

On the Prosodic Coding of Focus in Paraguayan Guaraní

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1. Introduction

An utterance conveys meaning not just through the words that are uttered (and the way these words combine to form larger expressions), but also through its prosody, i.e. its rhythm and tune.¹ The contribution of prosody to the truth-conditional meaning of an utterance as well as to its information-structural meaning, i.e. the way in which the utterance is used in discourse, is determined at the interface between the intonational phonology of the language, its syntax, and its semantics. The contribution of prosody to meaning has been studied extensively for a number of languages, including English (e.g., Bolinger 1958, Jackendoff 1972, Pierrehumbert 1980), Japanese (Beckman & Pierrehumbert 1986), Italian (D’Imperio 2002), Spanish (Face 2001), and Mandarin (Hu 2002). One insight of this research has been that there is “extensive cross-linguistic variation in the phonology of prosody” (Beaver & Clark 2008: 10, see also e.g., Jun 2005 and Ladd 1996). However, because the interface between intonational phonology and a theory of meaning has been explored mainly for English and German (e.g., Pierrehumbert & Hirschberg 1990, Rooth 1992, Büring 1997, Schwarzschild 1999, Féry & Samek-Lodovici 2006), the questions of how cross-linguistic differences in intonational phonology are reflected semantically, and whether the same (or similar) principles of interpretation govern the semantics of prosody across languages remain largely unaddressed.

The current study represents the first part of a larger project examining the meaning of prosody in Paraguayan Guaraní, a Tupí-Guaraní language spoken by approximately four million people in Paraguay and surrounding countries. Our long-term goals are to determine the meaningful units of Paraguayan Guaraní (henceforth Guaraní) prosodic structure and how the prosody of a Guaraní utterance contributes to its meaning. To begin to address these goals, the current study involves a production experiment designed to explore the prosody of simple Guaraní utterances realized in three focus conditions.

We define the focus of an utterance as that part of the utterance that answers the Question under Discussion (QUD, cf., Ginzburg 1996, Roberts 1996). Thus, we use the term focus to denote a semantic/pragmatic property, not a prosodic property. The QUD may be explicitly given, as in the examples in (1), or implicit in the discourse context. The three focus conditions included in the current study are illustrated in (1) for the English utterance *Maria is writing*. In (1a), which illustrates the ‘verb new focus’ condition, the explicit QUD is *What is Maria doing?*. Since the verb phrase *is writing* of the utterance *Maria is writing* answers the QUD, it is a focus of the utterance; since the verb phrase is not mentioned in the QUD (or in the preceding discourse), we refer to it as a ‘new focus’. The denotation of *Maria* in the answer to this QUD is given, or discourse-old (cf., Prince 1992), and not a focus. In (1b), which illustrates the ‘verb contrastive focus’ condition, the verb phrase *is writing* is again a focus of the answer, but the verb phrase is now what we call contrastively focused because the QUD inquires about which of the alternatives explicitly given in the QUD is the one that answers the QUD. The denotation of the subject *Maria* is again given and not a focus. In the ‘subject contrastive focus’ condition illustrated in (1c), the QUD inquires about which of the explicitly given alternatives,

¹ This work was supported by a Faculty and Student Study Grant from the Ohio State University Office of International Affairs. We would also like to thank Joe Marulli, Akinjide Famoyegun, Sara Weigand and Emily Williamson for research assistance, David Beaver, Craige Roberts and the audience at WCCFL 28 for feedback on the project, and the Guaraní speakers who participated in the experiment.

Maria or Fernando, constitutes the answer to the QUD. Thus, *Maria* is contrastively focused in the answer, and the verb phrase *is writing* is given and not a focus.²

(1) Focus conditions in the current study

- a. Verb new focus: [What is Maria doing?] Maria is writing.
- b. Verb contrastive focus: [What is Maria doing, writing or drawing?] Maria is writing.
- c. Subject contrastive focus: [Who is writing, Maria or Fernando?] Maria is writing.

In English, the three utterances in (1) can be, but need not be, distinguished prosodically by the position and type of nuclear pitch accent, as shown in (2). The type of pitch accent on the verb (H* vs. L+H*) distinguishes the verb new focus and verb contrastive focus conditions in (2a) and (2b), respectively, whereas the subject contrastive focus condition is realized with a L+H* pitch accent on the subject and a deaccented verb.³ In each example, the focus of the utterance is or contains the expression on which the final pitch accent of the phrase (i.e., the nuclear pitch accent) is realized. That is, the focus is or contains the prosodically most prominent expression. In addition, the given information in all three examples is unaccented, consistent with Schwarzschild's (1999) proposal that lack of prosodic prominence can be used to mark givenness.

