The Perceptual Relevance of Code Switching and Intonation in Creating Narrow Focus

Daniel Olson and Marta Ortega-Llebaria
University of Texas at Austin

1. Introduction

Regarding the functions of code switching, John Gumperz (1982) claims, "Code switching signals contextual information equivalent to what in monolingual settings is conveyed through prosody or other syntactic or lexical processes." Many authors, including Gumperz, note the connection between the use of intonation in monolingual contexts and code switching in bilingual contexts. However, these claims, generally from the field of sociolinguistics, have primarily relied on the authors' observation and judgments, and have yet to be examined from a controlled laboratory approach. The aim of the present study is to examine the impact of intonation and code switching on the perception of narrow focus by bilingual listeners.

1.1. Intonation

Within the last decade, building on the Autosegmental-Metrical model (Pierrehumbert, 1980; Beckman & Pierrehumbert, 1986), significant progress has been made towards achieving a unified model for the documentation and analysis of intonation patterns, called the Tones and Break Indices (ToBI) framework (Beckman, 2002). Within this framework, Hualde (2005) provides a description of the basic intonation contours, including both broad and narrow focus declaratives, of Spanish and a brief comparison with English. For the purpose of this study, broad focus declaratives are defined as utterances in which all the presented information is new. For example, if responding to the question 'What happens?' the utterance "Mary loves football" is a broad focus declarative. In Spanish the pre-nuclear pitch accents generally fall in the post-tonic syllable, represented as an L*H contour in the ToBI system, whereas in English the pitch accent typically falls within the tonic syllable, H* or H*L (Hualde, 2005; among many). Figure 1a illustrates the intonation contour of a sample broad focus utterance in Spanish.

Narrow focus utterances, for the purpose of this study, are defined as utterances in which information contrasts with or corrects a previous statement. For example, if it answers the question 'Does Mary love baseball?' the utterance 'Mary loves FOOTBALL' is a narrow focus utterance. The concept of narrow and contrastive focus in Spanish was first considered by Navarro Tomás (1944), who noted that although a syntactic dislocation is the most common method of creating narrow focus, speakers may also use prosodic prominence. Early detailed work on narrow focus in Spanish originally concluded that there is no consistent acoustic difference between broad and narrow focus (Toledo, 1989). However, these studies primarily considered duration and pauses, while only briefly mentioning the role of intonation. Subsequent research has found that, in Spanish, narrow focus is systematically associated with an increase in pitch range and a leftward shift in peak alignment, when compared to similar broad focus constituents (de la Mota, 1997; Face, 2002; Willis 2003). The result is an up-stepped intonation peak within the tonic syllable, represented as ¡LH* in ToBI notation. Figure 1b provides an example of an utterance with narrow focus on the constituent *NENA*.

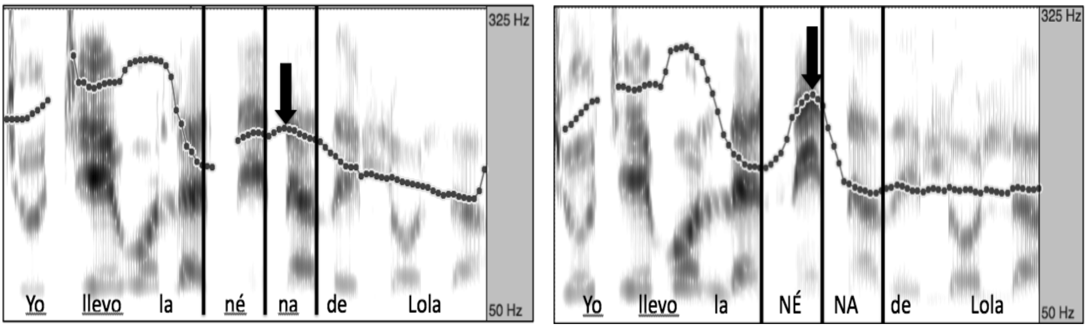

Figure 1: (a) The broad focus intonation contour of the utterance *Yo llevo la nena de Lola*, produced by a native Spanish speaker. (b) The narrow focus intonation contour of the same utterance with narrow focus on the constituent *NENA*. The arrows indicate the f_0 peak, which is produced with a greater pitch range and a leftward shifted peak alignment in the narrow focus contour when compared with the broad focus contour.

1.2. Code switching

Code switching (CS) "is the selection by bilinguals or multilinguals of forms from an embedded variety in utterances of a matrix variety during the same conversation" (Myers-Scotton, 1993, p. 3). CS can take place between different dialects, styles, registers or languages, and may occur either intersententially or intrasententially. Intersentential switches occur when one complete utterance is in one language, followed by an utterance in a distinct language. Intrasentential switches, which are the focus of the current study, occur when there is a switch in languages within a single utterance, sentence, or sentence fragment. Examples (1a) and (1b) illustrate intersentential and intrasentential code switches respectively. Borrowing terminology from the Matrix Language Frame, (Myers-Scotton, 1993) a code-switched utterance may be divided into the matrix language (ML) and the embedded language (EL). The matrix language is defined as the language in an interaction from which the greatest number of morphemes is drawn. The embedded language refers to the other language or languages that are used in the interaction, but with a lower frequency. Example (1b) below shows an intrasentential code switch in which English is the ML and Spanish is the EL.

