The effect of focus on lexical tones in Vietnamese

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Abstract

We investigated the effect of focus on the formation of f₀ in two of the six tones of the Hà Nội dialect of Vietnamese. This dialect contrasts six lexical tones, has no tone-sandhi, the language does not have focus markers and uses prosody exclusively to express pragmatic contrasts (Jannedy, 2007) by means of intonational emphasis in ways similar to English or German. To tease out the effect of focus on the duration and f₀ of the level tone *ngang* and the rising tone *sắc*, identical short SVO-type utterances were elicited with a question-answer paradigm under three focus conditions (subject-, verb-, and object focus). Results indicate that the tone especially under subject- and verb- but also object focus shows an f₀-excursion for the *ngang* tone and a scoop and sharp rise for *sắc*. Duration of the focused syllable also increases.

Key words: lexical tone, Vietnamese, focus, intonation

Introduction

Mon-Khmer languages are known for the complexity of their tone system: lexical contrasts are marked by tonal (pitch) as well as laryngeal features (Yip, 1995). This interaction of voice quality and lexical tone also characterizes Vietnamese (Brunelle, 2003). Several studies have explored the six-tone system of the northern (Hanoi) Vietnamese dialect and have established that there is a higher and a lower pitch register (Nguyễn and Edmondson, 1997). A graph of the shapes of the six lexical tones representative of the standard Hà Nội dialect can be found in Jannedy and Brunelle (2007). Three of the six tones are produced in a modal voice. In this work we will primarily describe the behavior of the rising tone *sắc* which canonically rises from the bottom of the pitch range to the top, and the neutral tone *ngang* which remains fairly stable in pitch throughout in its canonical shape. (In the larger study, we also investigated the low-level tone *huyền* and all positional combinations of the three modal tones to get an understanding of their behavior under focus.)

Brunelle (2003) investigated the effect of coarticulation on neighboring tones in Hà Nội Vietnamese and found that progressive assimilation is stronger than anticipatory assimilation. Michaud and Vu (2004) propose based on their results that “[...] a stable correlate of emphasis is curve amplification, manifested [...] as an increased slope of F₀ curve [...] or as F₀ register raising.” Jannedy (2007) tested whether native listeners of Hà Nội

Vietnamese were able to recover the information structure encoded in utterances recorded under different focus conditions and found that listeners were reliably able to identify subject-, verb- and object-focus utterances.

Method

Corpus

We constructed a corpus consisting of 21 simple SVO-sentences, all differing with regard to the lexical tones on the subject, verb and object. These sentences were recorded in a question-answer context under laboratory conditions. For an example, see Table 1.

Table 1. Má lấy muối – *Mother takes salt* . – *sắc sắc sắc*.

Chuyện gì thế?	What is happening?	[Má lấy muối] _F	Sentential
Ai lấy muối đây?	Who takes salt?	[Má] _F lấy muối	Subject
Má lấy gì đây?	What is Ngà taking?	Má lấy [muối] _F	Object
Má làm gì với muối đây?	What is Mother doing with the salt?	Má [lấy] _F muối	Verb
Má làm gì đây?	What is Mother doing?	Má [lấy muối] _F	VP

Only two of these tonal configurations are described in this paper. Four native Hà Nội Vietnamese speakers (3 females, 1 male) read the sentences 5 times as a reply to questions.

Measurements

All elicited utterances were constructed to contain three monosyllabic words with either the level tone *ngang* or the rising tone *sắc* on each word. The data was phonemically annotated in Praat (Boersma and Weenink, 2007) and the duration and F0-maximum was extracted for each phoneme. We also calculated the F0 at different time points (begin, 25%, 50%, and 75% into the vowel) within the tone bearing vowel in the word under focus. Also, time-normalized F0 contours were created via a script (Xu, 2007) and overlaid for easier visual comparison.

Results and discussion

The lines in the graphs below show time-normalized f0-trajectories for subject focus (black), verb focus (dark grey) and object focus (light grey) for the level tone *ngang* (left panels) and the rising tone *sắc* (right panels) for four speakers (F1-F3 and M1). Note that the language has complex vowel sounds much like diphthongs and that each vowel was preceded by a nasal or lateral consonant for easier tracking of the f0.

Figure 1. Time normalized F0-contours (Xu, 2007) for the level tone *ngang* (left) and the rising tone *sắc* (right) for three female (F1-F3) and one male speaker (M1).

We fitted linear mixed effects models with the measurements as the dependent variables, the *Focussed Word* as the fixed effect and *Focus Condition* and *Speaker* as random effects, separately for both tonal conditions. All main effects came out as significant ($p < .001$). Table 2 shows the results of the post-hoc comparisons: for example, for the *ngang* tone, in the subject (verb and object) focus condition(s), we compared the values for the focused subject with the subjects in the V and O focus conditions (paradigmatic comparison).

Table 2. Results of post-hoc Tukey-test of Subject-, Verb-, and Object focus conditions with S-, V-, and O in non-focus conditions in the same position.

Tone	<i>ngang</i> (level)						<i>sắc</i> (rising)					
Foc	Subject		Verb		Object		Subject		Verb		Object	
no Foc	V	O	S	O	S	V	V	O	S	O	S	V
F0-max	***	***	**	***	n.s.	n.s.	***	***	n.s.	***	***	**
Dur	***	***	***	***	***	***	***	***	***	***	n.s.	n.s.
F0-start	***	***	n.s.	***	n.s.	n.s.	*	n.s.	***	n.s.	n.s.	*
F0-25%	***	***	n.s.	***	n.s.	n.s.	*	*	***	n.s.	n.s.	n.s.
F0-50%	***	***	**	***	n.s.	n.s.	*	*	n.s.	n.s.	**	**
F0-75%	***	***	**	***	n.s.	n.s.	*	**	n.s.	n.s.	n.s.	n.s.
*** = $p < .001$ ** = $p < .01$ * = $p < .05$ n.s. = not significant												

Results indicate that focus is expressed through *f0* and *duration*: duration increases in most cases significantly under focus. An Object in the O-Focus condition is less often found to be significantly different from objects in on-focus conditions. Duration and *f0* cues may be confounded by final lengthening and lowering effects. For *ngang*, the maximum *f0*-excursion is aligned with the tone bearing unit, while the rising tone shows much of its scooped shape under focus and utterance finally, but not medially unfocussed.

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