(2) Possible prosodic tunes for focus conditions in English

- | | | |
|-------------------|---------------------------|------------------------------|
| a. Verb new focus | b. Verb contrastive focus | c. Subject contrastive focus |
| Maria is writing. | Maria is writing. | Maria is writing. |
| H* L-L% | L+H* L-L% | L+H* L-L% |

Following Rooth (1992), among others, we assume that an utterance *U* that contains a focused expression *F* asserts $[[U]]^o$ (the ordinary semantic value of *U*) and presupposes an antecedent for $[[U]]^f$, the focus semantic value of *U* obtained by abstraction over *F*. In the case of question-answer pairs, the ordinary semantic value of the question *Q*, i.e., a set of propositions obtained by abstracting over the position of the question word, may be the antecedent, if it is a subset of $[[U]]^f$, i.e., $[[Q]]^o \subseteq [[U]]^f$. Thus, both (1b) and (1c) denote the proposition that Maria is writing, but they differ in their foci and hence their focus semantic values. In particular, (1b), uttered with the tune in (2b), presupposes an antecedent that denotes a set of propositions of the form *Maria P*, where *P* is a property of Maria, of which the ordinary semantic value $[[Maria\ is\ writing]]^o$ is an element. (1c), on the other hand, uttered with the tune in (2c), presupposes an antecedent that denotes a set of propositions of the form *X is writing*, where *X* is an individual, of which $[[Maria\ is\ writing]]^o$ is an element. Since the question *What is Maria doing, writing or drawing?* in (1b) denotes a set of propositions of the form *Maria P*, the ordinary semantic content of this question is a suitable antecedent for *Maria is writing* with the tune in (2b). The question *Who is writing, Maria or Malena?* in (1c), on the other hand, is a suitable antecedent for *Maria is writing* with the tune in (2c). Thus, *Maria is writing* uttered with the tune in (2b) is felicitous in answer to the question in (1b), but not the question in (1c), and vice versa for an utterance of *Maria is writing* with the tune in (2c). The goal of the current study was to determine how focus is prosodically marked in Guaraní in each of the three focus conditions in (1).

2. Relevant aspects of the grammar of Paraguayan Guaraní

The grammar of Guaraní is fairly well-described, compared to other South American indigenous languages (see e.g., Gregores & Suárez 1967, Velázquez-Castillo 1996, 2002a, 2004, Tonhauser 2006 and references therein). This section introduces those aspects of the grammar of the language that are relevant for the current study.

² A 'subject new focus' condition was not included in the study because proper names can be felicitously used only in discourse contexts where the referent of the name has been previously established. Therefore, proper names cannot be new foci, according to the definition of 'new focus' used here.

³ We use the Tone and Break Indices (ToBI) transcription system (Beckman & Ayers Elam 1997) to indicate local prominences (pitch accents such as H* and L+H*) and phrasing phenomena (boundary tones such as L-L%).

Guaraní has a lexical stress system and lexical stress is reflected in the orthography (cf., Gregores & Suárez 1967: 63ff., Adelaar 1994). The canonical position for lexical stress is the final syllable of the word, in which case it is not orthographically marked; if lexical stress occurs in any other position or is associated with a nasal vowel, it is marked by an acute accent or a tilde, respectively (e.g., *apyka* ‘chair’, *óga* ‘house’, *hatã* ‘hard’). Some suffixes attract lexical stress and others do not: the desiderative modal suffix *-se* ‘DES’, for example, attracts lexical stress (e.g., *a-ha-se* (A1sg-go-DES) ‘I want to go’, not **a-há-se*), whereas the prospective aspect/modal marker *-ta* ‘PROSP’ and the perfect aspect marker *-ma* ‘PERFECT’ do not (e.g., *a-há-ta* (A1sg-go-PROSP) ‘I am going to go’ and *a-há-ma* (A1sg-go-PERFECT) ‘I have gone’, not **a-ha-ta* or **a-ha-ma*).

