

A Case Study of Phonological Attrition of Taiwanese Mandarin in California

Nicholas Young

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Advisors:
Keith Johnson
Leanne Hinton

1. Introduction

This paper is the culmination of two semesters of work at UC Berkeley and is being submitted as my linguistics undergraduate honors thesis. If you are viewing the enhanced PDF version of this document and have the latest version of Adobe Acrobat installed, you can click on any spectrogram to hear that recording. All Chinese characters used in this paper are given in their traditional forms, or zhèngtǐ, just as they would appear in Taiwan. The Chinese Romanization system used is Hanyu Pinyin.

1.1 Definitions

In his paper “Issues in finding the appropriate methodology in language attrition research,” Yagmur describes phonological attrition as follows:

L1 attrition is defined as the gradual loss of competence in a given language. It is generally agreed that ‘changes in language use’ are identified as language shift, and ‘changes in language proficiency’ as language loss and that, furthermore, language shift is located between generations (intergenerational), while attrition occurs within individuals (intragenerational) (135).

Others take ‘language loss’ as a more generic term meaning “a decline in language skills” both in groups and individuals. Both language loss and language attrition almost always occur simultaneously with language shift, which is generally defined as “a group or individuals gradual change from the regular use of one language to the regular use of another.” Some people distinguish language shift as intergenerational and language attrition as intragenerational, but this distinction is problematic. While it is definitely true that languages shift can be talked about in terms of the language employed by particular group of

people, many speakers as individuals experience language shift, for instance if they move to another country where their L1 is not the language used for everyday interactions.

For the purposes of this paper, language attrition describes the loss of language skills both inter- and intragenerationally. This broad definition is necessary because this is an apparent-time study, which is incapable of distinguishing whether the changes seen in second-generation speakers are simply intergenerational shifts, or whether they have happened over time within the second-generation speakers. Phonological attrition, therefore, is the loss of phonological distinctions/accuracy overtime, both inter- and intragenerationally.

1.2 Research on Language Attrition

Most of the research on language attrition and language loss concerns itself with lexical and syntactic matters. There are innumerable studies comparing the lexical usage and of native speakers and semi-native speakers who have supposedly undergone “language attrition.” Most of these studies, however, completely ignore the phonological aspects of language attrition. There are a few relevant studies, however, which will be discussed below.

The most significant single piece of research in the sub-field of phonological attrition is that conducted by Barbara Bullock and Chip Gerfin on the contracting variety of French spoken in Frenchville, Pennsylvania, detailed in their two papers “Frenchville French: A case study in phonological attrition” (2004). This paper concerns itself with investigating “the phonetic and phonological aspects of a contracting variety of French spoken in Frenchville,

PA.” (Bullock) In this study they specifically examine patterns of maintenance versus loss in this attrited French, and try to shed light on the origins of the shifts they observe. This paper sets out to address the problem they describe as “the dearth of evidence in phonological attrition research” and does a great deal to provide a methodological basis for future studies in phonological attrition and a framework around which others can shape similar investigations of phonological attrition studies. Of particular importance is their exploration of reasons why particular segments or phonemes undergo loss versus maintenance. They cite both contrastive features with high functional load, as well as acoustic salience as opposing, but often equally plausible explanations for the phonological shifts they observed.

Most other research on language contact and attrition, as previously stated, concerns itself with lexical, syntactic, and sociolinguistic elements of language attrition. The sociolinguistic situation surrounding cases of language attrition should not be overlooked or brushed aside. Yagmur claims, “It is not possible to investigate language attrition or maintenance on the basis of a number of linguistic tests alone, without a careful description of the social context, the attitudes of the speakers, ethnolinguistic vitality of the group and so on” (134). Thus as is well documented, in order to be able to meaningfully interpret and understand situations of apparent language attrition, we must also have knowledge of the social context in which the attrition is occurring.

1.3 Sociolinguistics of Heritage Languages in the United States

In Lucy Tse's book "*Why Don't They Learn English?*" *Separating Fact from Fallacy in the U.S. Language Debate*, she describes the typical pattern of language loss of an immigrant language thus:

An adult immigrant arrives in the United states and learns enough English to operate in daily life, while continuing to use her stronger tongue—the heritage language—at home. She raises her children to speak the heritage language, but as these children enter school and learn English, they switch to English when speaking to their siblings and friends. By the time they graduate from elementary school, these same children are better speakers of English than they are of the home language and prefer using English in nearly every realm. When they grow up and have children of their own, English is typically the only language spoken in their own home, and these grandchildren have little or no familiarity with the heritage language (30-31).

This kind of pattern of language loss is extremely common in the United States because of the overwhelming degree to which this country emphasizes English proficiency and often discourages heritage language use. The odds are stacked against the heritage language, and unless a number of ideal situations occur, there will be imperfect acquisition of the heritage language.

First, it is almost undisputed that for a heritage language to be maintained and not lost, there must be a community of speakers with which children have regular interaction, and who the children respect and look up to. This may be a linguistic enclave community, like that which exists in the Chinatowns and Koreatowns across the country, or they may be smaller groups such as Churches or other organizations. Most of the time, however, the peers of heritage language speaking children are primarily English-speakers. The

influence of social pressures to speak English with their peers inevitably influences these children to expand the contexts in which they speak English.

Also, there must be school instruction conducted in the heritage language. Many heritage language speakers begin their lives speaking only the heritage language. That is the language used in the household, and so that is the language they learn first as children. Often times they may start elementary school with little to no knowledge of English. Once in school, they quickly pick up conversational English. As they go through elementary school, their use of English expands to educational, social, and extracurricular contexts, while they continue to use the heritage language only at home. As they go through school, they study topics like biology and mathematics exclusively in English. When they go home, they may have no idea how to talk to their parents about their biology class, or other school topics in the heritage language, and so resort to using English. Social pressure from peers may also give them a negative attitude about their heritage language, making them not want to speak it, even at home. By the time they enter middle school, they are more comfortable using English than the heritage language, and by high school, they have only limited competence in their heritage language. In this way, many children go from monolingual speakers of their heritage language to almost monolingual speakers of English in less than 10 years.

It has been repeatedly shown that the most effective way to maintain and develop heritage language proficiency and to avoid this tendency toward loss is for school to be taught in both the heritage language and English. Though this

practice is widespread in much of Europe, and is successful in maintaining heritage language ability while teaching the particular country's national language, most school systems in the U.S. do not offer such programs. Many parents, seeing the need for their children to be educated in their heritage language send their children to Saturday schools where they may have writing, reading, and cultural activities conducted in the heritage language. Most children at the time are resistant to such measures, as they feel it unfair that they should have more school while their peers have free time on the weekend. Often the kids put up such resistance that the parents eventually relent, effectively ending the children's education in their heritage language.

So there are essentially three external components necessary to the maintenance and development of a heritage language in the U.S.: home usage, peer groups/community of heritage language speakers, and education in the heritage language. In addition to these contexts of heritage language use, the speaker must have a positive attitude about the language, and want to pursue its development. Often the child's attitude is the deciding factor which limits their development of heritage language skills. Even with parents who speak the heritage language to them, Saturday school education, and a rich heritage language speaking community, many children, due to peer pressure and influence from general American emphasis on English skills, simply do not see the point in learning and speaking their heritage language, and so choose to only use English as much as possible.

1.5 Origin of Project

This project on phonological attrition came about rather unexpectedly, as I was fumbling around rather blindly for a topic for my linguistics honors thesis. Having studied Chinese for the past two years, I wanted my project to involve Chinese somehow, and to focus on phonetics and phonology, the level of linguistic analysis with which I am most comfortable. Furthermore, the topic of Taiwanese Mandarin was relevant to me personally because most of the people I knew that spoke Mandarin were from Taiwan, and so didn't speak the Standard Mandarin that I had been studying in school. It is most certainly the case that in Berkeley and much of the United States, most speakers of Mandarin Chinese are from Taiwan, as only in recent years have large groups of immigrants from mainland China begun coming to the United States.

The son in this study, J, is actually an friend of mine, and so from time to time I would chance to hear him speaking Chiense, perhaps with his mother on the phone, perhaps with one of his few friends with whom he speaks Chinese. (He and I almost never speak Chinese with each other.) When I began this project, I had just finished studying Chiense for a summer in Beijing, so it took me a bit to acclimate to his Taiwanese accent which was vastly different from that which I had been taught. Once I stopped thinking about whether his alveopalatals were supposed to be retroflexes or not, I began noticing something else. His alveolo-palatals sounded different than mine. After a few more times listening closely, I was fairly confident that a major sound change had occurred in his Chinese, and I decided to make it the topic of my honors thesis. Lucky for me,

I was able to obtain recordings from not just him, but his mother and younger sister as well, as they lived nearby. Only after making the recordings of all three of them did I start to notice the -in -en → -ing -eng shift in both his and his sister's speech.

2. Participants

The people who participated in this case study are comprised of a three-person family of Taiwanese Mandarin speakers who live in the San Francisco Bay Area. There is the Mother, H, the older son J, and the daughter L. The father was not available for this study because he works abroad. Brief linguistic background information for H, J, and L is provided below. This information was obtained from their answers to a series of questions sent to them over email, as well as conversations with J.

The mother, H, was born and educated in Taiwan and was 48 years old at the time of this study. She grew up speaking Taiwanese with her family in Taiwan and studied Mandarin in school from preschool through high school, and into college. She studied English from junior high school through college, but states that she didn't do well in her high school English classes, and wishes she had done better. She moved to the United States shortly after getting married in the mid 1980s. H has maintained strong ties with Taiwan, visiting periodically. She has continued speaking Mandarin on a regular basis with members of her Chinese church, and states that today on a day-to-day basis she speaks Mandarin about 60% of the time with friends, family members, and members of her church. 35% of the time she speaks English with neighbors, teachers, and classmates, and about 5% of the time she speaks Taiwanese when she calls her family members in Taiwan.

The son, J, was born and grew up primarily in Chicago, and was 21 years old at the time of this study. He grew up speaking both Mandarin and Taiwanese

before entering school. J can recall having conversations with his grandparents in fluent Taiwanese when he was much younger, but now he rates his Taiwanese speaking ability as 2/10. He states in his survey that he now only speaks Taiwanese occasionally with his mother. When J started school he spoke no English, but quickly picked it up, and now highly values his English ability, both spoken and written. He states that as his English got better, he spoke less and less Chinese with his parents, but since entering college has made a concerted effort to speak Chinese with his mother. He and his sister use mostly English with each other. Though J has had more or less constant contact with Chinese speakers his entire life through Church groups and other social circles, he never attended Chinese school. He took one Chinese course in college, but otherwise has had no formal education in Chinese. In his survey and in person J expressed a wish that he had “taken more time to read and write Chinese.” J feels that his accent in Chinese is good enough that if he “spent a few months in Taiwan he could pass as a native speaker.” He considers “Mandarin speaking ability a big part of his cultural identity.”