Example 1 (taken from Zentella, 1997, p. 133):

(1a) *Sí, pero le hablo en español*. When I don't know something I'll talk to her English.
(1b) Then *cuando se duerme* I give it to Vicky.

Espinosa (1917), his early description of the code switching patterns of Spanish-English bilinguals, reported that the use of English words in Spanish speech had no fixed limits and followed no regular laws. Contradicting this early impressionistic description, subsequent work has found that there are indeed clear syntactic (Lance, 1975; Pfaff 1979), socio-cultural (Myers-Scotton, 1988; 1993; Zentella, 1997) and pragmatic parameters (Gumperz, 1982; Auer, 1992; 1998; Chan, 2003) that govern the use of code switching. With respect to the syntactic grammaticality of code switching, although early studies claimed that code switches were essentially random, later studies showed that there are preferential sites for code switching (Lance, 1975) and that there are syntactic restrictions on where such switches are able to occur. Specifically, locations in which the grammars of the ML overlap with that of the EL are preferred sites for code switching (Pfaff, 1979; Poplack, 1978, 1980), and that cross linguistically, the most commonly switched item is a single, high-frequency N or NP (see Chan, 1993 for review). Specifically for the case of Spanish-English, Poplack (1980) and Zentella (1997) have shown that a single NP is the most common type of CS.

Regarding the motivations and functions of code switching, Myers-Scotton (1988) and Gumperz (1972) propose two comparable models. The Markedness Model (Myers-Scotton, 1988) claims that bilingual speakers operate within a socio-cultural context and that use of the unmarked language serves to maintain the status quo of the interaction. Use of the marked language serves to define the rights and identities of the interlocutors in the interaction. It is important to note that, as is often the case with fluent bilingual groups, "when participants are bilingual peers, the unmarked choice may be switching," (p. 160). Gumperz (1972) claims code switches can be categorized as either *situational*, similar to the marked choice, which serves to redefine situational norms, or *metaphorical*, which functions to enrich the communication while posing no realignment in the norms of the situation. These metaphorical code switches can then be examined in terms of their pragmatic meaning and contribution to the dialogue between the participants.

In Zentella's (1997) discussion of the meaning associated with code switches, particularly within the context of metaphorical switches, she proposes several functions including: communication factors, clarification, and crutching. Of these three, both communication factors and clarification are applicable to this study. Communication factors include intensification and attention grabbing. Clarification, similar to Face's (2002) definition of contrastive focus, is defined as correcting or repairing the preceding question. These functions constitute a method of drawing attention or creating focus on the code switched constituent. Similarly, Gumperz (1982) detailed a list of functions for code switching, including reiteration. He elaborated on the point by claiming that code switching, with respect to reiteration and clarification, serves to amplify, emphasize, and clarify the intended message. Additionally, work on the code switching of bilingual schoolchildren has shown that topic shift, clarification, and emphasis are among the first functions of code switching used by children (Reyes, 2004).

In an attempt to provide a coherent account for the distinct functions of metaphorical code switches, Auer (1998) suggests that CS is one of many contextualization cues, including prosody, gesture, posture, gaze, etc., and that these cues tend to co-occur to build contrast that affects the meaning of the utterance. These contextualization cues tend to co-occur because they function to highlight "noteworthy" words in a discourse. Chan (2003), building on the work of Gumperz (1982) and Auer (1998), proposes a relevance-theory based motivation for code switching. According to his proposal, although a code-switched message requires additional cognitive effort to process, as has been shown in a variety of studies (see Grossjean, 1995 for review), it conveys a much greater range of inferences that would require more effort to convey in monolingual speech. "The motivations behind these patterns, while subject to further research, are seemingly related to the phenomenon of *focus*, which also draws additional attention to parts of a discourse (Chan, 2003, p. 293)."

While authors use different terms when discussing the functions of code switching, nearly all make reference to its use for clarifying or emphasizing a particular constituent, akin to the idea of focus. It has been well demonstrated that, far from being random, code switching follows a set of clearly defined syntactic and social norms, and has clear pragmatic functions, including emphasizing or creating focus.

1.3. Intonation and Code Switching

As Queen (2001) notes, there is a general lack of intonation research that focuses on a bilingual perspective. The few studies that exist are primarily concerned with the intonation productions and transfer of second-language learners (see Queen, 2001 for review). Apart from second-language learners, a limited number of studies have been conducted on the intonation of balanced bilinguals, including examinations of balanced Spanish-English (Penfield & Ornstein-Galicia, 1985), Canadian French-English (Cichocki & Lepetit, 1986), and Catalan-Spanish (Simonet, 2008). These studies examined only monolingual utterances, with no mention of code-switched tokens. All of these studies showed some transfer of intonation features from one language to the other. Penfield and Ornstein-Galicia (1985), for example, found evidence of Spanish intonation contours in the English productions of Chicano speakers. Similar results were found by Cichocki and Lepetit (1986), who reported variable English declination patterns in the French productions of Ontario French speakers. Simonet, (2008) in his examination of Catalan-Spanish bilinguals, found instances of typically Catalan yes/no-question intonation in productions of Spanish dominant speakers. Of this limited body of research on bilingual intonation patterns of either second-language learners or balanced bilinguals, even fewer studies address the subject of code switching.

