

ON THE UNIVERSALITY OF PROSODIC REFLEXES OF CONTRAST: THE CASE OF YUCATEC MAYA

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ABSTRACT

This paper is about the tonal realization of contrastive focus in Yucatec Maya. Examining sentences with *in situ* focused adjectives (postverbally) we observe neither durational differences as compared to non-contrastive sentences nor any differences in F0 except for a higher non-contrastive high tone. Yucatec Maya, being a tone language, seems to use prosodic means exclusively to express tonal contrasts, thus belonging to a language type without prosodic marking of contrast.

Keywords: Yucatec Maya, contrastive focus, prosody, tone.

1. INTRODUCTION

Yucatec Maya is a Mayan language spoken by a population of 700,000 speakers (following the 1990 census) in the Yucatecan peninsula. It is the only Mayan language that displays lexical tones. Yet, as for many Mayan languages, the basic word order is V-initial with postverbal OS order, e.g. [8].

Yucatec Maya displays several morpho-syntactic means of encoding information structure including topic and focus constructions, topic affixes, and out-of-focus verb morphology [5]. Regarding contrastive focus, [3] does not observe any prosodic marking in sentence final position. Similarly, [4] observe no prosodic marking in the comparison of broad and narrow focus. The present study examines contrastive focus in postverbal but sentence medial position, in contrast to [3], excluding possible influences of finality which may have “overwritten” the prosodic marking of contrastive focus in [3].

1.1. Syntactic constructions

As is the case for most languages of the Mayan family, the basic word order is V-initial. The order of postverbal arguments is basically OS (see (1) and [8]).

- (1) t-u hàant-ah òon Pedro.
 PFV-A.3 eat:TRR-CMPL(B.3.SG) avocado Pedro
 ‘Pedro ate avocado.’

Focused constituents are placed left adjacent to the verb (compare (2a-b) with (1)). A difference in the morphology creates an agent/patient asymmetry: only in agent-focus (and in perfective aspect) is the aspect auxiliary dropped, together with the cross-reference clitic for the agent. This verb form is non-finite (also characterized as an ‘out of focus’ verb form) and never occurs in main clauses. Accordingly, such argument focus constructions are analyzed as cleft sentences [9].

- (2) a. òon t-u hàant-ah Pedro.
 avocado PFV-A.3 eat:TRR-CMPL(B.3.SG) Pedro
 ‘It was an avocado, that Pedro ate.’
 b. Pedro hàant òon.
 Pedro eat:TRR(SUBJ)(B.3.SG) avocado
 ‘It was Pedro, that ate an avocado.’

Data from production experiments revealed an asymmetry in the obligatoriness of the focus construction as in (2). While there is a strong preference to express focus on the agent constituent through the focus construction, focus on the patient was encoded either through the focus construction or *in situ*, with almost the same frequency [5]. The crucial generalization for our purposes is that *in situ* placement of the patient constituent is not specified syntactically for information structure. Consequently, this syntactic configuration is suitable for inspecting the availability of prosodic reflexes of information structure, which is the aim of the present study.

1.2. Yucatec Maya tone

As regards its prosodic characteristics, Yucatec Maya is exceptional in its language family in being the only Mayan language that has developed lexical tones. It is claimed to have two tones, lexically high and low [4]. A lexical tone appears on syllables containing a long vowel. Syllables with short vowels also exist and these are said to be toneless.

The realization of low and high tones was measured in [4]. In contrast to previous analyses, the high tone is claimed to be realized as a rise in pitch while the low tone remains flat on a low pitch level. The prosodic domain of tone has been claimed to be both the syllable and the mora [3].

2. METHODS

2.1. Subjects

The data reported in this paper was obtained with two native speakers, residents of the village Yaxley (Quintana Roo). Both speakers are native in Yucatec Maya and bilingual (in Spanish). The recordings took place in Berlin during a short visit by both speakers in August 2006.

2.2. Speech Materials

Based on the generalization that patient constituents are often focused *in situ* in spontaneous discourse (cf. 1.1; [5]), we constructed sentences instantiating this configuration. In particular, we wish to check for prosodic effects on adjectives (embedded within object NPs) comparing a contrastive and a non-contrastive context. The target sentence is given in (3). A syntactic option for focus on the adjective would contain movement into the focus position resulting in a discontinuous NP. Since split NPs are highly marked, the expression in (3) corresponds to a “natural” answer in the presented contexts. This sentence was read by the speaker in the contrastive context (4) or in the non-contrastive context (5). Notice that the target word is not sentence final, contrary to [3].

(3) Target sentence

t-in w-il-ah hun-kúul che' kóom
 PFV-1.SG 0-see-CMPLone-CL.PLANT tree short
ich-e kòol-o'.
 in-DEF milpa-D2
 'I saw a short tree in the milpa.'

(4) Contrastive context

t-in w-il-ah hun-kúul che' chowak
 PFV-1.SG 0-see-CMPLone-CL.PLANT tree long
ich-e kòol-o'.
 in-DEF milpa-D2
 'I saw a long tree in the milpa.'