The daughter, L’s, linguistic biography for obvious reasons is very similar to her brother’s. She was born and grew up primarily in Chicago, and was 17 at the time of this study. She states that she spoke Mandarin every day with her parents until she was in fifth grade and her father began working overseas, after which time she only spoke Mandarin with her mother on a day-to-day basis. L and her brother J speak almost exclusively in English to each other, and have always done so. She now uses Chinese with her mother, as well as with family

friends of her parents from Church if she should happen to see them. L has had no formal education in Chinese, and claims that she has only a very limited knowledge of a few Chinese characters. She made a point to state that her brother can read and write more Chinese than she can. She does, however, wish that she could read and write Chinese, and wishes that she knew more vocabulary so she could speak more formally and less colloquially. L believes she has an American accent when speaking Chinese, but doesn't think its so bad that people can't understand what she is saying.

3. Data Being Examined:

The participants in this case study, as stated above, are all native speakers of Taiwanese Mandarin. A description of Taiwanese Mandarin phonology is tricky, however, because it lies somewhere between standard Mandarin as taught in schools in Taiwan, and the heavily Southern Min-influenced Mandarin spoken by many older native speakers of Southern Min in Taiwan. Most speakers of Taiwanese Mandarin exhibit some, but not all of the phonological characteristics of ‘Taiwanese-accented’ Mandarin, not deviating drastically from Standard Mandarin. We will begin, therefore, with a look at the phonology of Standard Mandarin. Standard Taiwanese Mandarin, just like the Standard Mandarin taught in Mainland China, is based on the pronunciation of Beijing.

3.1 Standard Mandarin Phonology

Consonants of Standard Mandarin – IPA (Pinyin, if different):

manner\place	labial	alveolar	alveolo-palatal	retroflex	velar/uvular
aspirated stop	p ^h (p)	t ^h (t)			k ^h (k)
stop	p (b)	t (d)			k (g)
aspirated affricate		ts ^h (c)	tʂ ^h (q)	tʂ ^h (ch)	
affricate		ts (z)	tʂ (j)	tʂ (zh)	
unvoiced fricative	f	s	ʃ (x)	ʃ (sh)	X (h)
voiced fricative		z (i)		ʒ (r,i)	
liquid		l			

nasal	m	n			ŋ (ng)
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Examples of consonants in context:

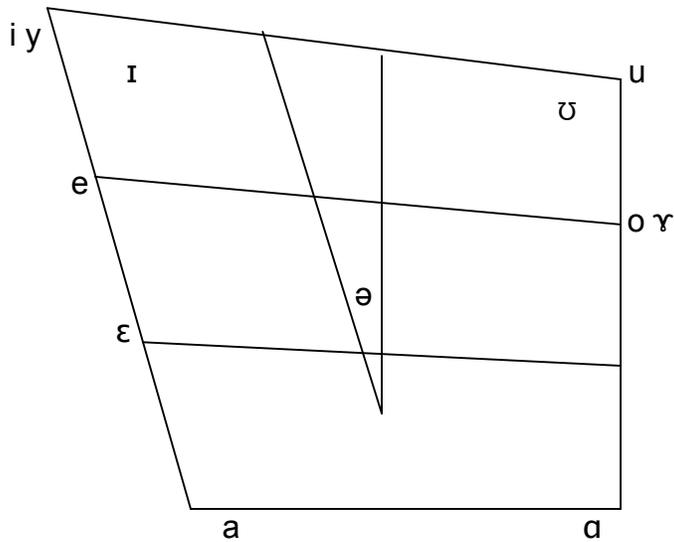
<u>Consonant</u>	<u>IPA</u> ¹	<u>Pinyin</u>	<u>Chinese</u>	<u>English</u>
[p ^h]	[p ^h a]	pà	怕	'be afraid'
[p]	[pa]	bā	八	'eight'
[f]	[f]	fā	發	'send out'
[m]	[ma]	mā	媽	'mom'
[t ^h]	[t ^h an]	tán	談	'chat'
[t]	[tʁŋ]	děng	等	'wait'
[ts ^h]	[ts ^h ai]	cāi	猜	'guess'
[ts]	[tsz]	zì	字	'character'
[s]	[sʊŋ]	sōng	鬆	'loose'
[z] ²	[sz]	sī	私	'private'
[l]	[li]	lì	力	'strength'
[n]	[nan]	nán	難	'difficult'
[tɕ ^h]	[tɕ ^h ian]	qiáng	強	'strong'
[tɕ]	[tɕi]	jī	雞	'chicken'
[ɕ]	[ɕyɛŋ]	xuǎn	選	'choose'
[tʂ ^h]	[tʂ ^h a]	chá	茶	'tea'

¹ For ease of reading, tone is omitted from IPA transcription.

² [z], though a consonant, only occurs as syllabic syllable-final consonant

[tʂ]	[tʂu]	zhū	猪	'pig'
[ʂ]	[ʂan]	shān	山	'mountain'
[ʐ]	[ʐʅ]	rè	热	'hot'
[kʰ]	[kʰɑʊ]	kào	靠	'rely on'
[k]	[kua]	guā	瓜	'melon'
[X]	[Xu]	hú	湖	'lake'
[ŋ]	[lʊŋ]	lóng	龍	'dragon'

Vowels of standard mandarin:



Examples of vowels in context:

<u>Vowel</u>	<u>IPA</u>	<u>Pinyin</u>	<u>Chinese</u>	<u>English Gloss</u>
[i]	[mi]	mǐ	米	'rice'
[y]	[y]	yú	魚	'fish'
[ɪ]	[ʃɪŋ]	xīn	心	'heart'

[e]	[mei]	méi	煤	'coal'
[ɛ]	[iɛ]	yè	葉	'leaf'
[a]	[san]	sān	三	'three'
[ə]	[wən]	wèn	問	'ask'
[u]	[tu]	tù	兔	'rabbit'
[ʊ]	[dʊŋ]	dǒng	懂	'understand'
[o]	[t ^h ou]	tóu	頭	'head'
[ʏ]	[kʏ]	gē	歌	'song'
[ɑ]	[ts ^h ɑŋ]	cáng	藏	'hide'

As can be seen above, the Standard Mandarin vowels can combine in diphthongs and even triphthongs, some only being seen in these contexts. Looking at the pinyin is a good way to see way native speakers conceptualize their phonemes. For example, the phoneme /a/ surfaces as back [ɑ] when followed by a back vowel or consonant, mid-front [a] elsewhere.

Tones of Standard Mandarin are fairly simple and primarily based on pitch contour, with some elements of voice quality change present in third tone. The four tones are as follows:

<u>Tone</u>	<u>IPA</u>	<u>Mark</u>	<u>Pinyin</u>	<u>Chinese</u>	<u>Gloss</u>
1. High	ma55	ˉ	mā	媽	'mother'
2. Mid-Rising	ma35	ˊ	má	麻	'hemp'
3. Low-Dipping	ma214	ˇ	mǎ	馬	'horse'

4. Falling	ma51	`	mà	罵	'scold'
5. Neutral	ma	N/A	ma	嗎	[question particle]

First tone is high and level, with almost a singing quality to it. Second tone starts at about the middle of the speaker's pitch range and rises upward, similar to the intonation of the English question intonation in the common utterance "Huh?". Third tone is the most complex. It begins near the bottom of the speaker's pitch range, and drops a tiny bit, with voice quality becoming quite creaky. Then it rises sharply to somewhere around the middle of the speaker's pitch range. Third tone exhibits tone sandhi whenever it is not sentence final. When a third tone is followed by another third tone, it becomes a second tone. When a third tone is followed by any other tone, it loses the final pitch rise, becoming simply a low, creaky tone. For example:

<u>Pinyin</u>	<u>Original</u>	<u>Tone sandhi</u>	<u>Chinese</u>	<u>English gloss</u>
Kǒngzǐ	[k ^h ʊŋ214 tsz214]	[khʊŋ35 tsz214]	孔子	'Confucius'
mǎlù	[ma214 lu51]	[ma21 lu51]	馬路	'road'
jiějué	[tɕiɛ214 tɕyɛ35]	[tɕiɛ21 tɕyɛ35]	解決	'solve'
dǎkāi	[ta214 k ^h aɪ55]	[ta21 k ^h aɪ55]	打開	'open'

3.2 Taiwanese Mandarin Phonology

Now that we have established the general system of standard Mandarin phonology, we must discuss the various ways in which Taiwanese Mandarin deviates from standard Mandarin. Most of these variations can be attributed to influence from Southern Min (Taiwanese) but there is also evidence of influence from other Southern Mandarin dialects (Kubler 173).

Before we delve into the ways in which Taiwanese Mandarin deviates from standard Mandarin, it should be noted that the characterization given is one that describes pronunciation that is easily identifiable by native Mandarin speakers as “Taiwanese.” People of differing linguistic and educational background in Taiwan may have some, all, or none of the features listed below. There are many older people who have learned Mandarin as a second language who have the features below plus additional mergers due to influence from Southern Min. Some well educated and fastidious Mandarin speakers in Taiwan, particularly teachers, may speak a variety of Mandarin so standard that their pronunciation is indistinguishable from that of a Standard Mandarin speaker from Beijing. What will be described below, however, is a set of unique features of Taiwanese Mandarin that are present in the casual speech of many, if not most Mandarin speakers in Taiwan (Kubler 95).

In terms of the consonants of Taiwanese Mandarin, there are a few major differences from Standard Mandarin. First, the retroflex sounds of standard Mandarin [tʂ], [tʂʰ], [ʂ], and [ʐ] in Taiwanese Mandarin lose all retroflexion, becoming [ts], [tsʰ], [s], and [dz]/[l]/[z] respectively. Below are examples of how these shifts would affect pronunciation of Mandarin words (SM = Standard Mandarin, TM = Taiwanese Mandarin, PY = Pinyin). Next to both the standard and Taiwanese mandarin is a pinyin Romanization of that pronunciation.