Queen (2001) examined the production of intonation contours in German-Turkish bilinguals. In addition to reporting on monolingual utterances, her data also included a limited number of code switched productions in the interrogative contexts. She found that for instances in which the Turkish question particle was inserted into a German matrix utterance, the question particle was produced with falling (H*L) Turkish intonation contours. Similarly, in the limited cases in which German question words (*who, what?*) were found in Turkish matrix language utterances, they were produced with German rising (L*HH%) intonation contours. Thus, the intonation contour of the code-switched constituent pertained to the EL, not to the ML. Contradictory results, however, were found in a study on production of Hunsruckish German-Portuguese code switches in a listing environment of three bilingual speakers (Birkner, 2004). The listing environment was chosen for the distinct intonation contours found in each language; the typical Portuguese listing intonation is a rising-falling contour, where as the German intonation is a "plateau-like" contour. For this specific context, unlike the results reported in Queen (2001), these German-Portuguese bilinguals produced intonation contours that were not based on the language of the EL, but rather on the language of the ML. Based on the contradictory results of these two limited studies, it is clear that additional research is needed to begin to understand the interactions between code switching and intonation.

In discussing the intersection between code switching and prosody, Zentella (1997) claims, "What monolinguals accomplish by repeating louder, and/or slower, or with a change of wording, bilinguals can accomplish by switching languages (p. 96)." In the same vain, Gumperz (1982) claims, "Code switching signals contextual information equivalent to what in monolingual settings is conveyed through prosody or other syntactic or lexical processes (p. 98)." Although many authors have noted a connection between the functions of intonation and code switching, there is a clear lack of research on the intonation of code switching. What little research there is to date has focused on production, and has neglected the perceptual aspect of code switching.

The current study addresses the functions of code switching from a laboratory approach. Specifically, the research questions are two-fold. First, this study examines the bilingual's perception of code-switched utterances and the interaction with intonation, in the context of narrow focus. Based on the existing body of research, it is anticipated that code-switched utterances will be perceived as narrow focus more frequently than their non-code-switched counterparts, particularly in the absence of intonation cues. Secondly, although there has been fairly extensive work on the production of broad and narrow focus intonation contours in both Spanish and English, there has been little perceptual evidence to support the importance of such acoustic cues. This study looks to provide perceptual data that will further the discussion of the importance of the acoustic cues associated with narrow focus.

2. Methodology

2.1. Participants

A total of 18 participants, ranging in age from 20-37 (M= 30.3), were recruited on the University of Texas, Austin campus. None of the participants received any compensation for their participation in the study. Participants reported normal hearing and speech in both English and Spanish.

The participants were divided into three language background groups of 6 participants: late bilingual native speakers of English (NE), late bilingual native speakers of Spanish (NS), and early bilinguals or simultaneous bilinguals (EB). Participants were chosen from these three distinct language backgrounds in order to control for the effects of native language (L1) dominance and age of second language (L2) acquisition. The NE participants spoke English as their L1, and did not begin learning Spanish until after age 8 (M= 14.5, SD= 1.6). Similarly, the NS participants spoke Spanish as their L1 and did not begin to learn English until after age 7 (M= 9.6, SD= 1.7). All NE and NS participants had more than 10+ years of experience with their L2 and had lived in an L2 speaking environment. Those in the EB group, defined as early or simultaneous bilinguals, learned both languages from birth, reported experience with code switching from an early age, and were fully literate in both languages. Participants were divided into these categories based on a self-reported language history, detailing the language used at home as a child, the language of schooling, age at which they started learning each language, years they had spent living in foreign language environments, among other information.

Additionally, speakers were asked to self-rate their language abilities on a scale of 1-10; 1 signifying "Don't Understand" and 10 signifying "Native Speaker." All speakers rated themselves a minimum of 7 in both English and Spanish. Late bilinguals (NE and NS) all rated their L1 abilities higher than their L2 abilities (Mean Difference L1-L2= 2.58). Early bilingual speakers varied in their assessments, but rated themselves comparably in both languages (Mean Difference L1-L2= 1.1). All subjects are considered to be highly proficient bilinguals.

2.2. Stimuli

The stimuli for this perception experiment were limited to manipulations of two short broad focus declaratives; one non-code-switched Spanish utterance (Example 2a) and one code-switched utterance (2b). The code-switched utterance consisted of a Spanish ML and English EL. The code-switched constituent was limited to a single high-frequency NP, which has been shown to be the most common type of code switch in Spanish-English bilinguals (Poplack, 1980; Zentella, 1997). None of the participants reported any agrammatical judgments of the stimuli.

Example 2:
(2a) Yo miro la luna de Maria
(2b) Yo miro *the mommy* of Maria.

Recordings of a single EB male speaker were made in a soundproofed recording booth, through a pop filter, with a 44.1kHz sampling rate. The utterances were designed using primarily sonorant sounds, avoiding stop consonants and fricatives, to provide listeners with as much prosodic information as possible.