Chapter 6 of Gregores and Suárez’s (1967) reference grammar of Guaraní is devoted to the intonational system of the language. Gregores and Suárez describe intonation contour III as marking meanings such as “emphasis”, “making important or calling attention to what is being said” or “correcting something previously said” (p. 76). This intonation contour differs from intonation contour II, which is used “for all normal colorless statements” and is “the characteristic one for all answers to the question ‘how do you say...’” (p. 76). This description suggests that prosodic tunes can be used to mark meaning differences in Guaraní.

Previous research on information structure in Guaraní has identified that word order, in particular the placement of direct objects, is affected by topicality (e.g., Velázquez-Castillo 1995, 1996, Tonhauser & Colijn 2010). For the purposes of the current study, it is important to note that utterances consisting of a proper name subject and an intransitive verb (in that order) are compatible with the three focus conditions introduced in (1). Guaraní speakers judged an answer of the form *María o-hai* (María A3-write) in the context of each of the three questions in (3a-c), which correspond to the questions in (1a-c), respectively, to be felicitous. In these answers, the verb root *-hai* ‘write’ is inflected for person/number information with the third person set A prefix *o-*, glossed ‘A3’.⁴

- (3) a. A: Mba’é-pa o-japo María? B: María o-hai.
 what-QU A3-do María María A3-write
 A: ‘What is María doing?’ B: ‘María is writing.’
- b. A: Mba’e-pa o-japo María? Ha’e o-dibuja o o-hai? B: María o-hai.
 what-QU A3-do María 3.pron A3-draw or A3-write María A3-write
 A: ‘What is María doing? Is she drawing or writing?’ B: ‘María is writing.’
- c. A: Máva-pa o-hai, María o Maléna? B: María o-hai.
 who-QU A3-write María or Malena María A3-write
 A: ‘Who is writing, María or Malena?’ B: ‘María is writing.’

In Guaraní, the participants of the eventuality denoted by a verb need not be realized with a full noun phrase or an independent pronoun, as illustrated in the examples in (4). The agent of the eventuality denoted by (4a), for example, is only realized by the verbal cross-reference marker *o-* ‘A3’, which refers to Dominga as the maximally salient entity in the discourse context. The patient, the water, is realized by a full noun phrase. In (4b), only the patient eventuality participant is cross-referenced on the verb, with the first person singular set B marker *che-*; the agent eventuality participant is neither cross-referenced on the verb nor realized by a full noun phrase or an independent pronoun; it is understood to be the contextually salient entity, namely the father of the daughter’s boyfriend. Because the goal of the current study was to compare the prosody of Guaraní utterances consisting of a proper name subject followed by an intransitive verb (on which the subject was cross-referenced, as illustrated in the examples in (3)), we designed the discourses used in the experiment

⁴ The Guaraní examples are given in the standardized orthography of Guaraní used in Paraguay (Ministerio de Educación y Cultura 2004, Velázquez-Castillo 2004:1421ff.), except that all postpositions are attached to their host. The language has two sets of cross-reference markers: the set A prefixes (which mark transitive subjects and some intransitive subjects) are *a(i)-* ‘A1sg’, *ja(i)-* ‘A1pl.incl’, *ro(i)-* ‘A1pl.excl’, *re(i)-* ‘A2sg’, *pe(i)-* ‘A2pl’ and *o(i)-* ‘A3’; the set B prefixes (which mark some intransitive subjects and possessors) are *che(r)-* ‘B1sg’, *ñande(r)-* ‘B1pl.incl’, *ore(r)-* ‘B1pl.excl’, *nde(r)-* ‘B2sg’, *pende(r)-* ‘B2pl’ and *i(ñ)/h-* ‘B3’. The following glosses are used: CAUS = causative, DES = desiderative modal, MUST = necessity modal, NEG = negation, NOM.PROSP = nominal prospective aspect/modal, PERFECT = perfect aspect, PL = plural, pron = independent pronoun, PROG = progressive aspect, PROSP = prospective aspect/modal, QU = question, RC = relative clause.

such that it was natural to refer to the agent eventuality participant using a proper name subject rather than just the verbal cross-reference marker.

(4) From Tonhauser and Colijn (2010: 258)

a. Context: Dominga entered. (adapted from Velázquez-Castillo 2002b: 521)

O-mby-akú-ta hina y ka'ay-rã.
A3-CAUS-hot-PROSP PROG water ka'ay-NOM.PROSP

'She was getting ready to heat water for *ka'ay* (= herbal hot drink).'

b. Context: A father returns home after going to talk to the father of his daughter's boyfriend. His wife asks him how the conversation went.