(5) Non-contrastive context

ba'x t-a w-il-ah ich-e kòol-o'?
 what PFV-2.SG 0-see-CMPLin-DEF milpa-D2
 'What did you see in the milpa?'

To get evidence for possible interactions between contrast and the different lexical tones, we

constructed items for six monosyllabic adjectives, i.e. two for each lexical tone: H, L and N (Tab. 1). Each token was recorded eight times per speaker (in separate sessions), yet some instances had to be excluded for analysis (see *n* of valid tokens in Tab. 1). The recording sessions contained a number of tasks which were used as fillers for each another.

Table 1: Target adjectives (H-high, L-low, N-no tone).

Tone	Carrier Word		n (contrastive / non-contrastive)
N	<i>chup</i> 'full'	<i>uts</i> 'beautiful'	34 / 27
H	<i>kóom</i> 'short'	<i>ch'óop</i> 'blind'	35 / 27
L	<i>àal</i> 'heavy'	<i>bòox</i> 'black'	27 / 24

2.3. Analyses

The data were processed in Praat [6] with a 22.05 kHz sampling rate and a 16 bit resolution. The labeling was done at word level including the beginning and end of the sentence. Since the target words were monosyllables, word level labeling equates to the level of syllable in our case. The duration as well as the F0 analysis were conducted semi-automatically using a Praat script.

Duration measurements were obtained from the word level labels; the time of the beginning and end of the sentence as well as the target word and its preceding head noun were stored. Time-normalization was done by relating the duration of the target word to the duration of the whole sentence ($\Delta t_{Adj}/\Delta t_S$) and in relation to the duration of the head noun ($\Delta t_{Adj}/\Delta t_{NP}$).

F0 was extracted using a Hanning window of 0.4 seconds length with a default 10 ms analysis frame. The analysis script allowed for marking of the sonorant part of the target word, which is not equivalent to the duration of the target word in all cases (cf. Table 1). Obvious F0 errors were corrected by hand and F0 was smoothed by 10 Hz. Within the sonorant part two measurements were made: first the pitch of the tonal target was extracted (H, L and N); second, ten points of F0 in equal distance in relation to the duration of the sonorant part of the target word were extracted resulting in time-normalized F0 time courses (pitch normalized according to a speaker's range [11]).

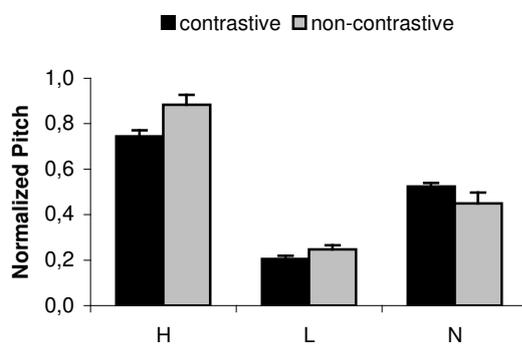
In the following analyses of pitch and duration we compare the means of the obtained values accompanied by their confidence intervals. We assume that a difference between two means x_1 and x_2 is such that $x_1 > x_2$ is not significant, if either the higher bound of x_2 is higher than x_1 or the lower bound of x_1 is lower than x_2 .

3. RESULTS

3.1. Tonal targets

Figure 1 displays a comparison of means of pitch on the two tonal targets (H and L) as well as the neutral tone syllable (N), for contrastive (black) and non-contrastive (grey) items. As can be seen, only the high tone comparisons yields a significant difference. Interestingly, it is the non-contrastive version that is significantly higher than the contrast version.

Figure 1: Normalized Pitch values of target items reflecting their tonal targets in comparison between contrastive (black) and non-contrastive (grey) focus.



3.2. Time course of F0

In this part we present the same comparison between contrastive and non-contrastive items in terms of the F0 time course over the target word. Figures 2 to 4 present ten measuring points of the sonorant part of the corresponding syllables for high, low and no-tone syllables respectively.

First, comparing the realization of the three tones, we can confirm [4] that the high tone is realized with a rise in pitch. Both the low and no-toned syllables show a fall in pitch, the latter being realized in a higher register than the former.

Second, comparing the contrastive version with the non-contrastive version in each figure we observe no significant difference between the two except for the high tone. In non-contrastive items the high tone is significantly higher throughout the whole syllable compared to the contrastive version.

3.3. Duration

Previous studies have shown that contrast may have an effect on the duration of focused elements, both in intonation languages such as German [1] or tone languages such as Chinese [10]. According to

Figure 2: Time course of F0 during the target word, normalized pitch and time normalized. Comparison of lexically high toned words in contrastive (black) and non-contrastive (grey) contexts.

