed word (henceforth simply ‘word,’ since unstressed items are not of particular interest), which could cue stress via accent, was examined for a pitch accent associated with the stressed syllable. As described earlier, a minimum change in F0 of 7 Hz needed to be present in order for F0 movement to be considered as a pitch accent. If this feature was absent in a word, it was marked as a deaccented item. Once it was clear which words were deaccented, these items, along with all stressed words, were further coded in preparation for evaluating the contribution of the seven variables listed in (2). Both the accented and deaccented words needed to be examined with respect to the seven variables in order to make a valid statistical comparison.

Before continuing, it is crucial to clarify how the variables are defined and how words are classified based on different categories of outcomes for each variable. Many of the previously detailed studies on Germanic and Romance languages connect deaccenting with given or repeated information in discourse. While these investigations use approaches to evaluating repeated information such as Grosz & Sidner’s (1986) discourse segments, the present study applies a method that takes into account a word’s repetition in discourse prior to deaccentuation, as well as the recency of its last occurrence prior to deaccentuation. This method incorporating general repetition in addition to recency was motivated by Terken & Hirschberg (1994), as well as the fact that many previous investigations do not seem to include or specifically define the importance of both of these factors in completely accounting for the relationship between repetition and deaccenting.

Due to the fact that the current approach is not widely documented, the definitions of general repetition and recent repetition emerged from the data. Five commonly deaccented words were chosen. For each of these words, the data of each speaker was examined to see how many times the word occurred before it was deaccented, and also how spread apart a deaccented articulation of the word was from its previous iteration (which may or may not be accented). Averaging the results across all speakers determined that a word would be classified as repeated if there is one previous occurrence, and as recently repeated if its previous appearance is within the preceding ten PWs. An example of this difference from the data is a speaker repeating the verb gustar ‘to be pleasing’ with 28 intervening PWs (in responses to different questions), while producing the adverb también ‘also’ in
consecutive sentences with only two PWs between repetitions. 9 *Gustar* is considered repeated but not recent, while *también* is both repeated and recent. For these two variables, all words are classified in a binary fashion, with the possibilities being yes or no.

Of the remaining variables, those that do not refer to prosodic constituents were coded in a fairly straightforward manner. Counting the number of syllables in all words led to forming the categories 1, 2, 3, 4 and 5+. The final category collapses all words of five or more syllables due to the overall low frequency of such lengths. Examples from each of these respective categories from the data are es ‘is’, gente ‘people’, *comida* ‘food’, *perspectiva* ‘perspective’, and *literatura* ‘literature’.

Words were also grammatically categorized as verbs, adverbs, nouns, stressed pronouns, adjectives, and stressed conjunctions. Samples of words from each of these categories are *vivo* ‘I live’, *muy* ‘very’, *verano* ‘summer’, *yo* ‘I’, *diferentes* ‘different’ and *hasta* [que] ‘until’, respectively.

The value for global high frequency derives from Fuller Medina’s (2005) study on verbs, in which this label refers to having at least 2,000 hits in the 20th century in the *Corpus del Español* (Davies 2002). 10 A few examples of words from the data satisfying this requirement are *mucho* ‘a lot’, *trabajar* ‘to work’, *decir* ‘to say/tell, and *ciudad* ‘city’. This measure of frequency is also a categorical distinction, with possible classifications being yes or no.

The final two variables deal with phrasal position of deaccented items, which required dividing the data into PPHs and IPs. Locating each type of phrase boundary was realized by searching for certain phonetic cues. For PPHs, such cues are F0 continuation rises, final lengthening, changes in pitch range, and pauses. Boundary tones (usually L%) and longer breaks in discourse signaled IP boundaries. For both levels of prosodic constituents, words are marked as initial, medial, final or single. If there are three or more words in a PPH, the first and last are initial and final, respectively, while all others between the beginning and end of the phrase are marked as medial. When only two words are present in a PPH, they are seen as initial and final, meaning such a PPH lacks medial components. The single tag represents a word that is individually phrased in a PPH.

At the IP level, words were coded with the same four options. However, in this case, the positional category of each word depends on the location of its PPH within an IP. For example, if a word is in the first PPH of a sequence of PPHs in a given IP, this word is considered initial for the IP variable and if it is in the final PPH of an IP, it is deemed final at the IP level. When there is only one PPH in an IP, a word in this PPH is single for the IP variable. When an IP contains three or more PPHs, any word belonging to any PPH between the initial and final PPHs is medial. A representation of this coding scheme is displayed in (3) through a general example. There are ten words dispersed across four PPHs that are all contained within one long IP. All Ws refer to stressed words that may or may not be accented.
Coding of the variables ‘position in the PPH’ and ‘position in the IP’

Note: i = initial, m = medial, f = final, s = single, Φ = PPH boundary

\[(W \ W \ W)Φ(W)Φ(W \ W)Φ(W \ W \ W)Φ]\IP

\[i \ m \ f \ s \ i \ f \ i \ m \ m \ f \ (PPH \ category)\]
\[i \ i \ i \ m \ m \ m \ f \ f \ f \ \ (IP \ category)\]

2.3 Statistical procedure

Once all the data were coded and prepared for statistical analysis, they were entered into an Excel spreadsheet. The distribution of words was described by calculating their frequencies across the categories just mentioned of each of the seven variables. Next, a logistic regression test with main effects and two-way interactions was carried out. A reduced version of the initial logistic regression was fit using a generalized linear mixed model with a random effect for subject and a binomial distribution for accenting/deaccenting. This model aims to illustrate the contribution of each independent variable to deaccenting, while also describing interactions between variables. The random effect component is useful because it allows for increased generalization of the findings to all speakers of this dialect, assuming the sample is representative of the population. The model initially informed us which variables contribute to the probability of deaccenting at statistically significant levels. Finally, odds ratios (or odds multipliers) were generated, indicating the effect of each covariate (i.e. potential influences on deaccenting here) on the odds of deaccenting, with all other things being equal. The relationship between odds and probability is shown in the following manner: odds = probability/1-probability. Odds ratios are advantageous because they permit a relatively straightforward interpretation of covariates. A condition belonging to these covariates is compared to a second condition, and if the odds ratio is higher/lower than one, the first condition increases/decreases the odds of the dependent variable. For example, in the recency variable of the current study, if we take the yes category as the baseline and compare it to cases instead falling under no, an odds ratio of less than one indicates that non-recent words decrease the odds of deaccenting when compared to recent words.

