Contact-Induced Phonological Change in Taiwanese

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the Graduate School of The Ohio State University

By

Alexander Takenobu Ratte

Graduate Program in East Asian Languages and Literatures

The Ohio State University

2011

Master's Examination Committee:

Marjorie K. M. Chan, Advisor

Donald Winford
Copyright by
Alexander Takenobu Ratte
2011
This thesis is a study of language contact in Taiwan. Previous research (Ratte, 2009) has shown that voiced obstruents /g/ /b/ /dz/ are not being articulated by bilingual speakers of Taiwanese Southern Min and Mandarin, and suggests that these sound changes could be due to influence from Mandarin. This study investigates contact between the two languages in the framework of imposition proposed by Van Coetsem (1988). Recordings were collected of 15 young Taiwanese adults reading a word list, and their pronunciations were examined for evidence of contact-induced shift. The study finds that bilinguals from all over Taiwan are exhibiting the same shift, and that virtually all sound changes can be attributed to the imposition of Mandarin phonology, followed by analogy to Mandarin cognates for the choice of strategy. Mandarin agentivity on the part of bilinguals implies Mandarin dominance in Van Coetsem’s framework, leading to the conclusion that bilinguals in this study were less proficient in Taiwanese. Close scrutiny of Taiwanese society in the context of language contact also offers evidence contradicting a linguistic revival of Taiwanese, and suggests that there is little motivation for bilinguals to maintain Taiwanese. The study concludes that bilinguals are shifting towards Mandarin dominance, and concludes that both the continued social dominance of Mandarin and the emergence of a “New Taiwanese” identity may be responsible for these shifts.
Acknowledgments

First and foremost, many thanks to Marjorie Chan for her guidance over these past two years and for her limitless patience. “Ma Laoshi” has been a nurturing and selfless advisor, and it is without a doubt that this thesis would not be what it is now without her advice, her prodding and her passion for the field. I would also like to express my gratitude to Donald Winford, whose course sparked my interest in the field of language contact and whose clarity of thought has been a guide and an inspiration in writing this thesis. The very beginnings of this thesis go back several years, for which I have Neil Kubler to thank. I am always grateful to “Gu Laoshi” for first introducing me to the world of Chinese Linguistics, for teaching me Taiwanese, and for his overall guidance during my time as an undergraduate. Thanks also to Nathan Sanders, who oversaw my first foray into the study of linguistics. I am also grateful to my classmates Seth Weiner, Rongbin Zheng, Litong Chen and Yutian Tan, not only for their input throughout the stages of this thesis and for lending me their ears, but also for providing an academic community from which I have learned a great deal. I would also like to thank Ju-yin Wang, Fu-ju Wu, Yi-zhen Chen, Ying-hua Hsiao, Carly Peselnick, Ren-Horng Wang, Ya-ting Shih, Yun Lee and Evelyn Huang for helping me find participants for my study. And finally, thanks to Joshua Francis, for holding my hand and giving me the strength to finish.
Vita

2001 - 2004 ........................................... Iolani School
2009 ............................................................ B.A. Linguistics, Williams College
2009 - 2010 .................................................. University Fellowship
2010 - 2011 .................................................. Foreign Language Area Studies Fellowship
2009 to present ............................................. Graduate Student, Department of East Asian Languages and Literatures, The Ohio State University

Fields of Study

Major Field: East Asian Languages and Literatures
Table of Contents

Abstract .......................................................................................................................... ii

Acknowledgments ........................................................................................................ iii

Vita ................................................................................................................................ iv

Fields of Study .............................................................................................................. iv

Table of Contents ........................................................................................................... v

List of Tables ................................................................................................................ xi

List of Figures ............................................................................................................... xii

Chapter 1: Introduction ............................................................................................... 1

1.1 Introduction ............................................................................................................ 1

1.1.1 Taiwan ............................................................................................................... 1

1.1.2 Motivations for this Thesis ................................................................................. 2

1.1.3 Goals and Research Questions ............................................................................ 4

1.1.4 Some Limitations .............................................................................................. 6

1.1.5 Romanization, Abbreviations and Terminology ................................................ 7

1.1.6 Organization of Chapters .................................................................................. 8

1.2 Background on Taiwan and Taiwanese .................................................................. 9
3.1 Affinity as applied to Taiwanese and Mandarin ........................................ 43
3.2 Analogy as applied to Taiwanese and Mandarin ........................................ 47
3.3 Comparison of Taiwanese and Mandarin Phonology ............................... 47
  3.3.1 Taiwanese Consonant Inventory ......................................................... 48
  3.3.2 Taiwanese Mandarin Consonant Inventory ............................................ 50
3.4 Analogy Between Cognates ........................................................................ 54
  3.4.1 Taiwanese [b] ~ Mandarin [m] ............................................................... 55
  3.4.2 Taiwanese [m] ~ Mandarin [m] ............................................................... 57
  3.4.3 Taiwanese [b] ~ Mandarin [w] ............................................................... 58
  3.4.4 Conclusion: Taiwanese /b/ ................................................................. 60
  3.4.5 Taiwanese [g] ~ Mandarin null onset (Proto *ŋ-) .................................. 60
  3.4.6 Do “Syllabic Finals” Have Onsets? ....................................................... 63
  3.4.7 Taiwanese [g] ~ Mandarin [n] ............................................................... 69
  3.4.8 Conclusion: Taiwanese /g/ ................................................................. 69
  3.4.9 Taiwanese [dz] ~ Mandarin [ɻ], [ʃ] ......................................................... 70
  3.4.10 Taiwanese [dz] ~ Mandarin null onset ............................................... 71
  3.4.11 Conclusion: Taiwanese /dz/ ............................................................... 72
3.5 Conclusion: Affinity and Analogy ............................................................... 72
3.6 Review of Methodological Literature ......................................................... 73
3.6.1 Pilot Study (Ratte, 2009) ................................................................. 73
3.6.2 Literature Pertinent to Methodology .................................................. 75
3.7 Contributions of This Study ................................................................. 76
  3.7.1 Hypotheses .................................................................................. 77
3.8 Experiment Methodology ................................................................. 78
  3.8.1 Defending an impressionistic analysis. ............................................. 82
  3.8.2 Elicitation Methodology and Challenges ........................................ 85
3.9 Analysis Methodology ..................................................................... 89

Chapter 4: Results, Analysis, and Discussion ........................................ 92
  4.1 Results by Speaker ......................................................................... 92
    4.1.1 Taipei 1 .................................................................................... 92
    4.1.2 Taipei 2 ................................................................................... 93
    4.1.3 Taipei 3 ................................................................................... 93
    4.1.4 Taipei 4 ................................................................................... 93
    4.1.5 Taipei 5 ................................................................................... 94
    4.1.6 Taoyuan 1 .............................................................................. 94
    4.1.7 Taoyuan 2 .............................................................................. 95
    4.1.8 Taizhong 1 ............................................................................. 95
    4.1.9 Nantou 1 ............................................................................... 95

viii
4.7 Conclusion: Imposition and Analogy ................................................................. 119

Chapter 5: Conclusions and Contributions ........................................................... 121

5.1 Summarizing Results ...................................................................................... 121

5.2 Suggestions for Future Research .................................................................... 122

5.3 Language Change and Bilingualism in Taiwan .............................................. 123

5.4 Language Change and Identity in Taiwan ...................................................... 125

References ........................................................................................................... 127

Appendix A: Word List ......................................................................................... 132

Appendix B: All Data ............................................................................................ 136

Appendix C: Grey-Scale Data .............................................................................. 140
List of Tables

Table 1: Taiwanese Consonant Inventory ................................................................. 49
Table 2: Examples of Taiwanese Phonemes ............................................................. 50
Table 3: Taiwanese Mandarin Consonant Inventory ................................................. 51
Table 4: Examples of Mandarin Phonemes ............................................................... 53
Table 5: Mismatched Phonemes .............................................................................. 53
Table 6: Taiwanese [b] ~ Mandarin [m] .................................................................. 56
Table 7: Taiwanese [m] ~ Mandarin [m] ................................................................. 57
Table 8: Taiwanese [b] ~ Mandarin [w] .................................................................. 59
Table 9: Taiwanese [g] ~ Mandarin null onset ...................................................... 61
Table 10: Taiwanese [g] ~ Mandarin [n] ................................................................. 69
Table 11: Taiwanese [dz] ~ Mandarin [ɻ] ............................................................... 70
Table 12: Taiwanese [dz] ~ Mandarin null onset .................................................. 71
Table 13: Analogical Matches ............................................................................... 106
Table 14: /dz/ Arranged by Area ....................................................................... 112
List of Figures

Figure 1: Map of Taiwan by County................................................................. 79
Figure 2: Spectrogram of [dzi]........................................................................ 83
Figure 3: Spectrogram of [tsi].......................................................................... 84
Figure 4: All Data Arranged by Word ................................................................. 105
Figure 5: All /g/ Data ......................................................................................... 137
Figure 6: All /b/ Data ......................................................................................... 138
Figure 7: All /dz/ Data ......................................................................................... 139
Figure 8: Grey-Scale Data .................................................................................. 141
Chapter 1: Introduction

1.1 Introduction

The following thesis is a study of language contact in Taiwan, specifically of contact-induced phonological change in the variety of Southern Min (閩南語 Minnanyu) most commonly spoken in Taiwan (hereafter referred to as “Taiwanese” 台語 taiyu). Previous research has shown that some bilingual speakers of Taiwanese and Mandarin show variation in the way that voiced obstruents are realized in speech, and I seek to demonstrate this variation across Taiwan and show that this variation is best explained as due to contact with Mandarin. This phenomenon is relatively recent, and to the best of my knowledge, this thesis is the first in-depth analysis that focuses on the linguistic influence of Mandarin on Taiwanese phonology.

1.1.1 Taiwan

“Taiwanese” or Taiyu is a term that refers to the dialects of Southern Min spoken in Taiwan. Of these dialects, two predominate: the Zhangzhou (漳州) dialect of Southern Min, and the Quanzhou (泉州) dialect of Southern Min (Tung et al., 1967). These two dialects of Southern Min are the ancestral languages of an estimated 70% of Han Chinese people living in Taiwan (Cheng, 1985; Chiung, 2001).
Representing a relatively early branch off of the Chinese language family, Southern Min is related to Mandarin, and the two languages share a great deal of cognates and are typologically very similar. However, their phonological inventories are quite different; Mandarin is distinguished by 4 tones and retroflex initials, whereas Taiwanese is distinguished by 6 lexical tones and 3 sets of obstruents: voiced, voiceless and aspirated. Now, virtually all educated Taiwanese people speak Mandarin in addition to any ancestral language, most with native proficiency. The exceptions to this are elderly Taiwanese people who were educated during Japanese colonial rule before 1945. This means that most native speakers of Taiwanese, and virtually all children to middle-aged adults, are bilingual and highly proficient in Mandarin (with a small minority also speaking Hakka) in addition to their L1 Taiwanese.

1.1.2 Motivations for this Thesis

This thesis is most certainly not the first to examine contact between Taiwanese and Mandarin. The study of language contact in Taiwan goes back several decades. Of note is Kubler (1985) whose dissertation is a comprehensive analysis of the Taiwanese language’s influence on the development of Mandarin in Taiwan. However, like Kubler, linguists have thus far focused on how Taiwanese has influenced Mandarin, and have largely ignored the question of whether Taiwanese has undergone any contact-induced linguistic change. This thesis shows that the opposite is now occurring, namely that Taiwanese is now being influenced by Mandarin.
The motivation for this thesis comes from a pilot study conducted in 2009 in Penghu County of Taiwan, which I explain in detail in Chapter 2 during the review of pertinent research. During my time in Taiwan in 2008, I noted that the Taiwanese speakers I came across did not seem to articulate /g/, and instead seemed to delete this voiced stop in a great deal of words. In order to explore this sound change in progress, my pilot study examined the voiced stops /g/ and /b/ in bilingual Taiwanese and Mandarin speakers. To do so, I decided to focus on Penghu County in the Penghu Islands. The Penghu Islands are an island chain off west coast of Taiwan, and are one Taiwan’s most remote locales with one of the most conservative dialects of Taiwanese (Kubler, 1981). I chose the Penghu Islands precisely for this reason--if it is possible to demonstrate that these same innovations in Taiwanese are occurring in one of the most linguistically conservative areas of Taiwan, then the implications for Taiwanese as a whole are great.

The pilot study examined bilingual speakers of Taiwanese and Mandarin in Penghu County, and focused on how participants pronounced words with underlying /g/ and /b/. What I found was surprising: that even in a location as remote and conservative as Penghu County, /g/ and /b/ were deleted or changed in many words. Even more surprising was the fact that I could find no means of accounting for this variation through phonetic conditioning. I initially concluded that Penghu Taiwanese was undergoing some kind of phonological conspiracy to delete /g/ and /b/, and I reasoned that different speakers chose different strategies at random for doing so. However, this conclusion did not sit well, since it seemed clear that some patterns existed in the data; for example,
speakers almost always deleted /g/ in the word *gwa* ‘I, me’, but were much more likely to nasalize /g/ into [ng] for the word *gu* ‘beef; cow’. At the time, I was unable to form any principled explanation for how and why speakers chose to change /g/ and /b/.

One year later in 2010, I revisited this data, and discovered that these sound changes can be understood not as phonological universals or conspiracies, but as the outcomes of language contact. Taking into account the fact that participants in the study were all bilingual in both Taiwanese and Mandarin, I reanalyzed the data through the lens of contact with Mandarin. The match was almost perfect: deletion was the most common strategy for /g/ when the morpheme’s Mandarin cognate had no onset or a /w/ onset, but nasalization was the most common strategy when the Mandarin cognate began with /n/. The variation in changes to Taiwanese /b/ could similarly be explained by the word’s cognate with Mandarin, and I tentatively concluded that speakers chose strategies based on analogy to the Mandarin cognate.

1.1.3 Goals and Research Questions

This thesis takes off where the pilot study ends, and both expands on the original idea of Mandarin influence and delves deeper into understanding the processes that underlie this contact. I investigate Mandarin influence on Taiwanese by collecting acoustic data from bilingual Taiwanese-Mandarin speakers, and examine data from the perspective of two contact phenomena: imposition and analogy. The goals of this thesis are as follows:
To give an overview of Taiwanese history and society as pertinent to the current status of Taiwanese;

To introduce a theoretical framework by which we can understand the influence of Mandarin on the Taiwanese language;

To review literature and research pertinent to both the study of language contact and Taiwanese;

To explain in detail how the imposition of Mandarin phonology and analogy to Mandarin cognates cause voiced obstruents to become marked and to change;

To discuss the findings of new research conducted in 2011 on contact-induced change in Taiwanese;

And to discuss the implications that this research raises regarding the status of bilingualism in Taiwan.

Ultimately, I seek answers to the following three research broader questions that have driven me to examine this sound change in progress:

1) Is the sound change seen in Penghu County occurring elsewhere in Taiwan?

2) Is contact with Mandarin responsible for this change? If so, in what way?

3) What does this sound change in progress tell us about bilingualism in Taiwan?

Finally, I will also assess and discuss the popular claim that Taiwanese is currently undergoing a revival across Taiwan.
1.1.4 Some Limitations

Before beginning, it is important to note what this thesis will and will not do. This thesis seeks to answer questions about a newly discovered sound change in Taiwanese, and asks whether this sound change is attributable to contact with Mandarin. However, this thesis will not answer some questions concerning the exact cognitive implications of imposition in the bilingual mind. Pavlenko (2004) raises interesting questions concerning the relationship between attrition and structural change in bilingual speech. She notes that there are conceptually many different ways in which contact-induced structural change could be occurring, from mutual convergence to attrition, each with potentially different implications for the status of bilingualism. Is shift away from language Y’s structure towards language X’s structure synonymous with deleting Y’s rule systems? Pavlenko points out that it is problematic to argue that structural influence of language X on language Y necessarily implies attrition of language Y, since it is plausible that highly skilled bilingual speakers could blur structural distinctions without actually losing those systems (Pavlenko, 2004). These are pertinent questions that the present analysis cannot answer, and moreover speak to essential questions of how high-functioning bilingualism works. In the conclusion, I offer conclusions about bilingualism in Taiwan as strong possibilities and avenues of future research.
1.1.5 Romanization, Abbreviations and Terminology

Mandarin words are Romanized in Pinyin unless otherwise noted, including names of locations in Taiwan. The following abbreviations are used: Taiwanese (T), Mandarin (M), source language (SL), recipient language (RL). The term “Taiwanese Mandarin” is explained in Chapter 2, but to offer some clarity, by this term I refer first and foremost to the variety as spoken by the majority of Taiwanese citizens. The term Mandarin as used in this paper refers first and foremost to the language as distinct from Taiwanese, and not specifically to Standard (Mainland) Mandarin. However, it must be noted that the monolithic use of the word Mandarin can be misleading if we are unclear about which type of Mandarin is being discussed. Since this analysis is concerned with Taiwanese and Mandarin as distinct systems in modern Taiwan, Standard (Mainland) Mandarin does not play a role in a discussion of current contact. Therefore, the term Mandarin as used in chapters 4, 5 and 6 refers to the kind of Mandarin that Taiwanese people regularly speak, which is the subject of Kubler (1981) and which I call Taiwanese Mandarin. There also exists a variant of Mandarin called 台灣國語 Taiwan Guoyu or simply 國語 Guoyu as identified by Fon (2002) and Kuo (2005), which represents the standard lect (linguistic variety) of Mandarin in Taiwan. Guoyu is more conservative than Taiwanese Mandarin but differs from Standard (Mainland) Mandarin in some ways. Since this thesis is concerned with the type of Mandarin that speakers actually use in their everyday lives, I will therefore not be concerned with Guoyu and instead will be focusing on Taiwanese Mandarin, the common lect. If a fine distinction is drawn in a historical context, this analysis uses the terms Standard (Mainland) Mandarin to refer to the
language of mainland China, that is, the Beijing dialect without its more extreme colloquial features (Kubler, 1981: 3C). *Taiwanese Mandarin* is used to refer to the type of Mandarin that arose popularly in Taiwan. Finally, any translations of Mandarin and Taiwanese in this thesis are my own.

1.1.6 Organization of Chapters

The rest of this chapter is devoted to an overview of Taiwanese history as pertinent to the study of contact between Taiwanese and Mandarin. Understanding the history of Taiwanese society, and by extension Taiwanese sociolinguistics, is critical in understanding language contact between Taiwanese and Mandarin. I conclude by discussing the popular claim that Taiwanese is experiencing a revival.

In Chapter 2, I discuss Van Coetsem's (1988) framework and introduce two important concepts for this study, namely, *imposition* and *analogy*, which inform this analysis. I give a brief account of general principles of language contact, followed by a discussion of how Van Coetsem’s (1988) framework is ideal for understanding structural transfer. I also discuss the concept of *linguistic affinity* that is incorporated in his framework.

In Chapter 3, I discuss how affinity and analogy apply to Taiwanese and Mandarin, introduce previous literature on the subject of contact between Taiwanese and Mandarin, and explain the pilot study I conducted in 2009 that motivates this thesis. I then introduce the experiment unique to this thesis and discuss its methodology.
In Chapter 4, I present the findings of my research, and discuss these results in the context of contact linguistics. Specifically, I examine results in the frameworks of imposition and analogy.

Chapter 5 concludes this thesis, in which I summarize the findings of this research and return to the three research questions that motivated this study. I also comment on the status of bilingualism in Taiwan, discuss the relationship between sound change and identity, and offer tentative predictions about the future of Taiwanese.

1.2 Background on Taiwan and Taiwanese

As Weinrich (1953) pointed out early in the history of contact linguistics, any understanding of bilingualism is predicated on first understanding the society and culture of the locale. Beardsmore (1986: 56), citing both Weinreich (1953) and Rickford (1986), argues that understanding the social contexts of bilingualism may be more important than understanding the linguistic structures involved in transfer. I will therefore begin with a summary of sociolinguistic information relevant to the study of Taiwanese-Mandarin contact. In this section, I will give an overview of Taiwanese history as it pertains to contact between Taiwanese and Mandarin. I then proceed to discuss the current statuses of Taiwanese and Mandarin in Taiwanese society, drawing from both prior literature and informational interviews conducted over the past two years. The complex question of whether Taiwanese and Mandarin can be considered dialects is also considered. I end

1 The information provided in the rest of this chapter on the history of Taiwan is drawn from a number of sources, namely Kubler (1981), Kubler (1985), Kuo (2005), Tse (2000), Wei (2000), Hung (2010) and Ting (1980).
this section with a reassessment of the popular claim that Taiwanese is undergoing a revival, and pose a series of sociolinguistic questions that I hope to address in this thesis.

1.2.1. Benshengren vs. Waishengren

There is some terminology that needs to be clearly defined before we can reach an understanding of the sociolinguistic landscape of Taiwan. In broad terms, there are two overarching groups of Han Chinese people living in Taiwan: 外省人 waisheng-ren "people from outside the province (of Taiwan)", who are the families that came to Taiwan in or around 1949 and natively speak Mandarin, and 本省人 bensheng-ren "people from this province (of Taiwan)", who are families that natively speak Taiwanese (i.e., the Southern Min variety of Chinese) and have lived in Taiwan since prior to 1949, with some families potentially stretching back as far as the 17th century. These two groups are in some sense artificially defined constructs, as waisheng-ren are essentially defined in opposition to bensheng-ren and do not necessarily share cultural characteristics among themselves beyond a shared language; however, understanding this divide is crucial in analyzing language contact in Taiwan.

Waisheng-ren families immigrated to Taiwan following the Nationalist defeat in 1949 (of which more will be said later) and came from all over China. Children of waisheng-ren families generally speak Mandarin as their primary language and do not learn Taiwanese as a first language, although some do learn some Taiwanese either in school or among playmates. Although most waisheng-ren families in 1949 spoke Mandarin as their primary language or at least as their lingua franca, they cannot be said
to constitute any kind of monolithic background, instead hailing from a variety of regions speaking a variety of Chinese dialects (and languages) (Kubler, 1981). The identity of “waisheng-ren” is a post-1949 innovation meant to capture the social and linguistic divide between long-time Taiwanese residents and these new immigrants, and consequently the strength of this inter-group contrast blurs some of the intra-group differences that existed among waisheng-ren. For the purposes of this analysis, I will broadly term waisheng-ren families as native Mandarin speakers, with the acknowledgment that this linguistic white-washing obscures some of the important differences among waisheng-ren.

Bensheng-ren families, on the other hand, historically have been native speakers of Taiwanese and not Mandarin. Before 1900, bensheng-ren families were overwhelmingly monolingual Taiwanese speakers, with some Hakka speakers included in this population as well (Ting, 1980). Between the Japanese occupation from the turn of the century to 1945, many bensheng-ren families also learned Japanese in colonial schools, though they retained Taiwanese as their primary language. After 1949, bensheng-ren families learned Mandarin in schools for use in society, after which point bensheng-ren families generally became bilingual in both Taiwanese and Mandarin (though there are still some bensheng-ren families, especially the elderly, that do not speak Mandarin). Previous research on contact between Taiwanese and Mandarin (Kubler, 1981) has operated under the assumption that bensheng-ren speakers are L1 Taiwanese speakers and L2 Mandarin speakers. It has now been 30 years since Kubler (1981), and I seek to show that this situation has changed in this analysis.
1.3 Taiwan Pre-1987

The history of language in Taiwan is intimately tied to the geopolitical events of the 20th century, and it is impossible to adequately understand the sociolinguistics of Taiwan without first understanding its complex political history. In this section, I will detail the history of Taiwan as it pertains to Taiwanese sociolinguistics and contact between Mandarin and Taiwanese.

The linguistic history of Taiwan relevant to this analysis begins in the Qing dynasty. Ethnic Chinese immigrated from modern day China's Fujian province in the 17th and 18th centuries and brought with them their native language, namely Southern Min. Southern Min is an early branch off of the Chinese language family that is highly divergent from the other Chinese languages and unintelligible to speakers of Mandarin. It is also noteable for some rarer phonological features, including voiced obstruents (descending from hardening of nasals in onset position), extensive tone sandhi, and a lack of historical t-palatalization present in the history of other Chinese languages. The two primary Min dialects spoken by these immigrants were that of Quanzhou and Zhangzhou, though a mix of the two dialects became widespread as a lingua franca and has come to be considered the prestigious variety (Hong, 2010).

The Sino-Japanese War fought between Qing China and Imperial Japan in the 1890s saw the end of Chinese control and the beginning of a new century of political, social and linguistic changes. Having emerged from a long period of self-imposed isolation decades before during the Meiji Restoration, the Japanese had quickly adopted modern warfare technologies from Western imperial powers in the late 19th century and
dealt Qing China a decisive defeat. The Sino-Japanese War marked Japan's rise as a military power in East Asia and set the stage for its ruthless imperialism that would come to dominate Taiwan. As part of China's terms of defeat, Taiwan was ceded to Japan in perpetuity, and the Japanese established Taiwan as a colony of the Japanese empire.