Based on the previous findings that the principle prosodic cues associated with broad and narrow focus productions are f_0 pitch range and f_0 peak alignment, manipulations were made to both pitch range and peak alignment of the stimuli. Using PRAAT 4.5.11 (Boersma and Weenink, 2007) the intonation contour of a single broad focus utterance was manipulated to create 25 distinct realizations of the code-switched utterance and 25 realizations of the non-code-switched utterance, for a total of 50 stimuli. Pitch range, defined as the difference in Hz between the f_0 at the peak associated with the stress syllable and the f_0 at the proceeding valley, was manipulated to form 5 levels ranging from 110Hz to 135Hz. The lowest pitch range level was situated below the actual broad focus productions. Similarly, the highest pitch range level was slightly above the actual narrow focus productions. In order to determine the upper and lower pitch range bounds, the mean pitch ranges of 20 utterances, produced by the same EB male in both broad and narrow focus, were computed.

F_0 peak alignment, defined as the location of the maximum f_0 realization with respect to the tonic syllable, was also manipulated along a five-step continuum ranging from the middle of the initial consonant of the tonic syllable to the middle of the vowel in the post-tonic syllable. The middle step was aligned at the end of the vowel of the tonic syllable. Crossing the 5 levels of pitch range with the 5 levels of f_0 peak alignment produced the 25 stimuli for each language.

Figure 2 shows an intonation contour, marked with the 25 realizations of the f_0 peak. The different pitch range levels are represented by the horizontal solid lines. The pitch range levels are numbered from 1-5, with 1 being the minimum pitch range, and 5 being the maximum. The alignment levels are represented by the vertical dashed lines. The steps are labeled from A-E, with A being the leftmost peak alignment, and E being the rightmost peak alignment. The continuous curve represents the intonation contour of one of the 25 stimuli, representing the maximum f_0 pitch range and the rightmost f_0 peak alignment.

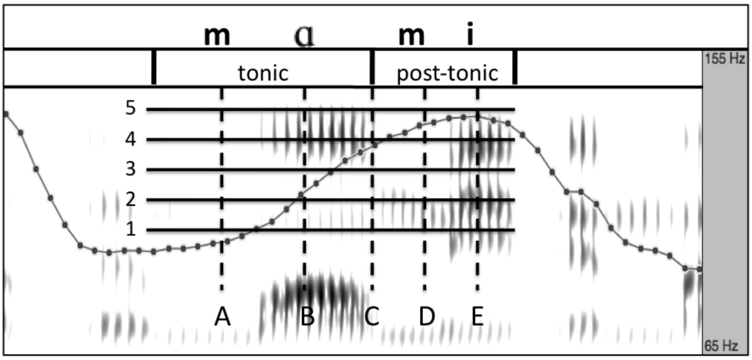

Figure 2: Intonation contour of the target constituent *mommy* taken from the utterance *Yo miro* the mommy *de María.* The horizontal solid lines represent the 5 different pitch range manipulations. The vertical, dashed lines represent the 5 f_0 peak alignment steps. The contour represented is the highest pitch range and the rightmost peak alignment, labeled 5E.

2.3. Procedure

The experiment was conducted at the University of Texas, Department of Spanish and Portuguese Phonology Laboratory. Participants were seated comfortably in front of a computer, wearing a headset with the volume adjusted in conjunction with the investigator. After a brief training, using the program Super Lab Pro version 2.0.4, participants were presented with 3 slides containing instructions. The instructions indicated that the participant would hear various repetitions of the stimuli and were asked to imagine that each stimuli were preceded by one of two contextualizing questions, corresponding to broad and narrow focus respectively: (1) *¿Qué pasa?* (What happens?); or (2) *¿Miras el padre de Maria?* (Do you watch the father of Maria?). If the subject thought the preceding question was (1) they were instructed to do nothing; if the preceding question was (2) they were instructed to press a specified key. Thus, a response signified that a narrow focus context was perceived by the participant.

Having read the instructions, the participant was given the opportunity to ask the investigator any questions. When ready, the participant started the presentation of the stimuli. There were 5 repetitions of the 50 stimuli for each participant, for a total of 4500 utterances (2 utterance types x 25 stimuli x 5 repetitions x 18 participants = 4500). The stimuli were presented in 5 blocks of 50 stimuli, in order to avoid listener fatigue. Each block of stimuli was randomized and each participant received a different randomized order. Responses of the subjects, indicating that they had perceived a narrow focus context, were recorded automatically by the Super Lab Pro software.

2.4. Analysis

Repeated measures ANOVAs were conducted on the number of narrow focus identifications with factors of Language Background, Stimuli, Pitch Range, and Peak Alignment. *Language Background* is defined as the three distinct language groups of the participants, i.e., late bilingual native speakers of English (NE), late bilingual native speakers of Spanish (NE), and early bilinguals (EB). *Stimuli* include code-switched utterances and non-code-switched utterances. *Pitch Range* refers to the location of the stimuli along the 5-level pitch range continuum. Similarly, *Peak Alignment* is defined as the location of the stimuli along the 5-step peak alignment continuum.