3. Results

The process of coding to separate stressed and unstressed words reveals that there are 2,609 stressed words in the data. Tables 1-8 include the frequencies with which these words belong to the categories described in the previous section for each of the seven variables. This general view of the data uncovers the overall trends across words. Then we focus specifically on how different categories of each variable affect deaccenting, in addition to any interactions between the seven variables and a
lack of F0 movement in words. All percentages are rounded to the nearest whole number.

3.1 Frequencies across variables

Table 1 gives an overall perspective on the frequency of deaccentuation in the present data. There is a categorical distinction, meaning if there was F0 movement through the stressed syllable, the words are accented and thus coded as ‘no’ (i.e. not deaccented), and if this feature was absent, they were coded as ‘yes’ (i.e. deaccented). The overall frequency of deaccented items, 23%, falls in the vicinity of the value documented by Face (2003), 30%. Even though this phenomenon occurs more in spontaneous speech than in lab speech, it is apparent that accented words remain dominant in the former speech style as well.

<table>
<thead>
<tr>
<th>Deaccented?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2003/2,609</td>
<td>77%</td>
</tr>
<tr>
<td>Yes</td>
<td>606/2,609</td>
<td>23%</td>
</tr>
</tbody>
</table>

Table 1. Overall breakdown of accented versus deaccented words

Table 2 breaks down whether or not words were repeated at least once in the interviews. The higher frequency of unrepeated words points to speakers utilizing a wide range of vocabulary when producing data. There is still a large number of repeated tokens, and each successive articulation after the first may lead to a higher likelihood of deaccenting. Intuitively this idea appears sound, since repetitions can decrease the informational salience of an item. However, if this were the case, it would contradict the findings of several previously mentioned investigations on the resistance to deaccent in Romance (e.g. Avesani & Vayra 2005, Bard & Aylett 1999, Cruttenden 1993, Ladd 1996, Gussenhoven 2004).

<table>
<thead>
<tr>
<th>Repeated Word?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>1,604/2,609</td>
<td>61%</td>
</tr>
<tr>
<td>Yes</td>
<td>1,005/2,609</td>
<td>39%</td>
</tr>
</tbody>
</table>

Table 2. Repetition of words

Table 3 shows the frequencies of words according to the recency component of repeated information. The majority of words are not repeated within a ten PW window. The 426 ‘yes’ tokens can still shed new light on the reasons for deaccenting due to the fact that most previous work on Romance does not differentiate between the two types of repetition used here. Generally, reference is
made to old or repeated information without considering at what point in discourse a repetition occurs after its first mention. This idea of recency, motivated by Terken & Hirschberg (1994), appears to be crucial because a word may be more likely to deaccent if it is uttered twice in the same sentence as opposed to once every two or three minutes. It is possible that the recent repetition decreases informational importance even more than would be the case with just one general repetition.

<table>
<thead>
<tr>
<th>Recently Repeated Word?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2,183/2,609</td>
<td>84%</td>
</tr>
<tr>
<td>Yes</td>
<td>426/2,609</td>
<td>16%</td>
</tr>
</tbody>
</table>

Table 3. Recent repetition of words

Table 4 illustrates the number of syllables contained in all words. The speech produced by participants contains more words that are two syllables long, with one and three being the next most common. To my knowledge, no previous investigations on Spanish connect number of syllables with deaccenting. One would intuitively think that shorter words increase the potential of deaccenting due to their decreased duration and thus less time and space for F0 movement to be manifested. Finally, it should be noted that in the logistic regression, the two least frequent categories were collapsed into ‘3,’ thus creating a ‘3+’ category. This was necessary because the low frequencies of ‘4’ and ‘5’ skewed the data and led to statistical inaccuracies.

<table>
<thead>
<tr>
<th>Syllables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>558/2,609</td>
<td>21%</td>
</tr>
<tr>
<td>2</td>
<td>1,166/2,609</td>
<td>45%</td>
</tr>
<tr>
<td>3</td>
<td>569/2,609</td>
<td>22%</td>
</tr>
<tr>
<td>4</td>
<td>272/2,609</td>
<td>10%</td>
</tr>
<tr>
<td>5+</td>
<td>44/2,609</td>
<td>2%</td>
</tr>
</tbody>
</table>

Table 4. Number of syllables in words

Table 5 divides all words according to grammatical category. Although some adverbs and pronouns are unstressed in Spanish, Quilis (1993) shows that there are stressed options in each of these grammatical categories as well. Only adverbs and pronouns appearing on his list are considered as candidates to appear in this table. Overall, nouns and verbs are the most frequent word types in the data, as expected, since they are the foundation of sentences. If the present results coincide with Face’s (2003), certain commonly appearing verbs across Spanish would be most disposed to deaccent. Stressed conjunctions were too scarce to be included in the
statistical analysis and therefore were dropped before frequency calculations were completed. Finally, the low frequency of pronouns eliminated them from the logistic regression procedure.

<table>
<thead>
<tr>
<th>Grammatical Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb</td>
<td>873/2,609</td>
<td>33%</td>
</tr>
<tr>
<td>Noun</td>
<td>851/2,609</td>
<td>33%</td>
</tr>
<tr>
<td>Adverb</td>
<td>454/2,609</td>
<td>17%</td>
</tr>
<tr>
<td>Adjective</td>
<td>311/2,609</td>
<td>12%</td>
</tr>
<tr>
<td>Pronoun</td>
<td>120/2,609</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Table 5. Grammatical category of words**

Table 6 shows the frequency of words that are globally frequent. As per the Davies (2002) corpus, almost three-fourths of the words in the data are frequent in general in the Spanish language. Face’s (2003) results on deaccenting of ‘commonly used’ verbs could lead one to conjecture that this type of ‘high frequency’ variable may extend beyond just verbs and play a role in the deaccenting of any of the word types from Table 5. Bybee’s (2002) position on high frequency words being prone to reductive processes would also lead us to believe that the ‘yes’ words in Table 6 significantly affect deaccenting.