The Japanese used Taiwan as a base of operations for their military expansion, but at the same time also considered Taiwan a model example of their colonies. They built modern infrastructure in an undeveloped Taiwan, including roads, schools and the largest university in East Asia (now Taiwan National University). The Japanese provided opportunities for Taiwanese people to become educated citizens of the Japanese empire, but were always considered second-class citizens and given an ideologically Japanese curriculum meant to inculcate association with and loyalty to Japan. Although we can say with virtual certainty that the intent of the colonizers was not altruism but the inculcation of pro-Japanese ideologies, the Japanese brought modern comforts and higher living standards to the Taiwanese, and their campaign to win over the hearts and minds of the Taiwanese people was partly successful, especially in hindsight long after the end of Japanese rule, long after the brutality of the occupation has become a distant memory (Kubler, 1981: 21). Importantly, however, the Japanese did not initially make a concerted effort to eliminate the Taiwanese language spoken in homes, which allowed Taiwanese to continue to be spoken, though efforts to stamp out Chinese languages were ramped up in the years up to and during WWII (Kubler, 1981: 21). Also, the Japanese did not draw sharp distinctions between the different kinds of Chinese languages spoken in Taiwan, unlike the Nationalist government did as will later be discussed. The Taiwanese
language, and some other local languages including Hakka, survived the Japanese occupation.

The Japanese occupation ended in 1945 with Japan's surrender at the end of World War II, and Taiwan was returned to Chinese control. Following the collapse of the Japanese government that had run Taiwan for the past five decades, the island fell into political chaos, with mismanagement and corruption crippling what had been a developed infrastructure. The return of Taiwan to Chinese control came in the midst of a bloody civil war between the Nationalists (國民黨 Guomindang or “Kuomintang,” hereafter referred to as “Nationalists” or “KMT”), who now controlled Taiwan, and the Communists, a war that was temporarily postponed during the Japanese invasion but which resumed soon after Japan's surrender. For the next 4 years of the war, Taiwan fell by the wayside of Chinese politics until 1949, which marked the de facto end of the Chinese Civil War after the Nationalists suffered decisive defeats on the Chinese mainland. The Nationalists, who had all but lost the war, retreated to their last bastion of power in Taiwan and established Taipei as the seat of the exiled Republic of China, a political entity claiming jurisdiction over all of China. The 1949 retreat to Taiwan by the Nationalists and the immigration thereto marks the greatest sociolinguistic event in Taiwan's history, and is crucial in understanding the sociolinguistics and language attitudes of Taiwan.

For two decades following 1949, the KMT government on Taiwan was recognized as the only legitimate Chinese government by NATO powers. Just as South Korea found its communist foil in the North, Taiwan became a focal point of the global
Cold War, with anti-communist NATO powers such as the United States aligning with Taiwan and the Soviet Bloc with mainland China. However, also much like South Korea, the KMT's anti-communist stance in no way guaranteed the rights of its citizens; although Taiwan enjoyed the support of Western democracies like the United States, the KMT's unresolved war against The People’s Republic of China was what guaranteed this, not its adherence to democracy or human rights. In much the same way as the threat of communism engendered the Red Scare in the United States, the KMT was gripped by the fear of communist sympathy sprouting within its borders, and McCarthy-esque draconian measures were implemented by the KMT to keep the populace loyal and in line. This led to what is known as the "White Terror", a four decade-long period of brutal suppression that had its roots in the massacre of the “2-28 Incident” on February 28, 1947, began with the implementation of martial law in 1949, and did not truly end until the lifting of martial law in 1987. During this period, dissent was violently quashed by the KMT. Taiwan championed the banner of democracy while being a *de facto* dictatorship every bit as oppressive as what they claimed to stand against, and the KMT’s Mandarin-only linguistic policy was a reflection of this.

The KMT viewed itself as the only legitimate government of all China, with Taiwan as a kind of representative jurisdiction; to them, Taiwan was the only remaining part of the true "China" that had been usurped. The retreat to Taiwan had brought not only people from all over China but priceless cultural treasures as well, and the KMT sought to make Taiwan into a Pan-Chinese area to serve as a proxy for all of China. It is unsurprising then in this light that KMT officials viewed any symbols of pre-1949 local
identity and culture to be ideologically dangerous and undesirable. In particular, the continued use of the Southern Min Taiwanese language was seen as threatening to the KMT establishment, who viewed Taiwanese as a vehicle for a uniquely Taiwanese (and not pan-Chinese) identity. This period saw an enormous influx of mainland Chinese into Taiwan: soldiers, bureaucrats, and businessmen, people who came from all over China. Although many of these people would ordinarily have had little in common, the fact that they were all strangers in Taiwan created a dichotomy between waisheng-ren and bensheng-ren, between the Mandarin they used as a lingua franca and the Taiwanese unfamiliar to them. The language of the KMT was Mandarin; Mandarin not only provided linguistic continuity with the lost mainland, but also represented and reinforced a pan-Chinese linguistic identity that the KMT sought to spread through Taiwan. Taiwanese, on the other hand, had no political or linguistic currency outside of Taiwan proper and was seen at best as useless, and at worst as subversive.

The Nationalist government campaigned to inculcate the idea that Taiwanese was a sub-standard Chinese language and suppressed the Taiwanese language, with punishments becoming routine for speaking any Taiwanese in schools. One Taiwanese informant reported that as a child he was forced to pay money each time he accidentally spoke Taiwanese in his school, and that this was one of the more lenient punishments. This campaign to promulgate Mandarin throughout Taiwan turned out to be extremely successful, and the virtually everyone of the bensheng-ren (native Taiwanese) generation who attended school between 1950 and 1980 became fluent in Mandarin.
1.3.1 Review of Literature Pre-1987

In addition to discussing “Mandarin” and “Taiwanese” as monoliths, it is important to note that contact between Taiwanese and Mandarin has been occurring since at least 1949, when the Nationalists took over Taiwan and imposed Mandarin. As Kubler (1981) explains in his dissertation, the variety of Mandarin spoken in Taiwan has developed under influence from Taiwanese. In this sense, the contact situation that this thesis focuses on is by no means a recent phenomenon.

Previous research into contact between Mandarin and Taiwanese has almost exclusively focused on the influence that L1 Taiwanese speakers have had on their L2 Mandarin following the Nationalist takeover of Taiwan in 1949. Kubler has written extensively on the development of Taiwanese Mandarin, the type of Mandarin spoken in Taiwan that has developed under influence from Taiwanese (Kubler, 1985). Kubler’s research contributes the most important literature informing this analysis, since his study is essentially a wide-scale, reverse version of this thesis. Kubler (1981) shows that Taiwanese influence is directly responsible for the development of Mandarin in Taiwan, giving accounts of how phonological mismatches between Taiwanese and Mandarin cause Mandarin phones to become replaced by Taiwanese phones. Kubler also explains the social reasons behind contact-induced change in Mandarin, namely, the KMT’s language policies, the results of which provide the backdrop for this analysis as well. Cheng (1985) also explores Taiwanese contact with Mandarin and its subsequent influence on Taiwanese Mandarin. Crucially, Cheng (1985) claims that the contact-induced changes to Mandarin directly correlate with the sociolinguistic situation of
Taiwan, in other words, that social pressures are the direct cause of structural change to Taiwanese Mandarin. However, both Cheng (1985) and Kubler (1981) studied a pre-1987 Taiwan that was still run by the Nationalist government. Now, Taiwan is a very different place, and it is important to review the post-1987 sociolinguistic situation in Taiwan, as well as pertinent post-1987 research.

1.4 Taiwan Post-1987

The sociolinguistic landscape of Taiwan has shifted drastically since 1987, and the social roles of Taiwanese and Mandarin have correspondingly seen change. In 21st century Taiwan, Taiwanese appears to occupy a role as ancestral language; its use is generally limited to within the family and not regularly used in society or among peers, especially in larger cities and in the northern areas of Taiwan. Mandarin, on the other hand, continues to be the language of education, commerce and politics well after the end of martial law, and is beginning to make inroads as a language of the home even among bensheng-ren families (Ratte, 2009). However, Taiwanese is also gaining in popularity, as attested by a number of informants and study participants. Winford (2005: 383) stresses that “we must not confuse language dominance with language maintenance”, and I will argue in the following section that despite a re-invigoration of interest in Taiwanese, Mandarin is clearly the primary language of bilinguals and the dominant language of society, with Taiwanese occupying a less dominant role as ancestral language both linguistically and in society.
1.4.1 Taiwanese Post-1987

Following its de-criminalization after the end of martial law in 1987, the Taiwanese language has been experiencing a social upheaval since the 1990s. There is a broad social consensus in Taiwan that the Taiwanese language is experiencing a revival, and that it has now become a language of some desirability. Part of this is the “Mother-tongue movement” or muyu yundong 母語運動, a political and social movement that has lobbied for greater visibility of the Taiwanese language, for example in schools.² Taiwanese is growing in popularity both among bensheng-ren, who see it as a symbol of their unique, ancestral Taiwanese identity now liberated after years of oppression, and among waisheng-ren, many of whom enjoy the exoticism of Taiwanese and see learning it as a means of gaining social currency in a newly liberal Taiwan.

Many bensheng-ren supporting the use of Taiwanese seek to rediscover their Taiwanese roots and remake their society with a uniquely Taiwanese identity. To some bensheng-ren people, the free use of Taiwanese and its rise in popularity represents a repudiation of the Pan-Chinese identity imposed on Taiwan during KMT rule (Wei, 2000, 2007). A focus on the Taiwanese language has also become synonymous with the political movement that seeks to gain official independence from China (Tse, 2000). Although these opinions and positions are not uniformly popular among all groups of Taiwanese citizens, younger generations of waisheng-ren are more likely than older generations to identify as “Taiwanese” and not “Chinese” (Tse, 2000). The popularity of

a unique Taiwanese identity among younger generations imbues this new popularity of Taiwanese with a sense of vibrancy and excitement.

One younger waisheng-ren informant for this study expressed her excitement with the rise in popularity of Taiwanese, but said that some employers promote Taiwanese-speaking applicants, and she felt at a slight disadvantage because she was waisheng-ren and did not speak any Taiwanese natively. This same informant also mentioned that although she had never been exposed to Taiwanese as a child and was not usually surrounded by Taiwanese speakers, she had made a conscious effort to learn Taiwanese words and had some basic communicative competence in it. In this respect, Taiwanese has been gaining some social traction, and there now appears to be at least some motivation for people to learn and speak Taiwanese. However, as I will discuss at the end of this chapter, popular attestation to a rise in the social traction of Taiwanese should not necessarily be construed as evidence for a real motivation for linguistic maintenance among bilingual Taiwanese speakers, and this rise in the popularity of speaking some Taiwanese is not necessarily reflective of the prestige or currency associated with the language itself.

1.4.2 Mandarin Post-1987

Unlike Taiwanese, the role of Mandarin in the 21st century has had little change. Following 1949, waisheng-ren native speakers of (Mainland) Mandarin had a distinct

---

3 Informant was waisheng-ren, 30 years of age and had lived in Taibei all her life. “說很道地的台語，可能比較容易找到工作” "It may be easier to find work if you speak authentic Taiwanese".
socioeconomic advantage over bensheng-ren families who natively spoke Taiwanese, since jobs or positions of socio-economic value were given to those who had a command of Standard (Mainland) Mandarin. Those who did not speak Mandarin or who spoke it imperfectly were socio-economically disadvantaged, a fact that gave waisheng-ren unique access to the highest echelons of white-collar Taiwanese society and relegated many bensheng-ren to blue-collar status. A fluent command of Mandarin was above all else a linguistic sine qua non for positions of power and status in KMT Taiwan.

This situation has remained relatively unchanged post-1987. Mandarin remains relatively unchallenged in the areas of education, commerce and politics. Informants, when asked about whether Mandarin was still necessary in Taiwan, were uniformly in agreement that Mandarin remains socially dominant. Now, virtually all educated Taiwanese citizens are able to speak Mandarin, and Mandarin is the primary language used among peers and friends, according to both waisheng-ren and bensheng-ren informants. Two bensheng-ren parents who were native Taiwanese speakers interviewed in 2009 admitted with heavy heart that they spoke Mandarin with their children, despite wanting them to speak Taiwanese. Thus, it is easy to see that Mandarin continues to make inroads in Taiwanese society, even sometimes replacing Taiwanese as the language of the home among bensheng-ren families.

1.4.3 Review of Literature Post-1987

Comparatively little has been written specifically on the contact between Taiwanese and Mandarin post-1987, but some literature attests to continued contact.
phenomena. In a phonetic study of contact-induced change in Mandarin, Peng (1993) mostly found that Mandarin fricatives are articulated in ways coinciding with Taiwanese phonemes, corroborating Kubler (1981); however, Peng (1993) also found that highly proficient bilinguals in Taiwanese and Mandarin actually showed some influence from Mandarin in their Taiwanese, with some speakers using the Mandarin [x] for Taiwanese /h/. However, Taiwanese influence on Mandarin is the primary focus of Peng’s study, and she does not go into greater detail about Mandarin influence on Taiwanese. Less has been said of Taiwanese voiced obstruents; Pan (1994) found that the Taiwanese voiced obstruent series is generally voiced like a true voiced stop, but also found in 2004 that some prenasalization was found depending on the speaker. In his massive study of Taiwanese varieties across Taiwan, Brewer (2008) does not reveal Mandarin-influenced change to the voiced obstruents that are the focus of this study. All in all, the literature reveals little about Mandarin influence on Taiwanese.

But let us return to the question that a description of modern Taiwan begs. How are we to understand a society that proclaims its Taiwanese political and cultural uniqueness, but that continues to lose ground to Mandarin? The answer lies in understanding two things: the power of social dominance in determining language maintenance, and the complex identities that Taiwanese people subscribe to in a post-1987 Taiwan.

Language maintenance is not simply a matter of choice. Appel and Muysken (1987: 33 - 36) quote Giles et al. (1977: 308) in discussing factors influencing language maintenance, including social status, education, economic status and population
demographics. These factors have clear implications for Taiwan, since Mandarin is more dominant in most if not all of these maintenance factors. Mandarin is the language of education; it is the *sine qua non* of the economy; in addition, the more prosperous northern areas of Taiwan are more heavily Mandarin-dominant. In this framework for understanding language maintenance in bilinguals, we have reason to assert that motivations for maintaining Taiwanese are weak or non-existent. This in turn means that Taiwanese will likely continue to lose ground to Mandarin, in spite of a rise in its popularity.

More literature exists on the linguistic identities of Taiwanese people post-1987, especially in relation to politics. As Appel and Muysken (1987: 11) note, language is inextricably tied to identity, and the maintenance of a language is necessarily tied to the maintenance of the identity associated with that language. Languages with which speakers strongly identify can persevere; on the other hand, languages to which speakers identify weakly, or languages whose associated identity becomes neutralized can easily undergo change or even disappear (Appel and Muysken, 1987: 11, 130). Therefore, the study of modern Taiwanese sociolinguistics and identity can shed light on the question of whether bilinguals are maintaining Taiwanese.

Wei (2007, 2008) shows that the explicit use of Taiwanese in society can be directly related to political attitudes and notions of a Taiwanese identity. In Wei’s (2008) study, Taiwanese can be seen as a vehicle for an identity that has historically defined itself in opposition to the KMT. Liao (2000) argues that the use or non-use of Taiwanese can be tied to an identification with political parties, where the practice of “Taiwanese
Chauvinism” is associated with left-wing independence politics. In a post-1987 Taiwan emboldened by the end of dictatorial rule, independence politics are more popular, and these studies attest to the recent strengthening of the Taiwanese identity.

On the other hand, some studies show that the older dichotomy between Taiwanese and Mandarin may be outdated, and that Taiwan is in the process of forming new types of identities. Tse (2000) argues that in recent years an identity of “New Taiwanese People” has emerged throughout Taiwan, a complex identity that combines aspects of both a pure Taiwanese identity and a Mandarin Chinese identity. With the disappearance of the old KMT, Taiwanese people are now re-negotiating their identity as a combination of both ancestral elements, as represented by Taiwanese, and modern elements, as represented by Mandarin. This group identity represents a kind of compromise between the two, and is intimately tied up with the politics of a post-KMT Taiwan. S. Liao (2008), in a study of indexicality of dialect features of Taizhong and Taipei, argues that phonological features of Mandarin in Taiwan are now being indexed as markers of dialect, location, political party and cultural identity. The linguistic dichotomy between Taiwanese versus Mandarin has given way to a more complex identity that combines both Mandarin and Taiwanese. This lends further support to Tse’s idea that language and identity are intimately tied together in Taiwanese politics, and moreover that Taiwanese people are in the process of reshaping their linguistic identities.

Through these recent studies, we can see that the Taiwanese identity has indeed been strengthened in the wake of political reform. However, we can also see that this identity may be becoming irrelevant in a post-1987 Taiwan where the strict dichotomy
between Taiwanese and Mandarin is no longer as salient. Taiwan is in the process of renegotiating its linguistic identity from a dualistic position to one that combines aspects of both Taiwanese and Mandarin. In this way, a case can be made that despite a higher social profile, the Taiwanese identity as it relates to the Taiwanese language is becoming less and less relevant. This also suggests that the Taiwanese language may be becoming irrelevant for bilinguals in a society that is less and less sectarian and where people are trending towards a singular identification with Taiwan as a pluralistic society.

1.4.4 Is Taiwanese really gaining prestige?

After discussing the history of language in Taiwan and the current social statuses of Taiwanese and Mandarin, we can begin to understand that the enthusiasm that informants purportedly express over the popularity of Taiwanese may not reflect any linguistic reality. It is undeniable that in the minds of many people in Taiwan, the Taiwanese language is experiencing a resurgence and is gaining in popularity. However, we must avoid the temptation to conclude that the Taiwanese language itself has gained prestige or surpassed Mandarin in its desirability. The social status of Taiwanese people who do not speak Mandarin illustrates this. The current situation in Taiwan cannot merely be described as a rise in the social prestige or dominance of the Taiwanese language, since, despite popular claims to the contrary, there are speakers of Taiwanese who do not gain the same kind of social currency from this supposed rise in the popularity of Taiwanese.
There are native Taiwanese speakers who, for any number of reasons, have only limited proficiency or no proficiency at all in Mandarin. Although there are fewer and fewer truly monolingual speakers of Taiwanese (with no knowledge of Mandarin) left in Taiwan, some still live in Taiwan’s southern region. Most of these people either lack an education, are elderly, or live in parts of Taiwan where the routines of quotidian living need not entail the regular use of Mandarin. These groups do not enjoy the extra social benefits accorded to the resurgence of Taiwanese. For these people, the lifting of the ban on Taiwanese has meant the restoration of linguistic freedom, but it does not correlate with the same rise in social capital that people seem to associate with using Taiwanese. Taiwanese informants constantly attested to the social currency of speaking Taiwanese, but did not agree that a monolingual Taiwanese speaker with little or no knowledge of Mandarin would have any kind of social standing in Taiwanese society. A young, urbane Taiwanese informant claimed that getting a job is much easier if you speak Taiwanese, and yet the southern areas of Taiwan are not brimming with high-powered job opportunities compared to the north. It may be true that white-collar professionals see Taiwanese as an asset in Taibei where Mandarin is king, but the more rural areas in which Taiwanese is actually spoken most remain heavily blue-collar and, to an extent, even backwards. For these rural Taiwanese people who speak Taiwanese as their first and primary language, their language is a barrier to their social mobility. Speaking Taiwanese alone is not, nor ever has been a sufficient credential for obtaining a job or high social status. In this respect, it seems little has changed since the early 1990s. This observation is very important: Taiwanese monolingualism alone does not bring with it the
social capital that people claim embody the rise in prestige of Taiwanese. Rather, it appears that Taiwanese carries social capital only when it is spoken bilingually. Furthermore, we can add that this bilingualism must necessarily consist of Mandarin and Taiwanese, since a bilingual Taiwanese-Hakka speaker would have no more social standing than a monolingual Taiwanese speaker would.

Is it really the Taiwanese language gaining social traction, or is it the allure of bilingualism? In light of this discussion, the claim that Taiwanese is gaining in prestige is entirely suspect, since the standing of Taiwanese alone seems to have changed only marginally, excepting of course the lifting of the ban. Rather, it is bilingualism that is becoming popular and socially advantageous, a bilingualism for which the dominant or co-dominant language must be Mandarin. Finally, one is forced to question whether it is Taiwanese itself that is gaining prestige, or whether Taiwanese happens to fill a role in bilingualism as second fiddle to Mandarin. It seems altogether reasonable to challenge the very notion that Taiwanese is gaining any capital at all.

1.5 Conclusion

The complex sociolinguistic history of Taiwan must be considered to understand language contact. Taiwanese is only recently emerging from 40 years of brutal suppression, and Mandarin continues to be the language of education, politics, and the economy. Recently, there has been some rise in the popularity of speaking Taiwanese, but Mandarin clearly remains the more socioeconomically beneficial language. Despite claims to the contrary, there still seems to be little real motivation for speakers to
maintain their Taiwanese, as attested by the fact that bensheng-ren families are beginning to abandon Taiwanese for Mandarin. In short, the social benefits of learning and/or maintaining Taiwanese seem little more than a “cool factor”. The rise in popularity of Taiwanese can be seen as an assertion of a Taiwanese identity, but Taiwan is also in the process of moving away from the Mandarin versus Taiwanese dichotomy and towards a combined identity that includes both.

In addition, the popularity of Taiwanese is limited to its use as an added bonus alongside Mandarin. L1 Taiwanese speakers with no command of Mandarin do not derive social benefit from the rise in its popularity, which shows that it is not Taiwanese per se but bilingualism that imparts social capital, a bilingualism that must also include Mandarin. Clearly, Mandarin is the primary language of bilinguals, even if bilinguals do not learn it as their chronologically first language. This provides a sociolinguistic reason for thinking that Taiwanese continues to decline and Mandarin continues to be dominant in Taiwan.
Chapter 2: Theoretical Background

In this chapter, I will introduce concepts relevant to the study of language contact, and give an overview of research pertinent to this analysis. In particular, the essentials of Van Coetsem’s framework will be introduced, along with an explanation of why this framework is best suited to understanding language contact. I also introduce the basics of analogy. I end with a discussion of linguistic affinity, a concept that plays an important part in understanding the unique situation of Taiwanese and Mandarin. In this analysis, I use the word “transfer” as a neutral term that simply describes when any material from one language is brought into another.

2.1 Basics of Language Contact

From its inception, the study of language contact has been plagued by an abundance of vague and misleading terminology. From “borrowing” to “interference” and “importation” to “transfer”, there is a host of words used to describe and explain contact-induced language change. Winford (2003) points out that a short perusal of linguistic literature shows that the word “borrowing” has been used to describe almost every kind of contact-induced change under the sun. Thomason and Kaufman (1988) use the term to refer only to the importation of foreign elements into one’s native language (Winford, 2003: 12). Van Coetsem introduces the concept of “imposition” as separate
from borrowing. Thomason and Kaufmann (1988) define “interference” in a way that covers the entire spectrum of language change, despite the fact that the term is often used in Second Language Acquisition studies to refer specifically to the use of native language features in learning a foreign tongue (Winford, 2003). With the additionally confusing use of mixed terms like “borrowing interference”, Winford (2003, 2005) is right to point out that a clear delineation of terminology is important in understanding the processes of language contact. Moreover, conflicting terminologies also indicate that there are fundamental disagreements about the nature of contact-induced change. In order to clarify these vague terminologies and to understand the process of language contact, we must ask ourselves what it really means to say that “transfer” has occurred in a bilingual context. When we take the time to return to an examination of the process of language contact itself, it becomes easy to see that monolithic terms like “interference” and “borrowing” are inadequate. I adopt the position held by Winford (2005) and Van Coetsem (1988) that both the directionality of transfer and the linguistic backgrounds of the speakers are crucial in understanding the outcomes of language contact. The following discussion of basic principles of language contact will illustrate the logic of this position.

The field of contact linguistics, as the name implies, is the study of what happens when languages come into contact. But what does it mean to say that languages are “in contact”? It is insufficient to say that linguistic contact occurs when two communities come into social contact, since it is conceivable that two adjacent speech communities could interact in such a way that they never hear or learn the other’s language. Instead,
linguistic contact necessarily implies that a set of speakers exists who are familiar, to varying extents, with both languages; in other words, the locus of language contact lies in the bilingual mind. The term “bilingual” in this sense refers broadly to any speaker who possesses at least some knowledge of a different language, and does not refer merely to highly skilled bilinguals (Weinreich, 1953). Under this definition, a second language learner can be considered a bilingual.

2.1.1 Lexical vs. Structural Transfer

It is an observable fact that when two languages come into contact in the mind of the bilingual, transfer of material from one system to the other can occur. This most often takes the form of lexical transfer, such as Japanese *apaato* from English ‘apartment’. However, it can also occasionally mean the transfer of structure such as morphology, phonology and/or syntax (Winford, 2003: 29). An example of this is when Cantonese speakers use dental sibilants in the place of retroflexes when speaking Mandarin. We can refer to both as “transfer”, but when we examine the motivations and requirements for transfer, it becomes clear that the borrowing of words like *apaato* must be a qualitatively different process from .