	<u>SM</u>	<u>PY</u>	<u>TM</u>	<u>PY</u>	<u>Chinese</u>	<u>English</u>
[tʂ]	[tʂz]	zhǐ	[tsz]	zǐ	只	‘only’

	[tʂɑʊ]	zhǎo	[tsɑʊ]	zǎo	找	'look for'
	[tʂʊŋ]	zhōng	[tsʊŋ]	zōng	中	'center'
[tʂ ^h]	[tʂ ^h z]	chī	[ts ^h z]	cī	吃	'eat'
	[tʂ ^h ʎ]	chē	[ts ^h ʎ]	cē	車	'vehicle'
	[tʂ ^h a]	chá	[ts ^h a]	cá	茶	'tea'
[ʂ]	[ʂa]	shā	[sa]	sā	殺	'kill'
	[ʂz]	shí	[sz]	sí	十	'ten'
	[ʂu]	shū	[su]	sū	書	'book'
[z]	[z]	rì	[dz]	[dz]	日	'day'
	[zanXou]	ránhòu	[dzanXou]	[dz]ánhòu	然後	'later'
	“	“	[lanXou]	lánhòu	“	“
	[zukuǒ]	rúguǒ	[dzukuǒ]	[dz]úguǒ	如果	'if'
	“	“	[lukuǒ]	lúguǒ	“	“
	[ʂz]	shī	[sz]	sī	詩	'poetry'

A second major difference between standard Mandarin and Taiwanese Mandarin is the fronting of the velar nasal final [ŋ] → [n] in certain contexts. Of the Standard Mandarin finals ending in in [ŋ], only [-iŋ] and [-ɤŋ] (Pinyin -ing and -eng) do not exist in Southern Min, and so are often fronted, resulting in [-in] and [-ɤn] (Kubler 94). This shift results in the loss of distinction between the Mandarin finals -in & -ing and -en & -eng. Examples of this shift:

<u>SM</u>	<u>PY</u>	<u>TM</u>	<u>PY</u>	<u>Chiense</u>	<u>English</u>
[liŋ]	líng	[lin]	lín	零	'zero'
[ɕiŋ]	xīng	[ɕin]	xīn	星	'star'
[tʂʰɿŋ ʂz]	chéngshì	[tʂʰɿn sz]	céngsì	城市	'city'
[bunɿŋ]	bùnéng	[bunɿn]	bùnén	不能	'can't'

A number of other vowel shifts occur in heavily Taiwanese-accented Mandarin. While a few of these shifts are occasionally noticeable in the speech of H, none are universally exhibited by any of the subjects of this case study, and are therefore not considered relevant to the data being examined.

The tones of Taiwanese Mandarin are exactly the same as those of Standard Mandarin, with two major exceptions:

1. The third tone of Taiwanese Mandarin is almost never realized with the final rise, even when in sentence-final position.
2. The neutral tone is much less common in Taiwanese Mandarin. Most syllables are pronounced with a full tone.

For examples:

	<u>SM</u>	<u>TM</u>	<u>Chinese</u>	<u>English</u>
1.	[tʰaɪ51 ɾaʊ214]	[tʰaɪ51 ɾaʊ21]	太好	'great!'
2.	[ti51 ti]	[ti51 ti51]	弟弟	'younger brother'

4. Methodology

4.1 Compiling the Word List

The collection of data for this project was a multi-step process which spanned several months and included multiple sessions. When I first set out to begin collecting data I was fairly certain that I wanted to focus on primarily the alveopalatals. To be sure that I, in my casual observations, had not missed anything else of interest in the speech of the participants, I gave recording equipment to J, and asked him to simply set it up at the dinner table one night at home and just let it run while the three of them ate dinner and talked casually. I asked him specifically to let his mother and sister know that they should not worry about what they said, and that they should just speak normally, not worrying about how much Chinese or how much English they used through the course of the recording.

The recording equipment used for this initial recording was a Sure SM-48 microphone and an M-Audio AudioBuddy dual microphone preamp/direct box plugged directly into a Apple Macbook and recorded using the audio software Praat.

The point of this recording was to provide me with a somewhat more voluminous sample of the speech of all three participants that I could use to finalize what on phonetic material I would be focusing my attention. After listening to the recording, the main feature that stood out to me was still the alveopalatals being uttered as more English-like alveopalatals, and so I proceeded as planned.

I then compiled a word list of 124 different Chinese syllables to record. I was able to benefit from a very well established table of all Mandarin syllables, sorted by place of articulation for both initial rhyme, and final to compile a list of syllables which would yield the maximum range of samples for alveolopalatals as possible. I also included some words without alveolopalatals, but which were minimal pairs with alveolo-palatal initial words to provide a set of syllables whose pronunciation I assumed would be more or less the same in all three participants. I then used a phonetic dictionary to choose a Chinese word for each syllable. Chinese has an enormous amount of homophones, and so I tried to choose a very simple, commonly used word for each syllable. This was especially important because I knew that both J and L would be having to generate the Chinese words as translations from English, as neither of them could read Chinese characters. In some cases, this ease-of-translation was the reason for the use of poly-syllabic words for certain entries. Otherwise I tried to use only monosyllabic words.

Preference was for first tone (high) over the other three tones because its length and constancy of pitch would provide the most clear phonetic material for both impressionistic and spectrographic analysis. Second tone (rising) and fourth tone (falling) were both given preference over third tone (dipping) because third tone is generally low, and contains voice quality changes that might obscure important phonetic information.

4.2 Word-list recording

Once the list was chosen, it was randomized using random.org's "True Random Number Service" which uses atmospheric noise to generate random sequences. This list of Chinese words, each with an accompanying English gloss and Pinyin Romanization, was then used to elicit the recordings from each of the three speakers. For this set of recordings I used the same microphone and preamp as before, but plugged them into an Apple Macbook and used Apple's QuickTime software to record uncompressed WAV files.

All three participants were brought in individually for recording and were each given the exact same word list and instructions. They were instructed to read the Chinese if possible, and if not, use English to cue the Chinese word being elicited. They were asked to use the Romanization only as a last resort, if neither the Chinese or the English for a particular entry led them to a word they knew. I knew that there were a few syllables for which no particularly common or easily translatable word existed in Chinese, and so I told them not to worry if they didn't know what I wanted for a few entries. I believe that all three participants *knew* in some regard every word on the list, but, especially for the non-Chinese-reading J and L, that it would be hard to elicit all of the words individually out of context. I could have helped them by providing them recordings of words for which they were unsure, or even saying them myself, but I decided that this would jeopardize the validity and then organic nature of the pronunciations being elicited.

4.3 Native speaker judgments

Once the word list recordings from H, J, and L were finished, I contacted through various channels native speakers of Taiwanese Mandarin (Táiwān Guóyǔ) to provide native speaker judgments which would corroborate my impressionistic observations. At the beginning, I told each of the native speakers that they would be listening to recordings of Chinese words being spoken by people **not** from Taiwan, but who had listened to a series of recordings from Taiwan, and were trying to imitate an authentic Taiwanese pronunciation for each word. The native speakers of Taiwanese Mandarin were asked to judge how much each word sounded like the pronunciation of a normal person in Taiwan. I emphasized that I was not looking for whether or not their pronunciation represented “standard” Taiwanese Mandarin, or a rating of “how Taiwanese” their pronunciation was. The criteria was “how much does this recording sound like the way a normal person in Taiwan would pronounce this word?” Through this clarification I hoped to make their basis for judgments a sort of “Taiwanese average” pronunciation that is neither extremely colloquial, nor extremely standard. on a scale of 1 (not at all like) to 5 (exactly like). To minimize error in the overall judgments, each native speaker was played all the recordings from one of H, J or L, and only then would they hear the recordings from the next speaker. This way they could accustom themselves to the speaker and hopefully be able to pick up on more subtleties than if the speakers had been mixed. For each session of playback and judgment, the order of H, J, and L’s recording blocks was randomized, as was the order of words within each speaker such that

all recording sessions were equally randomized. As we proceeded through the list of words and recordings, the participants were allowed to listen to any recording as many times as they wanted to be able to give an accurate rating. Once all native speaker judgments were recorded, all the data was entered into Microsoft Excel for analysis. The purpose of this analysis was to see if the native speakers would give J and L lower ratings than H for words with alveolopalatals.

The biggest problem I encountered during the course of this case study was spending a considerable amount of time compiling materials for and conducting the native speaker judgments, which ended up not yielding particularly useful data. There were a few reasons they were not helpful in the way that I had originally hoped. First, the criteria for judgment was too general, and so people varied widely as to in what range they judged, and what sort of features they used as cues for higher or lower scores. I was hoping that J and L would get significantly lower native speaker scores than H for the words containing the sounds which had shifted. Unfortunately, the only people who picked up on both sound changes in J and L's speech were also the only two linguistics students I interviewed. In all other cases, J and L's utterances which contained products of the two sound changes were rated similarly to their other utterances. I believe this was the case because the contrasts I was expecting people to pick up on and reflect in their ratings were non-phonemic in Chinese. To expect just any native speaker of Taiwanese Mandarin to pick up on the non-phonemic sound changes I was hoping for would be like asking any native speaker of American English to judge which version of 'she' sounds better, [ʃi] or

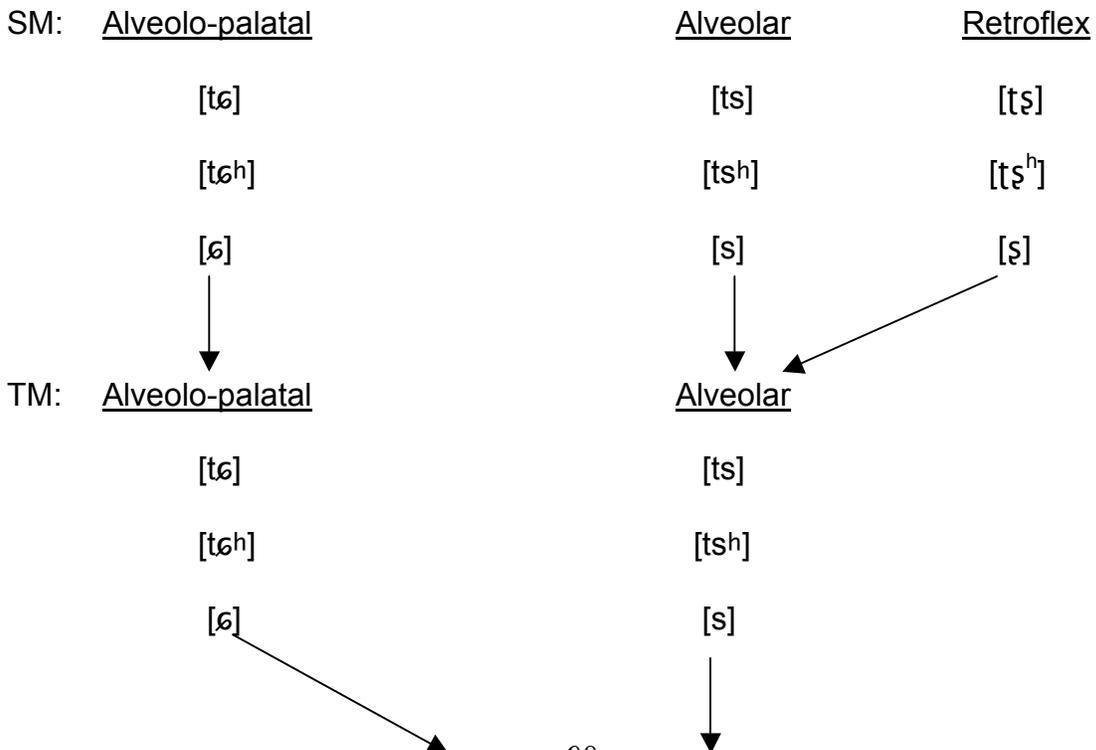
[øi]. This sort of fine non-phonemic distinction is not something normal people ever have to perform, and so it was unrealistic to expect it of the people with whom I met.