<table>
<thead>
<tr>
<th>High Frequency?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1,844/2,609</td>
<td>71%</td>
</tr>
<tr>
<td>No</td>
<td>765/2,609</td>
<td>29%</td>
</tr>
</tbody>
</table>

**Table 6. Global high frequency of words**

Table 7 categorizes all words by position in the PPH. Items fall in initial, medial, and final position at identical frequencies (when disregarding decimals of percentage values). Apparently, the lack of medial words in PPHs of two words is balanced by the fact that PPHs with more than three words have multiple items classified as medial. Individually phrasing words is done at a low frequency and often conveys narrow focus or the beginning of an incomplete thought. One would expect the medial category to have a greater influence on deaccenting based on the earlier discussion of prominence and strengthening in final and initial positions.
<table>
<thead>
<tr>
<th>Position in PPH</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>784/2,609</td>
<td>30%</td>
</tr>
<tr>
<td>Medial</td>
<td>802/2,609</td>
<td>30%</td>
</tr>
<tr>
<td>Final</td>
<td>775/2,609</td>
<td>30%</td>
</tr>
<tr>
<td>Single</td>
<td>248/2,609</td>
<td>10%</td>
</tr>
</tbody>
</table>

Table 7. Position of words in the PPH

Table 8 classifies words by IP position based on where their PPH falls within the larger IP constituent. Items are fairly evenly dispersed across the four categories, with more tokens belonging to initial and final PPHs within an IP. This could be due to having more cases of two PPHs inhabiting an IP, in which there are no words belonging to the ‘medial’ category of this variable. The slightly lower frequency of tokens in the ‘single’ category suggests that speakers do not favor producing IPs composed of just one PPH.

<table>
<thead>
<tr>
<th>Position in IP</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>769/2,609</td>
<td>29%</td>
</tr>
<tr>
<td>Medial</td>
<td>598/2,609</td>
<td>23%</td>
</tr>
<tr>
<td>Final</td>
<td>809/2,609</td>
<td>31%</td>
</tr>
<tr>
<td>Single</td>
<td>433/2,609</td>
<td>17%</td>
</tr>
</tbody>
</table>

Table 8. Position of words in the IP

3.2 Are there effects of the variables on deaccenting?

Once the general trends were found using frequencies with respect to each of the seven relevant variables, a qualitative assessment of the effects of each variable on deaccenting was realized. Beyond the seven variables of interest, a subject component is included in order to account for the random effect of individual differences. The probability that is modeled accounts for the words falling in the ‘yes’ category of the binary distinction between accented and deaccented words made in Table 1. A lower probability (p) value indicates stronger significance of some component(s) of each variable to deaccenting.

Table 9 reveals the variables and interactions that have a statistically significant effect on deaccenting. The analysis contains fixed variables, which are those that are measured with no error. The values of such variables in one particular study are assumed to be the same as these variables in another study. Fixed effects are assumptions made about independent variables and their errors. With these types of effects, one can extrapolate the results to other investigations employing the same
values of independent variables. All effects in Table 9 are fixed, but as previously mentioned, the subject variable is a random effect. Furthermore, we note that five of the seven variables in question individually have a significant influence: high frequency, number of syllables, grammatical category, recency and position in the PPH. Grammatical category makes an additional contribution by interacting with both high frequency and number of syllables. This means that one or more of the categories belonging to each of these variables join forces in affecting the odds of deaccenting. Finally, the model concludes that variables not appearing in this table, tied to repetition in discourse and position in the IP, were found to have p-values higher than .05, and therefore have very minimal effects.

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Frequency</td>
<td>.0005</td>
</tr>
<tr>
<td>Syllables</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Category</td>
<td>.0350</td>
</tr>
<tr>
<td>High Frequency*Category</td>
<td>.0074</td>
</tr>
<tr>
<td>Syllables*Category</td>
<td>.0059</td>
</tr>
<tr>
<td>Recency</td>
<td>.0083</td>
</tr>
<tr>
<td>Position in PPH</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Table 9. Analysis of effects. Only p-values pointing to statistical significance (p<.05) are included.

The results in Table 9 suggest that the reasons behind deaccenting are quite complex and that a variety of factors are involved when considering what types of words are more susceptible to this phenomenon in spontaneous speech. However, it is important to remember that this table only provides general information, meaning it only tells us that the variables included have some sort of effect on deaccenting. In order to gain a clearer understanding of what is occurring, it was necessary to analyze the effects of each category belonging to the variables in Table 9.

3.3 What are the effects?

Describing specific effects is done by obtaining odds ratios that explain these effects in terms of multipliers indicating an increase or decrease in the odds of deaccenting with respect to categories of each variable. In Tables 10 to 13, the rightmost category column is the reference group while the leftmost column contains an alternate outcome for each variable that either increases or decreases the odds of deaccenting. The repeated columns for high frequency and syllables in Tables 15 and 17, respectively, are interpreted in the same manner, with the right column
being the baseline and the left being a substituted outcome that either increases or decreases odds.

Before continuing, one obstacle to the statistical analysis should be noted. The fact that pronouns were all found to be high frequency turned out to be a problematic issue because it resulted in zeros in the data structure, since there were no pronouns belonging to the ‘no’ category of this frequency variable. This was discovered after the first part of the logistic regression was carried out and unfortunately prevented obtaining odds ratios for the high frequency variable. Consequently, based on Table 9, we know that high frequency has a significant effect on deaccenting, though we cannot provide any further evaluation of this variable’s independent effect. On the other hand, there is nothing impeding an analysis of the interaction between high frequency and grammatical category, since pronouns were discarded before the final phase of the statistical test.

Table 10 reports how recency affects the odds of deaccenting when a word is ‘yes’ instead of ‘no,’ which is taken as the baseline. From the odds ratio, it is clear that the odds of deaccenting increase when a word is repeated within a ten PW timeframe in that they are multiplied by a value of 1.42. This finding demonstrates the importance of incorporating a more specific recency component into the more general variable of repeated information, as the former is found to have significant effects, while the latter does not.

