

行政院國家科學委員會專題研究計畫成果報告

台閩語韻律結構 (PROSODY) 實驗研究台閩語加強語氣對韻律結構的影響

Focus and Taiwanese Prosodic Structures

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一、中文摘要

本研究分析設計語料中加重語氣音節之長度、基頻，結果顯示台閩語加中語氣音節有基頻範圍擴張、上升，及長度加長二特性。

關鍵詞：加重語氣、基頻、音節長度

Abstract

This study investigated F0 and duration of narrow focused, broad focused, and defocused syllables in Taiwanese. The F0 ranges of narrow focused syllables are expanded and raised, while duration are longer.

Keywords: Narrow focus, F0, duration

II. Introduction

Focus can be implemented with syntactic, semantic, morphological, phonological, and phonetic modification depending on the natures of languages. Phonetically, it has been found that narrow focused syllables have expanded F0 ranges, and longer duration. F0 and duration are also be used to distinguish lexical tones in tonal languages. The competition of two linguistic usage on the same acoustic cues complicates the study of focus in tonal languages. It was found in Mandarin that F0 of narrow focused syllables is expanded while duration is elongated. This study investigated the F0 and duration of narrow focus in Taiwanese, a tonal language with seven lexical tones. Only the five lexical tones of un-checked syllables were studied.

II. Methods

A. corpus

Eighty SVO sentences were used.

Subjects of these sentences formed a tonal group, while verb and object formed another tone group. The subjects were surnames beginning with diminutive morpheme 'a-' and followed by syllables in five different tones, i.e. a-mei /HH/ [HH], a-mo /LH/ [LH], a-ma /HM/ [HM], a-mai /ML/ [ML], a-liang /MM/[MM].

Verbs carry sanhi tones. Since low-rising tone /LH/ is not a possible sandhi tone, only four lexical tones were selected for verbs, /HH/ [HH] 'hug', liam /ML/ [HM] 'pinch', ma /MM/ [ML] 'scold', lau /LH/ [MM] 'save' Low-rising tone /LH/

The first syllable of object carry sandhi tone, again the low rising tone were not used. Only four tones were chosen as the first syllable of objects, liu/HM/ [HH] -a 'button', a /ML/ [HM] -leng 'egg', lua /MM/ [ML]-a 'comb', niu /LH/ [MM]-a 'silkworm'.

Each sentence have four different focus conditions, board focus, narrow focus on subject, narrow focus on verb, and narrow focus on object. To control for focus condition, subjects' production was elicited with short dialogues. Take the sentence 'a-mei holds buttons.' For example, the question experimenter produced to elicit broad focus was 'What happened?'. The question used to elicit narrow focus on subject was 'Who holds button?'. To elicit narrow focus on verb, the sentence produced was 'What did A-mei do to the button?' The question asked to elicit sentence with narrow focus on object was 'What did A-mei hold?'

Each sentence with different focus condition was repeated three times. There

were altogether (5 subjects x 4 verbs x 4 objects x 4 focus conditions x 3 repetitions) 960 sentences produced by each subject.

B. Subject

Four male students from National Chiao Tung University participated in the experiment. They were native speakers of Taiwanese.

C. Procedure

The recording was conducted in sound treated booth in the Phonetic Lab of National Chiao Tung University. Data were elicited through short dialogues between an experimenter and the subjects. The experimenter was a female graduate student. Subjects read sentences written on papers with no indication of focus conditions. The experimenter asked a question after the subject read a sentence. Depending on the experimenter's question, the subject placed focus on desired position. If the experimenter decided that the sentence was mispronounced, she would ask the question again to elicit another production of the same sentence.

D. Instrumentation

Utterances were recorded with a SONY MD Walkman, and a TEAC microphone 30 cm in front of the subject's mouth. Data were transferred digitally through a fiber-optical cable from MD to digital inputs of Sound Blaster Pentium Live sound card and recorded by Sound Forge software.

E. Data Analysis.

Each sentence was transcribed using Taiwanese ToBI annotation convention at word, stress, phones, tones and breaks levels using Emulabel software. F0 and duration were queried from the transcribed database with Emuquery software.

III. Results

The duration of narrow focused syllables (black symbols) are longer than those of broad focus syllables (white symbols) and defocused syllables (gray symbols) as shown in Figure 1-5.

F0 ranges of narrow focused syllables are higher and more expanded, as shown in Figure 6-10. Even for low falling tone, the F0 of narrow focused syllables are higher.