Jaguá-icha **che**-trata. Por póco na-**che**-nupã-i.
dog-like B1sg-treat barely NEG-B1sg-hit-NEG

'He treated me like a dog. He almost hit me'.

3. The production experiment on Guaraní prosody and focus

3.1. Methods

3.1.1. Participants

Sixteen pairs of adult Guaraní speakers participated in the experiment, which was conducted in San Lorenzo, a suburb of Asunción, the capital of Paraguay. Although Guaraní is widely spoken in Paraguay, only a minority of speakers is comfortable reading and writing in the language. The participants in our study were either young adults who had learned to read and write Guaraní in school, where Guaraní has been an obligatory subject since 1994, parents who learned to read and write Guaraní as their children learned it in school, and individuals who read the bible in Guaraní. All of the participants were paid for their time. One pair of speakers was excluded from the data analysis because one of the participants did not consider herself to be a native speaker of Guaraní.

3.1.2. Stimulus materials

Forty-five discourses consisting of four or six turns each were constructed, containing a total of 77 target utterances, with 25 or 26 target utterances in each focus condition (verb new focus, verb contrastive focus, subject contrastive focus).⁵ To allow us to distinguish between the pitch accent on the verb and utterance-final boundary phenomena (which will not be discussed here), three different verb-root lengths (1, 2 and 3 syllables) and three different lexical stress positions on the verb (final, penultimate and antepenultimate) were combined to create a range of verb lengths and stress patterns. Three different verb roots were included for each root length: *-ho* 'go', *-hai* 'write', and *-u* 'come' (one syllable verb roots); *-mano* 'die', *-ñani* 'run' and *-guahẽ* 'arrive' (two syllable verb roots); and *-tarova* 'crazy', *-rambosa* 'breakfast' and *-purahei* 'sing' (three syllable verb roots). To manipulate lexical stress position, we combined the verb roots with either no verbal suffixes (resulting in word final stress), with the perfect aspect suffix *-ma* (resulting in penultimate stress), or with the prospective aspect/modal marker *-ta* plus *-ma* (resulting in antepenultimate stress). The discourses were designed in English by the authors and then translated into Guaraní by the second author in collaboration with two native speakers of Guaraní. To ensure that the discourses were as natural as possible, the variety of Guaraní that is spoken by the population (in which Spanish borrowings are fairly frequent) was used, rather than the "pure" Guaraní taught in schools. Four different random orders of the forty-five discourses were created, and each random order was used with approximately one-quarter of the participant pairs. The participants were given the discourses in advance and were encouraged to practice reading them prior to the recording session if they wished.

A sample six-turn discourse is given in (5). The bold-faced part of the second and third utterances of speaker B (referred to henceforth as B2 and B3, respectively) constitute the target utterances. The Guaraní utterance in B2, *María ohai* 'Maria is writing', is in the subject contrastive focus condition because A's immediately prior question (A2) inquires about whether Maria or Malena is writing. The

⁵ The discourses were originally designed to elicit 27 target utterances per focus condition, but four of the targets were excluded from the analysis because they were later determined to not clearly elicit responses in the intended focus condition.

utterance in B3, *Maléna itarovátama* ‘Malena is about to go crazy’, is realized in the verb new focus condition because it answers A’s immediately prior question (A3) about how Malena is doing.

(5) Sample discourse from the current study

A1: *María ha Maléna o-reko projékto pyahu?*
Maria and Malena A3-have project new
‘Do Maria and Malena have a new project?’

B1: *Heẽ, mokoi-vé-va o-hai líbro mitã-nguéra-pe-ãgua-rã.*
yes two-of-RC A3-write book child-PL-at-for-NOM.PROSP
‘Yes, the two are writing a children’s book.’

A2: *Máva-pa o-hai, María o Maléna?*
who-QU A3-write Maria or Malena
‘Who is writing, Maria or Malena?’

B2: **María o-hai.** *Maléna o-dibuja.*
Maria A3-write Malena A3-draw
‘Maria is writing. Malena is drawing.’

A3: *Añete? Mba’é-icha-pa o-ĩ Maléna?*
really what-like-QU A3-be Malena
‘Really? How is Malena doing?’