It is cross-linguistically clear that lexical borrowing can occur in the absence of any structural transfer. There seem to be very few limitations on lexical borrowing; in fact, lexical borrowing can occur very easily and sometimes with only minimal levels of contact. Words like *okay*, *computer* and *television* (or *TV*) have achieved trans-national status, having been borrowed from English into hundreds or even thousands of languages.
Lexical borrowing often occurs in the transfer of culture and cultural items across communities, wherein new words must be coined for new concepts and objects. Japanese has borrowed many words from English to represent modern concepts and things such as *apaato* < ‘apartment’ or *toire* < ‘toilet’. Yet, there has not been structural impact on Japanese from any contact with English.

However, the motivations for and processes of structural transfer seem quite different. What does it mean to say that structure from one language has been “borrowed” into another? Structure is not a “thing” in the way that a lexical item is perceived to be; structure represents the organization of a language, and its use is subconscious. Linguists excluded, people do not “think” about what structures they use or even perceive them as cognitively real, and it may be more productive to think about them as patterns in language rather than a disembodied rule existing in the mind (this position can be debated). This is in contrast with lexical items, which can ultimately represent discrete semantic and phonetic values and whose use is most definitely conscious. It therefore makes little sense to argue that unconscious, structural features could be transferred without a full knowledge of the language itself in the same way that discrete words can be borrowed with only limited access to the language. In fact, it is difficult to imagine exactly how structure could ever be passed from one system to another without “piggy-backing” on the wholesale use of the source language itself. In any case, it is clear that transferring structure from one language to another is, in general, qualitatively different from transferring lexical items.
In the case of lexical borrowing, transfer can occur in cases of practical necessity, such as in cases where previously unseen cultural artifacts are exchanged across communities. But all languages, as complete systems, can already express any thought or concept; no language could ever “need” a foreign language’s structure in the way that it might need a new word for ‘television’. What motivation exists for transferring structural properties, if speakers already possess the tools they need to speak? Winford also raises this issue in a critique of Thomason and Kaufman’s broad view of borrowing (Winford, 2003: 30). What could possibly motivate an American learner of Japanese to apply Japanese patterns (which she is less familiar with) to her native English? And since speakers do not possess explicit knowledge of their language’s structure, does it even make sense to speak of explicit motivations? These questions suggest that lexical transfer and structural transfer are completely different.

Finally, structural transfer is governed by the bilingual’s linguistic dominance. In bilinguals for whom one language is clearly more dominant than the other (limited proficiency in the second language), structural transfer mostly occurs in the direction from more dominant language to less dominant language. It is absurd to think that a speaker of English learning Japanese as a second language would ever begin to use Japanese phonology and phonotactics in her English. In fact, we expect and see just the opposite—the American student of Japanese uses her English phonology in speaking Japanese (the structure of which she is less familiar with), which is precisely the phenomenon that gives rise to the “foreigner’s accent” in second language learning. Structural transfer only makes sense when we examine it in terms of its direction.
Structural transfer also requires that the speaker be proficient in the source language’s system, for otherwise they would have no access to its structure.

Given the illogicality of the former example (transfer from less dominant into more dominant), models of language contact that allow structural transfer to occur without a full knowledge of that language should be suspect. Yet this is exactly what models such as Thomason and Kaufman’s (1988) allow when they fail to make distinctions in the type and directionality of transfer. All of the reasons above suggest that a model of language contact should take into account linguistic dominance, the directionality of transfer, and the difference between structural transfer and lexical borrowing. The discussion above has necessitated the use of concepts such as “source language” and “recipient language”, and it is for these reasons that Van Coetsem’s model of language contact is adopted in this analysis as the most cogent and applicable.

2.2 Van Coetsem’s Framework

The framework put forth by Van Coetsem (1988) is employed in this analysis. This framework crucially makes distinctions between different kinds of linguistic agentivity, that is, which language speakers use to inform the transfer. In particular, the opposition between borrowing and imposition in Van Coetsem’s framework is crucial to understanding how and why Taiwanese lexical items are undergoing phonological change. This analysis adopts the view that the locus of language contact is in the bilingual brain, with the word “bilingual” taken broadly to mean any speaker with knowledge of two language systems as per Weinreich (1953). Van Coetsem (1988)
proposes a framework that crucially hinges on distinguishing between different kinds of linguistic agentivity and on determining linguistic dominance.

2.2.1 Linguistic vs. Social Dominance

*Linguistic dominance* in the context of language contact refers to that language which the speaker is most adept at speaking. *Linguistic dominance* is not the same as a *social dominance*, where a language carries increased prestige and social power (Van Coetsem, 1988: 13). Linguistic dominance is generally correlated with a speaker’s first language learned (L1), although this is not necessarily always the case, especially for highly skilled bilinguals spending long periods of time abroad who may eventually develop linguistic dominance in their second language (Winford, 2005: 377). As a general rule, a speaker’s linguistically dominant language will be the system that effects structural change. This makes sense--speakers do not have easy access to a system in which they are less proficient; the aforementioned American student of Japanese cannot effect structural change on her English by appealing to Japanese, because she does not have the requisite familiarity with Japanese structure. Structural imposition only makes logical sense when the source language is the speaker’s dominant language.

2.2.2 Source language vs. Recipient language

Van Coetsem’s framework makes distinctions between which language has *agentivity*, or in other words which language governs the procedural aspects of the transferred element. The source language in Van Coetsem’s framework is the language
that supplies the transferred element, and the recipient language is the language that
receives the transferred element. In other words, material goes from:

\[
\begin{array}{c}
\text{Source language} \\
\rightarrow \\
\text{Recipient language}
\end{array}
\]

For example, if English speakers transfer a French word into their English speech,
then French is the source language and English is the recipient language.

\[
\begin{array}{c}
\text{Source language} \\
\rightarrow \\
\text{Recipient language}
\end{array}
\begin{array}{c}
\text{French} \\
\rightarrow \\
\text{English}
\end{array}
\]

Van Coetsem (1988) crucially defines two kinds of transfer: transfer that is
mediated by the recipient language, and transfer that is mediated by the source language.

When the recipient language has agentivity, that is, the recipient language is
responsible for the procedural aspects of the transferred element, Van Coetsem calls this
type of transfer \textit{recipient language agentivity}. In the context of phonological loans, he
also calls this type of agentivity \textit{borrowing} in the strict sense of the word (borrowing
“proper”); \textit{borrowing} occurs when the recipient language receives transferred material
from the source language but appeals to the recipient language’s structure. An example
of this would be an English speaker borrowing a French word “déjà vu” [deʒa vy] but
pronouncing it with English phonology as [deɪdʒa vʊ]. In this type of transfer, the
speaker is generally linguistically dominant in the recipient language:

\[
\begin{array}{c}
\text{Source Language} \\
\rightarrow \\
\text{Recipient Language (ling. dom)}
\end{array}
\begin{array}{c}
\text{French} \\
\rightarrow \\
\text{English}
\end{array}
\]
Recipient language agentivity is generally initiated by speakers who have greater linguistic dominance in the recipient language than the source language (Van Coetsem, 1988: 10).

When speakers use the production processes of the source language, Van Coetsem defines this as source language agentivity. This type of agentivity is also called imposition in transfer; imposition occurs when the recipient language receives a foreign element with structural components that come directly from the source language’s structure, not the recipient language’s structure. An example of this would be a French-English bilingual speaker who is dominant in French inserting a French word into her English speech, but pronouncing it as if it were still French. It is also source language agentivity, by definition, if speakers directly transfer structural elements from a more dominant language to a less dominant language.

<table>
<thead>
<tr>
<th>Source language (ling. dom)</th>
<th>Recipient language</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>English</td>
</tr>
</tbody>
</table>

Source language agentivity is generally initiated by bilinguals with greater linguistic dominance in the source language (language providing loan) than the recipient language (Van Coetsem, 1988: 11. Generally speaking, imposition is also a term that we can utilize to describe a situation where any structure that is not native to the language of the lexical items is being forced or imposed onto speech. Imposition can be seen as “employing language production procedures of the dominant language in producing the less dominant language” (Winford, personal communication).
2.2.3 Rationale for Employing Van Coetsem’s Framework

Van Coetsem’s model is chosen in this analysis, though many of the concepts used herein are pertinent to other models of language contact as well. In particular, Van Coetsem’s model clearly ties the different kinds of transfer to linguistic agentivity, and doing allows us to see the principled reasons behind their constraints. This thesis focuses on structural transfer from Mandarin onto Taiwanese, namely in the realm of phonology. The type of transfer studied in this thesis might be seen as “structural borrowing”, yet Van Coetsem’s model makes it clear that Mandarin phonology is not being borrowed into Taiwanese, it is imposed. Other models of language contact that do not appeal to linguistic agentivity or directionality allow for illogical structural transfer (such as phonological transfer) to occur, namely transfer from less dominant language to more dominant language. This cannot occur under Van Coetsem’s model, since the imposition of Japanese structure onto her English only logically occurs in a Japanese-dominant bilingual, not an English-dominant one. Van Coetsem’s ideas succinctly capture what is at once obvious: that the type and extent of transfer depends on the proficiency of the bilingual and on the locus of agency. These ideas demystify the processes of borrowing and imposition in language contact.

There is another reason why Van Coetsem’s model is particularly pertinent to this analysis. Seeing this structural transfer as *imposition* through Mandarin agentivity allows us to potentially draw conclusions about the linguistically dominant language of bilinguals. Also adopting a framework based on Van Coetsem (1988), Winford (2005: 383) crucially notes that “Many languages are maintained over long periods of time, even
when large numbers of their speakers have adopted another language as their primary language”, and I have argued in Chapter 1 that Taiwanese is just such a language. In such instances, “speakers may be agents of significant structural changes in the maintained language” under “SL agentivity⁴, by which speakers of the dominant language impose its features on their version of the maintained ancestral language” (Winford, 2005: 383). Van Coetsem (1988: 11) stipulates that imposition requires dominance in the source language. This is because the motivation for massive imposition is likely to be due to a lack of access to Taiwanese structure--after all, if such bilinguals had complete access to Taiwanese structure, what motivation exists for them not to use it? The only reasonable answer is that a relative lack of Taiwanese proficiency, and dominance in Mandarin, are the motivations for imposing Mandarin structure onto Taiwanese. Such conclusions about the linguistically dominant language of bilinguals will be revisited in Chapter 5 and discussed in Chapter 6.

2.3 Affinity

There is one more reason why Van Coetsem’s framework applies well to language contact in Taiwan. The integration of elements from a source language can be hindered or eased by how similar a bilingual speaker judges two systems to be. Van Coetsem (1988: 11) notes that when speakers identify two languages as similar, phonological loans are more likely to be integrated into a language. Appel and Muysken (2006: 12) attest to the power of psychological and social associations in understanding

⁴Note: SL (Source language) agentivity implies linguistic dominance in the source language.
bilingual transfer. This process is both conscious and unconscious. Unconsciously and on the level of structure, it is easier for speakers to transfer elements from one language to another when the two share comparable structures (Hout and Muysken, 1995). For example, French and Spanish have similar morphosyntax, and it comes as no surprise that it is easier for bilingual French-Spanish speakers to transfer elements from one language to the other.

On a conscious level, speakers are more likely to transfer linguistic elements when two languages are psychologically identified as similar. In other words, when speakers think that the recipient language is similar to the source language, they are more likely to incorporate foreign elements into their speech. This makes perfect sense; it is entirely reasonable to think that bilingual Spanish-Catalan speakers would be more willing to incorporate words and structures of one into the other, while English-Japanese speakers would be less likely to do so. Van Coetsem uses the term *linguistic affinity* to describe the way in which speakers identify two languages as similar. This affinity can range from strong to weak; it is safe to say that the affinity between Japanese and Arabic would likely be very weak for almost any speaker, whereas the affinity between German and English might be moderate, and the affinity between Spanish and Italian would likely be very strong. However, understanding the affinity that two languages share in the minds of bilinguals consists of more than simply identifying typological or genetic similarities. One would be hard-pressed to find two languages that differed as greatly in typology and phonology as Japanese and Mandarin Chinese, and yet bilinguals might identify them with some degree of affinity due to their common cultural history and their
shared writing system. The stronger the affinity between the sl and rl constituents, the more easily the phonological loan can be incorporated into the recipient language. It is axiomatic to say that affinity cannot ever be perfectly strong between two different languages. The affinity can also never be zero or perfectly weak, since any two languages possess at least some common articulatory and acoustic features; Van Coetsem mentions that all languages have vowels and consonants and thus possess at least some basis for affinity, however weak (Van Coetsem, 1988: 111). This is the conscious process that helps shape how phonological loans are incorporated, and whether they become adapted into the recipient language, imitated by the rl, or ultimately rejected. The concept of affinity will be revisited in Chapter 4, when I apply the theoretical background introduced in this chapter to language contact in Taiwan.

2.4 Analogy in Language Contact

In addition to Van Coetsem’s framework of imposition, this analysis also examines Taiwanese from the perspective of analogy. Interestingly, analogy as a strategy for sound change is most often discussed in the context of historical linguistics (Hock and Joseph, 1996: 153; Campbell, 1999: 103). Analogy generally refers to the relationships drawn between one linguistic element and another when speakers make connections between the two. Analogical change in historical linguistics can result when a speaker takes element A, draws a comparison between element A and element B, and then subsequently imposes a change on element A based on information about element B. An example of this is when English speakers who are aware of the verb paradigm ring, rang,
rung impose this paradigm on the word bring to make bring brang brung (from original bring brought brought). Crucially, analogy can occur when speakers compare linguistic elements. Analogy in this study refers to one specific type of analogy: analogy drawn by bilinguals between cognate morphemes of two languages. An example of this would be a French-Italian bilingual who pronounced the Italian word centro (normally [tʃentro]) as [sentro] based on her knowledge of the French cognate word centre, which begins with [s]. In this way, the bilingual makes a connection between cognates centro and centre, and then imposes the pronunciation of the French cognate onto the Italian word. Section 3.2 will discuss exactly how analogy is drawn between cognates in Taiwanese and Mandarin, and what we might expect from analogy in terms of sound change.

2.5 Conclusion

In this section, I have introduced Van Coestem’s framework of language contact, specifically concerning the notion of imposition. This model is superior for its ability to clearly show the relationship between three different variables: a speaker’s dominant language, the language exerting agentivity, and the types of transfer that can subsequently occur. I have also discussed the concept of linguistic affinity, which pertains to the perceived similarity of two language systems in the bilingual mind and can impact the extent of transfer. Finally, I have given a brief overview of the concept of analogy in language change.
Chapter 3: Research Methodology

In this chapter, I introduce and discuss the methodology of my analysis. I begin with a discussion of how the twin concepts of affinity and analogy as discussed in Chapter 2 apply to contact between Taiwanese and Mandarin, and give a detailed account of analogical correspondences between Taiwanese and Mandarin cognates. I then give a review of literature pertinent to the experiment in this thesis, beginning with the findings of the pilot study in 2009, followed by a discussion of other recent literature. I describe the contributions that this thesis offers to the study of Taiwanese and Mandarin, along with three broader research questions motivating this study and some hypotheses on what the data will show. This chapter ends with a detailed description of the experimental and analytical methodology, as well as a critique of some of the challenges faced in collecting data.

3.1 Affinity as applied to Taiwanese and Mandarin

Let us return to Van Coetsem’s (1988) concept of affinity as expounded in section 2.3. The concept of affinity plays a role in understanding both imposition and analogy, since a strong affinity is a springboard for both types of contact-induced change. Although “affinity” as defined by Van Coetsem (1988) refers only to structural affinity, the ways in which speakers socially identify languages is also important in determining
whether linguistic elements will be transferred (Appel & Muysken, 2006). There are many reasons to think that speakers of Taiwanese would strongly identify Taiwanese constituents (lexicon and structure) with Mandarin constituents.

First, sociolinguistic reasons for a strong association between Taiwanese with Mandarin abound, with two particularly worthy of consideration. As previously expounded in Chapter 2, Taiwanese is widely referred to as a 方言 fangyan or ‘dialect’ of Chinese, even by linguists who study it (Wu, 1995; Zhang, 1983). This was corroborated by interviews with participants, who agreed that Taiwanese was a fangyan. This shows that Taiwanese is widely viewed as related to and divergent from Mandarin.

The ideology of a Pan-Chinese gives us another social reason to think that bilingual speakers draw close associations between the two languages. Many waisheng-ren citizens supporting eventual reunification sponsor the view that both the Taiwanese language and the Taiwanese (Hoklo) people all belong to a greater Chinese language and ethnicity (S. Liao, 2008). On the other hand, there are pro-independence bensheng-ren citizens who claim an explicitly Taiwanese identity, one separate from a Pan-Chinese identity (S. Liao, 2008). However, the reality that bensheng-ren themselves are Chinese immigrants from Fujian province is not denied. What is more, even without the KMT’s overt inculcation of Pan-Sinicism, notions of a cross-linguistic Pan-Chinese identity are deeply rooted in traditional Chinese societies. Norman attests to the “profound unity of Chinese culture,” and argues that “The Chinese language . . . has always been one of the most powerful symbols of this cultural unity” (Norman, 1988: 1). It is no stretch then to think that bilingual speakers draw connections between the two groups’ languages. These
socio-cultural observations constitute strong evidence that Taiwanese and Mandarin are closely associated in the bilingual mind.

Second, lexical transfer between Chinese languages in both the past and present generally takes the form of morpheme calques, not imitation. This process is productive, and moreover is easy to do because the Chinese languages are all rather closely related and similar. However, the dominance of calques as the primary mode of transfer generally holds true even in cases when non-Chinese words are transferred between Chinese languages. 的士 Dishì is the Mandarin word for ‘taxi’, calqued directly from the morphemes used to represent Cantonese 的士 tìksi, which is an imitation of English. This shows how calquing occurs even when the target word is an imitation and not etymologically Chinese. In effect, when loanwords are transferred between Chinese languages, speakers use adaptation through calquing and generally ignore imitative properties of the loan. Bilingual speakers of two Chinese languages or dialects, therefore, are likely to be predisposed to viewing the morphemes of one language (such as Mandarin) as possible candidates for calquing into another (such as Taiwanese) both diachronically and synchronically. We do see some wholesale lexical transfer from Mandarin in discourse marker words like 然後 ranhou ‘and then’, which some bilingual speakers insert into Taiwanese speech (see Ratte, 2009). However, it is unclear whether this is truly lexical transfer into Taiwanese or simply represents a code alternation into Mandarin by highly skilled bilinguials.

Third, Taiwanese and Mandarin are genetic relatives, diverging from a common ancestor close to two millennia ago, and have a number of easily identifiable cognates.
Taiwanese and Mandarin also share a great deal of common borrowed vocabulary, words calqued from Sino-Japanese words coined to describe modern concepts like ‘society’, ‘culture’ and ‘language’. Taiwanese, and the Southern Min languages in general, also have a literary stratum of Middle Chinese vocabulary similar to Mandarin. These are further reasons to think that bilingual speakers of Taiwanese and Mandarin might be especially attuned to recognizing correspondences between Taiwanese and Mandarin cognate morphemes, since a great deal of vocabulary has direct morpheme parallels between the two languages, both from their genetic relationship and from borrowing.

Lastly, the Chinese writing system is another good reason to think that Taiwanese and Mandarin have a strong affinity among bilingual speakers. In both Mandarin and Taiwanese, the syllable overwhelmingly represents the atomic constituent of both languages, with the vast majority of morphemes in both language consisting of one syllable (Norman, 1988: 8). Chinese writing can be characterized as “morpho-syllabic”, where each character represents a morpheme and the vast majority of morphemes are one syllable (DeFrancis, 1984: 88). This makes both languages amenable to using the same syllable-based writing system. Also, characters usually contain a graphic element that hints at the pronunciation, and characters containing the same phonetic element generally represent syllables that are identical or similar in phonological form. These phonetic elements do not cross-linguistically represent only one phonetic value; in the same way that the letter <z> represents the sound [z] in English but [ts] in Italian, a character’s phonetic element represents different syllables depending on the language. This phonetic element may differ inter-lingually in the sound it represents but is intra-lingually regular,
a fact that makes this system of phonetic graphic elements cross-linguistically stable, even when the languages in question are phonologically quite different. From a quotidian perspective, the Chinese languages are almost always written using Chinese characters, sometimes abiding by unique dialectal standards (as in the case of Cantonese). Cognates are almost always represented by the same characters -- for example, Taiwanese gwa and Mandarin wo both mean ‘I, me’ and are both represented as 我. The connections between cognate correspondences, cognates being orthographically identical, therefore become exceedingly salient for bilinguals acquainted with some degree of writing in their two languages.

For these many reasons, it is entirely reasonable to think that Taiwanese and Mandarin have close affinity in the bilingual mind. With this high degree of affinity, we have even further reasons to think that contact-induced transfer is responsible for changes in Taiwanese.

3.2 Analogy as applied to Taiwanese and Mandarin

In order to understand analogy in the context of Taiwanese and Mandarin contact, I will first introduce the structural features in question, namely phonology, of Taiwanese and Mandarin.

3.3 Comparison of Taiwanese and Mandarin Phonology

As Kubler (1981) notes, any analysis of contact-induced phonological change first requires a comparison of the phonological inventories in question. Since this analysis is
concerned only with initial consonants, a comparison of vowel inventories is not included.\textsuperscript{5} Also, since this analysis is limited to Mandarin influence on Taiwanese, my focus is on those instances in which Taiwanese consonants do not have a Mandarin equivalent. I will not be focusing on the opposite, namely when Mandarin consonants do not have a Taiwanese equivalent.\textsuperscript{6}

It would be improper to compare Taiwanese phonology with Standard (Beijing) Mandarin phonology, since Taiwanese speakers do not speak the Beijing dialect. Instead, we must compare it to Taiwanese Mandarin phonology, which represents the end result of the contact situation detailed in Kubler (1981, 1985). This is the type of Mandarin that is now virtually ubiquitous in Taiwan, and represents the type of Mandarin that participants in this study would speak.

3.3.1 Taiwanese Consonant Inventory

Below is a table listing the Taiwanese consonant inventory for comparison with Mandarin. Affricates are combined with stops, both for clarity and since this analysis groups them together.

\textsuperscript{5}See Kubler, 1981: 60 for a complete comparison of Taiwanese and Mandarin vowels.\textsuperscript{6}See Kubler, 1981: 51-84 for an in-depth analysis.
<table>
<thead>
<tr>
<th></th>
<th>Labial</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain Stops + Affricates</td>
<td>p</td>
<td>ts</td>
<td>t</td>
<td>k</td>
<td></td>
</tr>
<tr>
<td>Aspirated Stops + Affricates</td>
<td>pʰ</td>
<td>tsʰ</td>
<td>tʰ</td>
<td>kʰ</td>
<td></td>
</tr>
<tr>
<td>Voiced Stops + Affricates</td>
<td>b</td>
<td>dz</td>
<td></td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Fricatives</td>
<td></td>
<td>s</td>
<td></td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>Nasals</td>
<td>m</td>
<td>n</td>
<td></td>
<td>η</td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td></td>
<td></td>
<td>1 / r /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glides</td>
<td>w</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Taiwanese Consonant Inventory

Specifically, the consonants in question for this analysis are voiced obstruents, so the following examples in Table 2 show voiced obstruents and related sounds in Taiwanese morphemes.

---

7 Kubler (1981) notes that the liquid sound is generally represented phonemically as /l/ but is sometimes pronounced as [ɾ].
<table>
<thead>
<tr>
<th>Consonant</th>
<th>Example</th>
<th>Character Gloss</th>
<th>English Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>/m/</td>
<td>/miã/</td>
<td>名</td>
<td>‘name’</td>
</tr>
<tr>
<td>/b/</td>
<td>/bwe/</td>
<td>妹</td>
<td>‘younger sister’</td>
</tr>
<tr>
<td>/p/</td>
<td>/pai/</td>
<td>拜</td>
<td>‘praise; week’</td>
</tr>
<tr>
<td>/n/</td>
<td>/na/</td>
<td>若</td>
<td>‘if’</td>
</tr>
<tr>
<td>/dz/</td>
<td>/dzit/</td>
<td>日</td>
<td>‘day; sun’</td>
</tr>
<tr>
<td>/l/</td>
<td>/lang/</td>
<td>儂，人</td>
<td>‘person’</td>
</tr>
<tr>
<td>/ŋo/</td>
<td>/ŋo/</td>
<td>吳</td>
<td>‘Ngo (a surname)’</td>
</tr>
<tr>
<td>/g/</td>
<td>/go/</td>
<td>五</td>
<td>‘five’</td>
</tr>
<tr>
<td>/k/</td>
<td>/kok/</td>
<td>國</td>
<td>‘country’</td>
</tr>
</tbody>
</table>

Table 2: Examples of Taiwanese Phonemes

3.3.2 Taiwanese Mandarin Consonant Inventory

Below is a table listing the Mandarin consonant inventory as pertinent to this analysis.