<table>
<thead>
<tr>
<th>Recently Repeated Word?</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1.42</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Effects of recently repeated words on the odds of deaccenting

Moving on to the effects of word length based on number of syllables, it is first necessary to explain the inability to produce odds ratios for the latter two rows of Table 11. This is caused by zeros in the data structure, as was the case for high frequency. Due to the interactions between the high frequency, syllables and grammatical category variables, the analysis of the former two was broken out by grammatical category. However, there were no pronouns longer than two syllables, and therefore the ‘3+’ category for the syllables variable had values of zero for the aforementioned grammatical category. Although this problem arose, we can still comment on the effect of having words of one syllable in length as opposed to two. The first row of Table 11 demonstrates that when the number of syllables in a word is one rather than two, the odds of deaccenting increase by a factor of 1.61. Therefore, it appears that the shortest words have an increased likelihood of deaccenting based on odds. Even though the odds ratios for the final two rows of Table 11 are absent, the present discussion leads us to predict that if these ratios
were available they would be greater than one, since it seems that shorter words increase the odds of deaccenting.

<table>
<thead>
<tr>
<th>Number of Syllables</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2</td>
<td>1.61</td>
</tr>
<tr>
<td>1 3+</td>
<td>-</td>
</tr>
<tr>
<td>2 3+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 11. Effects of number of syllables on the odds of deaccenting

Table 12 displays odds ratios pointing to an increase in the odds of deaccenting when replacing words grammatically belonging to the rightmost category column with those of the leftmost column. After comparing each row, it becomes clear that the hierarchy of increased odds of deaccenting based on category is as follows:

verb >> adverb >> adjective >> noun. A series of observations leads us to this conclusion. The first row reveals that an adverb as opposed to an adjective increases the odds of deaccenting while the second reveals that when adjectives are present instead of nouns, the odds increase as well. Therefore, by transitivity, we expect an increase in odds when adverbs are present rather than nouns as well. The fourth row of the table shows just that, as the odds increase in adverb versus noun cases by a multiplier of 1.19. Finally, the third, fifth and sixth rows of the table point to an increase in the odds when verbs are present instead of any of the other three categories just mentioned. This suggests that verbs are atop the hierarchy of effects on the odds of deaccenting, a finding that reflects Face’s (2003) suggestions about spontaneous speech.

<table>
<thead>
<tr>
<th>Grammarical Category</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverb</td>
<td>Adjective</td>
</tr>
<tr>
<td>Adjective</td>
<td>Noun</td>
</tr>
<tr>
<td>Verb</td>
<td>Adjective</td>
</tr>
<tr>
<td>Adverb</td>
<td>Noun</td>
</tr>
<tr>
<td>Verb</td>
<td>Adverb</td>
</tr>
<tr>
<td>Verb</td>
<td>Noun</td>
</tr>
</tbody>
</table>

Table 12. Effects of different grammatical categories on the odds of deaccenting

In a similar fashion to the results in Table 12, those in Table 13 suggest a hierarchy of positions in the PPH with respect to effects on the odds of deaccenting. Upon evaluating each row of the table, the ranking that emerges is: medial >> initial >> final >> single. The disparity between the top two levels and single is enormous, as shown in the final two rows of the table. When looking at a word in
initial or medial position of the PPH instead of a word that is phrased in its own PPH, the odds in the former two positions increase by multipliers over 20, which are extremely large. The comparison final versus single also reveals that the former category increases the odds of deaccenting by a considerable factor of 4.80. Furthermore, when concentrating on rows one and two, we observe that a word in initial or medial position instead of final position leads to odds increases by factors of over 4 in both cases. Now that we know that odds are increased in initial and medial positions when compared to the other two categories, we must look at the fourth row to examine medial versus initial. This row conveys that when a word is in medial position rather than initial position, the odds of deaccenting increase by a factor of 1.16. Even though medial increases the odds over initial, the multiplier just over 1 informs us that the odds of each outcome are fairly close. Therefore, medial is atop the hierarchy of odds increase, with initial being close behind, followed by larger gaps between these two and final and between final and single.

<table>
<thead>
<tr>
<th>Position in PPH</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>Final</td>
</tr>
<tr>
<td>Medial</td>
<td>Final</td>
</tr>
<tr>
<td>Final</td>
<td>Single</td>
</tr>
<tr>
<td>Medial</td>
<td>Initial</td>
</tr>
<tr>
<td>Initial</td>
<td>Single</td>
</tr>
<tr>
<td>Medial</td>
<td>Single</td>
</tr>
</tbody>
</table>

Table 13. Effects of different positions in the PPH on the odds of deaccenting.

At this juncture, all variables that independently influence the odds of deaccenting have been exposed. Now interactions between high frequency, syllables and category will be the topic of discussion.

3.4 Effects with interactions

Table 14 breaks out the effects of high frequency by grammatical category. From the results, we see that adverbs and verbs are the only two categories that are significantly affected by globally frequent words in such a way that contributes to deaccenting. It is not surprising that this is the case, as these two grammatical categories possess odds ratios in Table 12 that establish that they increase the odds when replacing adjectives and nouns. The lowest p-value of verb reflects its status as the grammatical category resulting in the most increase in odds. As was the situation in Table 9, the table below only delivers information telling us that there is
some effect of high frequency on adverbs and verbs. In order to discover the exact effects, it is crucial to come up with odds ratios.

<table>
<thead>
<tr>
<th>Grammatical Category</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjective</td>
<td>.1514</td>
</tr>
<tr>
<td>Adverb</td>
<td>.0108*</td>
</tr>
<tr>
<td>Noun</td>
<td>.6092</td>
</tr>
<tr>
<td>Verb</td>
<td>.0009*</td>
</tr>
</tbody>
</table>

Table 14. P-values showing whether there is a significant effect of high frequency on category. Starred values are significant (p<.05).