5. Findings and Significance

For the most part the findings were consistent with the initial impressions from the conversation recording. The J and L's alveolo-palatals [tɕ] [tɕʰ] and [ɕ] have all shifted to alveopalatals [tʃ] [tʃʰ] and [ʃ], and all nasals finals are [ŋ] after [i]. Both of these shifts will be addressed in depth below, and possible causes and related factors will also be discussed.

5.1 Alveolo-palatals → Alveopalatals

Standard Mandarin has three sets of stridents that are distinguished primarily by place of articulation: the alveolo-palatals [tɕ] [tɕʰ] and [ɕ]; the alveolars [ts] [tsʰ] and [s]; and the retroflexes [ʈʂ], [ʈʂʰ], and [ʂ]. Casual Taiwanese Mandarin reduces the number of sets of stridents to two by fronting the retroflex set, merging them with the alveolars. Then in J and L's speech, the alveolo-palatals become coronal alveopalatals. Here is a diagram of the shifts from SM to TM to the Mandarin of J and L. :



J&L:

Alveopalatal

Alveolar

[tʃ]

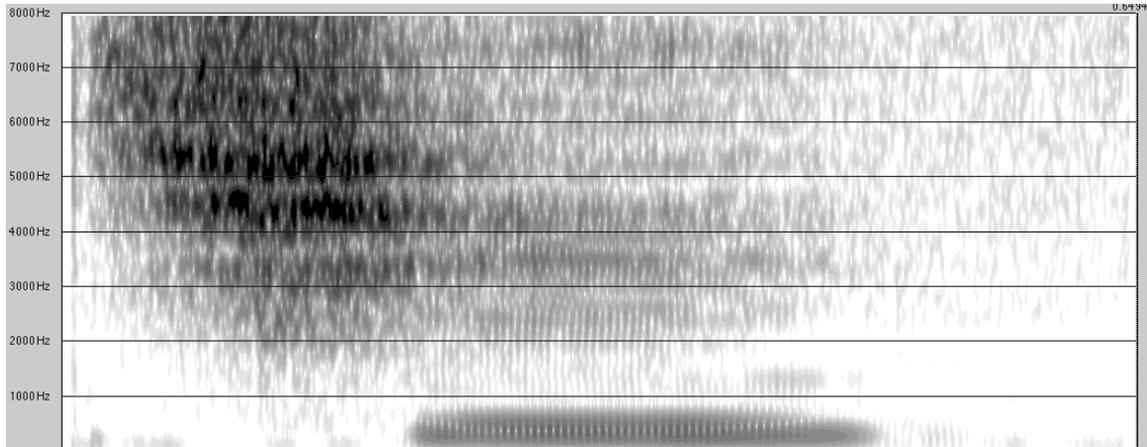
[ts]

[tʃʰ]

[tsʰ]

[ʃ]

[s]



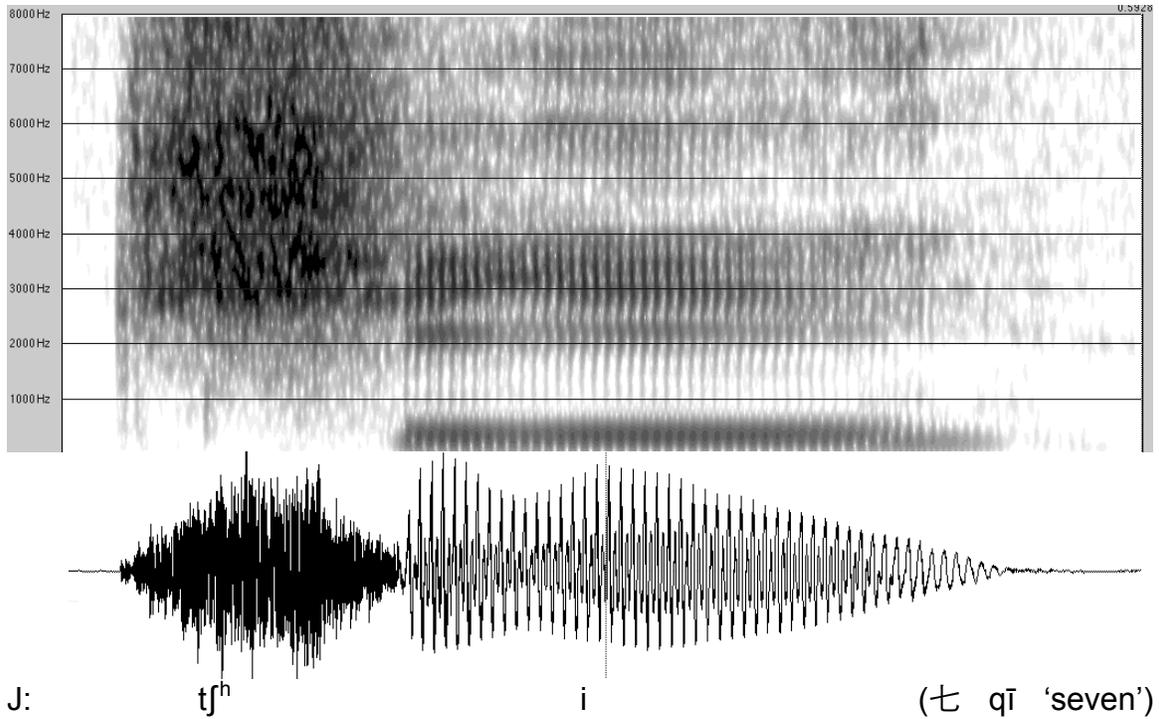
H:

tʃʰ

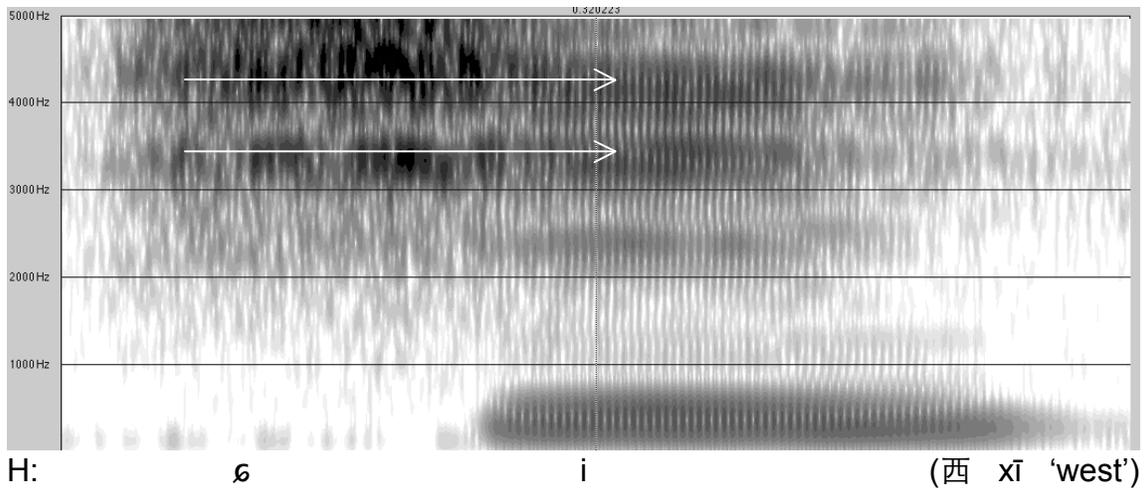
i

(七 qī 'seven')

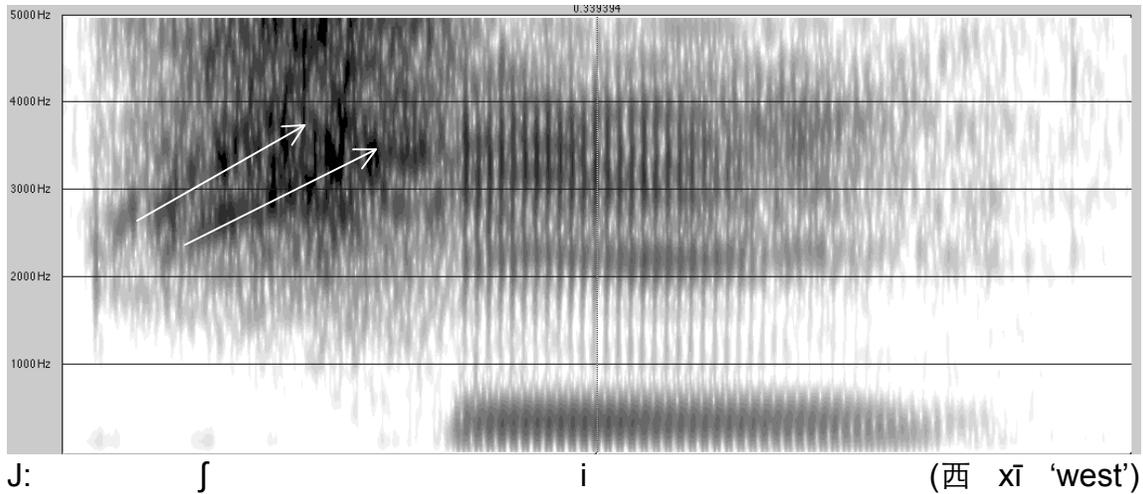
In the above spectrogram of H's utterance of qī you can clearly see the narrow concentration of noise in the higher frequencies typical of an alveopalatal. There are two formants clearly visible during the strident around 4500Hz and 5300Hz. Also, in the waveform you can see the gradual fricative onset typical of a laminal fricative. Compare to the spectrograms of J and L below.



In the above spectrogram of J's utterance of qī you can clearly see that there are no narrow bands of concentration during the strident, but rather a more spread out pattern of concentration that, unlike H's utterance, extends from 3000Hz past 6000 Hz. The two formants apparent in the alveolo-palatal spectrogram also are absent here. We can also see from the waveform and spectrogram that, compared to H's utterance, his fricative has a much more sudden onset, typical of an apical fricative.