Again, stops are combined with affricates.

---

8 This character can also be pronounced /go/. The velar nasal can appear phonetically at the beginnings of words, but is in complementary distribution with its more frequent counterpart /g/, so I will not consider this as a possible Taiwanese-Mandarin mismatch.
<table>
<thead>
<tr>
<th></th>
<th>Labial</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Palatal</th>
<th>(Retroflex)</th>
<th>Velar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain Stops + affricates</td>
<td>p</td>
<td>ts</td>
<td>t</td>
<td>tɕ</td>
<td>(tʂ)</td>
<td>k</td>
</tr>
<tr>
<td>Aspirated Stops + Affricates</td>
<td>pʰ</td>
<td>tsʰ</td>
<td>tʰ</td>
<td>tɕʰ</td>
<td>(tʂʰ)</td>
<td>kʰ</td>
</tr>
<tr>
<td>Fricatives</td>
<td>f</td>
<td>s</td>
<td>c</td>
<td>(ʂ)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Nasals</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td></td>
<td>l</td>
<td></td>
<td>(ɻ)⁹ , (z)¹⁰</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glides</td>
<td>w</td>
<td></td>
<td>j</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Taiwanese Mandarin Consonant Inventory

Since this analysis focuses only on consonant initials, I only discuss those consonant phonemes that can appear at the syllable onset in the section comparing their inventories. Thus, I do not include the Mandarin velar nasal consonant, since it only appears in syllable-final position. Although a full examination of their phoneme inventories will be important in fully understanding language contact, only a comparison of the consonant inventories of Taiwanese and Mandarin is directly pertinent to this analysis.

The phonemic distinctiveness of the “retroflex” series in Taiwanese Mandarin is questionable. Kubler states that for many speakers, the “psychological reality of the distinction between the retroflex and non-retroflex classes no longer exists” (Kubler, 1990).

9 The retroflex fricative has been called both an approximant [ɻ] and a voiced fricative [ʐ]. This analysis adopts the position that this phoneme is an approximant [ɻ], supported by Norman (1988: 140), who argues that to call it a voiced fricative is “misleading” and that to do so “would be tantamount to recognizing voicing as a distinctive feature . . . a distinction which is otherwise unneeded”.

10 The retroflex approximant can also be pronounced as a syllabic [z] in isolation.
1981: 59), a claim to which Chung’s study of hypercorrection lends credence (Chung, 2006). However, Kuo rejects the common belief that retroflex consonants have completely merged with the dental sibilants, instead arguing that the retroflex series has remained phonemically distinct for most speakers (Kuo, 2005). Moreover, the issue is almost certainly complicated by dialectal differences between different regions of Taiwan; Liao notes that Taiwanese speakers of Taizhong city substitute [l] for the retroflex /ɻ/, a replacement that is common of bilinguals but found less often in Taibei (Liao, 2008: 397). At this time I cannot say with confidence that I disagree with this claim, but conversations with informants as well as personal experience in Taibei City and Penghu County lead me to believe that this replacement is quite widespread in Taiwan. Regardless, it is certain that there is more here than meets the eye, and it would be premature to conclude that the retroflex series does not exist. I therefore set aside this question and assume a conservative position, that the retroflex series does exist as a phonemically distinct series, but that its articulation is not truly retroflex. Table 4 lists example words illustrating pertinent phonemes.
Table 4: Examples of Mandarin Phonemes

We can thus see that Taiwanese and Mandarin have phonemic mismatches with respect to the voiced obstruent series, where consonant phonemes in Taiwanese do not have a corresponding sound in Mandarin, and vice versa. Table 5 lists these mismatches:

Table 5: Mismatched Phonemes

These phonemic mismatches represent instances in which the Mandarin and Taiwanese phonemic inventories do not overlap. This means that if speakers of Taiwanese were to
impose the Mandarin phonemic inventory onto their Taiwanese lexicon, those Taiwanese phonemes that do not match up to a Mandarin phoneme become marked.

3.4 Analogy Between Cognates

In order to resolve these phonemic mismatches, speakers imposing Mandarin structure are forced to choose alternative sounds that do not violate Mandarin phonology. One way to resolve these problems is to use analogy to determine the choice of an alternative sound.

Analogy occurs when speakers draw comparisons between different but related elements of language. In this case, the analogy is between Taiwanese and Mandarin cognates. Taiwanese shares a great deal of cognates with Mandarin, and many cognate morphemes between Mandarin (M) and Taiwanese (T) are identifiable, even to speakers with no knowledge of linguistics. Some examples include T miâ ~ M ming ‘name’, T ho ~ M hao ‘good’, T kong ~ M jiang ‘speak’, and T tiong-kok ~ M zhong-guo ‘China’. The earlier section on linguistic affinity between Mandarin and Taiwanese gives us a solid foundation for positing that speakers draw cross-linguistic connections between Mandarin and Taiwanese cognates. An analogy-based strategy uses the Mandarin cognate as a target, and then changes the Taiwanese voiced obstruent by analogy to whatever the Mandarin cognate has for an onset; for example, if bilingual speakers took the Taiwanese word for ‘temple’ /bio/ and targeted its Mandarin cognate /miao/ for analogy, we might see a resulting [mio], whereby the Taiwanese onset has become [m] due to analogy with Mandarin. Yet, analogy can be difficult to distinguish from
internally-motivated sound change. How are we to know that analogy is responsible, and not other kinds of sound change? The best evidence for analogy is if we see Taiwanese words not only becoming Mandarin-like, but also undergoing sound changes in phonologically unpredictable ways where the only logical explanation is analogy.

This section will examine how speakers draw analogy to Mandarin cognates, and why this is the only appropriate explanation. In order to understand how analogical comparisons are drawn between the two, we must examine the kinds of patterns we see in cognate correspondences between Taiwanese and Mandarin. Each section describes a comparison of onsets of Taiwanese and Mandarin cognates, followed by those items on the word list for this study (introduced in the following chapter) that follow that pattern. Then, I offer a brief explanation for the pattern’s existence, and suggest what kind of sound changes would constitute grounds for positing analogy between cognates.

3.4.1 Taiwanese [b] ~ Mandarin [m]

Table 6 lists the 4 morphemes on the word list for which Taiwanese [b] corresponds to Mandarin [m].
<table>
<thead>
<tr>
<th>English Gloss</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘American’</td>
<td>美(國人)</td>
<td>bi-</td>
<td>mei-</td>
</tr>
<tr>
<td>‘buy’</td>
<td>買</td>
<td>bwe</td>
<td>mai</td>
</tr>
<tr>
<td>‘sell’</td>
<td>賣</td>
<td>bwe</td>
<td>mai</td>
</tr>
<tr>
<td>‘temple’</td>
<td>廟</td>
<td>bio</td>
<td>miao</td>
</tr>
</tbody>
</table>

Table 6: Taiwanese [b] ~ Mandarin [m]

Taiwanese voiced /b/ historically came about due to syllable-initial fortition of nasals, and Modern Taiwanese /b/ is historically derived from *m. This historical *m dates back to before Southern Min and Mandarin were distinct languages. In Mandarin, this proto-phoneme *m has been preserved as modern /m/ when it is not followed by the labiovelar glide /w/ (about which more will be said following). Mandarin has thus generally preserved this historical *m as modern /m/, and we see that Modern Taiwanese /b/ generally corresponds to Modern Mandarin /m/. This can be applied as a somewhat general rule, since the majority of cognates share this correspondence. Furthermore, this is a type of correspondence which bilingual speakers of Taiwanese and Mandarin might be expected to be consciously aware of by its regularity. From the perspective of analogy, because this comparison is both phonetically plausible and widespread, we would expect that speakers would associate Taiwanese /b/ with Mandarin /m/, and if bilingual speakers replaced /b/ with [m], it would constitute grounds for positing analogy.
3.4.2 Taiwanese [m] ~ Mandarin [m]

As stated previously, Taiwanese *m became /b/; however, /m/ was retained in Taiwanese when followed by a nasal coda or a nasalized vowel (Chan, 1987). Table 7 shows those morphemes on the word list for which Taiwanese /m/ corresponds to Mandarin /m/: 

<table>
<thead>
<tr>
<th>English Gloss</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘next year’</td>
<td>明(年)</td>
<td>min-</td>
<td>ming-</td>
</tr>
<tr>
<td>‘name’</td>
<td>名</td>
<td>mià</td>
<td>ming</td>
</tr>
<tr>
<td>‘tomorrow’</td>
<td>明(阿仔)</td>
<td>min-</td>
<td>ming</td>
</tr>
</tbody>
</table>

Table 7: Taiwanese [m] ~ Mandarin [m]

Additionally, Taiwanese has some words for which there is no distinction drawn between initial [m] and [b]. For example, the word for ‘tomorrow’ is often pronounced as [min-a-tsai], but is alternatively [bin-a-tsai] for some speakers. In every Taiwanese dictionary consulted for this analysis, both of these forms constitute separate dictionary entries but are glossed with the same meaning. This allomorphy is only sporadic, affecting mostly high frequency words such as ‘tomorrow’ and ‘next year’. Taiwanese /m/ seems to have some kind of distinctive status, but is generally in complementary distribution with /b/.

Finally, there are some words in Taiwanese that do not show any allomorphy with [b]; the only occurrence I have been able to find of this is [miʔ] in the word *siam*?
meaning ‘what’. However, ‘what’ is a word with an unusually high frequency, and it may be that ‘what’ is the only word in Taiwanese that fits this particular exception.

To summarize, speakers of Taiwanese do make some distinctions between /b/ and /m/ in determining the stratum of origin for morphemes, and can certainly distinguish them as separate sounds; however, Taiwanese /m/ should not be considered a fully independent phoneme, since there are no words for which /b/ and /m/ form a true minimal pair. Also, the allomorphy between [b] and [m] in the semantically identical morphemes [min] and [bin] suggests that at some level, whether completely synchronic or partially diachronic, speakers consider them to be related sounds. We can therefore consider /m/ to be more than simply an allophone of /b/, but less than a full consonant phoneme in Taiwanese.

3.4.3 Taiwanese [b] ~ Mandarin [w]

Table 8 lists those morphemes in the word list for which Taiwanese [b] corresponds to Mandarin [w].
In addition to the regular correspondence of Taiwanese /b/ to Mandarin /m/, there is also a less regular correspondence Taiwanese initial /b/ to Mandarin initial /w/. Historically, Mandarin underwent a sound change in which Proto-MT *m became Mandarin /w/ when *m was historically followed by /w/, thus in effect Proto-MT *mw became Mandarin /w/. This knowledge is not synchronically available to speakers of Taiwanese, because no predictable markers exist in Mandarin to indicate a historical */mw/ onset as distinct from
This sound change has made *mw historically opaque; the simplification of *mw to /w/ in Mandarin has made it impossible for speakers of both Mandarin and Taiwanese to know that *m ever existed in these morphemes. Thus, despite a regular derivation of all Modern Taiwanese /b/ from *m, speakers of Taiwanese would be confounded, and cannot deduce this information simply by comparing Mandarin morphemes to Taiwanese ones. Logically, they are aware only of the seemingly random correspondences of Taiwanese /b/ to both Mandarin /m/ and /w/.

3.4.4 Conclusion: Taiwanese /b/

For cognates of the Taiwanese voiced labial initial, the two primary pertinent correspondence sets between Taiwanese and Mandarin reflexes are as follows:

| Taiwanese /b/ ~ Mandarin /w/ in some words, |
| Taiwanese /b/ ~ Mandarin /m/ in some words. |

If we see /b/ → [w] only in those words where T /b/ ~ M /w/, and /b/ → [m] only in those words where T /b/ ~ M /m/, then these would constitute strong evidence for analogy.

3.4.5 Taiwanese [g] ~ Mandarin null onset (Proto *ŋ-)

Table 9 lists those items on the word list for which [g] corresponded to a deleted velar:
### Table 9: Taiwanese [g] ~ Mandarin null onset

<table>
<thead>
<tr>
<th>English</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘foreigner’</td>
<td>外國人</td>
<td>gwa-</td>
<td>wai- [wai]</td>
</tr>
<tr>
<td>‘language’</td>
<td>語言</td>
<td>gi-gen</td>
<td>yu-yan [y-jen]</td>
</tr>
<tr>
<td>‘Sun-Moon Lake’</td>
<td>日月潭</td>
<td>-gwat-, -gwe-</td>
<td>-yue- [-jye-]</td>
</tr>
<tr>
<td>‘5’</td>
<td>五</td>
<td>go</td>
<td>wu [u]</td>
</tr>
<tr>
<td>‘Mandarin’</td>
<td>國語</td>
<td>-gi</td>
<td>-yu [y]</td>
</tr>
<tr>
<td>‘I; me’</td>
<td>我</td>
<td>gwa</td>
<td>wo [wo]</td>
</tr>
<tr>
<td>‘originally’</td>
<td>原來</td>
<td>gwan-</td>
<td>yuan [jyen]</td>
</tr>
<tr>
<td>‘September’</td>
<td>九月</td>
<td>-gwe</td>
<td>-yue [jye]</td>
</tr>
<tr>
<td>‘May’</td>
<td>五月</td>
<td>go-gwat, go-gwe</td>
<td>wu-yue [u-jye]</td>
</tr>
<tr>
<td>‘ball pen’</td>
<td>原子筆</td>
<td>gwan-</td>
<td>yuan- [jyen]</td>
</tr>
<tr>
<td>‘We, us’</td>
<td>阮</td>
<td>gwan, gun</td>
<td>wo-men (ruan)(^{11})</td>
</tr>
<tr>
<td>‘Wu (surname)’</td>
<td>吳</td>
<td>go</td>
<td>wu [u]</td>
</tr>
<tr>
<td>‘Taiwanese’</td>
<td>’台語’</td>
<td>-gi</td>
<td>-yu [y]</td>
</tr>
<tr>
<td>‘December’</td>
<td>十二月</td>
<td>-gwe, -gwat</td>
<td>-yue [jye]</td>
</tr>
</tbody>
</table>

\(^{11}\) Although this character is read *ruan* in Mandarin, it is almost certainly not etymologically related to Taiwanese *gwan*, which is derived from /gwa/ ‘I, me’ + /-n/ ‘pl.’. The correct analogical comparison is therefore Mandarin *wo* and *women.*
In the same way that Taiwanese /b/ comes from *m due to the fortition of nasal onsets, Taiwanese /g/ descends from *ŋ in its proto-language. However, Mandarin has completely eliminated velar nasal onsets, resulting in null onsets for syllables with *ŋ. Thus, Taiwanese /g/ corresponds most often to a deleted velar. In all of the correspondences in this data set, and moreover for most cognates in general, Taiwanese onset [g] corresponds to a Mandarin onset of [w] or [j]. This is not due to a true correspondence of these two sounds, but is instead due to the aforementioned deletion of velar nasal onsets in the history of Mandarin, which left *ŋw- and *ŋj- onsets as simply w- and j- onsets. Taiwanese preserves the velar initial as [g], thus giving the impression of a g ~ w correspondence when in fact this is simply due to deletion and is really a true correspondence of gw ~ w and gj ~ j. Going further, we can classify all of these correspondences as Taiwanese g ~ Mandarin null, since Taiwanese g ~ Mandarin w only before Mandarin back round vowels (u or o), and Taiwanese g ~ Mandarin j only before Mandarin mid- or high-front vowels (i or e). Therefore, although these two correspondences are phonetically different and conceivably could act as different analogical targets, I have labeled them thus under the same rubric, namely Taiwanese g ~ Mandarin null, and this is because all elements of the original velar have disappeared and their distributions are otherwise predictable.

These correspondences are not regular; there is no way to determine for which cognates Taiwanese [g] corresponds to a Mandarin deleted velar from only the Mandarin form. When Mandarin lost velar nasal onsets, these syllables merged with syllables of onsets [j] and [w] and onsetless syllables. For example, Mandarin 医 yi corresponds to
Taiwanese /i/, but Mandarin 義 yi corresponds to Taiwanese gi. The correspondence of Taiwanese [g] to Mandarin can only be identified from prior knowledge of both forms.

3.4.6 Do “Syllabic Finals” Have Onsets?

In comparing the Taiwanese /gi/ for ‘language’ with Mandarin /y/, we must tackle a thorny issue in the study of Mandarin phonology. How do we analyze the effects of analogy when the Mandarin cognate consists of only a syllabic high vowel? Strictly phonetically speaking, I analyze morphemes such as those for ‘one’, ‘five’ and ‘language’ as being pronounced as [i], [u] and [y] respectively. This is based on an impressionistic analysis, as well as on Jerry Norman’s phonetic description of these syllables in the modern standard language (Norman, 1988: 141-143). Norman explains that these finals can also be syllabic finals as [i], [u] and [y]. Unfortunately for this analysis, he also claims that syllables with a zero-onset can have a uvular fricative “dummy consonant” inserted in connected speech following a consonant; this dummy onset presumably becomes [j] and [w] before [i] and [u] respectively. This raises an extremely important question: in these types of syllables, do speakers of Mandarin target the onsetless syllables /i/, /u/ and /y/ for analogy, or do they instead target /ji/, /wu/ and /jy/? Because we are dealing not with strict phonology but language contact, we cannot be exactly sure what kinds of motivations would prompt speakers to choose targets for analogy. In a strictly phonological analysis, we can be relatively certain that the underlying (phonological) representations of words represent the cognitive model of a lexical item; however, analogy can be sporadic and unpredictable, and we cannot be sure
at what level of representation this analogy occurs. Even if we could conclusively say that Taiwanese Mandarin does not have underlying onset glides for these syllabic high vowels, speakers could still be targeting “dummy” phones for analogy, phones of whose existence we might not otherwise be aware. For example, if speakers are inserting a glide where none exists underlingly before syllabic high vowels in connected speech (suppose, say, for ease of articulation), speakers could conceivably target this surface form for analogy for its acoustic salience. If these syllables have glide onsets, then we might expect an analogical comparison of onsets between Taiwanese and Mandarin to target the glide; if not, then analogy should target a null onset. To be more specific, if the Taiwanese morpheme for ‘language’ /gu/ (a dialectal form) has a Mandarin reflex /y/ with no onset, then we might expect the [g] in Taiwanese to undergo deletion to match the onsetless Mandarin analogical counterpart, producing [u]. On the other hand, if /gu/ has a Mandarin reflex /jy/, then we might expect the Taiwanese onset [g] to become the Mandarin onset [j], resulting in [ju]. Furthermore, we must consider whether Mandarin has either underlying or surface glide onsets for syllabic high vowels, since analogy could plausibly target either one for shift. As we can see, resolving this question is of great importance to this analysis.

Norman remarks that the phonemicization of the Mandarin high vowels /i/ /y/ and /u/ has been exceedingly controversial. Some linguists deny phonemic status to the high vowels, instead postulating underlying representations as semi-vowels or glides (Norman, 1988: 144). Also, the vowels [y] and [u] have a semi-complementary distribution in Mandarin, which further leads one to wonder whether speakers might be analyzing them
as semi-allophonic and not truly underlying (Norman, 1988: 142). Additionally, at least some Mandarin [i] syllables are historically descended from */ji/, complicating an analysis of whether or not speakers of modern Mandarin might be reanalyzing [i] syllables as having underlying glide initials from folk linguistic influence. Traditional Chinese philology breaks syllables down into two atomic units: the "initial" (syllable onset), and the "final" (nucleus and coda). Lacking an alphabet, the only method of indicating character pronunciation that was widely used in China was called fanqie spelling. Fanqie 反切 worked by spelling one character with two other different characters; the first character glossed the initial, and the second character glossed the final of the character in question. For example, fanqie were of the form:

A: B C 切 qie

meaning “character A is to be read by combining the initial of character B and the final of character C”. For example, in order to spell the character 東 dong ‘east’, the following fanqie spelling could be used:

東 (dong): 德 (de) 紅 (hong) 切 qie

Meaning “character 東 (dong) is to be read by combining the initial of character 德 (de) and the final of character 紅 (hong)”. This formula was regularly used from as early as the 7th century C.E. with the compilation of the Qieyun rhyming dictionary and saw use until as late as the 20th century, and reflects the Chinese mindset of syllables atomistically containing initials and finals. Consequently, a great deal of importance in Chinese philology has traditionally been placed on this dichotomy and on folk
understandings of Chinese phonology. Even if speakers articulate neither underlying nor surface glides to these syllables, conveyed wisdom and folk understandings can factor into analogical comparisons. As much as these concerns may seem beyond the realm of sound change, we must consider every angle to how speakers might be cognitively representing syllabic high vowels.

To further complicate the matter, the relationship between Chinese orthography and underlying representations must be also considered. Just as many English speakers reanalyze the word original pronunciation for ‘often’ by adding a [t] due to the presence of an orthographic < t >, orthographies can influence the representations of words, and we must also consider whether speakers of Mandarin might be influenced by graphic representations of their language. Generally, Chinese characters provide little phonological information to Chinese speakers concerning the value of a syllable’s onset; when characters do reflect sound information, they instead mainly represent a combination of the syllable’s nucleus + coda traditionally referred to as the syllable “final” in Chinese linguistics. This information is orthographically derived from the character’s phonetic element—those characters that share an orthographic phonetic element generally represent a morpheme with an identical or similar final. Examining Chinese characters alone, we should conclude that speakers derive no phonological information about onset glides from a character’s phonetic element. Characters are far and away the most prevalent kind of written Chinese, but they are not the only kinds; in mainland China, the Pinyin system has been used since 1958 to alphabetically represent Mandarin, and the Zhuyin alphabet, created in 1913, has been retained in Taiwan
(DeFrancis, 1984: 242, 264). Although Pinyin has recently become the official Romanization of Taiwan\textsuperscript{12}, the Bo Po Mo Fo system, also known as Zhuyin Fuhao, has been the primary phonetic alphabet used throughout Taiwan. Much like Pinyin’s role in China, Bo Po Mo Fo symbols are not usually used in everyday life and have only a limited scope. They are primarily used in only two situations: to gloss readings of Chinese characters for school children learning to read, and to act as a phonetic input for typing Chinese characters. However, unlike Pinyin in China, Bo Po Mo Fo does not use the Roman alphabet and cannot also be used to help foreigners in Taiwan, thus having an even more limited scope than Pinyin. In the Pinyin system, syllabic high vowels are orthographically represented as $yi$, $wu$ and $yu$; we thus have some basis for thinking that mainland Chinese speakers of Mandarin might be predisposed to insert “dummy” glides as onsets, if only cognitively and not phonetically or phonologically. However, in the Zhuyin system used in Taiwan, morphemes such as ‘one’ and ‘five’ are written not as /ji/ and /wu/ but as simply /i/ and /u/, with only one alphabetic symbol used to represent each one. The letters used to represent these syllables are ㄨ and ㄧ for [i] and [u] respectively. These are the same letters used to represent the [i] vowel and [u] vowel in other syllables, as well as onset glides [j] and [w]. This gives us some basis to suppose that Taiwanese speakers of Mandarin would be predisposed to analyze phonetic [i] and [u] as underlyingly /i/ and /u/, not /ji/ and /wu/.

As part of the decision concerning which form should be used for this analysis, two short pilot experiments were run. First, in order to determine whether syllables [i]

\textsuperscript{12} As of January 1, 2009 (see http://www.taipeitimes.com/News/taiwan/archives/2008/09/18/2003423528)
and [u] were underlyingly /ji/ and /wu/, one native speaker of Mandarin was asked to distinguish between syllables that were phonetically [ji] versus [i], and [wu] versus [u]. The speaker was asked to listen to these syllables alone, and then in context followed by the general measure word. The speaker was asked to determine which phonetic form was more grammatical in Mandarin Chinese. This speaker was unable to determine any significant difference between the two, and judged both forms to be grammatical in natural Chinese. When pressed, the speaker judged that [i] and [u] sounded slightly more natural than [ji] and [wu], which matches my own expectations of the surface representations of these syllables. This pilot study suggests that speakers of Mandarin do not make distinctions between /ji/ and /i/ syllables and likely prefer the glide-less variant. A second experiment was run in which the same Chinese speaker was asked to judge a fanqie spelling for the syllable represented by 意, which is phonetically [i]. The fanqie spelling presented was 意: 牙一切, which in plain English says: “The syllable 意 (phonetically [i]) is spelled by taking the initial (onset consonant) of the syllable 牙 [ja] and combining it with the final (nucleus + coda) of the syllable 一切 [i]”. In other words, “[i] is pronounced [j] + [i]”. The speaker was asked to judge if this fanqie spelling was acceptable, and to provide one if not. The speaker rejected it as bizarre, but was unable to provide a suitable fanqie spelling in its place, saying that the syllable [i] was not able to be spelled by this method. I conclude from this study that syllables of this type are not underlyingly /ji/.