Table 15 provides the odds ratios by grammatical category when a word is ‘yes’ instead of ‘no’ with regard to the high frequency variable. The analysis is done using least squares means, which estimate the marginal means of specific factors of interest. A mean is considered marginal when it concerns only the factor of interest. In other words, the marginal mean is relevant when examining only that particular factor and estimating the mean response due to only that factor, while maintaining mean levels of all other factors in the model. Odds ratios are given for the adjective and noun rows even though the previous table uncovers that the high frequency variable does not have a significant effect on words belonging to these grammatical categories. The results for adverbs show that when a word is frequent rather than not, the odds of deaccenting increase by a large multiplier of almost 7. An example of a word fitting this classification is *muy* ‘very’. Furthermore, when a verb fits in the ‘yes’ category as opposed to ‘no,’ as does vivir ‘to live’, the odds increase considerably, by a factor of 2.65. Therefore, interaction of adverbs and verbs with high frequency produces higher odds ratios than observed in the previous section for these word types. Finally, the odds-related outcome for adjectives closely reflects that of verbs, while the odds for high frequency versus low frequency nouns interestingly decrease by a factor of .67.

<table>
<thead>
<tr>
<th>Grammatical Category</th>
<th>High Frequency</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjective</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Adverb</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Noun</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Verb</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 15. The effects of high frequency on the odds of deaccenting words belonging to four different grammatical categories.
The second significant interaction is between a word’s number of syllables and its grammatical category. The difference between the following two tables and the previous two is that the syllables variable now replaces high frequency with regard to having an effect on grammatical category. The results in Table 16 indicate that deaccenting of adverbs, nouns, and verbs is significantly affected by the number of syllables in each type of word. The effect on adjectives is not significant. Furthermore, as we would expect based on previous results, adverbs and verbs have the lower p-values. Now that we know the domain of the significant effects, we will once again employ odds ratios to explain these effects.

<table>
<thead>
<tr>
<th>Grammatical Category</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjective</td>
<td>.6550</td>
</tr>
<tr>
<td>Adverb</td>
<td>&lt;.0001*</td>
</tr>
<tr>
<td>Noun</td>
<td>.0232*</td>
</tr>
<tr>
<td>Verb</td>
<td>.0002*</td>
</tr>
</tbody>
</table>

Table 16. P-values showing whether there is a significant effect of number of syllables on grammatical category. Starred values are significant (p<.05).

Before elaborating on the results in Table 17, we must mention that even though there are overall significant effects of number of syllables on adverbs, nouns, and verbs, there are specific cases within each category of word in which the effects are not statistically significant. The asterisks next to some odds ratios in Table 17 denote the effects that are found at significant levels. All three rows for the adjective category are obviously not significant results, as per the overall p-value that is greater than .05 in Table 16.

In terms of the significant results in Table 17, it is apparent that shorter words increase the odds of deaccenting when compared to longer words. For example, when replacing an adverb of two syllables with a word of the same class containing one syllable, the odds of deaccenting increase by a factor of 3.64. When a substitution of adverbs is made by considering two syllable words versus those with three or more, the odds increase by a similar factor of 3.45. As we saw earlier, transitivity now leads us to believe that uttering an adverb of one syllable instead of one that is three syllables in length would also increase the odds. This is exactly what the fifth row of odds ratios in the table tells us, as the odds greatly increase by a multiplier of 12.53. Furthermore, only comparing nouns belonging to the ‘2’ category versus those of the ‘3+’ category generates significant results. The increase in odds shown in the ninth row of Table 17 provides further support for the idea that shorter words are more likely to deaccent. In this instance the odds increase by a factor of 2.14. Examining the final two rows of the table sheds more light on the effects of shorter words, which are verbs this time. Just as we found for adverbs,
when a verb of one syllable in length is present instead of a verb with three or more syllables, the odds increase. The difference is that the odds multiplier is around 3 here, a value that is much less than the 12.53 of this comparison among adverbs. Finally, when a verb with two syllables is produced instead of one with three or more syllables, the odds increase by a factor of 2.28. Overall, the significant findings here are narrower in scope when compared with previous results for the syllables variable because they consider the effects of this variable based on category of words. That being said, the results in Table 17 reflect the earlier claim that shorter words increase the odds of deaccenting.

<table>
<thead>
<tr>
<th>Grammatical Category</th>
<th>Syllables</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjective</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Adjective</td>
<td>1</td>
<td>3+</td>
</tr>
<tr>
<td>Adjective</td>
<td>2</td>
<td>3+</td>
</tr>
<tr>
<td>Adverb</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Adverb</td>
<td>1</td>
<td>3+</td>
</tr>
<tr>
<td>Adverb</td>
<td>2</td>
<td>3+</td>
</tr>
<tr>
<td>Noun</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Noun</td>
<td>1</td>
<td>3+</td>
</tr>
<tr>
<td>Noun</td>
<td>2</td>
<td>3+</td>
</tr>
<tr>
<td>Verb</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Verb</td>
<td>1</td>
<td>3+</td>
</tr>
<tr>
<td>Verb</td>
<td>2</td>
<td>3+</td>
</tr>
</tbody>
</table>

Table 17. The effects of number of syllables on the odds of deaccenting words belonging to four different grammatical categories. Starred odds ratios indicate statistically significant effects (p<.05).

Although six interactions in Table 17 do not achieve statistical significance, the trends discovered are worth discussing. In five of those six instances, the odds demonstrate some sort of increase (even though the multipliers are not much greater than one) when substituting fewer syllables for more syllables. The only exception to this pattern is when nouns of one syllable are present instead of those with two syllables, in which case the odds decrease by a factor of .78. The effects on nouns also deviate with regard to high frequency, as shown in Table 15 (though the effects are not at significant levels).

3.5 Random effect of subjects

The final variable addressed is the random effect of subject. This variable is not found to contribute to deaccenting at a statistically significant level; however, the
odds ratios generated for each subject are exhibited in Table 18 in order to comment on overall individual differences as well as those relating to gender. The range in odds ratios goes from a low of .77 (Subject 14) to a high of 1.38 (Subject 8). The effect of subjects on the odds is close to even in terms of those that increase the odds versus those that decrease the odds. This lies in the fact that nine of the odds ratios are greater than one while eight are less than one. Overall, the ratios do not deviate by much from 1, meaning the effect of each subject does not greatly increase or decrease the odds of deaccenting.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.78#</td>
</tr>
<tr>
<td>2</td>
<td>.90#</td>
</tr>
<tr>
<td>3</td>
<td>.99#</td>
</tr>
<tr>
<td>4</td>
<td>1.33#</td>
</tr>
<tr>
<td>5</td>
<td>1.14</td>
</tr>
<tr>
<td>6</td>
<td>.82#</td>
</tr>
<tr>
<td>7</td>
<td>1.10#</td>
</tr>
<tr>
<td>8</td>
<td>1.38</td>
</tr>
<tr>
<td>9</td>
<td>.80#</td>
</tr>
<tr>
<td>10</td>
<td>1.35</td>
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<tr>
<td>11</td>
<td>1.16#</td>
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<tr>
<td>12</td>
<td>1.06</td>
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<td>.79#</td>
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<td>14</td>
<td>.77#</td>
</tr>
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<td>15</td>
<td>.87#</td>
</tr>
<tr>
<td>16</td>
<td>1.17</td>
</tr>
<tr>
<td>17</td>
<td>.92#</td>
</tr>
</tbody>
</table>

Table 18. Variation in the odds of deaccenting among the 17 speakers. Ratios marked by # are those of female subjects.