Here the formants are clearly constant throughout the entire utterance of [ɕi], from onset of the alveolopalatal fricative all the way through the high front unrounded vowel. This picture is consistent with the commonly taught notion that in the Mandarin syllables ji-qi-xi, zi-ci-si, and zhi-chi-shi, the vowels which immediately follow the stridents have the same tongue position as the strident. Thus in Standard Mandarin alveolo-palatals [tɕ] [tɕʰ] and [ɕ] can be followed immediately by [i] but never by [z] or [ʒ]; alveolars [ts] [tsʰ] and [s] can be followed immediately by syllabic [z], but never by [i] or [ʒ]; and retroflexes [tʂ], [tʂʰ], and [ʂ] can be followed immediately by syllabic [ʒ], but never by [i] or [z]. Any of the Standard Mandarin syllables ji-qi-xi, zi-ci-si, and zhi-chi-shi, all with a strident onset should therefore show no formant movement between the strident and the vowel. Such is exactly the case for H's utterance of xī. J's utterance of xī, however, looks quite different:

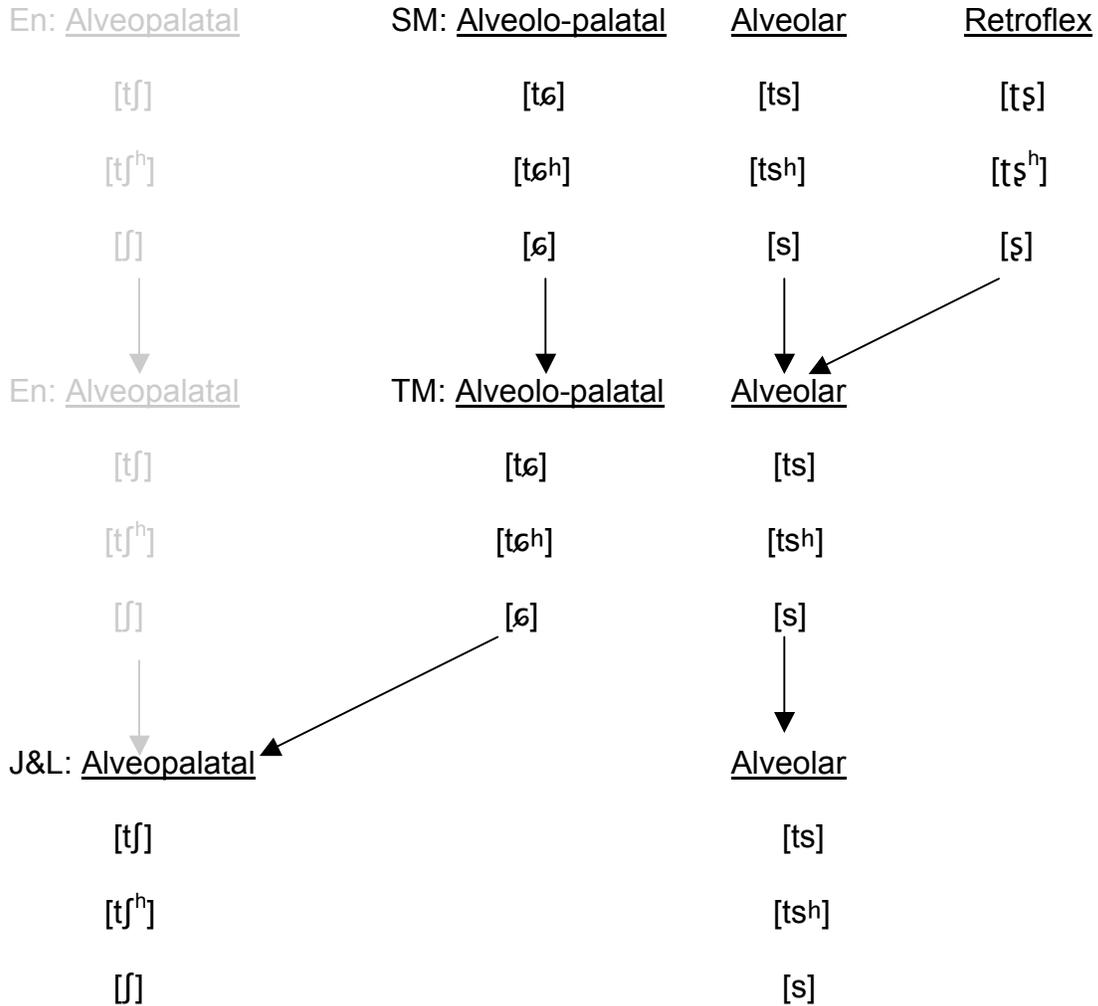


In this spectrogram of J's utterance of *xī*, the formants are clearly not level throughout the utterance. There is a clear rising of two formants from the onset of the alveolar fricative [ʃ] to the onset of the high front unround vowel [i]. This rise is due to the tongue moving forward from the back of the alveolar ridge where [ʃ] is articulated to the front of the mouth where the tongue must be to produce the vowel [i] to the front of the mouth to pronounce the *xī*. For all every words in the word list (see Appendix A) that H pronounced with an alveolo-palatal initial, J and L pronounced them with an alveopalatal initial. The words exhibiting this alveolo-palatal→alveopalatal shift are numbers 1-41, 45, 47, 100, 104, 106, and 120.

5.1.1 Origins of Alveolo-palatal→Alveopalatal Shift

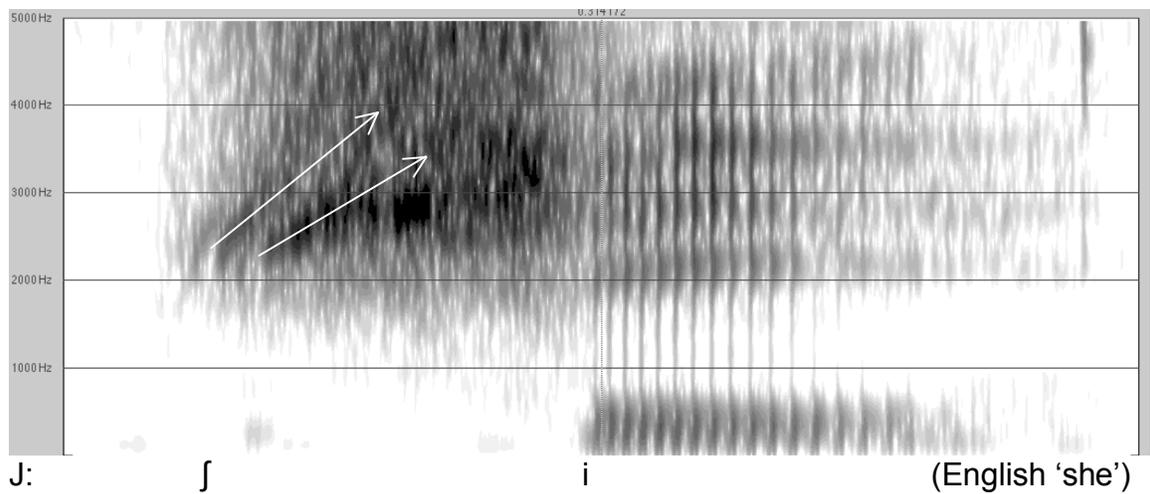
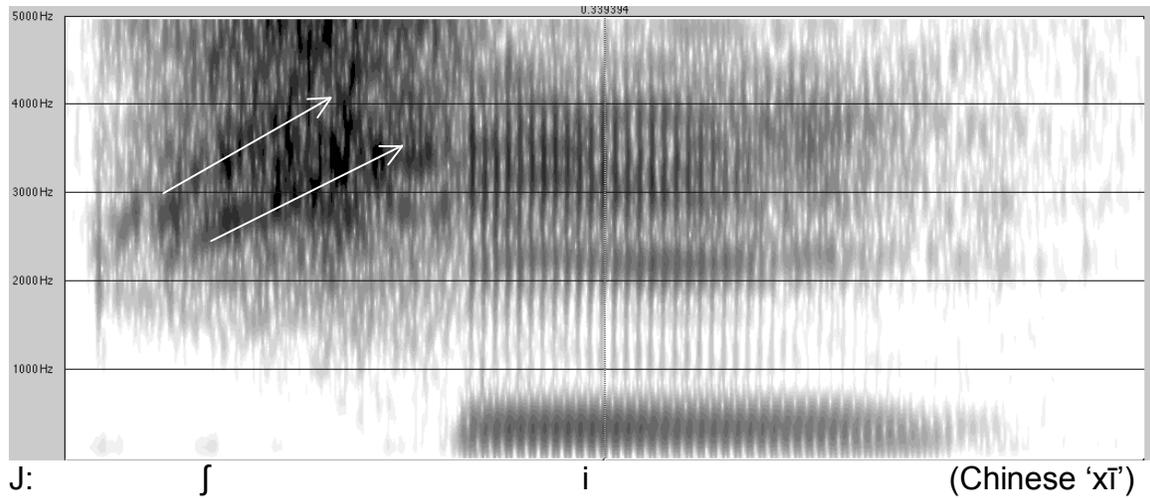
The origin of J and L's shift of the laminal alveolo-palatal stridents to alveolo-palatal stridents is a difficult-to-explain shift if seen only in the context of the Taiwanese Mandarin of H, and so I propose that instead of seeing it as a shift, we should analyze this change as a merger with the English alveopalatals /dʒ/

/tʃ/ and /ʃ/. If English is included in the flow chart from above, it would look something like this:



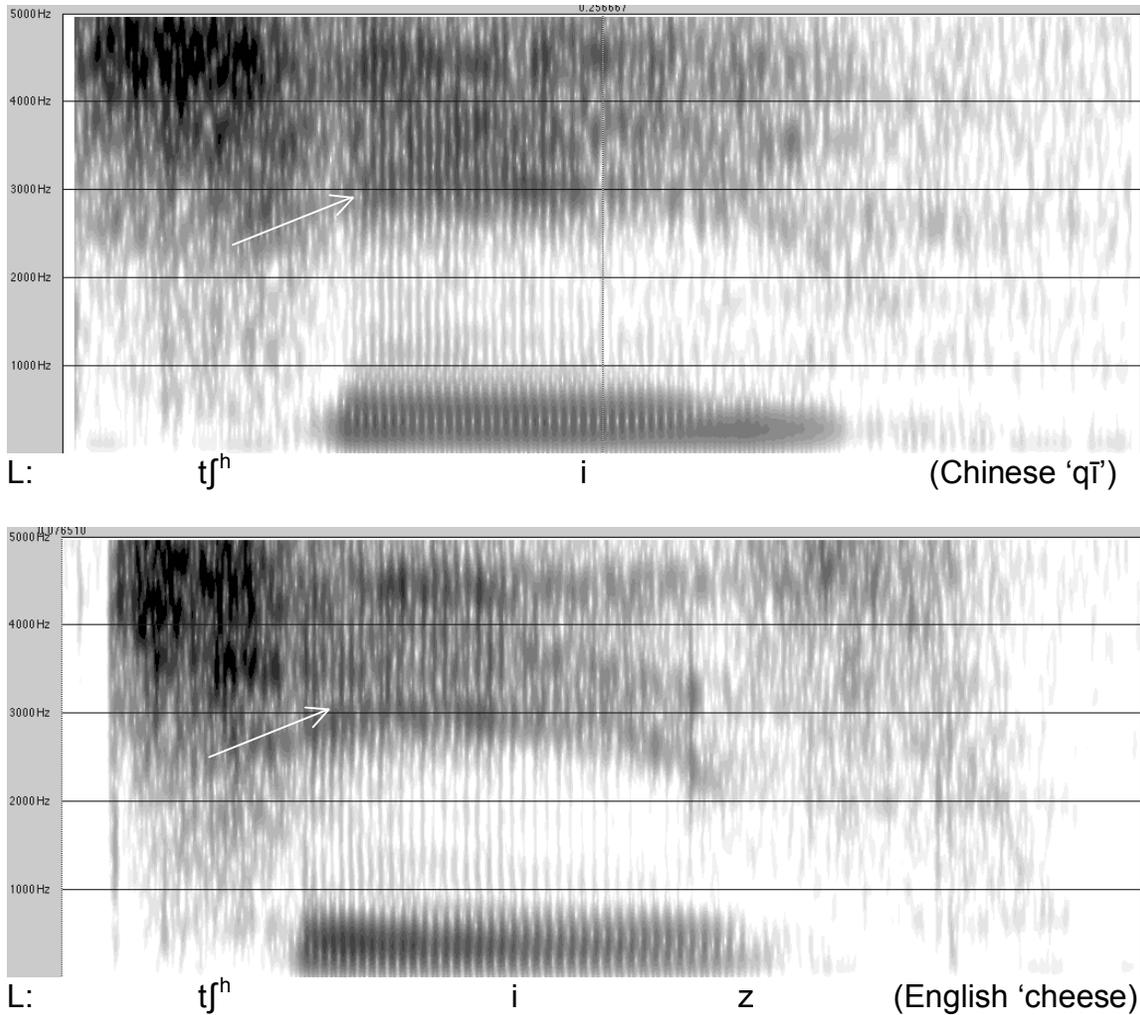
Such an explanation as the above requires that to at least a certain degree J and L's phonological systems for English and Chinese are overlapping. While recent research suggests that bilingual children, even from the earliest stages, show differentiation between the sound systems of two language, the shift occurring in J and L is undoubtedly a merger of their English and Chinese phonologies. To see that this is the case, we must examine syllables in Chinese and English with similar to identical onsets.

For J we will compare his utterances of Chinese 'xī' and English 'she,' both of which he pronounced as [ʃi]:



Looking at the above spectrograms it is clear that the initial of his utterance of Chinese 'xī' has the same alveopalatal onset as his utterance of English 'she,' with the same clear rising formants as he transitions to articulate the high front unround vowel [i].

The same pattern is evident in L's utterances of Chinese 'qī' and English 'cheese':



Looking at the above spectrograms of L's utterances of Chinese 'qī' and English 'cheese' you can see that they both have at least one clear formant moving upwards as she transitions from the alveopalatal affricate [tʃʰ] to the high front unround vowel [i]. In L's utterance of 'cheese,' the formant is still moving after the vowel onset, but only slightly.

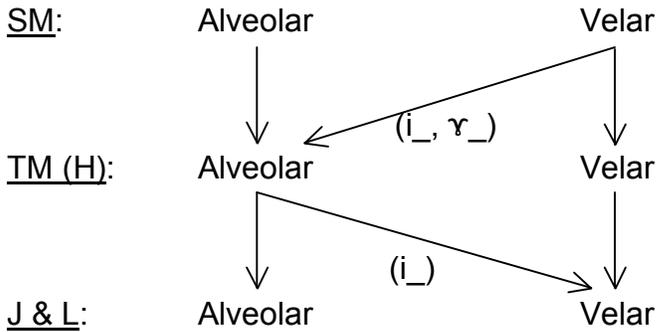
Given the impressionistic and spectrographic evidence, it is clear that the alveopalatals of Taiwanese Mandarin that H maintains have not simply shifted in the Mandarin of J and L, but have merged with the English alveopalatals /dʒ/ /tʃ/ and /ʃ/.

5.2 Velarization of nasal finals [ŋ]→[ŋ̠]

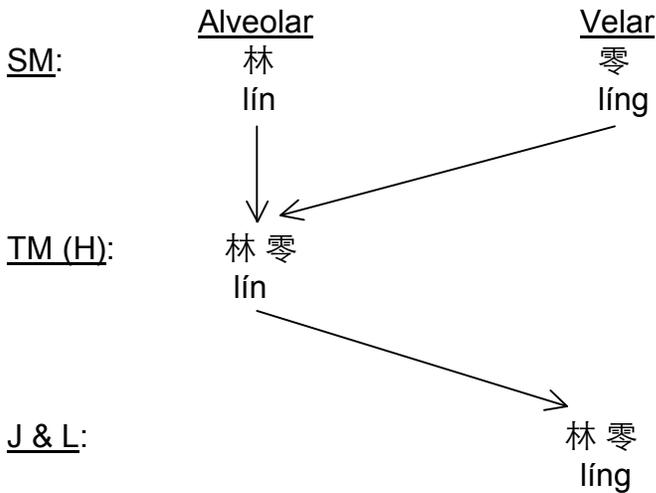
The second major sound change under investigation in this study is J and L's velarization of alveolar nasals which are pronounced exclusively as alveolar in H's Mandarin as well as normal casual Taiwanese Mandarin. The interplay between input from H, interference from English, and resulting phonemes produced by J and L is much more complicated for the nasals than for the previously discusses alveolo-palatal→alveopalatal shift.

Southern Min (Taiwanese) does not have the Standard Mandarin finals [iŋ] or [ɤŋ], so in casual Taiwanese Mandarin, these finals are pronounced as [iŋ] and [ɤŋ] respectively (Kubler 94). The result of this shift is a loss of contrast between many words that in Standard Mandarin would be pronounced differently. See section 3.3 for examples of words which are contrastive in Standard Mandarin but which are homonyms in Taiwanese Mandarin. H's nasal finals follow this pattern exactly; she pronounces all instances of SM [iŋ] and [ɤŋ] as [iŋ], and all instances of SM [ɤŋ] and [ɤŋ] as [ɤŋ]. J and L have gone the opposite direction with those nasals following the high front unround [i], pronouncing all nasals following this vowel as the alveolar nasal [ŋ]. The result is that all three participants in this study H, J, and L do not distinguish between xīn 'new' and xīng 'star.' Their pronunciations are vastly different, however, with H's being [çiŋ] while J and L's are both [ʃiŋ]. A diagram of the sound changes which have occurred would look something like the following:

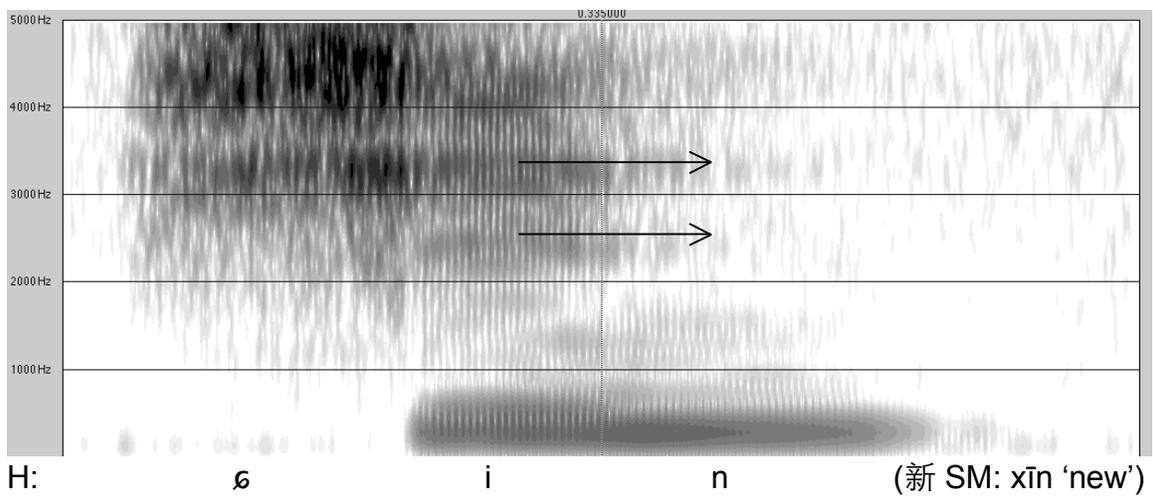
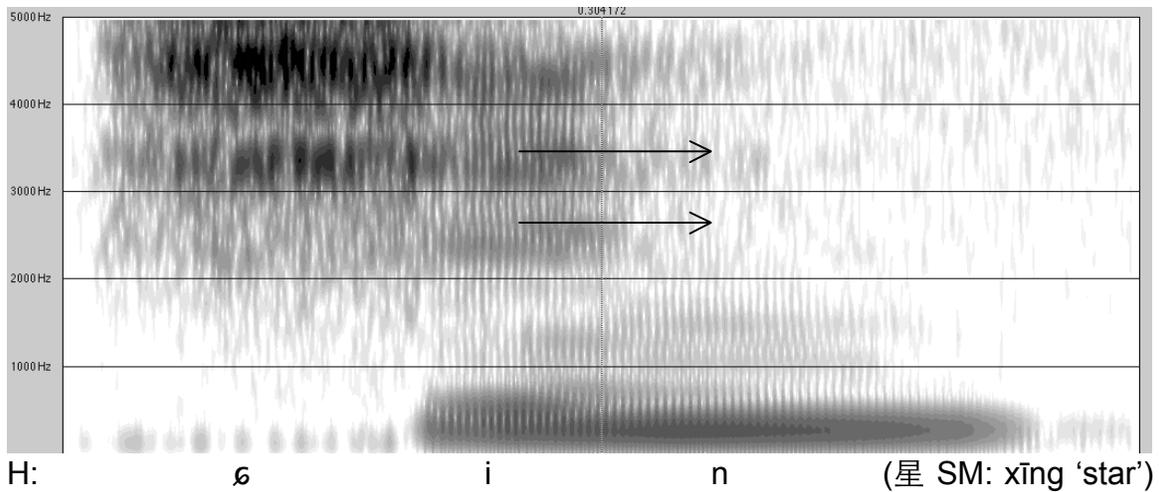
Nasal shifts from SM, to TM (H), and then to J & L:



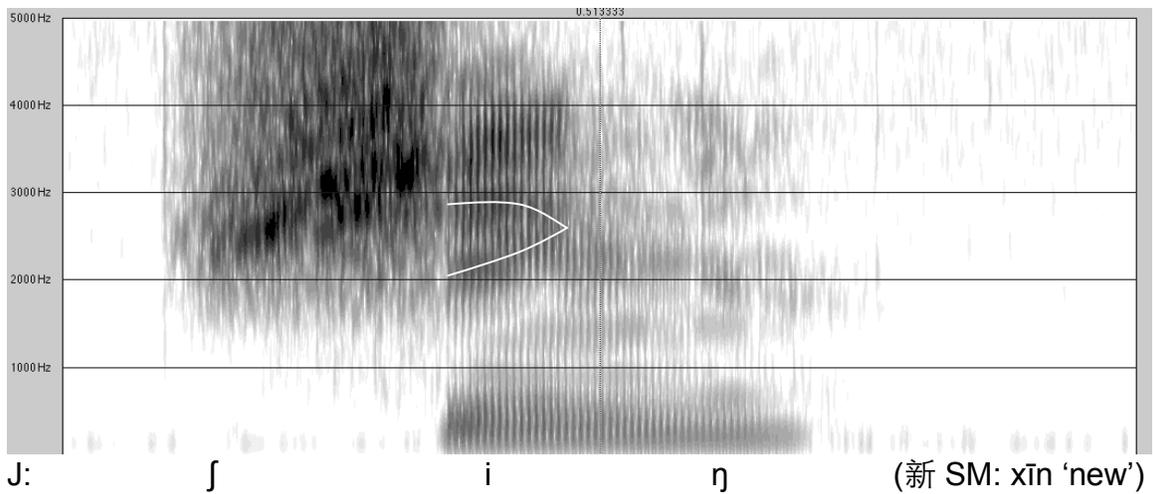
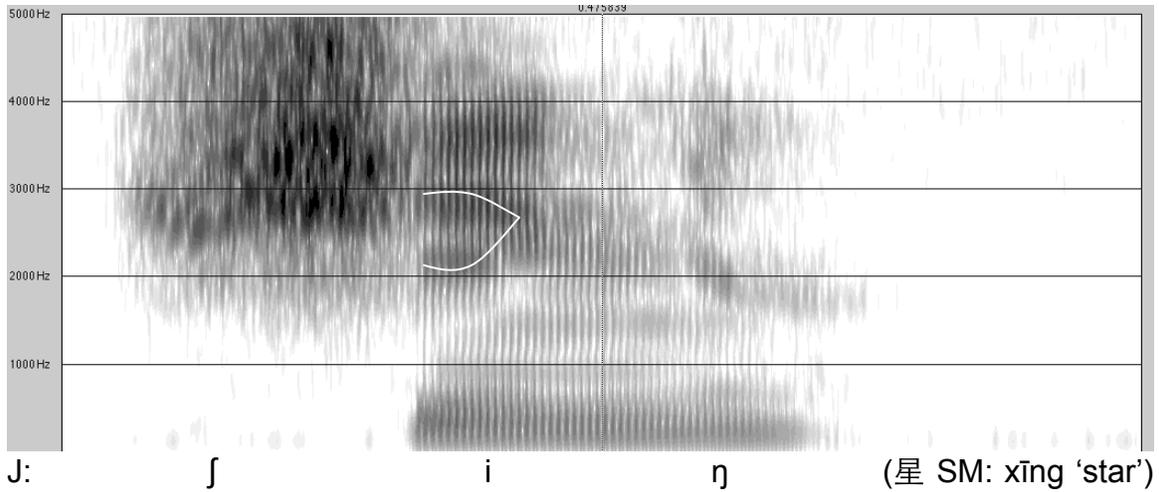
The nasal shift occurring between Standard Mandarin and H's casual Taiwanese Mandarin is merely a simple merger. The shifts become more clear with example words. The Chinese words used to illustrate this nasal shift are 1. 林 SM: lín 'forest' and 2. 零 SM: líng 'zero.'



For spectrographic confirmation of this shift we will examine H, J, and L's nasal finals for two words: 星 SM: xīng 'star' & 新 SM: xīn 'new':

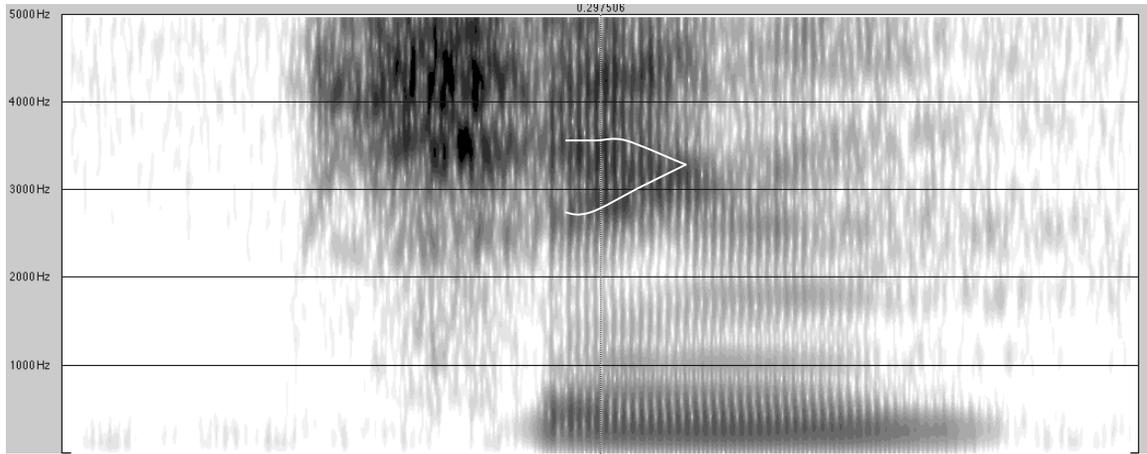


Here we can see that H's utterances of the words xīng 'star' and xīn 'new' are identical, and show none of the second and third formant movement typical of a velar final. In fact, both spectrograms show virtually no formant movement at all after the onset. She pronounces both words exactly the same, with a high front unround vowel [i] followed by an alveolar nasal final [n]. If either word had been pronounced with a velar nasal final, the second and third formants, indicated by the straight arrows above, would be seen to "pinch" together as she transitioned to the velar. This velar pinch, however, is clearly evident in the spectrograms of J and L:

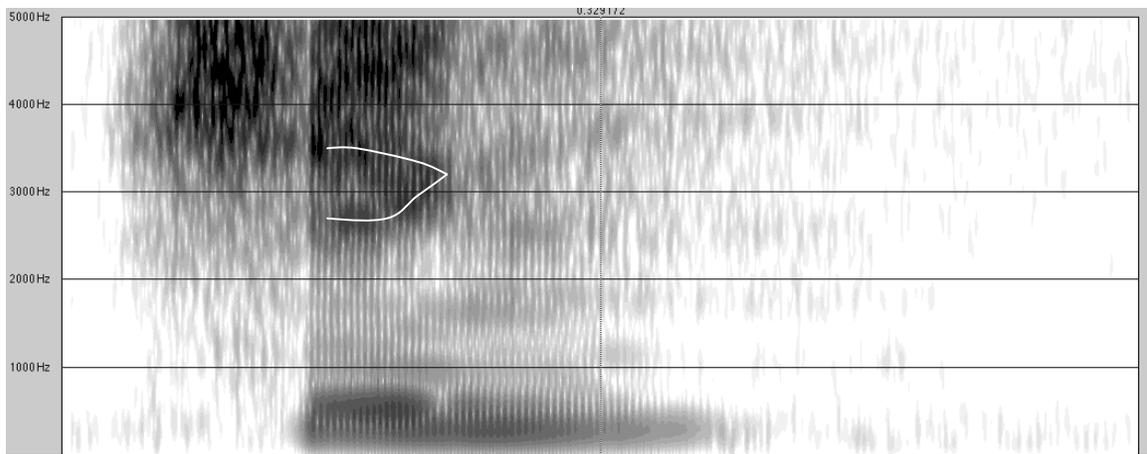


Comparing these spectrograms of J's utterances of *xīng* 'star' and *xīn* 'new' we can immediately tell that the nasal final is drastically different from that in H's spectrograms on the previous page. The velar pinch, or convergence of second and third formants characteristic of the transition into a velar consonant, is clearly visible in both spectrograms, and is highlighted with the hand-drawn curving white lines. The initial is also different from H's, as this word was affected by the alveolo-palatal→alveopalatal shift described earlier. The important thing to note about these spectrograms is that J's utterance for these two words is identical, and he produces both with a velar nasal final [ŋ] unlike his

mother who pronounces both with the alveolar nasal [n]. L's spectrograms show the same patterns as J's:



L: ʃ i ŋ (星 SM: xīng 'star')



L: ʃ i ŋ (新 SM: xīn 'new')

In L's spectrogram you can again clearly see the velar pinch highlighted in white, the signature of a velar consonant, in these cases the velar nasal final.

Both utterances have the same final, in both cases the velar nasal [ŋ].

5.2.1 Origins of Velarization of Nasal Finals [n]→[ŋ]

The case for English interference in the previously discusses alveolo-palatal→alveopalatal shift was fairly simple. J and L simply did not acquire the

Chinese alveolo-palatal phonemes, and substituted the similar English alveopalatals in their place. The velarization of nasal finals is much less straightforward, as the influence of English cannot be pegged as the driving force of the sound change. For this velarization of nasal finals to have origins in English phonology, it would have to be the case that English had only *velar* nasal finals following high unround consonants, but this is not so. English, in fact, only has alveolar nasal finals following the vowel [i]. For example, ‘keen’ [k^hin] and ‘king’ [k^hɪŋ] phonemically are minimal pairs differing only in that the first has an alveolar nasal final, and the second has a velar nasal final. Narrow transcription, however, shows that the /i/ in ‘king’ is actually a lax [ɪ].

If J and L’s mother H, has only alveolar nasals following the high unround vowels [i] and [ɤ], and English *also* has only alveolar nasals following the high unround vowel [i], how did J and L come to pronounce all post-high unround vowel nasals as velar? There is at least one plausible explanation which I will posit, but which would require further inquiry to substantiate.