B3: **Maléna i-tarová-ta-ma.** *María o-kambia ha o-kambia la istória,*
Malena B3-crazy-PROSP-PERFECT Maria A3-change and A3-change the story
ha ha’e o-japo-jey-va’erã la dibújo tre vése.
and 3.pron A3-do-again-MUST the painting three time
‘Malena is about to go crazy. Maria is changing the story over and over, and she already had to re-do the illustrations three times.’

3.1.3. Procedure

The participants were recorded in pairs, with one member of the pair reading the lines for speaker A and the other member of the pair reading the lines for speaker B. Each participant wore a head-mounted microphone and was recorded on one track of a digital stereo recording with a sampling rate of 22050 Hz using a compact flash recorder. The final stereo recording of each participant pair consisted of two time-aligned channels, with each speaker on one channel.

For one of the pairs of speakers, 31 of the 77 target utterances were not recorded due to an equipment failure. In addition, 57 of the target utterances were misread or produced with disfluencies and were excluded from the analysis. For the remaining 1067 utterances, we analyzed the shape of the f0 contour, the phonetic implementation of the f0 contour, and the duration of the stressed syllable of the subject and the verb.

3.2. Results

3.2.1. Contour shape

The majority of the 1067 utterances were produced with one of two contours, which we refer to as the ‘hat’ contour (543 occurrences) and the ‘two peak’ contour (384 occurrences). The remaining 140 utterances were realized with other prosodic contours, including an intonation boundary between the subject and the verb or deaccenting of the verb, and were excluded from the current analysis. We will return to these less frequent prosodic patterns in future work. The hat and two peak contour shapes are illustrated in Figure 1 for the utterance *Maléna itarováma* ‘Malena is already crazy’. The hat contour is characterized by a rise out of the stressed syllable of the subject, a high plateau, and then a fall onto the stressed syllable of the verb. The two peak pattern is similar to the hat pattern, but also includes a second rise out of the stressed syllable of the verb.

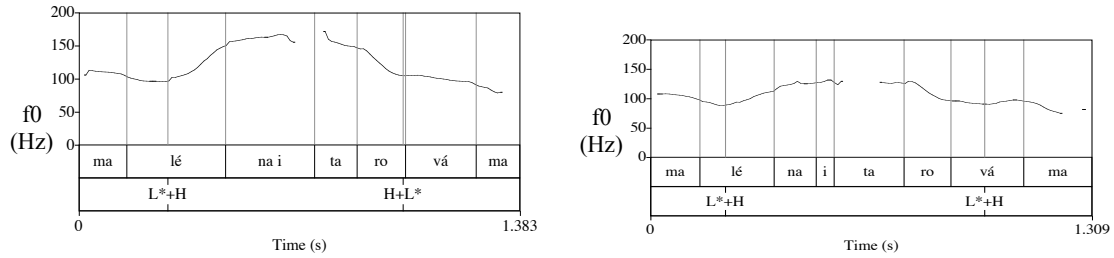


Figure 1. Example hat f0 contour (left) and two peak f0 contour (right) for the utterance *Maléna itarováma* ‘Malena is already crazy’.

The total counts of hat and two peak contours observed in each of the three focus conditions are shown in Table 1. The hat contour was observed relatively more frequently in the subject contrastive condition than in the verb contrastive ($\chi^2 = 5.6$, $df = 1$, $p < .05$) and verb new ($\chi^2 = 18.6$, $df = 1$, $p < .001$) conditions. The relative frequency of the two contours did not differ between the verb contrastive and verb new conditions ($\chi^2 = 3.6$, $df = 1$, n.s.).

Focus condition	Hat contour	Two peak contour
Subject contrastive	213	103
Verb contrastive	179	130
Verb new	151	151
Total	543	384

Table 1. Counts of the two contours (hat and two peak) in each of the three focus conditions.

3.2.2. Phonetic implementation of the contour

The effect of focus condition on the phonetic implementation of the hat and two peak contours was examined by comparing the phonetic alignment of the start of the rise associated with the subject with the onset of the stressed syllable of the subject, the end of the rise with the onset of the stressed syllable of the subject, the start of the fall with the onset of the stressed syllable of the verb, and the end of the fall with the onset of the stressed syllable of the verb, as well as the duration of the rise, high plateau, and fall, across the three focus conditions. For each dependent variable, linear mixed effects models were constructed with focus condition (subject contrastive, verb contrastive or verb new), verb-root length (1, 2 or 3 syllables), and stress position (antepenultimate, penultimate or final) as fixed effects and with random intercepts for talker and verb. To allow comparison between all three levels of the focus condition variable, two models were constructed for each dependent variable, one with subject contrastive as the baseline focus condition level and one with verb new as the baseline focus condition level. Statistical significance was determined using Markov Chain Monte Carlo simulations (Baayen et al. 2008) and the alpha value was set to .025 to correct for building two models for each dependent variable. We report only the effects of focus condition in this paper, and leave discussion and interpretation of the effects of verb-root length and stress position for future work.