Furthermore, an interesting observation on gender differences arises when focusing on the results in Table 18. The odds ratios signaled by # represent female speakers. These marked ratios reveal that the effects of three of the twelve female speakers increase the odds of deaccenting while the majority decrease the odds. On the other hand, the odds ratios for all five of the male speakers are above one, pointing to an increase in odds. Although there are fewer males than females and all ratios are fairly close to one, these findings are nonetheless valuable because they suggest that in spontaneous speech the effects of male speakers increase the odds of deaccenting more so than those of females.
4. Discussion and Conclusion

This paper discussed a detailed empirical study of deaccenting in the spontaneous speech of Barcelona Spanish. The motivation for such an investigation was threefold. First, although Face (2003) and others provide some preliminary insight into why this phenomenon occurs more in spontaneous speech than other speech styles, the majority of previous studies on Spanish intonation mainly define this phenomenon rather than adequately address what factors influence its occurrence. Second, the intonation of spontaneous speech, especially in Spanish, represents a relatively unexplored area of research. Lastly, very little previous work has focused on the Barcelona dialect of Spanish.

Based on the overall results of this study, we can posit that the following are characteristics of words that significantly increase the odds of deaccenting: having fewer syllables, being grammatically classified as adverbs or verbs, being frequent at a global level, being recently repeated in discourse, and occupying initial or medial positions of PPHs. The interactions between grammatical category and number of syllables/high frequency indicate that effects are cumulative. Such interactions between two variables increase the odds by even greater multipliers than one variable alone. Overall, the type of methodology employed here, as well as the focus on specific influences on deaccenting, are not widely documented in previous work on Spanish intonation.

The study contributes to research on accent, stress, and intonation in general. The findings for the variable global high frequency support the point of view of Bybee (2002), in that the effects of this covariate trigger a reductive process. In this case, such reduction is associated with F0 movement. This is noteworthy because the majority of prior usage-based research does not specifically address intonation and prosodic factors. Additionally, the fact that many frequent words are shorter in length proves to be crucial. That is, a fewer number of syllables corresponds with decreased duration for realizing a pitch accent. This durational effect increases the odds of deaccenting, meaning that less time for producing a pitch accent in a word increases the odds that a speaker will simply not show F0 movement before moving on to subsequent words.14 This idea is especially applicable to spontaneous speech, where speech rates are generally increased when compared to lab or other scripted speech styles. Furthermore, the fact that adverbs and verbs raise the odds of deaccenting support Face’s (2003) study, the suggestions by Terken & Hirschberg (1994), as well as other cited studies on English and Italian that report that grammatical category does indeed play a role in the propensity to deaccent (especially in English).

The interaction between grammatical category and frequency, as well as word length, illuminates the complex nature of deaccenting in Spanish. Such complexity is also found for English in Terken & Hirschberg (1994), when stating that the likelihood of deaccenting is greater when words are repeated in consecutive
sentences, play the same grammatical role, and appear in the same position of the sentence. Along these lines, the current study also shows that repetition of an item in a recent timeframe increases the odds of deaccenting. The distinction between the general category of repeated information and recently repeated information is essential, as the latter category allows us to notice that the second iteration of a lexical item within a short time span is produced in a less salient manner. In general, highly frequent, recently repeated words appear to have a communicative function when speakers do not include accent. That is, through deaccenting such words, speakers can decrease perceptive salience, thus further distinguishing informationally important words from those that are not.

With respect to phrase position, the increase in the odds of deaccenting of words in initial and medial positions of the PPH represents evidence in favor of the Nuclear Stress Rule. This result also reflects previous thoughts on the prominence of nuclear stress in Romance set forth by Frascarelli (2000) and Prieto (2005), among others. Based on the Nuclear Stress Rule and previous work on Romance, the odds ratios calculated here turned out as expected. Odds ratios being slightly higher for medial position than initial position of the PPH provides evidence in favor of segmental research on domain initial strengthening (over medial position). However, we might have expected the disparity between medial and initial positions to be slightly larger based on previous segmental findings. The present results seem to hint that, at the suprasegmental level, the gap in strength between initial and medial position may not be quite as great as what has been observed segmentally. By any means, when comparing three phrase positions, the overall hierarchy of effects on the odds of deaccenting (medial >> initial >> final) coincides with previous literature on prominence in a variety of languages. Final position is the most prominent, followed by initial, and then medial. That is to say, the hierarchy we have formulated shows that weaker domain positions increase the effects on deaccenting. Finally, the necessity to accent words that are individually phrased seems to make sense for two reasons: i. a PPH should contain at least one PW; ii. Face (2002) states that placing PWs in their own PPHs is a strategy of conveying narrow focus, which is normally not a condition conducive to the absence of a pitch accent. Overall, recognizing the similarities between this work and other studies on Germanic languages is fruitful because it permits us to begin seeing patterns that may be cross-linguistically relevant.

Another possible factor that may contribute to deaccenting that is not considered here is stress distance to the proceeding accent. For example, a study by Prieto, Oliva, Palmada, Serra, Blecua, Llach & Oliva (2001) on Catalan finds that contexts of stress clash favor deaccenting. In this article, clash situations such as camí net ‘clean road/way’ are shown to sometimes be misperceived as caminet, with only one stressed syllable rather than two. In such a case, the lack of rising movement in mít is provoked by stress clash. A similar example from the present data is given in (4). In this case the final syllable of ayer ‘yesterday’ and the
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monosyllabic *fui* ‘I went’ have clashing stress, which, based on the aforementioned findings for Catalan, may explain why the second of these words is deaccented.