IV Discussions

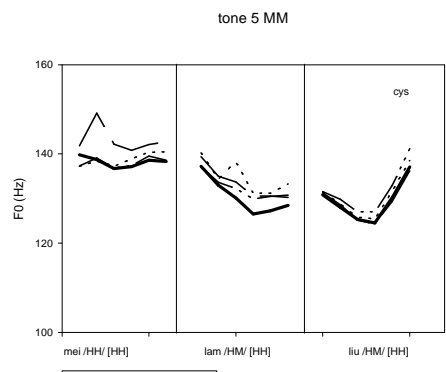
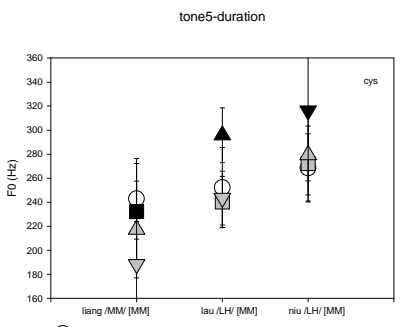
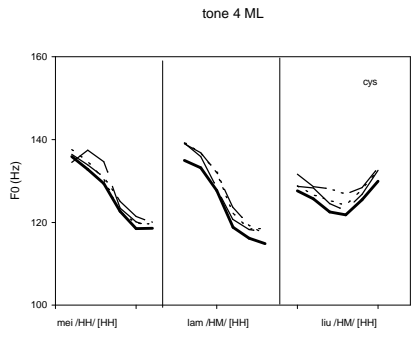
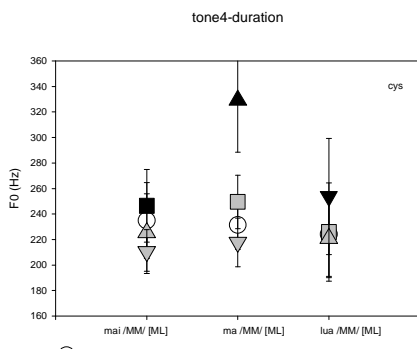
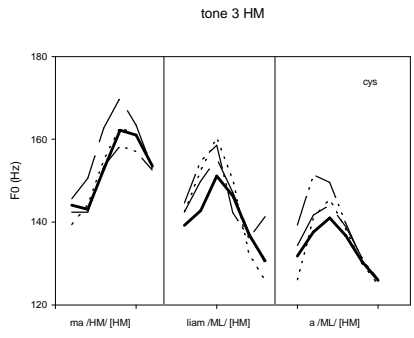
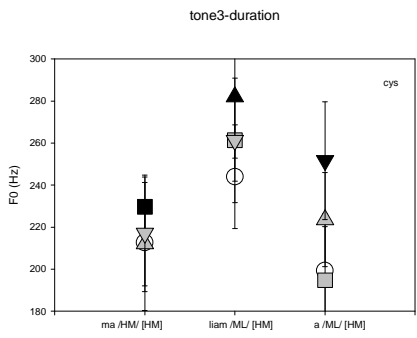
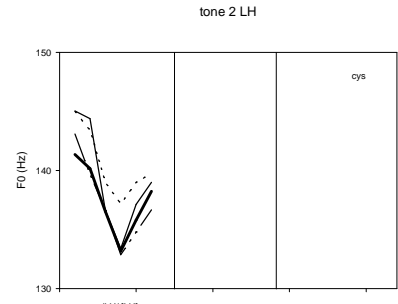
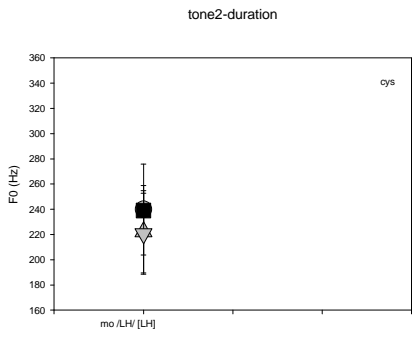
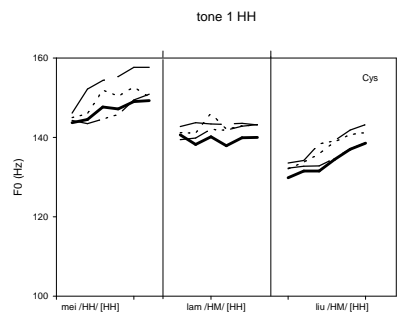
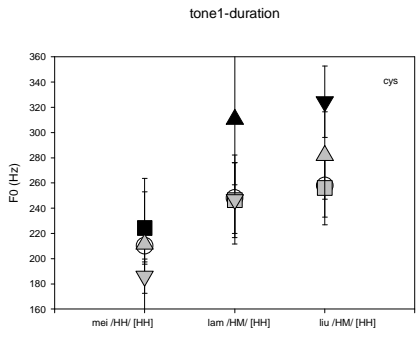
The elevation of F0 values in Taiwanese are more prominent than in Mandarin. Since there are two pairs of lexical tones, high falling vs. low falling tones, and high level vs. mid level tones, that are distinguished solely by tonal registers and not by tonal contours in Taiwanese, expansion of F0 ranges could lead to confusion on tonal registers. Therefore, the tonal ranges were not only expanded but also elevated in Taiwanese.

Different subjects used different strategies in implementing narrow focus. Some subjects expanded and elevated F0 more often than elongate syllable duration. While other subjects tend to elongate the duration more often. For the same syllable produced by the same subject, narrow focused syllables either have the longest duration or the F0 ranges expansion and elevation than defocused and broad focused syllables.

Since F0 is elevated for narrow focused syllables, it is very likely that narrow focused syllables sounds louder and with higher intensity in Taiwanese. However, direct measure of intensity is not as reliable as measurement of F0 and duration. It is proposed that spectral tilt be measured in future study.

Besides measurement of spectral tilt, vowel quality is another acoustic measurement that can be taken into consideration.

Results of this project were presented in the Topic/focus and intonational Workshop of 2001 LSA Summer Institute in Linguistic at the UC Santa Barbara.



○ broad focus
 ■ narrow focus on word 1
 ▲ narrow focus on word 2
 ▼ narrow focus on word 3
 □ pre-, post-focus on word 1
 △ pre-, post-focus on word 2
 ▽ pre-, post-focus on word 3

Figure 1-5 syllable duration

— broad focus
 - - - narrow focus on word 1
 . . . narrow focus on word 2
 - · - narrow focus on word 3

Figure 6-10 Syllable duration