The alignment of the start and the end of the rise with the stressed syllable of the subject, as well as the alignment of the start of the fall with the stressed syllable of the verb were not affected by focus condition. However, the alignment of the end of the fall relative to the onset of the stressed syllable of the verb was significantly different in the subject contrastive and verb new conditions ($t = 2.8$, $p < .01$). As shown in the middle column of Table 2, the end of the fall occurred closer to the onset of the stressed syllable of the verb in the verb new condition than in the subject contrastive condition. The differences in fall end alignment between the verb contrastive condition and the other two focus conditions were not significant.

Focus condition	Fall end alignment (ms)	Plateau duration (ms)
Subject contrastive	35	152
Verb contrastive	34	140
Verb new	18	163

Table 2. Mean phonetic implementation measures in each of the three focus conditions.

The duration of the rise and the duration of the fall were also not affected by focus condition. However, as shown in the last column of Table 2, the duration of the high plateau between the subject and the verb was significantly longer in the verb new condition than in the subject contrastive ($t = 2.4$, $p < .025$) and verb contrastive ($t = 2.4$, $p < .025$) conditions. Given the longer high plateau and the earlier alignment of the end of the fall in the verb new condition, we expect the slope of the fall to be steeper in the verb new condition than the subject contrastive condition. The pitch scaling and slope of the rise and the fall, as well as the phonetic implementation of the second rise in the two peak pattern will be analyzed in future research.

3.2.3. Duration of the stressed syllables of the subject and verb

Finally, we examined the durations of the stressed syllables of the subject and the verb in the three focus conditions using linear mixed effects models as in the analysis of the phonetic implementation of the f0 contours. The mean durations of the stressed syllable of the subject and the verb in each of the three focus conditions are shown in Table 3. The stressed syllable of the subject was significantly longer in the subject contrastive condition than in the verb contrastive ($t = 3.5$, $p < .001$) and verb new conditions ($t = 3.4$, $p < .001$). The stressed syllable of the verb was significantly longer in the verb contrastive and verb new conditions than in the subject contrastive condition ($t = 4.6$, $p < .001$ for verb contrastive and $t = 5.3$, $p < .001$ for verb new). The difference between the verb contrastive and verb new conditions was not significant for either duration measurement.

Focus condition	Subject stressed syllable (ms)	Verb stressed syllable (ms)
Subject contrastive	222	227
Verb contrastive	217	243
Verb new	219	239

Table 3. Mean stressed syllable durations in each of the three focus conditions.

3.3. Discussion

The research question addressed in the current study was how three different focus conditions are prosodically realized in Guaraní. Perhaps not surprisingly, given the widespread use cross-linguistically of prosody to mark focus and the description of Guaraní intonation provided by Gregores and Suárez (1967), we found that utterances differed in their prosody depending on which focus condition they were realized in. In particular, utterances in the three focus conditions were distinguished by the overall shape of the intonation contour, the phonetic implementation of the contour and the duration of the stressed syllable of the subject proper name and the verb. Utterances in the subject contrastive condition occurred significantly more often with the hat contour than utterances in the verb new and verb contrastive conditions. Utterances in the verb new condition also had a significantly longer high plateau than utterances in the subject contrastive and verb contrastive conditions and the end of the fall was realized earlier in the stressed syllable of the verb in utterances in the verb new condition than in utterances in the subject contrastive condition. Finally, the stressed syllable of the subject proper name in utterances in the subject contrastive condition had a longer duration than in utterances in the other two focus conditions, and the stressed syllable of the verb in utterances in the verb new and verb contrastive conditions had a longer duration than in utterances in the subject contrastive condition.