3. Results

3.1. Language Background

There were no significant differences between different language backgrounds ($F(2,15)= 0.041$, $p=.960$), indicating that late bilinguals L1 Spanish, late bilinguals L1 English, and early bilinguals perceived narrow focus in a similar manner. Therefore, neither the age of L2 acquisition (late bilinguals vs. early bilinguals) nor the participants' L1 had an effect on the perception of narrow focus. Given these findings, subsequent ANOVAs were performed on all participants' responses without regard for the differing language backgrounds.

3.2. Stimuli: Code-switched utterances vs. Non-code-switched utterances

Participants identified code-switched utterances (CS) as narrow focus more frequently than non-code-switched utterances (NCS). Subjects identified a total of 1061 (of 2250) of the CS stimuli as narrow focus. With identical intonation contour manipulations, only 852 of the NCS stimuli were identified as narrow focus, a difference of 20%. Figure 3 shows a comparison of the code-switched and non-code-switched stimuli, in terms of the total percentage of stimuli identified as narrow focus. Thus, although the main factor of stimuli did not reach statistical significance ($F(1,15)= 3.153$, $p=.09$), there was a trend for participants to perceive code-switched stimuli as narrow focus more often than their non-code-switched counterparts.

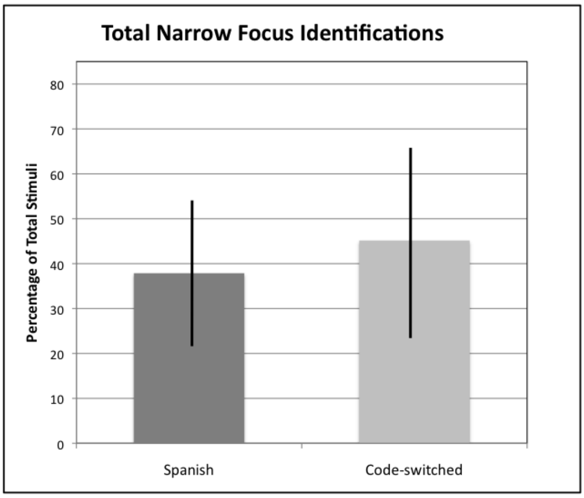

Figure 3: Mean total percentage of stimuli identified as narrow focus by language type. The error bars represent one standard deviation.

Although there was no overall main effect of stimuli, there was a significant interaction between the factors Stimuli and Pitch Range (Stimuli X Pitch Range: $F(4,60)=6.142$, $p<.001$). Figure 4 shows a comparison between the percentage of Spanish and CS utterances identified as narrow focus at each of the 5 pitch range levels. Across all levels of pitch range, there is a trend for the code-switched tokens to be identified as narrow focus more frequently than the non-code-switched tokens. This difference is largest at the lowest levels of pitch range.

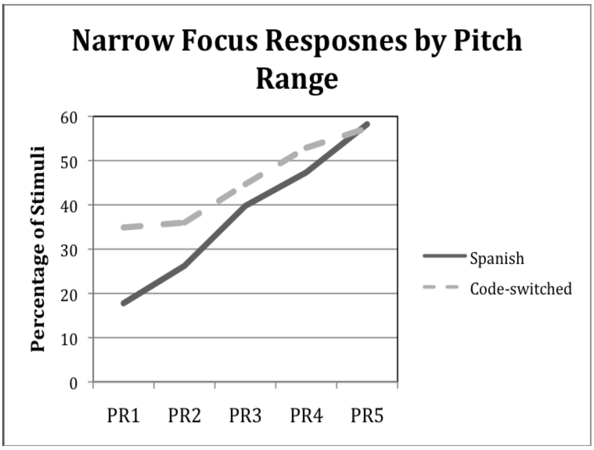

Figure 4: Percentage of stimuli identified as narrow focus by pitch range level, with PR1 approximating broad focus productions and PR5 approximating narrow focus productions.

This interaction was further analyzed by performing a separate ANOVA for each pitch range level. The results revealed a significant difference between the narrow focus identification of CS and NCS stimuli at PR1 ($p<.001$). Recall that the pitch range of PR1 was lower than actual broad focus production levels. Additionally, although narrow focus identification for CS and Spanish stimuli at PR2 was not significantly different ($p=.09$), it trended similarly to PR1. In contrast, pitch range levels 3-5, those most closely approximating the narrow focus productions, showed no significant difference between the narrow focus identifications of CS and Spanish stimuli ($p>.1$). Thus, although there is a general trend for CS utterances to be identified as narrow focus more often than their NCS counterparts, the differences are significant only at the lowest levels of pitch range.

Given that pitch range in PR1 was below actual broad focus productions, lacking any prosodic cues to narrow focus, the increase in narrow focus perception of the CS stimuli demonstrates that code switching alone carries a narrow focus effect.