It would seem most probably that J and L’s velarization of all nasals following high unround vowels is some sort of hypercorrection. Such an explanation would be almost certainly correct if J and L had any education in Chinese. Many times, when speakers of Taiwanese Mandarin are exposed to formal education in Mandarin, one of the most stressed topics is “correct” or standard pronunciation. Standard pronunciation includes distinguishing between the retroflex and alveolar set of stridents which are all pronounced as alveolar in Taiwanese Mandarin, as well as between velar and alveolar nasals in all

positions. Children are rewarded for producing “correct” retroflex pronunciations, and if this notion is engrained well enough it can lead to overcorrection. Native speakers of Taiwanese Mandarin with a small amount of education can often be heard retroflexing stridents whose “correct” pronunciation is actually alveolar. Since the retroflex stridents and alveolar stridents are not yet fully distinguished in their minds, and they don’t know which words are supposed to have which consonant, they over-apply retroflexion leading to forms which do not exist in normal Mandarin. An example would be someone taking ‘Confucius,’ whose normal Mandarin pronunciation is PY: kǒngzǐ IPA: [k^hʊŋ tsz], and retroflexing the initial of the second syllable, yielding the unnatural sounding PY: kǒngzhǐ IPA: [k^hʊŋ tʂz], an overcorrection that I have personally heard a few times.

For such overcorrection to occur, however, there must be a desire or pressure to correct in the first place, which is where the overcorrection explanation for J and L’s nasal velarization is lacking in evidence. Aside from a few classes J took 2-3 years ago, neither J or L have had had any formal education in Chinese, so it is unlikely that J and L were at one point encouraged to produce velar nasals where they had before produced alveolar nasals.

Alternately, the correction pressure could have come from parental influence, but this explanation is also problematic. From the recordings elicited, there is no evidence that H corrects her own speech for velar nasals. She does, however, correct for many retroflex initials, such as 殺 shā ‘kill’ which both J and L pronounced [sa] but which H pronounced [ʂa]. So while she corrects some sounds to sound more “standard,” there were no instances where she produced

a velar nasal after a high unround vowel. The only possible explanation for a source of pressure to correct could be J and L's father. J and L were assumedly equally exposed to their father's Mandarin in their linguistically formative years as they were to that of their mother, H. It is possible that he has velar nasals occurring in his speech after high unround vowels, which would provide an explanation of the source of J and L's nasal velarization. Since their father was not available for this study, however, this explanation remains speculation.

6. Conclusion

6.1 Issues

A second issue I encountered during this project involved the preparation of the word list in order to maximally highlight the sound changes I was looking for. When I set about compiling the list and then making the recordings, I was only looking for the first sound change (alveolo-palatals→alveopalatals). I did not notice and decide to examine the velarization of nasals until I noticed it when going through the recordings after the fact. Because I did not prepare the list with the second change in mind, there were some syllables which were left off the list of which I would have liked to have gotten recordings to further illuminate and disambiguate this sound change. Luckily, by chance I had a few minimal pairs with alveolar and velar nasal finals that I was able to use to investigate this second sound change.

A Third major issue was how to conduct the recordings and elicit the words I wanted to record. This was not a problem with H, because she could simply read the Chinese characters I printed on the list, and so had no problem. Eliciting specific words from J and L was more tricky, because neither of them could read Chinese characters. That left two options, English and Romanization. I included both literal English gloss and Pinyin Romanization, along with the Chinese character on the list used for the recordings. This was still limiting because often times the Romanization is not intuitive from the standpoint of an English reader, and so was often little help to J and L. They were left, then, having to translate words and phrases from English into Chinese in isolation, a

very difficult task that not surprisingly led to many instances of them not being able to think of, or not knowing what I was looking for. I believe that in most all cases, they *knew* the word I wanted, but coming up with it out of context was unrealistic.

6.2 Major Findings

The purpose of this case study was to examine a case of phonological attrition in the context of Taiwanese Mandarin as spoken by a family in California. The major finding of this study was that the Mandarin of the two children J and L had undergone two unique sound changes relative to the Mandarin spoken by their mother, H. These sound changes were:

	<u>First Generation</u>		<u>Second Generation</u>
1.	alveolo-palatals	→	alveopalatals
2.	[ŋ]	→	[ŋ]/i__*

The first sound change was attributed to the influence of English phonology, and was taken as a wholesale replacement of Mandarin alveolo-palatals with English alveopalatals. The origins of the second sound change are less clear, but were assumed to be due to overcorrection by J and L. The standard towards which they were correcting, however, could not be determined given the constraints of this study.

6.3 Future Research

The Findings of this case study are limited and preliminary. First of all, a more thorough set of recordings of natural conversation from which to draw conclusions would yield more accurate results. If possible, recordings of the

father's speech would also help to establish possible origins of the nasal velarization sound change which as of now are unexplainable. Finally, it would be interesting to conduct more expansive studies of second generation Chinese speakers in the US to see if the sound changes observed here are common throughout the Chinese-American community.

Appendix A: Word List

*The right three columns indicate if I got a recording of that word from H, J or L.

No.	Chinese	Pinyin	English gloss	H?	J?	L?
1	機	jī	machine, airplane	H	J	
2	七	qī	seven	H	J	L
3	西	xī	west	H	J	
4	家	jiā	home	H	J	L
5	恰恰	qiàqià	exactly, precisely	H		
6	下	xià	go down, below	H	J	L
7	姐	jiě	younger sister	H	J	L
8	切	qiē	to cut	H	J	L
9	寫	xiě	to write	H	J	L
10	教	jiāo	to teach	H	J	L
11	橋	qiáo	bridge	H	J	
12	小	xiǎo	small	H	J	L
13	九	jiǔ	nine	H	J	L
14	球	qiú	ball	H	J	L
15	休息	xiūxi	rest	H	J	L
16	見	jiàn	see	H	J	L
17	錢	qián	money	H	J	L

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18	先	xiān	first	H	J	L
19	進	jìn	to enter, go in	H	J	L
20	鋼琴	gāngqín	piano	H	J	L
21	新	xīn	new	H	J	L
22	醬	jiàng	sauce	H	J	L
23	強	qiáng	strong	H	J	
24	想	xiǎng	think, want	H	J	L
25	鏡子	jìngzi	mirror	H	J	L
26	請	qǐng	request, ask, "Please"	H	J	L
27	星	xīng	star	H	J	L
28	窮	qióng	poor	H	J	
29	熊	xióng	bear	H		L
30	工具	gōngjù	tool	H	J	L
31	去	qù	go	H	J	L
32	需要	xūyào	need, want, require	H	J	L
33	決定	juéding	decide	H	J	L
34	缺	quē	lack, be short of	H	J	
35	學	xué	study, learn	H	J	L
36	卷	juǎn	to roll up	H	J	L
37	圈	quān	circle, ring	H	J	

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38	選	xuǎn	select, choose	H	J	L
39	軍隊	jūnduì	army, armed forces	H	J	
40	群	qún	group, flock, crowd	H	J	
41	訓練	xùnliàn	train, drill	H	J	
42	餓	è	hungry	H	J	L
43	二	èr	two	H	J	L
44	愛	ài	love	H	J	L
45	驕傲	jiāo'ào	proud, arrogant	H	J	
46	歐洲	ōuzhōu	Europe	H	J	
47	安靜	ānjìng	quiet, peaceful	H	J	
48	恩	ēn	kindness, favor	H		
49	一	yī	one	H	J	L
50	鴨	yā	duck	H	J	L
51	也	yě	also, too	H	J	L
52	要	yào	want, wish	H	J	L
53	油	yóu	oil	H	J	L
54	鹽	yán	salt	H	J	
55	銀	yín	silver	H	J	
56	羊	yáng	sheep	H	J	L
57	贏	yíng	win	H	J	L

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58	用	yòng	use	H	J	L
59	五	wǔ	five	H	J	L
60	挖	wā	dig	H	J	L
61	我	wǒ	I, me	H	J	L
62	外國	wàiguó	foreign country	H	J	L
63	為甚麼	wèishénme	why? how come?	H	J	L
64	晚上	wǎnshàng	evening	H	J	L
65	問	wèn	ask	H	J	L
66	忘	wàng	forget	H	J	L
67	魚	yú	fish	H	J	L
68	月	yuè	month, moon	H	J	L
69	遠	yuǎn	far, distant	H	J	L
70	雲	yún	cloud	H	J	
71	低	dī	low	H	J	L
72	你	nǐ	you	H	J	L
73	歷史	lìshǐ	history	H		
74	脫掉	tuōdiào	take off (clothing)	H	J	L
75	跳	tiào	jump	H	J	L
76	鳥	niǎo	bird	H	J	L
77	跌	diē	fall	H	J	

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78	鐵	tiě	iron	H	J	L
79	丟	diū	lose, misplace	H		
80	牛	niú	cow	H	J	
81	六	liù	six	H	J	L
82	電話	diànhuà	telephone	H	J	L
83	甜	tián	sweet	H	J	L
84	年	nián	year	H	J	L
85	練習	liànxí	practice	H	J	L
86	您	nín	you (polite)	H	J	
87	林	lín	forest, woods	H	J	
88	兩	liǎng	two (of something)	H	J	L
89	鼎	dǐng	big pot	H		
90	聽	tīng	listen	H	J	L
91	零	líng	zero	H	J	L
92	女人	nǚrén	woman	H	J	L
93	綠	lǜ	green	H	J	L
94	再說	zàishuō	say again	H	J	L
95	早	zǎo	early, "Goodmorning"	H	J	L
96	走	zǒu	walk, go	H	J	L
97	暫時	zànshí	temporary	H	J	

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98	怎麼	zěnmē	how?	H	J	L
99	髒	zāng	dirty	H	J	L
100	增加	zēngjiā	increase, raise, add	H	J	L
101	總是	zǒngshì	always, invariably	H	J	
102	猜	cāi	guess	H	J	
103	草	cǎo	grass, straw	H	J	L
104	參加	cānjiā	attend, take part in	H	J	
105	藏	cáng	hide	H	J	
106	曾經	céngjīng	ever before	H	J	
107	從	cóng	from	H	J	L
108	塞車	sāichē	traffic jam	H	J	
109	三	sān	three	H	J	L
110	鬆	sōng	loose	H	J	
111	債	zhài	debt	H	J	L
112	找	zhǎo	look for, seek	H	J	L
113	八	bā	eight	H	J	L
114	怕	pà	be afraid of	H	J	L
115	媽	mā	mom	H	J	L
116	發財	fācái	get rich, make money	H	J	
117	大	dà	big	H	J	L

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118	他	tā	him	H	J	L
119	拿	ná	take, grab	H	J	L
120	垃圾	lāijī/lèsè	garbage	H	J	L
121	炸	zhà	fry	H	J	L
122	茶	chá	tea	H	J	L
123	殺	shā	kill	H	J	L
124	卡通	kǎtōng	cartoon	H	J	L

Appendix B: References

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