(4) Deaccenting in a stress clash situation

(* denotes a deaccented word, bold refers to stressed words)

\[(\text{Ayer } \textbf{fui* al gimnasio})\Phi(\text{de buena mañana})\Phi]\text{IP}

‘Yesterday I went to the gym early in the morning’

In general, work in Prosodic Phonology states that a possible repair strategy of stress clash is actually a deletion of one of the stresses. Such an idea can be extended to studies on Spanish accent and stress.

Another idea that merits future investigation is the consideration of speech acts. For example, Ortega-Llebaria & Prieto (2007) show that parentheticals can demonstrate complete deaccentuation. Also, in certain interrogative and declarative pitch contours the only tonal movement takes place on the first and last word, while all other intervening words are frequently or obligatorily deaccented. Based on these cases, it appears that speech acts should be teased apart in future work. An additional area of research also stems from Ortega-Llebaria & Prieto (2007). As we saw in the literature review in this paper, this recent study reveals that stress contrasts are maintained in cases of deaccenting through other cues such as duration, spectral tilt, and vowel quality. These issues extending beyond the scope of the present study should be examined in upcoming work in order to shed more light on the cues to stress in Spanish. Further investigations of accent can also seek support for deaccenting and help determine whether it occurs at the phonetic or phonological level. We must attempt to answer the following questions regarding the status of deaccenting: Is it the case that a pitch accent corresponding with tonal targets is present and then removed by some phonological process? Or, on the other hand, is the lack of a pitch excursion the absence of a phonetic correlate to stress (and thus, in itself, not a phonological phenomenon)? Moreover, since dialectal variation is common across languages, it would be fruitful to carry out related studies based on Latin American Spanish. Finally, a greater variety of speakers should be examined with respect to deaccenting so that the effects of factors such as age, gender, and social class can be described. The statistics on the effects of gender in this study (at insignificant levels), which hint that males deaccent more than females, can serve as initial motivation for further research on extralinguistic variables.

In sum, this study contributes to the field of Spanish intonation because it reports new findings on what types of words are more prone to lack accent as a cue to stress. It also has implications for possible cross-linguistic tendencies regarding factors that significantly influence deaccenting. By pointing out connections between the current results and ideas proposed in previous work on accent and stress, the study advances our knowledge of deaccenting while also stimulating
ideas for further growth. The hope is that the methods and results presented here will serve as a useful point of departure for further investigation of accent and stress in Spanish and other languages.

Notes

1 A discussion regarding the debate over appropriate pitch accent representations in different contexts in Spanish is beyond the current discussion. However, as one reviewer points out, L nuclear pitch accents do exist in interrogatives. Therefore, it is important to avoid saying that deaccenting is a complete lack of tonal movement through stressed syllables, because if that were the case, nuclear L tones would be considered deaccented. The determination of how much tonal movement is necessary to gain accented status is described in Section 1.2. Though a threshold value for tonal movement is used here, another possibility would be employing semitones. Also, in F0 plateaus in situations of downstepping, an H plateau has been thought of as interpolation between two H tones, which forms a surface contour in the absence of a notable pitch excursion. See Face (2001, 2002), Hualde (2002, 2003) McGory & Díaz-Campos (2003), Nibert (2000) and Toledo (2006, 2007), among others, for an extensive look at pitch accents in Spanish.


3 As Hualde (in press) shows, stress in Spanish can be predicted based on factors such as categories of words; however, it is possible to find examples in which syllables of content words are stressed to the same degree. Cases also exist in which the syllable one would not expect to be stressed actually is the most prominent. With regard to such atypical situations, he provides extensive examples of stress deletion, destressing, and secondary stress, all of which are valuable areas for future exploration.

4 The status of deaccenting as a phonetic or phonological process remains debatable. While F0 movement is a phonetic correlate to stress, one can also claim that the removal of a pitch accent coincides with eliminating specific phonological targets. An interesting idea of Face (p.c.) that seems to support the former position is that the de- prefix is not accurate because if a pitch accent is not present in the first place, due to some tonal movement, it cannot subsequently be taken away. For this reason, Face believes that unaccenting would be a more adequate label, although he himself continues to refer to deaccenting because it is the dominant term in work on intonation.

5 Sosa (1999) and Willis (2003) include spontaneous speech data in their studies on Spanish intonation. Furthermore, a larger body of literature exists on the segmental characteristics of spontaneous speech (especially sociolinguistic
One example is Alba (2005), who investigates vowel reduction in part based on spontaneous speech.

Chafe (1974) describes old information in terms of that which is consciously available to interlocutors during an interaction. However, since this type of abstract idea is difficult to measure, the present study limits the discussion of old or repeated information to the data produced by each speaker.

22 speakers participated in the study but data from five of them was discarded due to background information or technical difficulties.

Factors such as emphasis and changes in speech rate, which are characteristic of spontaneous speech, can result in the manifestation of pitch accents associated with normally unstressed words. This only occurred a few times in the present study, mainly when speakers elongated such words while thinking of what to say next. A couple examples are pero ‘but’ and porque ‘because’.

Throughout the coding process for repetition, recent repetition, and global high frequency, all conjugations of verbs were classified based on their infinitive form. Thus, if soy ‘I am’ appears five PWs before somos ‘we are’, the second of these words is considered recently repeated because both verbs are forms of ser ‘to be’.

The notion of a high frequency word is used quite loosely in previous studies. We have intuitions about such words, but in order to incorporate such a category into a statistical study, it is necessary to provide a precise definition that can be implemented in a coding scheme. Although Fuller Medina (2005) does not explain why she chose 2,000 as her threshold value, her study is one of the few that specifically attempts to define this vague concept. For this reason the same system is utilized here.