These results suggest that prosody is used to mark focus in Guaraní, at least with respect to the differences between utterances where the denotation of the subject noun phrase is contrastively focused and utterances where the denotation of the verb is new or contrastively focused. When the denotation of the subject proper name is contrastively focused in Guaraní, the stressed syllable of the subject proper name is longer and the utterance is more likely to occur with the hat contour; when the denotation of the verb is new or contrastively focused, the stressed syllable of the verb is longer and the utterance is more likely to occur with the two peak contour.

4. The phonology of Guaraní prosody and its interface with semantics

Having identified some of the prosodic realizations of focus in Guaraní, it is now possible to entertain hypotheses about our larger research questions: what are the meaningful units of Guaraní prosody and how does the prosody of a Guaraní utterance contribute to its meaning?

Regarding the first question, our findings suggest that the hat and two peak contours are meaningful tunes of the language. The hat contour was realized relatively more often in the subject contrastive condition, whereas the two peak contour was realized relatively more often in the verb new and verb contrastive conditions, suggesting that overall contour shape may be used to distinguish meaning. We can take this interpretation further and also hypothesize that the hat and the two peak contours reflect a series of pitch accents associated with the stressed syllable of the subject and the verb, as shown in Table 4. Both the hat and the two peak contours can be characterized as involving a L*+H pitch accent that is aligned with the stressed syllable of the subject, which accounts for the rise out of the stressed syllable of the subject that was observed in the 927 utterances that exhibited one of these two contours. The two contours differ with respect to the pitch accent associated with the stressed syllable of the verb: while the hat contour features a H+L* accent, the two peak contour has a L*+H accent, which accounts for the second peak. However, this interpretation may not be able to account for the high plateau observed in the two peak pattern because a second H target is not available to maintain a high f0. Further exploration of the pitch accent categories in Guaraní is therefore needed to determine what the full inventory of pitch accents is and how phonetic interpolation between pitch accents is realized.

Contour	Stressed syllable of the subject	Stressed syllable of the verb
hat	L*+H	H+L*
two peak	L*+H	L*+H

Table 4. Hypothesized pitch accents in the hat and two peak contours in Guaraní.

If these interpretations are on the right track, Guaraní is similar to languages like English and German in that pitch accents are part of the inventory needed to describe the intonational phonology of the language. However, one difference between Guaraní and English that seems to emerge from our study is the role of nuclear pitch accents in marking focus. For example, compare the prosodic realization of the English and Guaraní versions of *Maria is writing* in the three focus conditions in our study. In English, a contrastively focused subject can be prosodically distinguished from a focused verb by the placement of the nuclear pitch accent. As shown in (2), the focus of the utterance is or contains the expression on which the nuclear pitch accent is realized. In Guaraní, however, a pitch accent is typically realized on both the subject and the verb in all three focus conditions. As a result, the location of the final pitch accent in a phrase is not sufficient to identify the focus of the utterance. Rather, other prosodic features, such as the duration of the stressed syllables, the alignment of the f0 contour, and the type of pitch accent (H+L* vs. L*+H), come into play in marking focus prosodically in Guaraní.

This difference between the intonational phonologies of the two languages raises the question of whether there are differences in the interpretation of prosody between the two languages. Rooth's (1992) analysis of question-answer congruence, outlined in section 1 above, relies on the assumption that the focus of the answer is or contains the prosodically most prominent expression (cf. also Selkirk 1984, Schwarzschild 1999, Féry & Samek-Lodovici 2006). To identify whether Rooth's analysis can be applied to question-answer congruence in Guaraní, i.e., whether a Guaraní answer is felicitous if and only if the denotation of the Guaraní question is a subset of the focus semantic value of the answer, requires a better understanding of how prosodic prominence is realized in Guaraní. Because neither author is a native speaker of Guaraní, we intend to explore prosodic prominence through perception experiments with native Guaraní speakers. Our hypothesis is that although English and Guaraní may differ in how prosodic prominence is realized, the focus of an utterance in Guaraní also contains (or is) the prosodically most prominent expression in the utterance and triggers a presupposition along the lines of Rooth's (1992) analysis. Thus, in the subject contrastive condition in the current study, the pitch accent on the verb would be interpreted as a post-nuclear pitch accent that is less prominent than the nuclear pitch accent on the subject proper name. In combination with perception experiments, future production experiments with utterances longer than two words will also

give insight into prosodic non-prominence in Guaraní and whether lack of prosodic prominence gives rise to a givenness requirement along the lines of Schwarzschild's (1999) analysis of English.

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