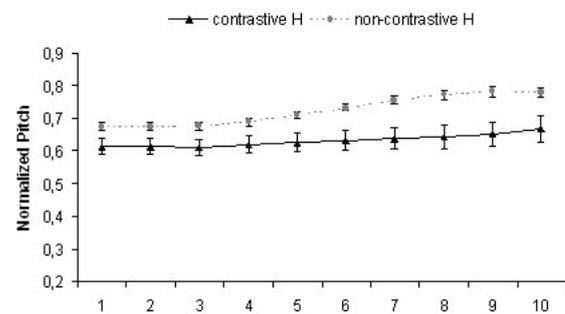


Figure 3: Time course of F0 during the target word, normalized pitch and time normalized. Comparison of lexically low toned words in contrastive (black) and non-contrastive (grey) contexts.

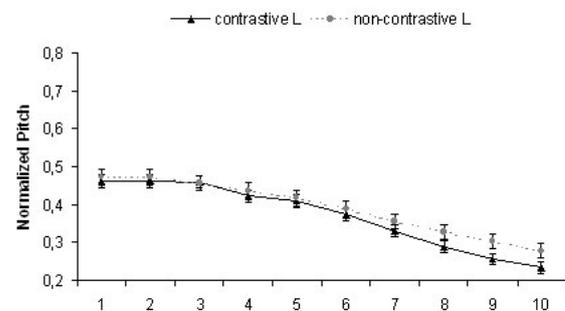
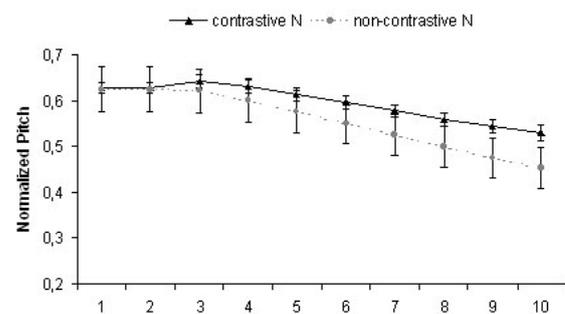


Figure 4: Time course of F0 during the target word, normalized pitch and time normalized. Comparison of lexically no-toned words in contrastive (black) and non-contrastive (grey) contexts.

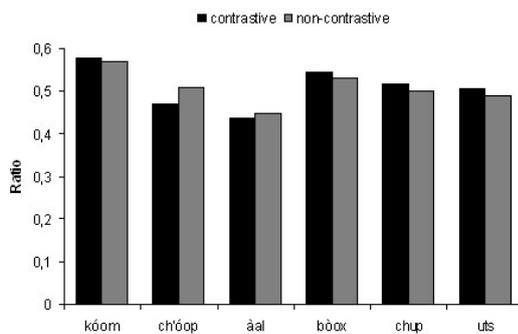


such observations, the contrastive version in our experiment was expected to show longer duration than the non-contrastive one.

However, a comparison of the average duration of the adjectives in the contrastive and non-contrastive conditions reveals that this expectation does not hold for Yucatec Maya. Figure 5 presents the means of the $\Delta t_{Adj}/\Delta t_{NP}$ ratios calculated per

speaker and item separately. The differences in duration are randomly distributed in the target items. A comparison across items reveals no difference between contrastive and non-contrastive (means of ratios in both cases: 0.508), which is not in accordance with our prediction and which is statistically not significant.

Figure 5: Means of ratios ($\Delta t_{Adj}/\Delta t_{NP}$) of duration values in contrastive and non-contrastive contexts; Δt_{Adj} : adjective duration, Δt_{NP} : NP duration.



4. DISCUSSION

This paper is about the prosodic realization of contrastive focus in Yucatec Maya. We compared the prosodic realization of sentences containing an *in situ* contrasted adjective with the realization of the same sentences in a non-contrastive context. The 174 sentences realized by two native speakers were analysed in terms of duration, tonal target pitch values, and time-normalized pitch course over the target word. In contrast to [3], target words were sentence medial to avoid sentence final effects.

None of the prosodic correlates showed a significant difference between the contrastive and corresponding non-contrastive version except the high tone. It is however the non-contrastive version that is realized higher in contrast to studies that report certain prosodic effects of focus such as H-raising [7]. Phrasing might cause this result in our data since both speakers insert a pause after the target item in contrastive contexts; a phrase boundary lowers the pitch of a high tone [4]. From this we conclude for the present analysis that contrast in Yucatec Maya is not expressed by tonal means (see also [2], [4]). Tone languages need not necessarily to show tonal reflexes of focus such as pitch accents since the primary correlate, F0, is used for expressing differences in lexical tone.

Our findings are in line with previous studies that show that focus is not prosodically expressed

([2], [4]). Since Yucatec Maya has a variety of morphological and syntactic means to express information structure, the above observation might lead to the conclusion that prosody is not necessary as an additional cue to express focus. However, we examined sentences where focus is not expressed by means of syntax or morphology, and where, moreover, a syntactic expression would result in a highly marked structure (split NP) which is rarely used in spontaneous discourse. The results of our study suggest that in the unmarked syntactic configuration there is no effect of contrast at all – neither in prosody nor in syntax.

Glosses:

A=person clitic class A; B=person clitic class B; CL=noun class; CMPL=completive aspect; D=deictic marker; DEF=definite; PFV=perfective aspect; SG=singular; SUBJ=subjunctive; TRR=transitivizer.

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