

行政院國家科學委員會專題研究計畫成果報告

台閩語齒齶邊音與鼻音的交換形式

The Alternation between Taiwanese Dental Lateral and Nasal

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I、中文摘要

本計畫以電子假顎圖、氣流、聲學資料觀察台閩語子齶邊音、鼻音在不同韻律結構後的各種語音變體，結果顯示台閩語齒齶邊音在音節、詞、及語調界線後確有 $l \rightarrow n$ 的變體，齒齶邊音受音節界線前的鼻音尾影響變為 $l \rightarrow n$ ，但在詞、及語調界線後，齒齶邊音並不受前面鼻音尾影響而鼻化，在入聲韻尾後，齒齶邊音之舌動作開始對齒齶接觸時間，常早於入聲韻尾口腔阻塞放開 (release of oral closure) 之時間。

關鍵詞：台閩語、齒齶邊音、齒齶鼻音、電子假顎圖、鼻氣流、韻律結構。

Abstract

This study investigated the alternation between Taiwanese l and n through EPG, nasal airflow and acoustical data. Results showed that Taiwanese /l/ can surface as [d] before syllabic, word, and intonational boundaries. Taiwanese [l] becomes [n] when preceded by nasals across syllabic boundaries. Word and intonational boundaries block the nasalization. Lingual-alveolar contacts for /l/ start before the release of oral closure for preceding final /t, k/.

Keywords: Taiwanese Min, dental lateral, dental nasal, EPG, nasal airflow, prosodic boundaries

II、Introduction

Phonological analysis of Taiwanese sound system described Taiwanese lateral to have a stop-like qualities (Ting, 1985). According to nasal airflow data, [l] would change into [n] when preceded by nasals, nasal vowels (Pan, 1994).

This study investigated three questions, (1) the stop-like quality of Taiwanese lateral after syllabic, word and intonational boundaries, (2) the nasalization of Taiwanese [l] preceded by final nasals across syllabic, word and intonational boundaries, (3) the coarticulation of lingual contacts between m and preceding alveolar and velar consonants across syllabic, word, and intonational boundaries.

III. Method

A. Subjects

Two native Taiwanese speakers, one male, Jgau, and one female, Jchen, participated in the experiments. Jgau is from Taipei, Jchen is from Taichung. Jchen and Jgau also speak Mandarin and English.

B. Corpus

There were four corpus sets, namely (1) citation form set, (2) syllabic boundary set, (3) word boundary set, (4) intonational boundary set. In citation form four Taiwanese morphemes, m ʔ m 1 'clam' 蜆, m ʔ m 1 'forest' 林, m ʔ m 1 8, ... t y r ... u 8 1 蘭, m ʔ m 1 'six' 六, were chosen. In syllabic boundary set, those four morphemes were placed after syllables with final oral vowels, final nasal vowel, final nasals and

final voiceless stops to form disyllabic words. In word boundary and intonational boundary sets, the four morphemes were embedded in carrier sentences preceded by oral vowels, nasal vowels, nasals, and voiceless final stops across word and intonational boundaries.

C. Instrumentation

A PC connected to Kay palatometer was used to record EPG and acoustical data, while another PC connected to airflow system and a cassette deck record nasal airflow and acoustical data. EPG, nasal airflow and acoustical signals were recorded simultaneously.

D. Recording Procedure

Lexical items in the same copus sets were repeated three times in random order. Subjects read the copurs through each session in normal and fast speeds.

D. Data Analysis

The amplitudes of nasal airflow data at onset, 50% points in time and offset of the consonant $m\}m$ were measured.

The time and number of electrodes lighted up at the onset and offset of lingual contacts in the alveolar region were taken. The times at which full oral closures for $m\cup m$ were formed and released were also taken.

IV. Results

Nasal airflow data showed that /l/ is realized as [n] when followed by nasal vowels. When preceded by nasal vowels and nasals across syllabic boundaries, /l/ is realized as [n]. When preceded by nasal vowels and nasals across word and intonational boundaries, the nasalization of $m\}m$ is blocked.

EPG data showed that the onsets of lingual contacts at the dental-alveolar region start during the production of oral vowels and nasal vowels across syllabic, word, and boundaries. The onsets of lingual contacts at dental-alveolar regions for $m\}m$ are before the offset of lingual contacts for preceding $m|m$ across syllabic, word and

intonational boundaries. For $m\}m$ following $m\ddagger = 1 \in m$ across syllabic, word, and intonational boundaries, lingual contacts at dental-alveolar regions continues from $m \in m$ to $m\}m$, with no offset of lingual contacts at the end of $m\ddagger = 1 \in m$.

Full oral closure at dental-alveolar regions can be observed at the onset of Taiwanese $m\}m$ after syllabic, word, and intonational boundaries. Subjects first formed full closures then gradually release one side of the closure to form a gap.

Lingual contacts at the dental-alveolar regions for lexical items read in normal and fast speech rate showed that Taiwanese $m\}m$ can surfaced as tap [“] at fast speech rate.

V. Discussions

Taiwanese dental laterals $m\}m$ have stop-like articulation, especially at the onset of $m\}m1$ when full closures were formed at the dental-alveolar regions. Speakers gradually release the closures at one side of contact. EPG data here supported phonological observations. The [d] like characteristic for Taiwanese $m\}m$ could lead to phonetic interference for Taiwanese speakers learning English. In which case words such as $l\ddagger r\ddagger n$ ‘slot’ is produced as $l\ddagger r\ddagger n$.

The onsets of lingual contacts at the dental-alveolar regions begin during the production of vowels preceding $m\}m$. When $m\}m$ is preceded by alveolar consonants such as $m\ddagger m$ or $m \in m$, lingual contacts at dental-alveolar region started form the preceding alveolar consonants and continued to the offset of $m\}m$. When preceded by $m|m$, lingual contacts in dental-alveolar region start before the release of $m|m$.

Results of nasal airflow data showed that Taiwanese $m\}m1$ are nasalized when preceded by nasals across syllabic boundaries. However, this nasalization process is blocked across word and intonational boundaries. Similar results could be observed on the nasalization of final voiceless stops followed by nasals across syllabic boundaries, but not across words and intonational boundaries.

The [d] coloring of m}m is not influenced profoundly by prosodic boundaries. Rather, the speed of articulation seems to influence the articulation of m}m more than preceding prosodic boundaries. The duration of full closure at the beginning of m}m is longer at slower speed than at faster speed. These results agree with Peng (1996) in which the extent of lingual overlapping between velar and alveolar final voiceless stops and following velar and alveolar stops correlate more with articulatory speed. Unlike the realization of English dark and light m}m which is influenced by prosodic boundaries (Sproat & Fujimura, 1993), in this paper the influence of prosodic boundaries on the [d] coloring for Taiwanese m}m is not as strong as the influence of articulatory speed.

VI. Evaluation

These findings clear up the original hypothesis of two competing models. Unlike the realization of English dark and light m}m that is influenced by prosodic boundaries, the extent of [d] coloring for Taiwanese m}m is influenced more by speech rate.

Due to the limitation of EPG data, we were not able to address the question that whether flap is one of the phonetic realization of Taiwanese m}m1, ...1 € , ‡1 .

Results of this project should be further elaborated to be presented as a journal paper in Chinese linguistics area to provide concrete articulatory data supporting phonological observation which claimed that Taiwanese m}m is [d] like.

VII Reference

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附件：封面格式

行政院國家科學委員會補助專題研究計畫成果報告

台閩語齒齶邊音與鼻音的交換形式

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