3.3. Pitch Range and Peak Alignment

There was a significant main effect of both pitch range ($F(4,60)= 47.288$, $p<.001$) and peak alignment ($F(4,60)= 3.651$, $p<.01$) on narrow focus identification. Figure 5a shows the mean narrow focus identifications at each level of the pitch range continuum. Again, PR1 corresponds to the stimuli with the lowest pitch range, falling below the average broad focus contour. As expected, stimuli with the lowest pitch range were identified least often as narrow focus. As pitch range increases, so does narrow focus identification (slope =.4).

Figure 5b illustrates the mean narrow focus identifications at each step along the peak alignment continuum. The greatest percentage of focus identifications occurred towards the end of the tonic syllable, the peak alignment manipulations most closely resembling the natural production for Spanish narrow focus. Thus, participants used f_0 peak alignment functions as a cue to narrow focus perception.

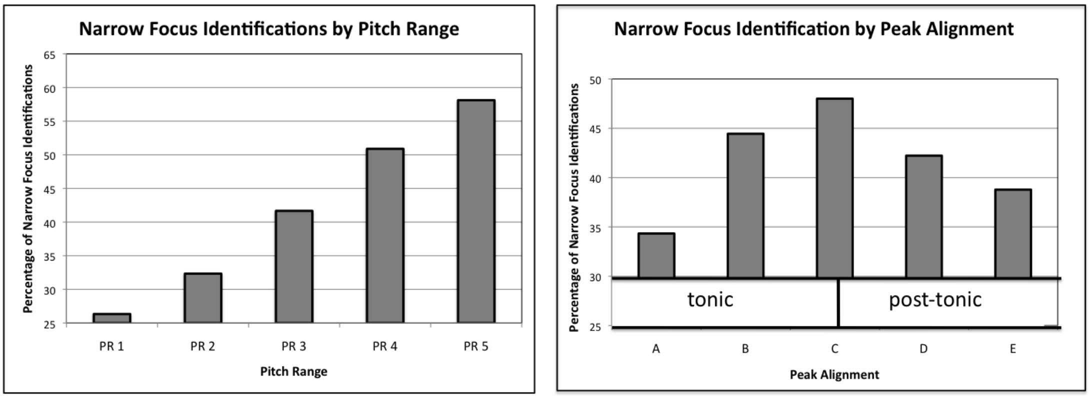

Figure 5: (a) Narrow focus identification by pitch range. PR1 is below the actual broad focus pitch range production level and PR5 approximates the narrow focus pitch range level. (b) Narrow focus identification by f_0 peak alignment. Alignment C represents the end of the vowel of the tonic syllable.

3.4. Interaction between Peak Alignment and Pitch Range

The ANOVA also revealed a significant interaction between pitch range and peak alignment ($F(16,240)= 4.020$, $p>.0001$) on the identification of narrow focus. Figure 6 shows narrow focus identification for each level of pitch range at the given peak alignments.

When pitch range is compressed, as in PR1 and PR2, there are no effects of peak alignment. However, as pitch range increases from PR3 to PR5, the effects of peak alignment become increasingly more salient. Thus, only at sufficiently large pitch range did peak alignment function as a cue to narrow focus.

Post-hoc (univariate ANOVAs) analysis confirmed that at both PR1 and PR2, there was no difference in the focus identifications at the different peak alignment steps ($p>.1$). These results indicate that perception of narrow focus at these lowest pitch range levels was not affected by the peak alignment. In contrast, all three of the higher pitch range levels PR3-5, the narrow focus identifications at the different peak alignments were shown to be significantly different ($p< .05$). Therefore, only at higher pitch range levels did peak alignment affect the perception of focus, indicating a need for sufficient pitch range for peak alignment to be a relevant cue to narrow focus.

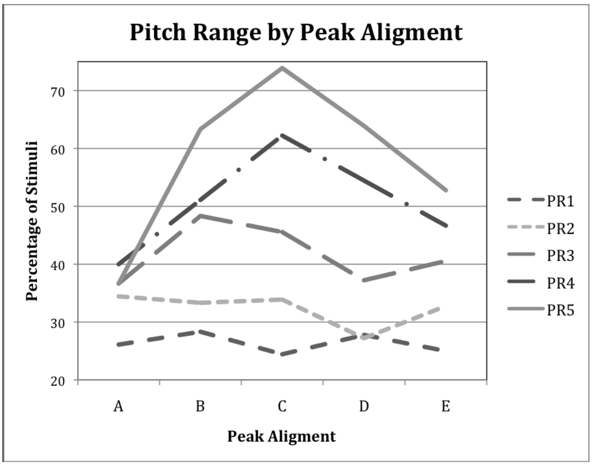

Figure 6: Percentage of stimuli identified as narrow focus at each peak alignment

3.5. Summary of Results

There are three main results of the current study. First, the perception of narrow focus by late bilinguals and early bilinguals was similar, indicating that the later age of L2 acquisition did not adversely impact performance of late bilinguals. Similarly, there were no effects of L1 in late bilinguals, showing that narrow focus perception was similar regardless of Spanish or English L1. Second, code-switched utterances were perceived more frequently as conveying narrow focus. This difference was most evident when there was a lack of additional narrow focus prosodic cues, indicating that code switching alone serves as a cue to narrow focus. Finally, participants used both peak alignment and pitch range to perceive narrow focus. However, peak alignment was dependent on a sufficient pitch range in order to serve as a viable cue to narrow focus.