Both of these experiments suggest the same conclusion: that syllables with phonetic realization [i] and [u] do not have underlying glides. Since the presence or
absence of initial glides [j] and [w] in syllables of this type fall below the level of the phoneme, and those syllables with no glide onset were judged to be phonetically most natural, I determine that there is no reason to think that /j/ and /w/ are underlyingly present in the representations of these morphemes. In this case, it is most reasonable to posit that the actual phonetic expression of these morphemes is also the underlying form. Also, the fact that the Zhuyin alphabet used in Taiwanese uses no orthographic glide in these syllables is further evidence in favor of using no underlying glide. I thus analyze syllables with surface forms [i] and [u] as underlyingly /i/ and /u/ with no glide for the purposes of this thesis.

3.4.7 Taiwanese [g] ~ Mandarin [n]

In a very small minority of words, Taiwanese [g] corresponds to a Mandarin [n] onset. The most common of such words is the word for ‘cow; beef’, which was the only such morpheme included in this study’s word list. Table 10 below lists the one morpheme on the word list for which this correspondence exists:

<table>
<thead>
<tr>
<th>English Gloss</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘cow; beef’</td>
<td>牛</td>
<td>gu</td>
<td>niu</td>
</tr>
</tbody>
</table>

Table 10: Taiwanese [g] ~ Mandarin [n]

3.4.8 Conclusion: Taiwanese /g/

For cognates of the Taiwanese voiced labial initial, the two pertinent correspondence sets between Taiwanese and Mandarin reflexes are as follows:
Taiwanese /g/ ~ Mandarin null onset in most words.
Taiwanese /g/ ~ Mandarin /n/ in very, very few words.

If we see the deletion of /g/ being used as a primary strategy, and furthermore if we see /g/ being nasalized (or otherwise affected by analogy to [n]), then these constitute good evidence for analogy as responsible for these sound changes.

3.4.9 Taiwanese [dz] ~ Mandarin [ɻ], [ʐ]

Below is a table listing correspondences to Mandarin for Taiwanese words beginning with /dz/.

<table>
<thead>
<tr>
<th>English Gloss</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin(1)</th>
<th>Mandarin(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Sun-Moon Lake’</td>
<td>日月潭</td>
<td>dzit-</td>
<td>ri [ʐ]</td>
<td>ri [lʐ]</td>
</tr>
<tr>
<td>‘today’</td>
<td>今天</td>
<td>-dzit</td>
<td>ri [ʐ]</td>
<td>ri [lʐ]</td>
</tr>
<tr>
<td>‘hot’</td>
<td>熱</td>
<td>dzwa</td>
<td>re [ɤ]</td>
<td>re [lɤ]</td>
</tr>
<tr>
<td>‘Japan’</td>
<td>日本</td>
<td>dzit-</td>
<td>ri [ʐ]</td>
<td>ri [lʐ]</td>
</tr>
</tbody>
</table>

Table 11: Taiwanese [dz] ~ Mandarin [ɻ]

Table 11 shows that in roughly half of words, /dz/ corresponds to the (Standard) Mandarin rhotic retroflex /ɻ/ sometimes transcribed as [ʐ], represented in Pinyin as r. As discussed in section 3.3.2, previous literature is conflicted on the issue of whether the retroflex series truly exists, with some arguing that they are completely merged with
dental sibilants, and others arguing that they are still cognitively real (Kubler, 1981; Kuo, 2005). S. Liao (2008) states that the retroflex rhotic is often pronounced [l] in Taiwan. I take a neutral stance on the issue, and instead take the position that two different targets for analogy are conceivable for /dz/: a deleted onset, which represents speakers for whom retroflexes are deleted or no longer distinct, and a liquid consonant, which encompasses both [l] pronunciations and a rhotic target.

3.4.10 Taiwanese [dz] ~ Mandarin null onset

<table>
<thead>
<tr>
<th>English Gloss</th>
<th>Character Gloss</th>
<th>Taiwanese</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘ten-thousand dollars’</td>
<td>一萬元</td>
<td>dzit-</td>
<td>yi [i]</td>
</tr>
<tr>
<td>‘December’</td>
<td>十二月</td>
<td>-dzi-</td>
<td>er [ɤ]</td>
</tr>
<tr>
<td>‘one professor’</td>
<td>一位老師</td>
<td>dzit-</td>
<td>yi [i]</td>
</tr>
</tbody>
</table>

Table 12: Taiwanese [dz] ~ Mandarin null onset

Table 12 shows that in the other half of the words in this experiment, Taiwanese /dz/ corresponds to a Mandarin null onset. Additional cognate correspondences exist, namely T /dz/ ~ M /ts/ as in 字 ‘word, letter’, but are outside of the scope of this analysis, as every word containing /dz/ in the word list corresponded to either a retroflex rhotic initial or a deleted onset in Mandarin.
3.4.11 Conclusion: Taiwanese /dz/

For cognates of the Taiwanese /dz/ phoneme, the two pertinent correspondence sets between Taiwanese and Mandarin reflexes are as follows:

- Taiwanese /dz/ ~ (Taiwanese) Mandarin null or liquid for half of the words.
- Taiwanese /dz/ ~ Mandarin null onset in the other half of the words.

If we see /dz/ being changed to a liquid in words for which Mandarin has Pinyin r such as ‘day’ and ‘hot’, and furthermore if we see /dz/ being deleted in ‘one’ and ‘two’, then these constitute good evidence for analogy as responsible for these sound changes.

3.5 Conclusion: Affinity and Analogy

Sections 3.1 to 3.2 have shown that under the definition of linguistic affinity offered by Van Coetsem, Taiwanese and Mandarin have a high degree of affinity that facilitates linguistic transfer. I have also compared the Taiwanese and Mandarin phonemic inventories, and shown that the mismatch exists between Taiwanese and Mandarin, namely that /g/ /b/ and /dz/ do not exist, nor have equivalents in Mandarin. I have then shown how analogy could apply to cognate morphemes between the two, and listed each correspondence as relevant to this study.
3.6 Review of Methodological Literature

3.6.1 Pilot Study (Ratte, 2009)

I will now give a brief overview of the pilot study that led to this thesis. The preliminary study in 2009 focused specifically on /b/ and /g/ in the dialect spoken in Penghu County of Taiwan, located off of the western coast. Speakers of Taiwanese in Penghu County exhibited a spectrum of variation, of which the following 5 patterns provide an overview:

(a) Retention of /b/ and /g/
(b) Deletion of /g/
(c) Devoicing to [p] and [k]
(d) Nasalization of /b/ to [m]
(e) Lenition of /b/ to [v], [w]

Research was carried out in two ways to investigate these sound changes. First, the prevalence and distribution of these shifts were tracked across Penghu County in a dialectal study, and second, acoustic data was collected from Penghu residents in a phonetic study to measure the voice onset times of stops.

In the dialectal analysis, I discovered that the urban area of Penghu County had the highest concentration of replacements of voiced stops, especially of /g/. This suggested that these sound replacements might be connected to an urban environment, perhaps due to the greater prevalence of Mandarin or due to increased contact to outside areas. The acoustic analysis showed four general strategies that speakers used to shift /b/ and /g/ to other sounds: nasalization, mild lenition, devoicing, and outright deletion.
However, the acoustic analysis did not reveal any principled patterns governing the usage of these strategies, and variation was widespread.

Three kinds of variation in sound changes were found in the data: differences between participants in the extent of shifting, differences in the shifting strategies used between /b/ and /g/, and differences between individual lexical items. Participants showed a great deal of variation, with both inter-participant and intra-participant variation found. For example, some speakers deleted /g/ while other speakers retained it; some individual speakers deleted /g/ in a few words but retained it in others. Both types of variation appeared random and no correlates were able to be established. Differences between /b/ and /g/ in shifting strategies were found to be not entirely random; nasalization was a more common strategy for /b/, whereas deletion was more common for /g/. Some variation existed between different lexical items; for example, /gwa/ ‘I, me’ was almost always pronounced [wa], whereas the /g/ in /go/ ‘five’ underwent deletion far less often. In this earlier analysis, I was unable to find any phonetic / phonological basis for variation. I concluded that variation was random, and that changes to /g/ represented a phonological “conspiracy” against voiced stops in Taiwanese.

In a follow-up to the original study, I examined the data once more to determine whether contact with Mandarin might provide a better explanation for how and why these sounds are shifted. Doing so revealed that contact with Mandarin can be seen as responsible for the sound changes seen in the data, with two contact processes mediating sound change: a) the overall imposition of Mandarin phonology on Taiwanese words, and b) analogy to Mandarin cognates at the lexical level for the choice of shifting strategy.
This pilot study did not account for the specific mechanisms by which these sound changes occurred, and the purpose of this thesis is both to elucidate these processes and to expand on previous research.

3.6.2 Literature Pertinent to Methodology

Williams (1979) has run a study similar to this thesis, in which he found that L1 Spanish speaking children who learned English in childhood showed influence from their L2 English in the voice onset time of their Spanish consonants. Williams concluded that an L2 can influence learning at the phonetic level, especially among children (Williams, 1979, 1980). This study is important not only for its focus on L2 influence on voicing, but also because it establishes a kind of precedent for the type of transfer examined in this thesis.

Also, the research by Brewer (2008) on Taiwanese dialects informs the methodology of this analysis. Based on recent research on phonological features of different Taiwanese dialects, Brewer’s analysis shows that the loss of voiced obstruents is not a dialect feature, traditional or modern, of any area of Taiwan (Brewer, 2008). Brewer (2008) allows us to state with some confidence that changes to Taiwanese voiced obstruents are shifts in progress, and do not reflect older sound changes that have been passed down to the current generation of adults. Tung (1964)’s study of Gaoxiong Taiwanese also provides evidence that voiced obstruents are traditionally features of Taiwanese. In addition, Tung’s analysis confirms that /dz/ is not traditionally pronounced as [l] in the Gaoxiong area (Tung, 1964).
3.7 Contributions of This Study

This analysis contributes a study of contact between Taiwanese and Mandarin in the spirit of Kubler (1981). However, 30 years have passed since Kubler (1981), and this thesis demonstrates an opposite phenomenon, namely how Taiwanese is being influenced by Mandarin. It is also similar to Williams (1979) in that it examines contact-induced change in bilingual production of voiced obstruents. This analysis seeks to expand the pilot study on a larger scale across Taiwan by collecting data from 15 bilingual Taiwanese and Mandarin speakers. These 15 speakers live in a number of different locations in Taiwan, namely Taibei and Taoyuan in the north, Taizhong and Nantou in the central area, and Gaoxiong, Tainan and Pingdong in the south. This analysis also seeks to show that Taiwanese speakers all across Taiwan are imposing Mandarin features onto Taiwanese and using analogy with Mandarin cognates as a strategy for changing Taiwanese words.

In order to answer the research questions posed in chapter 1, this experiment collected acoustic data in the form of audio recordings, and one-on-one interviews were conducted with bilingual Taiwanese and Mandarin speakers. Formal data was collected as acoustic recordings of participants reading a word list, and informal data on both participants and on Taiwanese society was collected through questions posed to participants before, during and after the interviews. Informal interviews were also conducted with four non-participant informants, and no recordings were created of these. This study also expanded on the pilot study by including an examination of the voiced
obstruent /dz/ along with /b/ and /g/, thereby examining all voiced obstruents in Taiwanese.

3.7.1 Hypotheses

As mentioned in chapter 1, three primary research questions motivate this study:

- Is the same sound change as seen in Penghu County (along with changes to /dz/) occurring elsewhere in Taiwan?
- 2) Is contact with Mandarin responsible for producing this change? If so, in what way?
- 3) What does this sound change in progress tell us about bilingualism in Taiwan?

I predict that the same sound changes attested in the pilot study of Penghu County will be seen in different areas of Taiwan. Chapters 1 gives us ample reason to think that Mandarin is the primary language of bilinguals, and that motivations for maintaining Taiwanese are low. As the pilot study showed, even the most linguistically conservative areas of Taiwan are not immune to these social pressures. Using the framework of imposition established in section 2.2, I predict that such changes can be attributed to contact with Mandarin, specifically to source-language agentivity on the part of Mandarin-dominant bilinguals who impose Mandarin phonology onto their Taiwanese. Furthermore, I hypothesize that bilinguals use analogy to Mandarin cognates at the lexical level in order to determine how to change voiced obstruents after imposition has marked them for removal.
I hypothesize that the extent of contact-induced change would correlate with the participant’s use of Taiwanese in their everyday lives, with less shift in bilinguals who regularly use Taiwanese and more shift in bilinguals who use Taiwanese less often. It is also possible that these changes will correlate with the participants’ place of residence, with speakers from historically conservative areas like Gaoxiong and Tainan using less imposition and Taibei speakers showing more. However, the pilot study showed that Penghu, an area considered very conservative by Kubler (1981), was undergoing such changes, which suggests that traditional notions of “conservative” Taiwanese regions may no longer be applicable in today’s Taiwan.

3.8 Experiment Methodology

Participants were recruited over the internet via the social networking site Facebook, as well as over email and Skype through personal contacts in Taiwan. Participants between the ages of 20 - 30 were selected based on their self-attested level of Taiwanese proficiency. There were a total of 15 participants, with 11 female and 4 male participants. Several participants who declared a non-fluent level of Taiwanese proficiency were interviewed but were not included in the 15 participants. five speakers were from 台北 Taipei, four from 高雄 Gaoxiong, two from 桃園 Taoyuan, one from 台中 Taizhong, one from 南投 Nantou, one from 台南 Tainan, and one from 屏東 Pingdong. Below is a map illustrating the locations of each of these areas.
Figure 1: Map of Taiwan by County\textsuperscript{13}

\textsuperscript{13} Map found at www.maps.google.com, edited for size.
In addition, these areas are spread out across Taiwan, with Taibei and Taoyuan in the north, Taizhong and Nantou in the west, and Tainan, Gaoxiong and Pingdong in the south. This allows us to both examine regional differences and draw conclusions about Taiwanese speakers from different areas of Taiwan.

Interviews were begun by contacting the participant over the video chat program Skype and beginning a video chat. At the same time, a software called Replay Telecorder was used to record the video chat directly to the computer, thereby minimizing the amount of static and background noise inherent in recording phone or chat conversations. Mandarin was used to communicate with participants throughout the interview, and I chose not to use any Taiwanese in order to avoid influencing participants’ pronunciations. The participant was then thanked for agreeing to participate. This was followed by a short explanation of the study and the participant’s right to discontinue the study, followed by reading the consent form and requesting consent. I then took several minutes to explain how the participant should be reading the word list, and responded to questions concerning items on the word list. Taiwanese is not often written or read and is mostly only spoken, which necessarily meant that participants would be less familiar with written forms of Taiwanese. Therefore, participants were encouraged to ask questions about the word list before beginning, and were asked to skip words that they felt they could not confidently say.

The word list consisted of one page of Taiwanese words arranged in 4 columns (see Appendix 1 for the attached word list). The word list consisted of 62 total items, with 34 target words and 28 distractor words strategically placed next to semantically
related target words. This was done both to diversify the word list, as well as to create semantic sets for priming target words. Following standard practices for commonly representing Taiwanese, all words were written in Chinese characters, and participants were given as much time as they liked to first look over the word list to make sure that they could read each item. Participants were then asked to read each item aloud on the word list in the kind of Taiwanese that they speak at home. Participants paused for several seconds in between words, reading each line from left to right. In total, the word list reading took approximately 3 - 5 minutes to complete. The interview concluded by asking the participant questions about his/her linguistic background. Questions were tailored to the individual, and included questions on the participant’s linguistic background, family, and sociolinguistic practices. Below is a representative sampling of the types of questions asked.

a) 你是在那裏出生長大的呢? Where did you grow up, and where do you live now?
b) 你第一個語言是什麽? What was your first language?
c) 你父母是本省人，還是外省人? Are your parents waisheng-ren, or bensheng-ren?
d) 你一般跟誰講台語呢? 跟這些人講話的時候都是台語嗎? How often and with whom do you speak Taiwanese?

---

14 For a list of the target words, please see Appendix B, which lists each target word. To see how distractor words were located strategically, please see the word list in Appendix A.

15 A Romanized form of written Taiwanese known as Peh-oe-ji does exist in Taiwan, but its usage is mostly limited to academic and educational writing. In actual Taiwanese society, the Taiwanese language is most often written in Chinese characters (Hanzi). Many Taiwanese words have an identifiable Mandarin cognate and are therefore written identically in Hanzi. For those Taiwanese words which do not, morphologically unrelated Hanzi are often used phonetically to represent the sounds of the word. Several words on my word list, including /ka-ki/ ‘self’, are written phonetically.

16 Participants were asked to do the following: 請你用你在家裏用的台語讀這些字, ‘please use the Taiwanese that you would speak at home to read these characters’.
3.8.1 Defending an impressionistic analysis.

Although the pilot study for this analysis employed a phonetic analysis looking at voice onset time, I have decided not to pursue an acoustic analysis for this study. Instead, I rely on an impressionistic analysis for determining sound changes in Taiwanese words, which I defend in the following discussion.

In my original pilot study, I found that the sound changes to voiced obstruents were plainly audible, as well as abundantly clear in a spectrogram analysis. An in-depth examination of voice onset time in the pilot study revealed that average voice onset time of voiced and voiceless obstruents differed at an average of 22 milliseconds for [g] / [k] and 25 milliseconds for [b] / [p]. This led to the conclusion that an in-depth acoustic analysis might not be necessary to derive analyzable results from examining voiced obstruents in Taiwanese. In order to verify that my impressions were accurate in this analysis, the spectrograms of several examples of underlying /dz/ were analyzed in Praat. Data from the speaker labeled ‘Taibei2’ was chosen at random, I found that my
impressions were accurate in every case. Below is an example of the differences between spectrograms of [dz], and [dz] devoiced to [ts]:

Figure 2: Spectrogram of [dzi]
Figure 3: Spectrogram of [tsi]

We can see that Figure 2 represents [dz] due to its distinct negative voice onset time, whereas Figure 3 represents [ts] with a positive VOT because voicing begins after the initial closure. I have relied on an impressionistic analysis of changes to voiced obstruents and I believe that my impressions are accurate. When determining the difference between voiced and voiceless became difficult in this analysis, the spectrogram in Praat was examined, but impressionistic analyses were otherwise used. I do note that impressionistic analyses are inherently less reliable than spectrogram analyses, and the decision to rely on mostly impressionistic analyses does leave open more room for error.
3.8.2 Elicitation Methodology and Challenges

Obtaining the data for the study was a challenge. First, I was hampered by the fact that Taiwanese is not usually written, and that prompting Taiwanese words is not a straightforward process.

Although Taiwanese is usually written in Chinese characters as previously explained, using Chinese characters poses problems for the methodology of this study. Chinese characters are predominantly used to write Mandarin, which makes it possible to think speakers might be experiencing influence from Mandarin in reading Taiwanese through characters. I also had to be sure that appropriate Taiwanese equivalents of characters existed, and that none of the words were too complex for participants to read. As previously noted in chapter 2, Taiwanese has not been a language of education, high society or politics since at least 1949, and I was therefore constrained to choose household words which participants would reasonably be expected to know and use.

As an alternative to using characters, Romanization was also considered. However, using Romanization instead of characters also proves problematic for two obvious reasons. If Romanization were used, then voiced obstruents /g/ /b/ /dz/ would have to be phonetically written out as alphabetic letters and thus would alert participants to their presence, thereby ruining the experiment. Also, I could not be sure that participants would even be accustomed to reading Taiwanese in a Romanized Peh-oe-ji script, since Peh-oe-ji is used mostly in an academic context as noted before. This made the use of Romanization completely untenable for this study.
The use of picture-based reading strategies was considered, where speakers would be shown a picture and asked to name it. However, this method is far more prone to generating inapplicable data, such as when speakers provide correct but off-target answers or when speakers are unable to determine what the drawing represents. It also severely limits the possibilities with respect to word choice, since it seems dubitable that concepts like ‘foreigner’ or ‘culture’ or ‘Taiwanese’ could even be coherently depicted as pictures. A picture-based elicitation strategy also takes a great deal more time than a word list entails. Patience on the part of participants also had to be taken into account, and I found it unlikely that participants would be willing to engage in a linguistic study that lasted for more than 15 minutes without compensation. There was therefore a need to keep the experiment short and simple, whereby a large amount of data could be gathered in a short time with a reasonable degree of accuracy.

In order to avoid these pitfalls, care was taken to create a Taiwanese word list using Chinese characters that I could be sure that participants would have no trouble reading. This resulted in a word list of relatively simple, quotidian words where some morphemes were repeated several times, such as the morpheme for ‘moon; month’ 月 gwe or gwat. The word list was also kept short to a total of 62 words so that the interview would take only around 5 minutes to complete. This allowed for more effective advertisement of the study.

One of the biggest challenges of this analysis is the small sample size. With a sample size of 15 participants, it becomes difficult to argue that contact-induced phenomena seen in this data are representative of language change in Taiwanese as a
whole. The small sample size remains an issue that cannot easily be remedied, except by a more in-depth study in the future. I should note that despite the small sample size, the data does remain intriguing. Language contact occurs in the mind of the bilingual speaker, and if there are any speakers at all exhibiting signs of Mandarin influence on their Taiwanese, this in and of itself is an interesting conclusion, even if the results are only arguably applicable to Taiwanese as a monolith.

In addition, the sample was slightly skewed towards over-representation from northern areas of Taiwan -- 7 total speakers from Taibei and Taoyuan (north), versus 6 from Gaoxiong, Tainan and Pingdong (south) and 2 from Taizhong and Nantou (central) -- which might be biasing results towards one particular regional variety of Taiwanese.

As mentioned above, it is possible that the use of impressions and not an acoustic analysis provides misleading data stemming from the researcher’s inability to properly hear sounds. I have previously justified the use of an impressionistic analysis. In the few instances in which voicing or presence of the consonant was ambiguous, I examined the spectrogram in Praat to check my impressions.

The lack of a longitudinal study is another challenge for this analysis. The current study is not longitudinal and thus cannot make any definite claims about how Taiwanese has changed from generation to generation. The participants in this thesis study were all adults ages 20-30, which represents approximately the same generation as the parents of children ages 9 - 12 in my original pilot study, albeit slightly younger; however, the adults were not residents of Penghu County and had no relation to the children. Thus, caution must be exercised in coming to any far-reaching conclusions about the
longitudinal development of Taiwanese in either Penghu County or in the rest of Taiwan. A longitudinal or multi-generational study in which both parents and children were interviewed along with any other family members might yield more insights into how Taiwanese is maintained or lost among bilinguals.

Another factor over which I cannot maintain complete control is the proficiency of bilingualism of the participants. All participants claimed strong bilingualism, and all participants claimed Taiwanese as the first language they learned at home. However, I did not have the means to test their Taiwanese proficiency, and accepted their word at face value that they were still fluent in Taiwanese. The possibility exists that participants’ idea of “fully bilingual” differed from my interpretation of high proficiency bilingualism, and that some participants were only functionally bilingual or had limited communicative ability. In order to account for these discrepancies, I did my best to ascertain their level of proficiency through a set of unscripted, unrecorded questions about the speakers’ backgrounds and how often they used Taiwanese.

Finally, an account of variation in the data runs into problems when we consider word frequency. I have no reliable method of determining relative frequencies of Taiwanese words for each of the participants in this study. Even if I were to access a corpus of Taiwanese conversations, the social settings in which Taiwanese is spoken tend to vary considerably depending on the speaker’s family background, family relations, language of peers, and a host of other factors. I would therefore expect considerable variation in the kinds of words that each participant regularly uses. These factors make determining word frequency impossible in this study. We can be fairly certain that words
such as ‘I, me’ and ‘tomorrow’ have a much higher frequency in conversation than words like ‘Sun-Moon Lake (toponym)’ and ‘culture’, but there are many words like ‘news’ and ‘temple’ for which we cannot make claims with any degree of certainty. For the purpose of this analysis, I only appeal to frequency in words which are obviously high frequency words, such as ‘I, me’, and I do not draw conclusions from words of ambiguous frequency.

3.9 Analysis Methodology

After data was collected, the data in the form of recordings were again replayed, and this time the pronunciations that participants used were written down in individual spreadsheets. In order to analyze the collected data, Excel and Googledocs were used to keep track of all consonants and numerical values. On each spreadsheet, each item on the word list that contained a voiced obstruent was given a column from top to bottom in order of appearance on the word list. Each speaker was assigned a spreadsheet, and pronunciations were listed alongside the standard form of each word for each participant. This constitutes the primary method of recording responses.

For each instance in which voiced obstruents /b/ /g/ and /dz/ are normally found in standard Taiwanese, the consonant that was actually articulated by the participant was noted. Each attested pronunciation was compared to the standard form and given one of 6 labels in 6 columns: Deletion, Nasalization, Lenition, Liquid (for both liquids and approximants), Devoicing, and None (meaning that the voiced obstruent was preserved). Each of these labels represents the strategy that participants used in changing the standard
voiced onset to the final pronunciation. Thus, for the word 問題 /bunte/ meaning ‘problem, question’, a pronunciation of [unte] would merit the label “Deletion”.