Thanks to Jerome Braun of the UC Davis Statistics Lab for his assistance with the statistical portion of this paper. The logistic regression approach belongs to a broader group of generalized linear models (see Agresti 1996). It allows the modeling of discrete outcomes based on a group of variables that can be continuous, dichotomous, discrete, or a combination of these types. The dependent variable is normally dichotomous, as is the case in this study considering the presence/absence of deaccenting. To produce a more parsimonious model, an exploratory technique called stepwise regression was utilized. The two types of stepwise regression are called forward selection and backward selection. The former begins from scratch and adds variables until there is no further gain by doing so, while the latter begins saturated by all variables, eliminating each one until it is no longer possible without disrupting the model’s fit with the data. Experimentation with both types led to similar results, with the outcomes of forward selection being slightly more precise and therefore utilized in the following section.

As noted by Quilis (1993), -mente ‘-ly’ adverbs normally exhibit two F0 rises, which suggests that they are one lexical item but two PWs.
Many deaccented verbs here are presentational verbs such as *ser* ‘to be’ and *estar* ‘to be’. Blake (p.c.) notes that this makes sense intuitively since such verbs that are considered copula are not even present in some languages. In a future study it would be useful to tease apart presentational verbs from other verbs when looking at effects on deaccenting.

Timing influences other environments as well. For example, Face’s (2001) experiments with intonational narrow focus reveal that F0 peaks, which are manifested earlier in narrow focus than in broad focus, are often not as tall because their rise time is decreased due to early alignment with the stressed syllable.

**Appendix A**

This appendix contains examples of deaccented words from the data belonging to each category of the seven variables examined. Accented words are bolded and deaccented words are underlined. Unstressed words are not marked in any way. Although examples are given for specific variables, they may also be relevant to other variables.

1. Repetition in discourse
   a. Repeated word: *Ayer fui al gimnasio* ‘Yesterday I went to the gym’
   b. Deaccented but not previously mentioned: *Los amigos que viven alrededor de Barcelona* ‘The friends that live around Barcelona’

2. Recent repetition in discourse
   a. Recently repeated: *Tiene que haber diversidad* ‘There needs to be diversity’
   b. Not recently repeated: *Estaba lloviendo todo el día* ‘It was raining all day’

3. Number of syllables
   a. One: *Es más pequeño que yo* ‘He is smaller than me’
   b. Two: *Le da mucha alegría la vida* ‘Life gives him much happiness’
   c. Three or more: *Mi hermano es sagrado* ‘My brother is sacred’
      *No me gusta este sistema* ‘I don’t like this system’
      *Estábamos mi padre, mi madre, y yo* ‘My father, my mother and I were there’

4. Grammatical category of word
   a. Adverb: *No tiene esa facilidad* ‘(The people) do not have that ease’
   b. Verb: *Tiene más problemas por ejemplo con el castellano* ‘(The people) have more problems, for example, with Spanish’
   c. Noun: *La literatura del siglo diecinueve* ‘The literature of the nineteenth century’
   d. Adjective: *Hay mucha diferencia* ‘There is a lot of difference’
   e. Pronoun: *Yo vivo en Cerdanyola* ‘I live in Cerdanyola’
5. Global high frequency
   a. Frequent: *Está muy lejos de mi casa* ‘(It) is very far from my house’
   b. Not frequent: *Tienes mucha variedad de cosas* ‘You have much variety of things’

6. Position in the PPH
   a. Initial: *(Suelen conservar su lengua materna)*Φ ‘They usually conserve their mother tongue’
   b. Medial: *(Todavía no me he encontrado con ningún problema)*Φ ‘I still have not encountered any problem’
   c. Final: *(Vas a escuela)*Φ ‘You go to school’
   d. Single: None

7. Position in the IP
   a. Initial and Final: *(Quizás hay más gente)*Φ*(que quiere trabajar)*Φ*(que hay trabajo)*Φ ‘Perhaps there are more people that want to work than there are jobs’
   b. Medial and Final: *(Creo que)*Φ*(se puede hacer)*Φ*(todavía mucho más)*Φ ‘I think one can still do much more’
   c. Single: *(Estuve allí seis meses)*Φ ‘I was there six months’

**Appendix B**

Pitch contours illustrating deaccenting

![Pitch contours illustrating deaccenting](image)

**Figure 1.** Deaccenting of *hermana* (‘sister’) in the phrase *La hija de la hermana de mi marido* ‘The daughter of my husband’s sister’. The pitch movement in the stressed syllable, *ma*, of *hermana* is less than 7 Hz. The deaccented word is in PPH medial position.
Figure 2. Deaccenting of the words *todo* ‘everything’ and *bastante* ‘enough’ in the phrase *Porque lo tengo todo bastante a mano* ‘because I have everything right on hand’. The pitch movement through the stressed syllable of *todo* is less than 7 Hz, and is hardly detectable in *bastante*. Both words are in medial position of a PPH.

Figure 3. Deaccenting of the word *verano* ‘summer’ in the phrase *Trabajando todo el verano* ‘working all summer’. Pitch reduction occurs in IP-final position here.
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Figure 4. Deaccenting of the words no ‘no’ and es ‘is’ in the utterance *Mi lengua no es el catalán* ‘My language is not Catalan’. Pitch movement is less than 7 Hz in both cases. In such short words, there is less time for F0 movement. Decreased duration makes these short words susceptible to lacking accent.

Figure 5. Deaccenting of the first two stressed words of the utterance *Tiene que haber diversidad* ‘There needs to be diversity’. The flat highlighted portion of the contour is indicative of deaccenting. These types of commonly used verbs have been found to be prone to deaccent in previous work.
Figure 6. The absence of tonal movement through the stressed syllable, ní, of the word tenía ‘I had’ in the utterance Tenía un examen de fonética ‘I had a phonetics exam’. The word examen ‘exam’ has an 8 Hz rise, which is just enough to be considered accented.

Figure 7. Deaccenting of algo ‘something’ in the utterance Voy por la calle o algo así ‘I go out on the street or something like that’. The highlighted portion does not have F0 movement that meets the threshold value.
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Figure 8. Deaccenting at the end of an IP of the stressed words *peligro* ‘danger’ and *Cataluña* ‘Catalonia’ in the utterance *El castellano está en peligro en Cataluña* ‘Spanish is in danger in Catalonia’.

Figure 9. Deaccenting of phrase medial *lleve* ‘carries’ in the phrase *La política que lleve*… ‘The politics held by…’. The F0 movement does not reach the threshold value in the medial word of this IP-final PPH.
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