4. Discussion

4.1. Code switching as a Cue to Narrow Focus

The main research question investigated in this study was how code switching impacts the perception of focus for bilingual speakers of different language backgrounds. Given that many authors, primarily from the field of sociolinguistics, have noted that code switching serves to "reiterate… amplify or emphasize a message" (Gumperz, 1982), to create "clarification and emphasis" (Reyes, 2004), and have even found that code switching for clarification and emphasis were the most common types of switches (Zentella, 1996), the findings of the current study provide additional support for these claims from a perceptually based, experimental approach.

The current investigation has provided evidence that code switching does increase the narrow focus identification, most evident in the absence of prosodic cues such as an increased pitch range. There is a clear trend for CS tokens to be identified as narrow focus more often than their NCS counterparts. However, it is important to note that, as many authors note the connection between a narrow focus effect and code switching, there is an additive relationship between CS and prosodic cues, thus narrow focus identification is most prominent in the presence of both types of cues.

These results support Auer's (1995) assertion that code switching may be considered a contextualization cue. Contextualization cues, including prosody, gesture, code switching, etc., tend to co-occur, and they work together to build up contrasts, which affect the inferencing in the utterance. The fact that these cues co-occur and work in conjunction to build up contrast relates to the idea that all of these contextualizing cues serve to highlight important portions of a discourse. Furthermore, within the framework of his relevance theory account, Chan (2003) claims that code switching is a "textualization" cue which occurs on top of other contextualization cues such as prosody, to not only highlight particular constituents in the discourse, but contribute additional meaning that would be more difficult to create without the presence of the switched word. In either case, either as a contextualization cue or a textualization cue, both accounts posit that code-switched constituents must co-occur with other cues in order to carry the full pragmatic weight of the switch. This study showed that, although in the absence of prosodic cues, code switching increased the interpretation of focus, the probability of an utterance being perceived as narrow focus was still relatively low. Only through the additive relationship involving both prosody and code switching are utterances most likely to be identified as narrow focus.

4.2. Perceptual Importance of Narrow Focus Cues

For all speakers, regardless of language background, both pitch range and peak alignment were shown to have an effect on the perception of narrow focus utterances. Additionally, these results were the same for both NCS utterances and CS utterances. The results for the effect of intonation on the perception of focus are consistent with the previous findings for production.

Pitch range correlated positively with the identification of focus. The stimuli with greater pitch range levels were more likely to be perceived as narrow focus than those with smaller pitch ranges. This perceptual data concurs with what has been previously found in production studies, which have shown an increase in pitch range for narrow focus constituents (de la Mota, 1997; Face, 2002, among many).

However, it was shown that pitch range does not function in a categorical manner, with a particular pitch range threshold for focus identification. Rather, pitch range seems to function in a gradient manner. As pitch range increases, so does the probability of identification as narrow focus. Given that an up-stepped or raised f_0 peak has traditionally been represented with ¡ in the ToBI notation, as in ¡L*H, the gradient perceptual response to the stimuli continua seems to indicate that the current notation system may lack some additional fine-grained detail. Specifically, only the highest level of pitch range (PR 5) would be represented as an up-stepped (¡) peak, however participants clearly perceived narrow focus at PR levels 3 and 4. It should be noted, however, that given the laboratory, non-natural nature of the task, participants may have turned to cues not normally used in natural conversation. Future research on the perception of intonation could work to clarify the present results and add to the discussion on the current prosodic notation models.

With respect to peak alignment, previous production studies have shown that, whereas broad focus pitch accents are typically aligned within the post-tonic syllable, narrow focus pitch accents are produced shifted leftward, within the tonic syllable. This study has shown that peak alignment is perceptually salient, with the greatest narrow focus identification occurring towards the end of the vowel of the tonic syllable. However, it should be noted that peak alignment only significantly affects narrow focus perception when there is also an increased pitch range. Stimuli with a compressed pitch range (PR1 and PR2) were not affected by peak alignment. Seemingly, without sufficient pitch range, peak alignment is not perceptually salient to listeners. These findings may relate to the findings of Face (2008), who claimed that peak height is a much stronger cue to focal contexts than is peak alignment. Thus, in terms of perception, peak alignment only functions as a cue to narrow focus when accompanied by a corresponding narrow focus pitch range.

Building on the claims from sociolinguistic studies with empirical evidence, the current study showed that code switching has a clear narrow focus effect, most evident in the absence of other contextualizing cues such as narrow focus intonation. In addition, this study has shown that the cues that have been found in previous research on the production of narrow focus in Spanish, mainly f_0 pitch range and f_0 peak alignment, are indeed perceptually relevant, although pitch range was found to be a more salient cue, with peak alignment dependent on a minimum pitch range.

References

Auer, P. (1992). Introduction: John Gumperz' approach to contextualization. In P. Auer and A. Di Luzio (Eds.), *The Contextualization of Language* (pp. 1-38). John Benjamins.

Auer, P. (1998). The pragmatics of code switching: A sequential approach. In L. Milroy and P. Muysken (Eds.), *One Speaker, Two Languages, Cross-disciplinary Perspectives,* 115-135. Cambridge University Press.