Similarly, a pronunciation of [vunte] would be labeled as “Lenition”, [munte] as “Nasalization”, and [punte] as “Devoicing”. The label “None” is used when the speaker made no change to the voiced obstruent. The label of “Liquid”, encompassing both liquids and approximants in order to cover the Mandarin phoneme /ɻ/, applies only to /dz/, and is used when the pronunciation became [l] or [ɾ]. Actual attested pronunciations with a strategy label other than “None” were marked as potential instances of imposition.

In addition, the Mandarin cognate was listed alongside the standard form and was also associated with one of the 6 labels: Deletion, Nasalization, Lenition, Liquid, Devoicing, and None. These labels represent the strategies by which the standard form could become most like the Mandarin form. For example, the Taiwanese word 我 /gwa/ with Mandarin cognate 我 /wo/ would be labeled as “Deletion”. This was done so that the actual attested onset could be compared with its Mandarin counterpart. When the actual attested pronunciation had a strategy label that matched the strategy label attached to the Mandarin cognate, such instances were marked as potential analogical matches.

Data was analyzed in this way for each individual speaker. In addition, three spreadsheets were calculated that combined speaker data. First, the aggregate total of all utterances by Taibei speakers was collected, and compared to the aggregate total of all utterances by Gaoxiong speakers. This was done to compare the two locations for any differences, since these two locations represent opposite ends of Taiwan and also
accounted for the most speakers in this study. Second, three totals were compared: a combination of speakers from Taibei and Taoyuan, a combination of speakers from Taizhong and Nantou, and a combination of all speakers from Gaoxiong, Tainan and Pingdong. Taibei/Taoyuan represent the northern area of Taiwan, Taizhong/Nantou represent the central area, and Gaoxiong/Tainan/Pingdong represent the southern area. Third, all speakers were pooled into a single table representing speakers of Taiwanese from all over Taiwan, to determine if global patterns emerge with respect to how every bilingual Taiwanese speaker treated voiced obstruents.
Chapter 4: Results, Analysis, and Discussion

In this chapter, I present my analysis of the data collected according to the methodologies in chapter 3. This chapter begins with a discussion of results from each participant, followed by an analysis of imposition and analogy. I discuss patterns in the data and attempt to account variation.

4.1 Results by Speaker

The following section gives the results of data collection for each speaker. Speakers are given in rough order from north to south.

4.1.1 Taipei 1

Taipei1 was among the most innovative speakers, with the vast majority of her voiced obstruents changed via analogy to Mandarin. Devoicing was not a strategy that Taipei1 ever employed, and instead we find an enormous amount of analogy to the Mandarin cognate's onset. Strangely, she articulated [ɾi] for one instance of ‘two’ /dzi/ ~ Mandarin er, which suggests that direct analogy with Mandarin was not the strategy employed to change this particular word. Taipei1 speaks Taiwanese with her family and friends, and spoke Taiwanese with friends and classmates during her time at university in Taipei.
4.1.2 Taibei 2

Taibei2 was extremely innovative and almost never articulated a full voiced obstruent. Instead, she replaced voiced stops and affricates with onsets corresponding to their Mandarin cognate counterpart, with only one instance of devoicing being used as a shifting strategy, namely /dzit/ meaning 'one'. This word was commonly devoiced across speakers, suggesting that its semantic salience and high frequency result in speakers using acoustically-based shifting strategies, not analogical strategies (discussed in section 4.5). Taibei2 speaks Taiwanese with her family and with members of her religious organization.

4.1.3 Taibei 3

Taibei3 was the most conservative Taibei speaker, but still did not pronounce voiced obstruents as often as the more conservative speakers (Gaoxiong2 and Gaoxiong3). Instead, Taibei3 almost always chose a Mandarin-like onset to replace voiced obstruents. Taibei3 now only speaks Taiwanese with her family members and almost never with peers or friends.

4.1.4 Taibei 4

Taibei4 was on the slightly more conservative side, with 33% of his voiced stops changed and 66% remaining unchanged. This was surprising, since other participants
from Taibei were more innovative. /dz/ was most commonly shifted to [r], while /b/ was mostly preserved, except in the word /bunte/ 'problem; question' which was [wunte].

4.1.5 Taibei

Taibei5 showed some more devoicing than other participants. Interestingly, Taibei5 sometimes deleted /g/, even when they were found in the same morpheme; for example, the morpheme for 原 'origin' was [gwan] in the word 'originally' but [wan] in the word 'ball pen'. Also, the morpheme for 月 'month; moon' was [gwe] in 'September' and 'December' but [we] in 'May'. Taibei5 speaks Taiwanese with his parents and grandparents, but not among peers or friends.

4.1.6 Taoyuan 1

Taoyuan1 exhibited interesting variation. The word for /gwan/ 'we, us' derives regularly from the word /gwa/ 'I, me' via the pluralizer -n; however, it was surprising that Taoyuan1 pronounced [gwa] for 'I, me' but [wan] for 'we, us'. Also, the use of [ɛn] instead of /gwan/ for the morpheme 原 'origin' is clear influence from Mandarin via analogy to Myuen [jyɛn]. Taoyuan1 speaks Taiwanese with her family members, especially her parents and grandparents, and speaks Taiwanese to her siblings when discussing household affairs. Taoyuan1 emphasized that she had a close relationship with her grandmother while growing up, and consequently spoke Taiwanese throughout much of her childhood and adolescence.
4.1.7 Taoyuan 2

Taoyuan2 is the older sister of Taoyuan1 with an identical linguistic background. Taoyuan2 patterned somewhat similar to Taoyuan1, but showed more lenition of /b/ to [w] and [v] than Taoyuan1. Also, additional differences include /dz/, which was not uniformly changed to [ɾ], even in the morpheme for 'day'/dzi/.

4.1.8 Taizhong 1

Taizhong1 was conservative in preserving voiced stops overall but showed some internal variation, even in the same morpheme. Three examples: he articulated a full [gwa] in the morpheme for 'moon'/gwa/ in the word 'Sun-Moon Lake', but otherwise articulated [we] with no /g/. The morpheme for 'origin'/gwan/ was pronounced [wan] in the word 'originally' but pronounced [gwan] in the word for 'ball pen'. And, the morpheme for 'speech' was pronounced [u] in the word for 'language', but [gi] in the words 'Taiwanese' and 'Mandarin'. Taizhong1 speaks Taiwanese with his parents and older family members, and also speaks some Taiwanese with friends.

4.1.9 Nantou 1

Nantou1 was moderately conservative but showed a fair amount of lost voiced obstruents. Of note are two pronunciations: [ɛn-] for /gwan-/ in 'ball pen' (~ M [jyɛn]) and [-wan-] for /-ban-/ in '10,000 dollars' (~ M [wan]). These are clearly analogy, and the fact that a speaker from Nantou (outside Taizhong City) used [ɛn-] for /gwan/ in the same way that both speakers from Taoyuan (outside of Taipei City) did show that this
substitution has occurred independently in different areas. Nantou 1 speaks Taiwanese with his family, including parents, grandparents, and siblings. Nantou 1 also speaks Taiwanese with his neighbors and community members, but speaks Mandarin among peers.

4.1.10 Tainan 1

Tainan 1 was one of the more conservative speakers, with most voiced obstruents intact. However, several important observations were found: Tainan 1 showed internal irregularity, wherein the morpheme /gwan/ 'origin' was pronounced as [gwan] in the word 'originally' but [wan] in the word 'ball pen'. Also, Tainan 1 irregularly used liquidization as a strategy for /dz/; the morpheme /dzit/ 'sun; day' was pronounced [dzit] in 'Sun-Moon Lake', but [рит] in the words for 'Japan' and 'today'. Tainan 1 speaks Taiwanese with her family members, and spoke Taiwanese exclusively as a child. Tainan 1 said that she now hardly ever speaks in Taiwanese with her friends and peers, though she continues to do so with her older relatives.

4.1.11 Gaoxiong 1

Gaoxiong 1 almost never shifted /b/, but changed /g/ frequently, sometimes in contradictory ways in the same morpheme. For example, she used [we] for 'month' in most cases, but [gwe] in one instance. Gaoxiong 1 speaks Taiwanese with her family members and with some peers/friends in her hometown.
4.1.12 Gaoxiong 2

Gaoxiong2 was in general rather conservative, but showed a greater tendency to simply devoice the consonant. As I will discuss in section 4.5, this devoicing should be seen as evidence of substitution based on phonetic distance, with devoicing being the shifting strategy that traverses the shortest phonetic distance. Devoicing was unpredictable, with the same morpheme showing up both voiced and devoiced several times in the data set. Gaoxiong2 only uses a liquid in the place of /dz/ one time, showing that the substitution of [l] for /dz/ (Maryknoll, 1976) is not a phenomenon that is necessarily widespread in Gaoxiong. Gaoxiong2 speaks Taiwanese at home with family and with some friends.

4.1.13 Gaoxiong 3

Gaoxiong3 was one of the most conservative speakers, with almost all of his voiced obstruents intact. Gaoxiong3 also emphasized that he speaks Taiwanese very often with both his family and his peers. In the few instances in which he did not articulate a voiced obstruent, influence from Mandarin through imposition and analogy can be seen as responsible. Gaoxiong3 speaks Taiwanese at home with his family, amongst friends, and with peers in his community.

4.1.14 Gaoxiong 4

Gaoxiong4 was also one of the most conservative speakers, with only a few instances of shifted voiced obstruents. All voiced stops and affricates were preserved,
except in the morphemes for 'I, me' [wa], 'we, us' [wun], 'moon; month' [we], 'foreign' [wa] and 'origin' [wan], all of which had originally had /g/ and were relatively higher frequency words. Thus, it appears that Gaoxiong4 had a preference for removing /g/ but not /b/. There was also one instance of clear devoicing with aspiration for the word 'one' [tsit]. Gaoxiong4 speaks Taiwanese with her family and friends, and prides herself on her Taiwanese.

4.1.15 Pingdong 1

Pingdong1 was tied for most conservative with Gaoxiong3. Almost all voiced stops were fully articulated, with only one instance of devoicing. The few instances where devoicing did not occur and voiced obstruents were changed, analogy to the Mandarin cognate provides the explanation. Pingdong1 speaks mostly Taiwanese with her parents but not with her siblings, and speaks only Taiwanese with her grandparents. She does not usually speak Taiwanese with peers or friends.

4.2 General Results

Several observations immediately stand out. First, a majority of all voiced obstruents were left unchanged by speakers. Of a total 554 voiced obstruents, 198 show shift by participants, or 35.7%. This number is considerable but not overwhelming, and the majority were left unchanged. Even the most innovative speakers retained some of their voiced obstruents, showing that these changes are not across the board. This suggests that this sound change is still very much in progress. Second, devoicing as a
strategy was very rarely used, with only 2.5% of all voiced obstruents becoming devoiced, and devoicing only accounted for 7.1% of all shifted consonants. Peculiarly, devoicing of one particular morpheme, /dzt/ ‘one’ accounts for over half of all cases of devoicing, an observation that will be revisited later. Section 4.5 will discuss devoicing as being motivated by phonetic distance.

Third, three kinds of variation existed in the data. Differences existed between /b/ /g/ and /dz/ with respect to the extent to which they were shifted. Of 239 total /g/ in the data set, 105 or 43.9% were shifted by participants. Of 222 total /b/ in the data, only 38 or 17.1% were shifted by participants. Of 93 total /dz/ in the data, 55 or 59.1% were shifted. Thus, we can see that /dz/ was most commonly shifted, /g/ in second place, and /b/ was least commonly shifted. Variation also existed between speakers. Some speakers were innovative and showed more shifting of voiced obstruents, such as Taipei1 with 49% of voiced consonants shifted. However, some speakers were more conservative, such as Pingdong1 with only 15% of voiced obstruents shifted. Variation also existed within individual speakers themselves. Some speakers removed voiced obstruents in some morphemes but did not in others, and some speakers even showed variation in the pronunciation of a single morpheme. However, this variation was limited to whether speakers preserved or did not preserve voiced stops. When speakers did remove voiced obstruents, there was very little variation with respect to the strategies they used to do so.

At this point, we can answer the first of the research questions posed in Chapter 1, namely “Is the same sound change as seen in Penghu County occurring elsewhere in Taiwan?” to which the answer is a definite “yes”. Speakers from every area of Taiwan
showed the same patterns in the way that voiced obstruents were shifted, wherein /g/ was most often deleted, /b/ was most often lenited, and /dz/ was most often weakened to a flap [ɾ]. We can therefore affirm that this sound change is occurring all across Taiwan and is not simply limited to Penghu County.

4.2.1 Explanations We Can Rule Out

The focus on young bensheng-ren adults age 20 - 30 in this analysis allows us to discount much of the linguistic influence that parents or grandparents may have effected. In particular, the role of linguistic dominance in imposition shows that the current generation of young adults must be the agents of Mandarin imposition on Taiwanese.

As a good estimate, the age of participants’ parents would likely range from their mid-40’s to their 60’s, and grandparents in their 70’s or older. We can be almost certain that the grandparents of participants, being bensheng-ren natives, are all Taiwanese speakers who possess at most limited proficiency in Mandarin. Most grandparents must have already been adults by the 1950s, and it is therefore unlikely that their Taiwanese has any influence from Mandarin. We can also be certain that the parents of participants grew up in Taiwanese-speaking households, but learned Mandarin in school. This is the tail end of the generation primarily responsible for the development of Taiwanese Mandarin, which has developed under the influence of Taiwanese-dominant bilinguals. It therefore makes little sense to think that these Taiwanese-dominant bilinguals would be agents in imposing Mandarin influence on their Taiwanese. Therefore, we are left to conclude that the older members of the participants’ families are not agents of
imposition; in other words, the current generation could not have learned these forms from imposition and analogy having previously occurred. The current generation of young adults is the first generation for whom it is likely that their Mandarin might be equal to or exceed their proficiency in Taiwanese, and it is this generation of bilingual speakers to whom we can attribute contact-induced change in Taiwanese.

The sound changes examined in this analysis also cannot be attributed to the kind of “indirect structural borrowing” that can result from the large-scale importation of lexical items (Winford, 2003: 30, Pavlenko 2004). As a rule, imitative borrowing almost never occurs in Taiwanese; lexical transfer between the two languages is invariably achieved through morpheme calques. Therefore, we can be certain that Mandarin phonology has not entered into Taiwanese through lexical importation. When Mandarin does appear in Taiwanese speech, it should be regarded as bilingual code-switching, not as imitative lexical borrowing.

Finally, we can also rule out the explanation that this lack of voiced obstruents is instead reflecting crystallized changes to Taiwanese phonology that have already occurred in the language’s history. Dictionaries of modern Taiwanese all attest to the presence of a voiced obstruent series; no dictionary had any entry for ‘me’ as [wa], all list [gwa]. Second, and most importantly, deletion or shifts in the voiced obstruent series are not across the board; speakers showed widely varying degrees of loss, with some speakers preserving most voiced obstruents and others preserving few. Some speakers even used devoiced the voiced obstruents, and variation was seen not only across locales but within locales as well. The fact that members of the same speech community show
such differences suggests that this is a change in progress, not a reflection of linguistic history.

4.3 Analysis: Imposition

We can also now begin to answer the second research question, that is, “Is contact with Mandarin responsible for producing these changes? If so, in what way?” As explained in the literature review, Brewer’s (2008) study of Taiwanese dialects does not indicate that any dialect traditionally does not articulate /g/ or /b/. This allows us to rule out dialectal differences in whether voiced obstruents are present or absent. The enormous amount of variation in the data also allows us to rule out Neogrammarian sound change and phonologically-conditioned sound change, and no phonetic conditioning can be found. Furthermore, if Taiwanese-internal sound change (Neogrammarian sound change) is responsible for marking /g/, we should expect all instances of /g/ to be shifted using the same strategies, or at least see strategies that are phonetically conditioned, rather than the large amount of phonetically inexplicable variation we see in strategies. The same is true of /b/ and /dz/, where we also see large variation in the types of sound changes occurring, not just between consonants but also between participants, between individual lexical items and occasionally even within the same lexical item. This is even greater impetus for a conclusion that these sound changes cannot be accounted for by appeals to Neogrammarian sound change.

Contact with Mandarin is the only possible explanation, and also happens to be the best possible explanation. We can attribute all of the sound changes regarding voiced
obstruents in the data to the Mandarin imposition. The imposition of Mandarin phonology on Taiwanese first causes voiced obstruents to become marked as “foreign”. These are the phonological mismatches mentioned earlier in the chapter, Taiwanese sounds that do not have Mandarin counterparts and are thus “foreign” in Mandarin phonology. As a result, speakers fix these mismatches by removing voiced obstruents. We are thus able to explain all of the different sound changes as expressions of the same underlying phenomenon—an avoidance of Taiwanese voiced stops, which are foreign in Mandarin and thus become subject to substitution via phonological imposition. Individual speakers may vary in the way in which they change these sounds, but the motivation for each participant in doing so stems from one common, underlying aim, namely, to avoid these mismatches.

In Van Coetsem’s framework, we can understand this structural imposition as Mandarin agentivity on the part of bilingual speakers.

<table>
<thead>
<tr>
<th>Source language (ling. dom)</th>
<th>Recipient language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandarin</td>
<td>Taiwanese</td>
</tr>
</tbody>
</table>

During this process, speakers rely on source language agentivity, namely Mandarin agentivity, and impose Mandarin phonology on Taiwanese. Crucially, we must note that in Van Coetsem’s model of SL agentivity, the source language is dominant by definition: “In sl agentivity the linguistically dominant term in the relation between the rl and the sl is the sl; this is sl dominance” (Van Coetsem, 1988: 11). This means that speakers applying Mandarin imposition on their Taiwanese are dominant in Mandarin by definition. This conclusion will be revisited and discussed in Chapter 5 of this thesis.

103
4.4 Analysis: Analogy

The imposition of Mandarin structure provides an explanation for why voiced obstruents are being deleted or changed in the data. However, this does not necessarily provide an explanation of why we see the final results that we do. For example, we see that /g/ became deleted in 42.6% percent of cases, but imposition alone fails to explain why deletion was chosen as a strategy and not, say, nasalization or devoicing. This section shows that analogy with Mandarin is the best explanation for how speakers decide on a strategy.

As explained in section 3.9, I identify 5 different primary types of sound change that speakers used as strategies to shift voiced obstruents. Each actual attested pronunciation was compared to the standard form and given one of the 6 labels: Deletion, Nasalization, Lenition, Liquid, Devoicing, and No Change. In addition, the Mandarin cognate morpheme was also associated with one of the 6 labels: Deletion, Nasalization, Lenition, Liquid, Devoicing, and No Change. These labels represent the strategies by which the standard form could become most like the Mandarin form. Those instances where both the actual attested pronunciation’s strategy label and the Mandarin cognate’s strategy label coincided were marked as an analogical match. Figure 4 below shows the pooled data for all speakers, with analogical matches highlighted in darkened cells.
<table>
<thead>
<tr>
<th>Word</th>
<th>Deletion</th>
<th>Nasalization</th>
<th>Lenition</th>
<th>Liquid</th>
<th>Devoicing</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>gi-(gen)</td>
<td>4 (31%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9 (69%)</td>
</tr>
<tr>
<td>(gi) gen</td>
<td>7 (58%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (42%)</td>
</tr>
<tr>
<td>(tai)gi</td>
<td>2 (13%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13 (87%)</td>
</tr>
<tr>
<td>(kok)gi</td>
<td>4 (27%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 (73%)</td>
</tr>
<tr>
<td>gwa-(koklang)</td>
<td>11 (73%)</td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td></td>
</tr>
<tr>
<td>gwa</td>
<td>9 (60%)</td>
<td></td>
<td>1 (7%)</td>
<td>5 (33%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gwan</td>
<td>10 (67%)</td>
<td></td>
<td></td>
<td></td>
<td>5 (33%)</td>
<td></td>
</tr>
<tr>
<td>go</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>go-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 (100%)</td>
<td></td>
</tr>
<tr>
<td>-gwe</td>
<td>8 (57%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (43%)</td>
</tr>
<tr>
<td>(kau)gwe</td>
<td>9 (60%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (40%)</td>
</tr>
<tr>
<td>(tsap-dzi)gwe</td>
<td>7 (47%)</td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td></td>
</tr>
<tr>
<td>-gwa (tham)</td>
<td>7 (50%)</td>
<td></td>
<td></td>
<td></td>
<td>7 (50%)</td>
<td></td>
</tr>
<tr>
<td>gwan(lai)</td>
<td>10 (71%)</td>
<td></td>
<td>1 (7%)</td>
<td>3 (22%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gwan(tsu-pit)</td>
<td>10 (71%)</td>
<td></td>
<td>1 (7%)</td>
<td>3 (22%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>go/ngo</td>
<td></td>
<td></td>
<td>1 (10%)</td>
<td>9 (90%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gu-(bamiN)</td>
<td>2 (14%)</td>
<td></td>
<td></td>
<td></td>
<td>12 (86%)</td>
<td></td>
</tr>
<tr>
<td>bin(a-t sai)</td>
<td>14 (100%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bi-koklang</td>
<td>1 (7%)</td>
<td></td>
<td>1 (7%)</td>
<td>13 (86%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 (93%)</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bio</td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(sin)bun</td>
<td></td>
<td></td>
<td>5 (36%)</td>
<td>9 (64%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ban-kho</td>
<td></td>
<td></td>
<td>4 (21%)</td>
<td>11 (79%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bi-lai</td>
<td>1 (7%)</td>
<td></td>
<td>1 (7%)</td>
<td>13 (86%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bi</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>14 (93%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bun(te)</td>
<td></td>
<td></td>
<td>5 (33%)</td>
<td>10 (67%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bun-(ku-tiam)</td>
<td>1 (10%)</td>
<td></td>
<td>9 (90%)</td>
<td>9 (90%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bun(hwa)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>13 (93%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bo(nai)</td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bo</td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(gu)uba(miN)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td>12 (86%)</td>
<td></td>
</tr>
<tr>
<td>dzit-(gwatham)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td>8 (57%)</td>
<td>6 (43%)</td>
<td></td>
</tr>
<tr>
<td>(kina)-dzit</td>
<td></td>
<td></td>
<td></td>
<td>6 (55%)</td>
<td>4 (36%)</td>
<td></td>
</tr>
<tr>
<td>dzit-pun</td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td>7 (47%)</td>
<td></td>
</tr>
<tr>
<td>dzwa</td>
<td></td>
<td></td>
<td></td>
<td>11 (73%)</td>
<td>4 (27%)</td>
<td></td>
</tr>
<tr>
<td>dzit-(bankho)</td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td>7 (47%)</td>
<td></td>
</tr>
<tr>
<td>dzit(wi-lausu)</td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td>11 (73%)</td>
<td></td>
</tr>
<tr>
<td>(tsap)dzi-</td>
<td></td>
<td></td>
<td></td>
<td>5 (36%)</td>
<td>5 (36%)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: All Data Arranged by Word
Figure 4 clearly shows that analogical matches were exceedingly common and dominate the data set\textsuperscript{17}. Table 13 shows the percentage of analogical matches for each voiced obstruent and for the total:

<table>
<thead>
<tr>
<th>Sound</th>
<th>Number of shifted</th>
<th>Number of analogical matches</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>/b/</td>
<td>38</td>
<td>36</td>
<td>94.7%</td>
</tr>
<tr>
<td>/g/</td>
<td>105</td>
<td>101</td>
<td>96.2%</td>
</tr>
<tr>
<td>/dz/</td>
<td>55</td>
<td>43</td>
<td>78.2%</td>
</tr>
<tr>
<td>Total</td>
<td>198</td>
<td>174</td>
<td>87.9%</td>
</tr>
</tbody>
</table>

Table 13: Analogical Matches

This table shows that of the 38 total /b/ that were shifted, 36 of them or 94.7% were analogical matches to Mandarin. Of the 105 total /g/ that were shifted, 101 or 96.2% of them were analogical matches to Mandarin. Of the 55 total /dz/ that were shifted, 43 or 78.2% of them were analogical matches to Mandarin. In total, of the 198 total shifted voiced obstruents in the data, 174 of 87.9% of them were analogical matches to Mandarin cognates. The fact that 87.9% of all shifted voiced obstruents were found to be analogical matches to Mandarin cognates shows that the great majority of shifts in the data can be attributed to analogy to Mandarin forms. The following section shows, sound by sound, the process by which analogy is drawn between Taiwanese and Mandarin cognates, and how this process determines the outcome of imposition.

\textsuperscript{17} For the full data table including English and Character glosses, see Appendix B.
4.4.1 Analogy for /g/

When Taiwanese /g/ was not retained, it was almost always deleted. The use of deletion as the primary strategy for /g/ is consistent with analogy to Mandarin, as in the following examples:

\[
\begin{align*}
/gwa/ & \rightarrow [wa] \sim M\ wo \\
/gwan-lai/ & \rightarrow [wan-lai] \sim M\ yuan-lai \\
/gi-gen/ & \rightarrow [i-en] \sim M\ yu-yan
\end{align*}
\]

In only one instance did a speaker do anything other than delete /g/, and this was in the word for ‘beef; cow’, as in the following example:

\[
/gu/ \rightarrow [ŋu] \sim M\ niu
\]

This case of nasalization can be understood as possibly arising due to some pre-nasalization of Taiwanese voiced stops. Chan (1987: 88-90) notes that both Quanzhou and Zhangzhou dialects of Taiwanese are attested as showing pre-nasalization of the voiced stop series, as does Pan (1994) who finds pre-nasalization but notes that it is not necessarily universal. The voiced series and nasal series are mostly in complementary distribution, though Chan (1987: 89) cites Tung (1958) in mentioning that exceptions exist, such as /bin/ alternating with /min/ in the word for ‘next year’, a variation that also exists for words like /bin-a-tsaι/ ~ /min-a-tsaι/ ‘tomorrow’ in dictionaries consulted for this analysis. Given the small phonetic distance between pre-nasalized voiced stops and plain nasals and the allomorphy they exhibit, it is reasonable to think that this instance of nasalization could either be due simply to their phonetic similarity, or due to analogy working through pre-nasalization.
The loss of /g/ in words where Mandarin has only the glide onset constitutes strong evidence for analogy. Bilingual speakers targeted a null onset in Mandarin and chose a strategy whose result was closest to that null onset. In the case of /g/, this involved deleting the velar onset entirely.

4.4.2 Analogy for /b/

When Taiwanese /b/ was not retained, it was mostly lenited to [w] or [v], and this was due to direct analogy with Mandarin cognates beginning with /w/. Examples:

/bun-te/ → [wun-te] ~ M wenti,

However, speakers did not lenite /b/ into [v] or [w] when the corresponding Mandarin cognate began with [m], as in the word for ‘American’ /bi-kok-lang/;


In all of these instances, /b/ was mostly retained or rarely nasalized, but never lenited. The fact that we see /b/ → [v], [w] in words where the Mandarin cognate begins with [w], as well as the fact that we do not see this shift when the Mandarin cognate begins with [m], provide evidence for analogy as the motivation for this sound change.

It should be noted that the word list contained more Taiwanese words with /b/ that correspond to Mandarin /w/ than to Mandarin /m/. Of the common, household words containing /b/ that I determined suitable for use, a greater number corresponded to Mandarin /w/ rather than /m/, so I was forced to choose more words for which Taiwanese b ~ Mandarin w. This therefore gives the impression that /b/ is universally shifted to [w],
which is not principally the case, but is instead due to the overabundance of \( b \sim w \) cognates in the data set.

4.4.3 Explaining Retention of \(/b/\)

It is interesting to note that participants almost always retained \(/b/\) in three particular morphemes: \(/bio/ ‘temple’, /bwe/ ‘buy’ and /bwe/ ‘sell’. These three morphemes correspond regularly to Mandarin /miao/ ‘temple’, /mai/ ‘buy’ and /mai/ ‘sell’. Only one participant changed the word ‘buy’, but the strategy chosen was devoicing, not nasalization as one might expect.

Why did speakers change \(/b/\) when the analogical target in Mandarin was [w], but not do so when the target was [m]? One possible explanation is that [m] and [b] are phonetically similar enough that no analogy to Mandarin is required in such cases. It has been found that voiced obstruents \(/b/\) and \(/g/\) in Taiwanese are sometimes articulated as prenasalized (Pan, 1994). Although it is outside the scope of this thesis to investigate prenasalization of \(/b/\), the possibility that some [b] phones could have a nasal component is intriguing and worthy of further investigation. This may explain why speakers so rarely changed \(/b/\) when the Mandarin cognate began with /m/.

4.4.4 Analogy for \(/dz/\)

The voiced stop \(/dz/\) in Taiwanese words was pronounced as [l] or as a flap [ɾ] in a majority of cases by analogy to the Mandarin rhotic retroflex fricative, a sound that is associated with the liquid [l] in Taiwanese Mandarin (Kubler, 1981: 35). Examples:
Taiwanese /dzit/ → [ɾit] ~ M ri
Taiwanese /dzwa/ → [ɾwa] ~ M re

However, /dz/ only changed to [ɾ] or [l] when the corresponding Mandarin cognate began with the rhotic retroflex; speakers did not change /dz/ to [ɾ] when the corresponding Mandarin sound differed. The only two instances in which /dz/ did not regularly change to [ɾ] were the words for ‘one’ /dzi/ and ‘two’ /dzi/, which have Mandarin cognates yi and er. The absence of an [ɾ] pronunciation in the words ‘one’ and ‘two’ is clear evidence that speakers are drawing direct comparisons to Mandarin cognates.

4.4.5 Explaining [ɾi] from T /dzi/ ~ M er

Surprisingly, for the word ‘two’, speakers targeted [ɾ] for analogy despite the Mandarin cognate being onsetless, as in the following:

/dzi/ → [ɾi] ~ Mandarin er

An explanation of why some speakers use a liquid to replace the word /dzi/ ‘two’ is that although the Mandarin cognate er has no onset consonant, its coda is the same retroflex fricative that appears in words like ri ‘day’. Words with this retroflex onset often correspond to Taiwanese /dz/ onset, which explains how speakers may be making a round-about analogy to Mandarin. Also the syllable er in Mandarin can be thought of as a syllabic rhotic vowel with a single tongue gesture (Norman, 1987: 144). This suggests that the entire syllable er can be thought of as a single rhotic retroflex and thus act as a
target for [ɾ] just like the Mandarin syllables re and ri. Thus, instances of this type do not constitute contradictory evidence for the analogy hypothesis.

4.4.6 Quanzhou Dialect Forms

The Zhangzhou dialect, which I have thus far analyzed as the basis for Standard Taiwanese, has the phoneme /dz/ in words such as 日 /dit/ ‘sun; day’. The Zhangzhou dialect form is considered the standard form and is indicated in dictionaries consulted for this analysis. However, in the Quanzhou dialect, the sound corresponding to /dz/ in Zhangzhou Taiwanese is a liquid /l/. This is not due to contact with Mandarin, and is instead an older feature of the Quanzhou dialect (Tung, 1967). Therefore, the fact that some speakers articulate an [l] for instances of /dz/ does not necessarily mean that contact with Mandarin is responsible. This poses a problem for analyzing the sound change of /dz/ becoming [l] that we see in the data as due to contact with Mandarin.

Of the 15 total speakers interviewed, 4 speakers were from traditionally Zhangzhou-speaking areas (Nantou, Taizhong, Taoyuan), 5 from traditionally Quanzhou-speaking areas (Taibei), and 6 from areas of Taiwan that are now considered “mixed” Zhangzhou and Quanzhou areas (Gaoxiong, Tainan, Pingdong) (Hong, 2010). Table 15 below shows the data associated with /dz/, with speakers grouped by area from top to bottom:

\[\text{Table 15}\]

---

18 There was one online dictionary that I did not consult but that also cited Quanzhou forms as alternative readings.
The data show that instead of clear dialect differences, speakers exhibited a range of both Quanzhou and Zhangzhou dialect forms, with most speakers showing a combination of both /dz/ and /l/. For example, Taipei5 (Quanzhou) used [dz], whereas Taoyuan1 (Zhangzhou) used [l]. There was also a great deal of intra-speaker variation; many speakers used both [dz] and [l] in different words. This means that we cannot point to any speakers and definitively say that they are Quanzhou or Zhangzhou dialect speakers. It also means that [l] was sometimes used in place of /dz/ even for those speakers that used /dz/ in other words.

Also, we see a large amount of contact-induced change for /b/ and /g/, and we would expect contact-induced change in /dz/ as well. Therefore, it does not make sense to analyze all of the variation with respect to /dz/ as being solely due to dialect differences. Furthermore, /dz/ was shifted in 59.1% of all cases, which is much greater

<table>
<thead>
<tr>
<th>Speaker</th>
<th>/dz/</th>
<th>/dz/</th>
<th>/dz/</th>
<th>/dz/</th>
<th>/dz/</th>
<th>/dz/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taipei1</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>R</td>
<td>ts</td>
<td>dz</td>
</tr>
<tr>
<td>Taipei2</td>
<td>l</td>
<td>l</td>
<td>l</td>
<td>r</td>
<td>ts</td>
<td>ts</td>
</tr>
<tr>
<td>Taipei3</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>ts</td>
<td>ts</td>
</tr>
<tr>
<td>Taipei4</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>dz</td>
<td>ts</td>
</tr>
<tr>
<td>Taipei5</td>
<td>dz</td>
<td>r</td>
<td>dz</td>
<td>r</td>
<td>ts</td>
<td>ts</td>
</tr>
<tr>
<td>Taoyuan1</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
</tr>
<tr>
<td>Taoyuan2</td>
<td>r</td>
<td>dz</td>
<td>r</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
</tr>
<tr>
<td>Taizhong1</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>ts</td>
<td>dz</td>
</tr>
<tr>
<td>Nantou1</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>r</td>
<td>dz</td>
<td>dz</td>
</tr>
<tr>
<td>Gaouxiong1</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>dz</td>
<td>ts</td>
<td>Deleted</td>
</tr>
<tr>
<td>Gaouxiong2</td>
<td>r</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>Deleted</td>
</tr>
<tr>
<td>Gaouxiong3</td>
<td>Deleted</td>
<td>r</td>
<td>r</td>
<td>ts</td>
<td>dz</td>
<td>Deleted</td>
</tr>
<tr>
<td>Gaouxiong4</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>ts</td>
<td>dz</td>
</tr>
<tr>
<td>Tainan1</td>
<td>dz</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>dz</td>
<td>dz</td>
</tr>
<tr>
<td>Pingdong1</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>dz</td>
<td>ts</td>
<td>Deleted</td>
</tr>
</tbody>
</table>

Table 14: /dz/ Arranged by Area
than either /b/ or /g/. Given the large-scale replacement of /dz/ with liquids by speakers from all areas, and given the fact that speakers from all areas replaced /dz/ with [l] or [ɾ], it seems unlikely that all of this changes are pre-existing dialect differences.

Finally, the data show that for some words, such as ← /dzit/ ‘one’, speakers only used devoicing as their strategy for shift and did not use [l] or [ɾ]. In these cases, we can know for certain that imposition of Mandarin phonology is responsible. This establishes that imposition does work on /dz/, and provides further impetus for thinking that the sound change of /dz/ becoming a liquid is driven by imposition.

Instead of attributing this alternation entirely to a Quanzhou dialect feature, the most reasonable analysis is that the enormous preference for [l] or [ɾ] instead of [dz] is a result of contact-induced change acting on pre-existing dialect differences. Clearly, an alternation between /dz/ and the liquids /l/ or /ɾ/ already exists for Taiwanese speakers; Hong (2010) argues that there are no longer any areas of Taiwan that can be considered pure Zhangzhou or Quanzhou dialect areas, and that dialect mixing has permeated all of Taiwan. I conclude that speakers have access to competing forms [dz] and [l] or [ɾ], and that imposition of Mandarin phonology on Taiwanese works on this pre-existing alternation. Imposition causes /dz/ to become marked for shift, and those speakers for whom /dz/ is the underlying form subsequently use the [l] or [ɾ] form as its replacement. Some [l] or [ɾ] that are attested in the data must be Quanzhou dialect forms and are not the result of contact with Mandarin; however, the data does not show speakers who are clearly differentiated in terms of Zhangzhou versus Quanzhou dialect, and if we take into
account the widespread imposition we see and the fact that dialect mixing is widespread, this conclusion is the most reasonable.

4.5 Devoicing and Phonetic Distance

Devoicing was rarely used as a strategy by participants, but it deserves mention since it does not conform to the analogy hypothesis. Devoicing /b/ /g/ and /dz/ to [p] [k]and [ts] preserves acoustic and articulatory features of these stops while simply altering the [+voiced] feature in order to obey Mandarin phonology. We can think of devoicing as a strategy motivated by phonetic distance. Literature on L2 learning of foreign phones such as James (1996), Flege (1980) and Leather & James (1991) emphasizes the importance of phonetics in understanding how L2 learners produce new sounds. Going further, literature on phonological adaptation such as Peperkamp & Dupoux (2003), Peperkamp (2005), and Paradis (1997) stresses the primacy of phonetic distance in phonological adaptation; when speakers adapt phonologically ill-formed words, speakers consistently choose a minimally different sound in its place. The fact that we do see some shifting of voiced obstruents based on phonetic distance makes it even more intriguing that analogy, not phonetic distance, is what governs the choice of sound change in the vast majority of cases, as I have argued. This runs counter to literature that emphasizes phonetic distance in phonological adaptation.

In addition, there is an explanation for why devoicing was more common in the word /dzit/ 'one', which sometimes was pronounced as /tsit/. Neither Taiwanese nor Mandarin have definite or indefinite articles; instead, the construction "one + measure
word + noun" is very often used to represent the indefinite "a + noun" in English. Consequently, the word /dzit/ for 'one' sees an enormous amount of usage in Taiwanese. Although I was unable to find a Taiwanese corpus study, Huang et al. (1997) conducted a spoken and written morpheme corpus study that found that the word for 'one' in Mandarin is the sixth most common morpheme. Given the great similarity that Taiwanese syntax bears to Mandarin, we can assume that 'one' is also one of the most common morphemes in spoken Taiwanese. The fact that 'one' is of such high frequency may account for its being devoiced more often. It has been found that adults make significantly fewer errors in high frequency words (Vitevitch, 1997), and it is possible that speakers are more likely to attempt to remain articulatorily and acoustically faithful to the original sound /dz/, thereby substituting /ts/ based on its close similarity. This explanation, however, does not account for the fact that /gwa/ 'I, me', which is also a high frequency word, very often becomes [wa].

4.6 Accounting for Variation

One of the most intriguing and puzzling results of this study is that variation in the data did not appear to correlate to any known variables.

The most conservative speaker, Gaoxiong2, stated that he uses Taiwanese regularly with his family, friends and peers, whereas the most innovative speaker, Taibei2, stated that she only uses Taiwanese with some members of her family. This seems to corroborate the hypothesis that the regular use of Taiwanese correlates with more conservative forms. However, contradictory evidence also exists. Taibei3 and
Pingd pong1 also stated that they both only use Taiwanese with older members of her family, and both were among the more conservative speakers. Similarly, Taibeı1 and Gaoxiong1 both stated that they use Taiwanese regularly, but were among the most innovative in their pronunciations. It is important to note that these results are based on information provided by participants themselves and may be subject to individual bias. I conclude that based on the information that participants provided, the extent to which participants use Taiwanese is not correlated with the extent of their innovative pronunciations.

Location also did not seem to have a strong correlation with innovative pronunciation. Taken as an aggregate whole, Taibeı speakers were the most innovative, but caution must be exercised in drawing conclusions from comparisons of only several data points. The most innovative of the speakers were Taibeı1 and Taibeı2, which suggests that Taibeı pronunciations may be more influenced by Mandarin. This is a logical conclusion, since it is widely known that Mandarin is more dominant in the northern regions of Taiwan, especially Taibeı (Kubler, 1981; S. Liao, 2008; personal contacts). However, evidence is weak that any of these sound changes are dialect features of Taibeı or northern Taiwan. In addition to a lack of evidence from Brewer (2008), speakers from Taibeı did not show total uniformity in shifting voiced obstruents, and instead showed variation from speaker to speaker, e.g. ‘problem; question’ Taibeı1 [wunte] but Taibeı3 [bunte], and ‘Taiwanese’ Taibeı1 [kok-gi] but Taibeı3 [ko-u]. Therefore, we might interpret the correlation between Taibeı and innovation not as
evidence of any regional differences, but due to social factors which may be causing bilinguals to be influenced by their Mandarin.

The only true commonality between participants that could account for how all of them are imposing Mandarin phonology on their Taiwanese is the fact that every participant claimed that they spoke Mandarin more than they spoke Taiwanese. In sum, it seems unavoidable to conclude that innovative pronunciations are occurring all over Taiwan without regard to frequency of Taiwanese use, and only tentatively with location.

Some commonalities can be found with respect to specific morphemes, in that there are a small set of morphemes that were almost always shifted regardless of the participant. For example, in 59% of total cases, /dzit/ ‘Sun, day’ was pronounced as [ɾit] with a liquid initial. There also appear to be some morphemes that are completely resistant to shift. For example, the three morphemes /bwe/ ‘sell’, /go/ ‘5’, and /bio/ ‘temple’ were never shifted by any of the speakers. However, there does not seem to be a straightforward explanation for which words undergo shift and which do not. When we examine word frequency, no straightforward pattern emerges; both ‘sun, day’ and ‘5’ seem to be relatively high frequency morphemes and yet were treated completely differently by participants in the data set. On the other hand, the words for ‘temple’ and ‘language’ seem to be relatively lower in frequency, but were again treated differently, with ‘language’ /gigen/ mostly being shifted and ‘temple’ /bio/ never undergoing shift. I conclude that word frequency does not play a role in determining whether imposition and analogy will occur. Van Coetsem notes that “frequency is here only one of a variety of known and unknown factors, which often intimately interact, making it very difficult to
establish their respective roles and their hierarchy” (Van Coetsem, 1988: 26). If word frequency does play a role, its effects are likely very complex and ultimately speaker-dependent.

One possible explanation lies in the different speech domains to which Taiwanese words might belong. Given the fact that participants in this study learned Taiwanese at home from older relatives, it is plausible that those words belonging to the domain of older people and traditional life might be pronounced more conservatively. This might explain why the word /bio/ ‘temple’ was universally left unchanged as /bio/. Temples are commonplace in Taiwan but frequented more often by the older generations of Taiwanese. Therefore, the word for ‘temple’ might see use only in the context of traditional Taiwanese practices and in conversations with older relatives, which could explain why all speakers used the conservative form /bio/. However, this explanation does not account for other words such as /go/ ‘five’, which also did not undergo any shift.

I conclude that none of the factors examined in this study definitively correlate with shifting of voiced obstruents, with the exception of location, which I only tentatively conclude correlates with Mandarin imposition and analogy.

4.6.1 Shifting and Word Length

One interesting trend is worth mentioning, namely that participants appeared to shift /b/ /g/ and /dz/ more often when these sounds appeared in longer words, and appeared to shift less often in shorter words. For example, all of the words that were never shifted by any participant were words consisting of only one morpheme, such as
/go/ ‘5’, /bio/ ‘temple’ and /bwe/ ‘sell’. This may be due to the fact that individual consonants are more salient in shorter words, leading speakers to pay more attention to the pronunciation of voiced obstruents in shorter rather than longer words. In order to test this idea, a short statistical test was run. It was found that when a voiced obstruent was articulated in a word consisting of only 1 morpheme, there was an average of 1.56 shifts per morpheme. When a voiced obstruent was articulated in a word consisting of 2 syllables, the average was 2.86 shifts per syllables, and in words consisting of 3 syllables, the average was 3.54 shifts per syllable. Comparing these values, I found none of the comparisons to be statistically significant (p < .05). This may, however, be due to the sample size, and this explanation deserves further research.

4.7 Conclusion: Imposition and Analogy

The results of this study point towards analogy as the only explanation for variation in the ways that speakers changed voiced obstruents. The most common strategy for each of the voiced obstruents differed greatly. In instances where speakers changed voiced obstruents, deletion was most common for /g/, lenition most common for /b/, and /dz/ was almost always changed to a liquid (which can also be seen as a kind of lenition). These sound changes correlate precisely with the cognate correspondences to Mandarin that we established in chapter 4. We also see variation at the lexical level, where voiced obstruents undergo different sound changes depending on the morpheme they appear in. When we compare these morphemes to their Mandarin counterparts, it becomes clear that the variation can only be accounted for by appealing to analogy.
We can now answer in full research question #2, “Is contact with Mandarin responsible for producing this change? If so, in what way?”: Yes, contact with Mandarin is responsible for these changes. Under Mandarin agentivity, bilingual speakers impose Mandarin structure onto Taiwanese words, specifically Mandarin phonology. Imposition of Mandarin phonology causes non-Mandarin phones in Taiwanese to become marked. Voiced obstruents exist in Taiwanese but do not exist in Mandarin, and thus become marked for removal. As a strategy to resolve this markedness and remove voiced obstruents, bilinguals do one of two things: 1) simply devoice them as a default strategy, or 2) target the Mandarin cognate of the word in question as an analogical model for changing voiced obstruents. Speakers employing analogy have a choice of 4 strategies (deletion, nasalization, lenition, liquidization), and choose the strategy whose result will be closest to the Mandarin cognate’s onset.
Chapter 5: Conclusions and Contributions

5.1 Summarizing Results

As I have shown in chapter 5, we can now answer the first two of the three research questions that motivate this thesis:

1) Is the same sound change as seen in Penghu County occurring elsewhere in Taiwan?
2) Is contact with Mandarin responsible for producing this change? If so, in what way?

This research has shown that the bilingual Taiwanese-Mandarin speakers of this study show the same sound changes as seen in Penghu County in the pilot study, and that these changes are occurring all over Taiwan, from Gaoxiong to Taibei. These sound changes include the changes to /g/ and /b/ examined in the pilot study as well as changes to /dz/, in short, to all voiced obstruents. These changes show great inter-speaker and intra-speaker variation for which the best and only explanation is contact-induced change. Specifically, we can understand these sound changes as Mandarin-agentivity on the part of bilingual Taiwanese-Mandarin speakers who are Mandarin-dominant and imposing their Mandarin phonological structure on their Taiwanese lexicon. These voiced obstruents do not exist in Mandarin phonology, which marks them as disallowed with the imposition of Mandarin phonology on Taiwanese. Then, speakers are faced with a choice of two primary strategies for determining the outcome of imposition: devoicing the obstruents as a default strategy (less common), or analogy with the Mandarin cognate
Participants in this study showed repeated use of analogy, whereby /g/ was generally deleted, /b/ was generally lenited and /dz/ was changed to a liquid [r]. Moreover, the data showed analogy on a word-by-word basis to Mandarin cognates; instead of the use of generalized strategies, strategies were unique to each voiced stop in each lexical item and can only be explained by direct analogy to Mandarin.

5.2 Suggestions for Future Research

The current study has demonstrated a contact-induced sound change in progress across Taiwan. However, there are limitations to this study, and I offer several suggestions for future research. It would be valuable to investigate the relationship between prenasalization and analogy as discussed at the end of chapter 4. It may be the case that some speakers prenasalize voiced obstruents, which might account for the lack of nasalization as a common analogical strategy among participants. Also, a longitudinal study of bilingual speakers that recorded data over a long time-span would be ideal in determining the effects of Mandarin on Taiwanese, since this type of study would be able to capture changing linguistic dominances in bilingual speakers. Also, this study was hampered by the inability to predetermine participants’ levels of proficiency in Taiwanese, and it would be very helpful to develop a method of measuring proficiency in Taiwanese that could be administered before future iterations of this study to pinpoint their proficiency.
5.3 Language Change and Bilingualism in Taiwan

But returning to question #3, what do imposition and analogy tell us about bilingualism in Taiwan? We now return to the point raised in Chapter 4: in source language agentivity (imposition), the source language is linguistically dominant by definition (Van Coetsem, 1988: 11). Winford (2005) supports this idea, that “In imposition, the source language is the dominant . . . language of the speaker, from which materials are transferred into an RL in which the speaker is less proficient” (Winford, 2005: 377). We are left to conclude that given the clear evidence for Mandarin imposition and analogy in Taiwanese, bilingual speakers in this study must be Mandarin-dominant bilinguals. In fact, it is perfectly reasonable to think that the cause of these shifts is a decline in the maintenance of Taiwanese on the part of bilinguals in the study. A loss of proficiency in bilinguals is the perfect avenue for imposition—bilinguals supplement a lack of proficiency in one language system with structural elements from the other. To say so is not without a cost, for it would seem to contradict the claim of every participant that they spoke Taiwanese natively and fluently. Yet, self-attested fluency and true high proficiency are by no means the same, and despite claims to the contrary, there is a compelling case to be made for this conclusion. Appel and Muysken (1987) note a variety of factors that discourage language maintenance in bilinguals, including low socioeconomic status, lack of education in the language and shrinking demographics. Taiwanese is certainly gaining some popularity, but we cannot deny that Taiwanese scores low on these markers; it is taught in elementary school but not used in higher education, and Mandarin remains the undominated *sine qua non* of the economy.
As described in chapter 2, the social popularity of Taiwanese does not mean that speakers have any more real motivation to maintain it. Interviews with participants also bore out these claims: while all participants claimed fluency in Taiwanese, every participant also admitted that they spoke Mandarin more often and in more situations.