Beckman, M. E., Díaz-Campos, M., Tevis McGory, J., & Morgan, T. A. (2002). Intonation Across Spanish, in the Tones and Break Indices Framework. *Probus 14*.

Beckman, M. E., & Pierrehumbert, J. B. (1986). Intonational structure in Japanese and English. *Phonology Yearbook, 3,* 255-309.

Birkner, Karin. (2004). List intonation of German and Portuguese bilinguals in south Brazil. Regional Variation in Intonation, *Linguistische Arbeiten*. Tubingen.

Boersma, Paul & Weenink, David (2009). Praat: doing phonetics by computer. Version 5.1.07. [computer program]. Retrieved January 10, 2009. Available from http://www.praat.org/

Chan, B. H. (2003). *Aspects of the Syntax, the pragmatics and the production of Code switching: Cantonese and English.* Berkeley Insights in Linguistics and Semiotics, Vol 51. New York: Peter Lang Publishing.

Cichocki, W. & Lepetit, D. (1986). Intonational variability in language contact: F0 declination in Ontario French. In D. Sankoff (Ed.), *Diversity and diachrony* (239-247). Amsterdam: John Benjamins.

de la Mota, C. (1997). Prosody of Sentences with Contrastive New Information in Spanish. Proceedings of the ESCA workshop on intonation: Theory, models and applications. Athens, Greece.

Espinosa, A. M. (1917). Speech mixture in New Mexico: The influence of the English language on New Mexican Spanish. Reprinted in Hernández-Chavez et al. 1975: 99-114.

Face, T. (2002). Contrastive Focus and Local Intonation Patterns in Spanish. *Probus, 14*, 71-92.

Face, T. (2008). Intonation Cues and the Perception of Focal Context in Castilian Spanish. Presented at Laboratory Approaches to Spanish Phonology 4.

Gumperz, J. J., & Hymes, D. (Eds.). (1972). *Directions in sociolinguistics: The ethnography of communication.* New York: Holt, Rinehart and Winston, Inc.

Gumperz, J. J. (1982). *Discourse strategies*. Cambridge, UK: University Press.

Hualde, J. I. (2005). *The sounds of Spanish*. Cambridge, UK: University Press.

Lance, D. M. (1975). Dialectal and nonstandard forms in Texas Spanish. In Hernández-Chavez et al. 1975: 37-51.

Myers- Scotton, C. (1988). Code switching as indexical of social negotiations. In Heller, M. (Ed.). *Codeswitching- Anthropological and sociolinguistic perspectives*. The Hague, Germany. Mouton.

Myer-Scotton, C. (1993). *Dueling languages*. Oxford, UK: Oxford University Press.

Navarro Tomás, T. (1944). *Manual de entonación española*. Madrid, Spain: Guadarrama.

Pierrehumbert, J. B. (1980). The Phonology and Phonetics of English Intonation. (Doctoral dissertation, MIT).

Penfield, J. & Ornstein-Galicia, J. (1985). *Chicano English: An ethnic contact dialect.* Philadelphia: John Benjamins.

Pfaff, Carol W. (1979). Constraints on Language Mixing: Intrasentential Code switching and Borrowing in Spanish/English. *Language, 55*, 2.

Poplack, S. (1978). Dialect acquisition among Puerto Rican bilinguals. *Language in Society.* 7(1) 89–103.

Poplack, S. (1980). Sometimes I'll start a sentence in Spanish y termino en español: toward a typology of codeswitching. *Linguistics, 18*, 581-618.

Queen, R. M. (2001). Bilingual intonation patterns: Evidence of language change from Turkish-German bilingual children. *Language in Society 30*, 55-80.

Reyes, I. (2004). Functions of Code Switching in Schoolchildren's Conversations. *Bilingual Research Journal, 28*.

Simonet, M. (2008). Language contact in Majorca: An experimental sociophonetic approach. (Doctoral dissertation, University of Illinois at Urbana-Champaign).

Toledo, G. (1989). Señales prosódicas del foco. *Revista argentina de lingüística 5*, 205-30.

Willis, E. (2003). The intonational system of Dominican Spanish: Findings and analysis. (Doctoral dissertation, University of Illinois at Urbana-Champaign).

Zentella, A. C. (1997). *Growing up bilingual*. Oxford, UK: Blackwell Publishers Ltd.

Selected Proceedings of the 4th Conference on Laboratory Approaches to Spanish Phonology

edited by Marta Ortega-Llebaria

Cascadilla Proceedings Project Somerville, MA 2010

Copyright information

ISBN 978-1-57473-438-6 library binding

Ordering information

Orders for the library binding edition are handled by Cascadilla Press.
To place an order, go to www.lingref.com or contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, fax: 1-617-776-2271, e-mail: sales@cascadilla.com

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Olson, Daniel and Marta Ortega-Llebaria. 2010. The Perceptual Relevance of Code Switching and Intonation in Creating Narrow Focus. In *Selected Proceedings of the 4th Conference on Laboratory Approaches to Spanish Phonology*, ed. Marta Ortega-Llebaria, 57-68. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #2367.