In conclusion, both social evidence and linguistic evidence all converge on the conclusion that bilinguals in this study are Mandarin-dominant. An examination of Taiwanese society has shown two things: that Taiwanese is still socially subordinate, continuing to lag behind Mandarin in its utility, and that the popularity of Taiwanese is really just the popularity of multi-cultural bilingualism, not a rise in the prestige of Taiwanese itself. An examination of the linguistic data in this thesis shows that Mandarin influence on Taiwanese is widespread across all of Taiwan. Furthermore, SL agentivity in Van Coetsem’s framework implies SL-dominance, and the fact that participants showed clear Mandarin agentivity in their Taiwanese implies their linguistic dominance in Mandarin. In simpler terms, we can thus now answer Research Question #3: the imposition and analogy seen in this study are evidence that bilinguals all across Taiwan are not maintaining their Taiwanese, and are becoming more and more Mandarin-dominant. This is a repudiation of the popular claim that Taiwanese is experiencing a resurgence across Taiwan from a structural linguistic perspective, and offers a sobering reality check that Taiwanese may not be able to recover from the iron grip of 50 years of Kuomintang policy that have gutted the social status of Taiwanese.
5.4 Language Change and Identity in Taiwan

In both the testimonies of informants and the emergence of the “Mother-tongue Movement” (母語運動 muyu yundong), it is plain to see that even if the Taiwanese language is not experiencing a linguistic revival, it is at least experiencing a cultural revival throughout Taiwan. Yet it is also easy to see that this revival is tied to the popularity of a political “Taiwanese” identity that identifies itself as a unique nation and culture, implicitly against the backdrop of a Pan-Chinese identification with mainland China (Wei, 2007; S. Liao, 2000; Tse, 2000). In particular, Tse (2000) argues that a “New Taiwanese People” identity has emerged since 1987, and this group identity is tied to use of code-switching and dual use of Taiwanese and Mandarin. In this new Taiwanese identity, waisheng-ren citizens of mainland descent who lack access to Taiwanese are not explicitly excluded, but instead are able to take part in this identity. Three waisheng-ren Taiwanese adults were interviewed as informants but not recorded, and they all stated a desire to learn Taiwanese and to become more “Taiwanese” in the context of this identity.

Appel and Muysken (1987: 131) note that with the neutralization of an identity, language shift can occur, through which elements of that identity’s language also become neutralized. In a modern Taiwan where regionalism and the bensheng-ren / waisheng-ren distinction is becoming increasingly irrelevant for people born in recent decades, it is plausible that the structural imposition in this thesis correlates with the emergence of this “New Taiwanese People” identity, resulting in both a language and an identity that is neither Taiwanese nor Mainland Chinese, but simultaneously both island and mainland,
Taiwanese and Chinese. This dual identity expresses itself linguistically as the structural convergence of Taiwanese towards Mandarin and the neutralization of Taiwanese voiced obstruents, a feature that is Taiwanese and Taiwanese alone. In this broad view, both the creation of this new identity and the imposition of Mandarin phonology on Taiwanese mark the end result of 60 years of contact between Taiwanese and Mandarin, beginning with the development of Taiwanese-influenced Mandarin or “Taiwanese Mandarin” per Kubler (1985) and ending with the development of a Mandarin-influenced Taiwanese as per this thesis. In essence, the influence of Mandarin on Taiwanese can be thought of within a greater sociolinguistic context as the culmination of a long process of mutual structural convergence. From this study, we can see that the Mother-tongue movement and the recent revival of Taiwanese are doing little to prevent Mandarin from becoming the linguistically dominant language of Taiwanese bilinguals and the socially dominant language of Taiwanese society. However, rather than see the current resurgence of Taiwanese as a failure or superficial, it may be more productive to view it as an expression of a new identity that has taken root in Taiwan, an identity with which language is inextricably entwined. Perhaps the language change that I have studied in this thesis is one aspect of the emergence of this new Taiwanese identity, one that no longer sees the dichotomy between Mandarin and Taiwanese in black and white terms, and that instead celebrates its pluralistic cultural and linguistic heritage.
References


127


Ting, P.H. 丁邦新 (1980). *Taiwan yuyan yuanliu* 台灣語言源流 (*The origins of Taiwan’s languages*). Taipei: Xuesheng Shuju.


http://groups.yahoo.com/group/protecting_knowledge/message/6879. Date accessed: 06/01/11. Article on efforts to preserve Taiwanese.

Appendix A: Word List
The following word list contains the Taiwanese words in Chinese characters that participants were asked to read. Transcriptions of the Taiwanese in standard Taiwanese have been written below the character, along with Mandarin equivalents in Pinyin. English glosses are also given.

<table>
<thead>
<tr>
<th>Chinese Characters</th>
<th>Standard Taiwanese</th>
<th>Mandarin</th>
<th>Pinyin</th>
</tr>
</thead>
<tbody>
<tr>
<td>你好</td>
<td>li ho</td>
<td>ni hao</td>
<td>ha? hau xue xiao</td>
</tr>
<tr>
<td>學校</td>
<td>xue xiao</td>
<td>xue xiao</td>
<td>xue xiao</td>
</tr>
<tr>
<td>公園</td>
<td>gong yuan</td>
<td>gong yuan</td>
<td>gong yuan</td>
</tr>
<tr>
<td>美國人</td>
<td>bi kok lang</td>
<td>mei guo ren</td>
<td>mei guo ren</td>
</tr>
<tr>
<td>中國人</td>
<td>tiong kok lang</td>
<td>zhong guo ren</td>
<td>zhong guo ren</td>
</tr>
<tr>
<td>外國人</td>
<td>gwa kok lang</td>
<td>wai guo ren</td>
<td>wai guo ren</td>
</tr>
<tr>
<td>台灣</td>
<td>tai wan</td>
<td>tai wan</td>
<td>tai wan</td>
</tr>
<tr>
<td>語言</td>
<td>gi gen</td>
<td>yu yan</td>
<td>yu yan</td>
</tr>
<tr>
<td>日月潭</td>
<td>dzit gwa tham</td>
<td>ri yue tan</td>
<td>ri yue tan</td>
</tr>
<tr>
<td>五</td>
<td>go</td>
<td>wu</td>
<td>wu</td>
</tr>
<tr>
<td>國語</td>
<td>kok gi</td>
<td>guo yu</td>
<td>guo yu</td>
</tr>
<tr>
<td>國家</td>
<td>kok ka</td>
<td>guo jia</td>
<td>guo jia</td>
</tr>
<tr>
<td>我</td>
<td>gwa</td>
<td>wo</td>
<td>wo</td>
</tr>
<tr>
<td>家己</td>
<td>ka ki</td>
<td>zi ji</td>
<td>zi ji</td>
</tr>
<tr>
<td>未來</td>
<td>bi lai</td>
<td>wei lai</td>
<td>wei lai</td>
</tr>
<tr>
<td>明年</td>
<td>min niN</td>
<td>ming nian</td>
<td>ming nian</td>
</tr>
<tr>
<td>今年</td>
<td>kin niN</td>
<td>jin nian</td>
<td>jin nian</td>
</tr>
<tr>
<td>原來</td>
<td>gwan lai</td>
<td>yuan lai</td>
<td>yuan lai</td>
</tr>
<tr>
<td>九月</td>
<td>kau gwe</td>
<td>jiu yue</td>
<td>jiu yue</td>
</tr>
<tr>
<td>明天</td>
<td>bin/min a tsai</td>
<td>ming tian</td>
<td>ming tian</td>
</tr>
<tr>
<td>今天</td>
<td>kin a dzit</td>
<td>jin tian</td>
<td>jin tian</td>
</tr>
<tr>
<td>昨天</td>
<td>tsa hng</td>
<td>zuo tian</td>
<td>zuo tian</td>
</tr>
<tr>
<td>問題</td>
<td>bun te</td>
<td>wen ti</td>
<td>wen ti</td>
</tr>
<tr>
<td>關係</td>
<td>kwan he</td>
<td>guan xi</td>
<td>guan xi</td>
</tr>
</tbody>
</table>

'hello' 'school' 'park' 'An American'

‘A Chinese’ ‘Foreigner’ ‘Taiwan’ ‘language’

‘Sun-Moon Lake’ ‘5’ ‘Mandarin’ ‘country’

‘I, me’ ‘self’ ‘future’ ‘next year’

‘this year’ ‘originally’ ‘September’ ‘tomorrow’

‘today’ ‘yesterday’ ‘problem’ ‘connection’
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>新聞</td>
<td>熱</td>
<td>買</td>
<td>問</td>
<td></td>
</tr>
<tr>
<td>sin bun</td>
<td>dzwa</td>
<td>bwe</td>
<td>mng</td>
<td></td>
</tr>
<tr>
<td>xin wen</td>
<td>re</td>
<td>mai</td>
<td>wen</td>
<td></td>
</tr>
<tr>
<td>‘news’</td>
<td>‘hot’</td>
<td>‘buy’</td>
<td>‘ask’</td>
<td></td>
</tr>
<tr>
<td>賣</td>
<td>無</td>
<td>五月</td>
<td>決定</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td>bo</td>
<td>go gwe</td>
<td>kwat ting</td>
<td></td>
</tr>
<tr>
<td>mai</td>
<td>wu</td>
<td>wu yue</td>
<td>que ding</td>
<td></td>
</tr>
<tr>
<td>‘sell’</td>
<td>‘not have’</td>
<td>‘May’</td>
<td>‘decide’</td>
<td></td>
</tr>
<tr>
<td>名</td>
<td>兩個人</td>
<td>禮拜</td>
<td>台北</td>
<td></td>
</tr>
<tr>
<td>miaN</td>
<td>nng e lang</td>
<td>le pai</td>
<td>tai pak</td>
<td></td>
</tr>
<tr>
<td>ming</td>
<td>liang ge ren</td>
<td>li bai</td>
<td>tai bei</td>
<td></td>
</tr>
<tr>
<td>‘name’</td>
<td>‘two people’</td>
<td>‘week’</td>
<td>‘Taipei’</td>
<td></td>
</tr>
<tr>
<td>一萬元</td>
<td>便當</td>
<td>文具店</td>
<td>原子筆</td>
<td></td>
</tr>
<tr>
<td>dzit ban kho</td>
<td>pen tong</td>
<td>bun ku tiam</td>
<td>gwan tsu pit</td>
<td></td>
</tr>
<tr>
<td>yi wan yuan</td>
<td>bian dang</td>
<td>wen ju dian</td>
<td>yuan zi bi</td>
<td></td>
</tr>
<tr>
<td>‘10,000 dollars’</td>
<td>‘bento’</td>
<td>‘stationary store’</td>
<td>‘ball pen’</td>
<td></td>
</tr>
<tr>
<td>牛肉麵</td>
<td>阮</td>
<td>吳</td>
<td>台語</td>
<td></td>
</tr>
<tr>
<td>gu ba miN</td>
<td>gwan; gwun</td>
<td>go</td>
<td>tai gi</td>
<td></td>
</tr>
<tr>
<td>niu rou mian</td>
<td>ruan</td>
<td>wu</td>
<td>tai yu</td>
<td></td>
</tr>
<tr>
<td>‘beef noodles’</td>
<td>‘we, us’</td>
<td>‘Go (surname)’</td>
<td>‘Taiwanese’</td>
<td></td>
</tr>
<tr>
<td>味</td>
<td>無奈</td>
<td>光明</td>
<td>文化</td>
<td></td>
</tr>
<tr>
<td>bi</td>
<td>bo nai</td>
<td>kong ming</td>
<td>bun hwa</td>
<td></td>
</tr>
<tr>
<td>wei</td>
<td>wu nai</td>
<td>gwang ming</td>
<td>wen hwa</td>
<td></td>
</tr>
<tr>
<td>‘taste’</td>
<td>‘it’s no use’</td>
<td>‘bright’</td>
<td>‘culture’</td>
<td></td>
</tr>
<tr>
<td>女孩子</td>
<td>倓久</td>
<td>去年</td>
<td>日本</td>
<td></td>
</tr>
<tr>
<td>cha bo kin a</td>
<td>gwa ku</td>
<td>ku niN</td>
<td>dzit pun</td>
<td></td>
</tr>
<tr>
<td>nv hai zi</td>
<td>ruo jiu (duo jiu)</td>
<td>qu nian</td>
<td>ri ben</td>
<td></td>
</tr>
<tr>
<td>‘girl’</td>
<td>‘how long?’</td>
<td>‘last year’</td>
<td>‘Japan’</td>
<td></td>
</tr>
<tr>
<td>閒於</td>
<td>魚</td>
<td>鳥</td>
<td>廟</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>kwan i</td>
<td>hi</td>
<td>tsiao</td>
<td>bio</td>
<td></td>
</tr>
<tr>
<td>guan yu</td>
<td>yu</td>
<td>niao</td>
<td>miao</td>
<td></td>
</tr>
<tr>
<td>‘pertaining to’</td>
<td>‘fish’</td>
<td>‘bird’</td>
<td>‘temple’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>十二月</th>
<th>一位老師</th>
<th>男孩子</th>
<th>兒童</th>
</tr>
</thead>
<tbody>
<tr>
<td>tsap dzi gwe</td>
<td>dzit wi lau su</td>
<td>cha po kin a</td>
<td>kin a</td>
</tr>
<tr>
<td>shi er yue</td>
<td>yi wei lao shi</td>
<td>nan hai zi</td>
<td>er tong</td>
</tr>
<tr>
<td>‘December’</td>
<td>‘one teacher’</td>
<td>‘boy’</td>
<td>‘child’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>麻煩</th>
<th>玉山</th>
</tr>
</thead>
<tbody>
<tr>
<td>ma hwan</td>
<td>yok swaN</td>
</tr>
<tr>
<td>ma fan</td>
<td>yu shan</td>
</tr>
<tr>
<td>‘trouble’</td>
<td>‘Jade Mountain’</td>
</tr>
</tbody>
</table>
Appendix B: All Data
<table>
<thead>
<tr>
<th>Word</th>
<th>Deletion</th>
<th>Nasalization</th>
<th>Lenition</th>
<th>Liquid</th>
<th>Devoicing</th>
<th>None</th>
<th>Word Gloss</th>
<th>Chinese Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>gi-(gen)</td>
<td>4 (31%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9 (69%)</td>
<td>language</td>
<td>語(言)</td>
</tr>
<tr>
<td>(gi) gen</td>
<td>7 (58%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (42%)</td>
<td>language</td>
<td>語(言)</td>
</tr>
<tr>
<td>(tai)gi</td>
<td>2 (13%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13 (87%)</td>
<td>Taiwanese</td>
<td>(台)話</td>
</tr>
<tr>
<td>(kok)gi</td>
<td>4 (27%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 (73%)</td>
<td>Mandarin</td>
<td>(國)語</td>
</tr>
<tr>
<td>gwa-(koklang)</td>
<td>11 (73%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td>foreigner</td>
<td>外(國人)</td>
</tr>
<tr>
<td>gwa</td>
<td>9 (60%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>I, me</td>
<td>我</td>
</tr>
<tr>
<td>gwan</td>
<td>10 (67%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (33%)</td>
<td>We, us</td>
<td>阮</td>
</tr>
<tr>
<td>go</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td>Five</td>
<td>五</td>
</tr>
<tr>
<td>go-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 (100%)</td>
<td>May</td>
<td>五(月)</td>
</tr>
<tr>
<td>-gwe</td>
<td>8 (57%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (43%)</td>
<td>May</td>
<td>(五)月</td>
</tr>
<tr>
<td>(kau)gwe</td>
<td>9 (60%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (40%)</td>
<td>September</td>
<td>(九)月</td>
</tr>
<tr>
<td>(tsap-dzi) gwe</td>
<td>7 (47%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td>December</td>
<td>(十二)月</td>
</tr>
<tr>
<td>-gwa (tham)</td>
<td>7 (50%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (50%)</td>
<td>Sun-Moon Lake</td>
<td>(日)月(潭)</td>
</tr>
<tr>
<td>gwan(lai)</td>
<td>10 (71%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>originally</td>
<td>原(來)</td>
</tr>
<tr>
<td>gwan(tsu-pit)</td>
<td>10 (71%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td>ball pen</td>
<td>原(子筆)</td>
</tr>
<tr>
<td>go/ngo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (10%)</td>
<td>Go, Ngo (surname)</td>
<td>姓(吳)</td>
</tr>
<tr>
<td>gu-(bamiN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 (86%)</td>
<td>Beef Noodles</td>
<td>牛(肉麵)</td>
</tr>
</tbody>
</table>

Figure 5: All /g/ Data
<table>
<thead>
<tr>
<th>Word</th>
<th>Deletion</th>
<th>Nasalization</th>
<th>Lenition</th>
<th>Liquid</th>
<th>Devoicing</th>
<th>None</th>
<th>Word Gloss</th>
<th>Chinese Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>bi-koklang</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td></td>
<td>1 (7%)</td>
<td>13 (86%)</td>
<td>American</td>
<td>American</td>
<td>美(國人)</td>
</tr>
<tr>
<td>bwe</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>14 (93%)</td>
<td>buy</td>
<td>買</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td>sell</td>
<td>賣</td>
<td></td>
</tr>
<tr>
<td>bio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td>temple</td>
<td>廟</td>
<td></td>
</tr>
<tr>
<td>(sin)bun</td>
<td>5 (36%)</td>
<td></td>
<td></td>
<td></td>
<td>9 (64%)</td>
<td>news</td>
<td>(新)聞</td>
<td></td>
</tr>
<tr>
<td>-ban-kho</td>
<td>4 (21%)</td>
<td></td>
<td></td>
<td></td>
<td>11 (79%)</td>
<td>10,000 dollars</td>
<td>(一)萬(元)</td>
<td></td>
</tr>
<tr>
<td>bi-lai</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td>13 (86%)</td>
<td>future</td>
<td>未(來)</td>
<td></td>
</tr>
<tr>
<td>bi</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>14 (93%)</td>
<td>flavor</td>
<td>味</td>
<td></td>
</tr>
<tr>
<td>bun(te)</td>
<td>5 (33%)</td>
<td></td>
<td></td>
<td></td>
<td>10 (67%)</td>
<td>problem; question</td>
<td>問(題)</td>
<td></td>
</tr>
<tr>
<td>bun-(ku-tiam)</td>
<td>1 (10%)</td>
<td></td>
<td></td>
<td></td>
<td>9 (90%)</td>
<td>stationary store</td>
<td>文(具店)</td>
<td></td>
</tr>
<tr>
<td>bun(hwa)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>13 (93%)</td>
<td>culture</td>
<td>文(化)</td>
<td></td>
</tr>
<tr>
<td>bo(nai)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td>helpless</td>
<td>無(奈)</td>
<td></td>
</tr>
<tr>
<td>bo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td>not have</td>
<td>無</td>
<td></td>
</tr>
<tr>
<td>(gu)ba(miN)</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td>12 (86%)</td>
<td>beef noodles</td>
<td>(牛)肉(麵)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: All /b/ Data
<table>
<thead>
<tr>
<th>Word</th>
<th>Deletion</th>
<th>Nasalization</th>
<th>Lenition</th>
<th>Liquid</th>
<th>Devoicing</th>
<th>None</th>
<th>Word Gloss</th>
<th>Chinese Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>dzit-(gwatham)</td>
<td>1 (9%)</td>
<td></td>
<td></td>
<td></td>
<td>8 (57%)</td>
<td>6 (43%)</td>
<td>Sun-Moon Lake</td>
<td>日月潭</td>
</tr>
<tr>
<td>(kina)-dzit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (36%) today</td>
<td>(今)天 = (今阿)日</td>
</tr>
<tr>
<td>dzit-pun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (47%) Japan</td>
<td>日(本)</td>
</tr>
<tr>
<td>dzwa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (27%) hot</td>
<td>熱</td>
</tr>
<tr>
<td>dzit-(bankho)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td>7 (47%)</td>
<td>10,000 dollars</td>
<td>(一)萬(元)</td>
</tr>
<tr>
<td>dzit(wi-lausu)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td>11 (73%)</td>
<td>1 teacher</td>
<td>一(位老師)</td>
</tr>
<tr>
<td>(tsap)dzi-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (36%)</td>
<td>December</td>
<td>(十)二(月)</td>
</tr>
</tbody>
</table>

Figure 7: All /dz/ Data
Appendix C: Grey-Scale Data
<table>
<thead>
<tr>
<th>Word</th>
<th>Deletion</th>
<th>Nasalization</th>
<th>Lenition</th>
<th>Liquid</th>
<th>Devoicing</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>gi-(gen)</td>
<td>4 (31%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9 (69%)</td>
</tr>
<tr>
<td>(gi) gen</td>
<td>7 (58%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (42%)</td>
</tr>
<tr>
<td>(tai)gi</td>
<td>2 (13%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13 (87%)</td>
</tr>
<tr>
<td>(kok)gi</td>
<td>4 (27%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 (73%)</td>
</tr>
<tr>
<td>gwa-(koklang)</td>
<td>11 (73%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
</tr>
<tr>
<td>gwa</td>
<td>9 (60%)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td></td>
<td>5 (33%)</td>
</tr>
<tr>
<td>gwan</td>
<td>10 (67%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (33%)</td>
</tr>
<tr>
<td>go</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>go-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 (100%)</td>
<td></td>
</tr>
<tr>
<td>-gwe</td>
<td>8 (57%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (43%)</td>
</tr>
<tr>
<td>(kau)gwe</td>
<td>9 (60%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (40%)</td>
</tr>
<tr>
<td>(tsap-dzi) gwe</td>
<td>7 (47%)</td>
<td></td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td></td>
</tr>
<tr>
<td>-gwa (tham)</td>
<td>7 (50%)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td></td>
<td>3 (22%)</td>
</tr>
<tr>
<td>gwan(lai)</td>
<td>10 (71%)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td></td>
<td>3 (22%)</td>
</tr>
<tr>
<td>gwan(tsu-pit)</td>
<td>10 (71%)</td>
<td></td>
<td></td>
<td>1 (7%)</td>
<td></td>
<td>3 (22%)</td>
</tr>
<tr>
<td>go/ngo</td>
<td></td>
<td></td>
<td></td>
<td>1 (10%)</td>
<td></td>
<td>9 (90%)</td>
</tr>
<tr>
<td>gu-(bamiN)</td>
<td>2 (14%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 (86%)</td>
</tr>
<tr>
<td>bin(a-tai)</td>
<td>14 (100%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bi-koklang</td>
<td>1 (7%)</td>
<td></td>
<td>1 (7%)</td>
<td></td>
<td>13 (86%)</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>14 (93%)</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>bwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>(sin)bun</td>
<td></td>
<td></td>
<td>5 (36%)</td>
<td></td>
<td>9 (64%)</td>
<td></td>
</tr>
<tr>
<td>-ban-kho</td>
<td>4 (21%)</td>
<td></td>
<td></td>
<td></td>
<td>11 (79%)</td>
<td></td>
</tr>
<tr>
<td>bi-lai</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td>13 (86%)</td>
<td></td>
</tr>
<tr>
<td>bi</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>14 (93%)</td>
<td></td>
</tr>
<tr>
<td>bun(te)</td>
<td>5 (33%)</td>
<td></td>
<td></td>
<td></td>
<td>10 (67%)</td>
<td></td>
</tr>
<tr>
<td>bun-(ku-tiam)</td>
<td>1 (10%)</td>
<td></td>
<td></td>
<td></td>
<td>9 (90%)</td>
<td></td>
</tr>
<tr>
<td>bun(hwa)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td></td>
<td>13 (93%)</td>
<td></td>
</tr>
<tr>
<td>bo(nai)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>bo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 (100%)</td>
<td></td>
</tr>
<tr>
<td>(gu)ba(miN)</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
<td></td>
<td></td>
<td>12 (86%)</td>
<td></td>
</tr>
<tr>
<td>dzit-(gwatham)</td>
<td></td>
<td></td>
<td>8 (57%)</td>
<td></td>
<td>6 (43%)</td>
<td></td>
</tr>
<tr>
<td>(kina)-dzit</td>
<td>1 (9%)</td>
<td></td>
<td>6 (55%)</td>
<td></td>
<td>4 (36%)</td>
<td></td>
</tr>
<tr>
<td>dzit-pun</td>
<td>8 (53%)</td>
<td></td>
<td></td>
<td></td>
<td>7 (47%)</td>
<td></td>
</tr>
<tr>
<td>dzwa</td>
<td>11 (73%)</td>
<td></td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td></td>
</tr>
<tr>
<td>dzit-(bankho)</td>
<td></td>
<td></td>
<td>8 (53%)</td>
<td></td>
<td>7 (47%)</td>
<td></td>
</tr>
<tr>
<td>dzit(xi-lausu)</td>
<td></td>
<td></td>
<td>4 (27%)</td>
<td></td>
<td>11 (73%)</td>
<td></td>
</tr>
<tr>
<td>(tsap)dzi-</td>
<td>4 (28%)</td>
<td></td>
<td></td>
<td>5 (36%)</td>
<td></td>
<td>5 (36%)</td>
</tr>
</tbody>
</table>

Figure 8: Grey-Scale Data